

Revisiting a Controversial Issue on Cognitive Processing Routes in Translation Studies: Implications for Future Research

Liu Xiaodong^{*}, Zhou Xiangyan^{**}

School of Foreign Studies,
Hunan University of Humanities, Science and Technology

Research on cognitive processing routes has been a hot topic in translation process research in recent years, and has witnessed great developments as follows. To begin with, it has made a range of interesting empirical findings. Then, it draws the attention of Translation Studies scholars to the bilingual SL-TL transfer in the field. This exploration proves that an understanding of cognitive processing routes remains unclear in terms of theoretical constructs and empirical studies. Although the number of routes for SL-TL transfer in the translators' or interpreters' brain is suggested, i.e., there are two cognitive processing routes, more specifically the form-based processing and meaning-based processing routes. However, there is a controversial issue on cognitive processing routes based on the previous studies in the translation circle. This controversy to be addressed is which route dominates translation and interpreting: the form-based or the meaning-based processing route. Lastly, the implications for future research on cognitive processing routes are stressed.

Key words: translation studies, dominant route, cognitive processing routes, controversy, form-based processing route, meaning-based processing route

1. Introduction

*Director of the Center for Studies of Translation and Cognition,

**Deputy Director of the Center for Studies of Translation and Cognition,

Interlinguistic translation, in both its spoken and written forms, must involve the transfer from the source language (SL) to the target language (TL). A critical issue (to be) addressed is how the SL (or L1/L2) can be transferred to the TL (or L2/L1) in the “black box,” i.e., the cognitive processing routes for the transfer. Here, L1 refers to the mother tongue of a translator while L2 is his/her foreign language. To date, the cognitive processing routes, the form-based processing route and the meaning-based processing route, which may exist in translators’ or interpreters’ brain during the translation processes, have been (re-)discussed in the recent published studies (e.g., Christoffels & De Groot, 2005; de Groot, 2011; He, 2019; Liu, 2018; Lin et al., 2018). These two processing routes were formally proposed as transcoding and interpreting proper in Seleskovitch’s doctoral dissertation (1975), and she further claimed that interpreting proper is adopted more frequently by professional interpreters in real scenarios (Dam, 1998).

Therefore, the issue of which route dominates translation, form-based (i.e., transcoding) or meaning-based processing route (i.e., interpreting proper)¹⁾, has been hotly debated for many years in Translation Studies (hereafter TS, see section 3). For the last four decades, TS and other closely related disciplines have produced a rich literature, which provides ample evidence for issues on cognitive processing routes mentioned above or cognitive processes of translation, as previously reviewed by other scholars with a focus on experimental studies (e.g., García, 2015, 2019; Muñoz et al., 2019). However, the previous reviews on the processing routes are simply focused on cognitive or psychological construct and the studies reviewed place special emphasis on the lexical translation (e.g., García, 2015). In addition, issues of the cognitive processing routes have not been prioritized thus far in books and papers by TS scholars.

This paper seeks to explore the processing routes established in some of the published works in the discipline of Translation Studies. In the second section, the cognitive processing routes and related terms are introduced. They originated in TS itself or were borrowed from such neighboring disciplines as neurolinguistics and cognitive psychology by TS researchers. In the third section, the empirical studies conducted specifically by TS scholars are detailed, since they contribute to deepening our perception of the cognitive processing routes during the translation process. In the two sections that follow, we present the controversy about the cognitive processing routes and the possible implications for future research. Lastly, we provide our concluding remarks.

1) For consistency, “form-based processing route” and “meaning-based processing route” are used hereafter in this article.

2. Cognitive Processing Routes and Related Terms

In the literature, it is assumed there are two cognitive processing routes for bilingual SL-TL transfer in translation: a meaning-based processing route and a form-based processing route. These two concepts either came from Translation Studies or were borrowed from other neighboring disciplines by TS scholars. They have generated much interest among scholars in various fields, as we discuss in the following subsections (e.g., Christoffels & de Groot, 2005; de Groot, 1997, 2011; Paradis, 1994, 2004; He, 2019).

2.1. *Structural Route and Conceptually Mediated Route*

Neurolinguist Michel Paradis, probably for the first time, offers a neurolinguistic understanding of the translation process (1994). His theory assumes four neurofunctionally independent systems: one underlying L1, a second one underlying L2, a third one underlying the connections between L1 and L2, and a fourth one underlying the connections between L2 and L1 (1994, p. 328). The last two are what Paradis (1994) calls “the translation-specific underlying system,” which is metaphorized as “the shortcut” directly linking translation equivalents.

In terms of how these systems operate in detail, Paradis (1984) first mentions two possible translation strategies (i.e., processing routes at a cognitive level) in French. In Paradis (1994), once again there are two possible strategies to go from the SL linguistic item to the TL linguistic item in the brain: 1) the “conceptually mediated route,” as Paradis (1994) named Strategy I, which is the linguistic decoding of SL until the message is understood (i.e., meaning abstracted), followed by the linguistic encoding of the message; and 2) the structural route, i.e., Strategy II, which is direct transcoding by automatic application of rules, from one linguistic element in SL to its structural equivalent in TL (e.g., the morphological, syntactic or lexical level).

Paradis’ neurolinguistics theory of translation greatly contributes to our understanding of how two languages are processed at the same time in a single brain during bilingual processing. Another cognitive psychologist, de Groot, may have similar views on these issues, which we turn to in the following section.

2.2. Horizontal Translation and Vertical Translation

De Groot (1997), three years after Paradis (1994), states that there are two views of translation: “vertical translation” on the one hand and “horizontal translation” on the other. In her 1997 article “The Cognitive Study of Translation and Interpretation: Three Approaches,” de Groot construes “vertical translation” as two main processes: full comprehension of SL text/discourse and then the production of the constructed meaning in the TL text. “Horizontal translation” refers to “transcoding,” i.e., the replacement of SL linguistic structures of various types (words, phrases, clauses) by the corresponding TL (De Groot, 1997, p. 30).

In de Groot’s later work (2011, pp. 319–320), “vertical translation” and “horizontal translation,” two hypothesized procedures, are respectively referred to as “conceptually mediated translation” and “transcoding.” According to her “conceptually mediated” view, translation is understood as follows: the input is first received, and then for a peripheral analysis moves upward to an assigned non-verbal conceptual representation. In what follows, a downward process begins with this conceptualized representation and finally the output is produced, either verbalized (in interpreting) or written down (in written translation). In contrast to “conceptually mediated translation,” “transcoding” refers to that “SL input structures, be they words, common phrases, or idiomatic expressions, are directly replaced by the corresponding target language structure.”

However, another question may also need to be addressed: how does “transcoding” take place? On this topic, de Groot (2011, p. 320) clearly indicated that, in order to perform transcoding (or horizontal translation), the translator/interpreter must possess a large stock of memory structures, while the experienced translator or interpreter is more likely to carry out horizontal processes. Simply put, the more translation-equivalent structures in the memory system are activated, the more easily available the transcoding processing will be (de Groot, 2011, p. 320). In Paradis (1994)’s words, the frequency and recency were directly associated with the activation threshold of that particular structure in the memory system. In other words, if the particular items are more frequently and recently used, they will be more easily activated.

de Groot, in another neurophysiological account, explains that the more often co-activated memory nodes fire together, the more the bond between them strengthens. To some degree, this brings to mind “automatic processes” in the brain, which is defined as an automated mental process requiring no attentional resources, which can be

performed in parallel with other conscious or unconscious processes (de Groot, 2011, p. 335).

2.3. *Other Terms*

The other terms used for these two cognitive processing routes are conceptual mediation and interlingual transfer (He, 2017; Lang et al., 2019) or form-based processing route and meaning-based processing route (Dam, 1998, 2001; Liu, 2018). Meaning-based processing route is one of the recoding strategies available to translators and interpreters at all times.

In this meaning-based strategy, the translator or interpreter prioritizes the meanings carried in the SL utterances, constructing the TL utterance from these abstractions. As a result, if conceptual mediation is employed as the processing route for a given text, the translator or interpreter must fully understand the message in the source language (Fabbro & Gran, 1994; Christoffels & de Groot's, 2005: 459). What is clear is that meaning-based processing may be employed by beginning interpreters and average bilinguals, in addition to more skilled professional interpreters (He, 2017, 2019). When we claim that all bilinguals employ the meaning-based route, even children, we mean that bilinguals tend to paraphrase what they see or hear when the input is alien to them (He, 2017, 2019).

In addition to meaning-based processing, professional translators and interpreters also engage in form-based processing (lexical links, phonological links and syntactic links). When the meaning-based processing route is engaged, information is processed from the L1 into concepts (meaning decoding) and then into the L2 (encoding), or vice versa. When the form-based route is engaged, the L1-L2 or L2-L1 system works to complete the translating/interpreting task more automatically through lexical links, phonological links and syntactic links.

3. Empirical Studies on Cognitive Processing Routes in Translation Studies

This section covers previous empirical studies of form-based and meaning-based processing routes by TS scholars, specifically involving written translation and interpreting mode. Although researchers of psychological and neurolinguistic backgrounds have summarized the developments of cognitive processing routes, they focus only on the lexical translation in experimental settings. This paper touches upon either the naturalistic or experimental studies beyond the lexical level. However, the purpose here is not to present an exhaustive literature review. Therefore, studies reviewed in this section were mostly conducted by scholars in the field of Translation Studies.

3.1. Studies on Written Translation Mode

Research on cognitive processing routes has been a hot topic in translation studies in recent years, specifically with respect to the Chinese-English language pair (Chou, Lei, Li, & He, 2016; Ge & He, 2010; Ge, 2011; He, 2004, 2007, 2009; Hou, 2017; Zhao, 2009; Zhou & He, 2012). These studies have tried to seek universal cognitive features by analyzing how the linguistic features of the source text are translated into those of the target text. They hone in on culture-specific items (CSIs)—i.e., those items that unique to the source system (i.e., not shared by the target system's language and culture)—to probe the processes mediating translation and interpreting in the brain. In particular, a bilingual parallel corpus containing multiple translations of the same source text or interpretations is used to infer translators or interpreters' underlying cognition, via the extraction of the rendering patterns of the CSIs.

He (2004) investigates translating patterns, i.e., the dominant translating strategy, of culturally indigenous concepts, including political and ideological concepts extracted from Chinese government white papers (1991-2003) and historic idioms and conventional metaphors. It is found that the dominant route depends on the source text features, i.e., political and ideological concepts are often transferred through concept-transplanted translation (transcoding) while historic idioms and conventional metaphors are conceptually mediated. In that follows, He (2007) further investigates the translation of some grammatical constructions in a situation where conceptual mediation between the source and the target representation is blocked by those so-called alien sources concepts. It is also argued that such transcoding is still memory-based. He (2009) attempts to link the deployment of translation strategies in the target text, and further proposes that processing economy works as a cognitive mechanism behind the translation strategies. It

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assumes, to be more specific, that the deletion is the most economical, substitution is the least economical while trans-coding and paraphrasing stand in between.

But so far, few studies have touched upon the translation direction, specifically for Chinese-English language pair. Zhao (2009) investigates common and diverse features between two Chinese translations of Dan Brown's 2003 novel *The Da Vinci Code* from five different aspects, namely, phonological, lexical, syntactic, semantic and conceptual aspects. The translating patterns for 349 alien source concepts in these two translations are quite similar. In the same translating direction from Chinese to English, Ge (2011) also investigates the translation of alien source concepts in Chinese humorous literary work *Fortress Besieged* by Qian Zhongshu. To be more specific, Ge observes the translating patterns of alien source concepts are mostly meaning-based.

Another study on translating indigenous concepts unique to the source system (i.e., language, and culture) is more complex than the previous two. Chou et al. (2016:165) explores the translation patterns for culture-specific items extracted from a self-built bilingual parallel corpus totaling about one-million words, including an English novel of *The Joy Luck Club* by Amy Tan and its four Chinese translations. It is revealed that transcoding dominates the translation strategies in translating the CSI-related units in four individual translations. For the comparison to CSI-related units, non-CS-related textual units based on three literary themes (i.e., mother-daughter relationship, ethnical identity, and cultural conflicts), were also chosen from the source text. Chou et al. (2016) observe that in general transcoding is more frequently adopted in dealing with CSI related units than with non-CS related units. This finding confirms the formal postulation of the Processing Economy Hypothesis.

The studies above have only concentrated on written translation. However, the final translated product can be edited for many times so the time it takes is unknown. The next section presents relevant studies on interpreting mode.

3.2. Studies on Interpreting Mode

Form-based and meaning-based routes have been a research topic on not only written translation but also interpreting (e.g., Barik, 1975; Dam, 1998, 2001; Lang et al, 2018, 2019; Liu, 2018).

Barik (1975) is one of the earliest to compare professional conference translators, student interpreters, and “amateur” translators by analyzing their interpreting

performances. In particular, Barik (1975) examines such independent variables as omissions, additions, and errors. The results suggest that less proficient translators perform the task better from L1 to L2 than from L2 to L1, and their translations are both less literal and more conceptually accurate. This finding suggests that meaning-based interpreting plays a more important role than form-based interpreting for less professional interpreters and, relatedly, that they produce more semantically fluent results.

Other studies directly contradict this generalization, finding that professional interpreters tend to rely more on form-based processing routes than meaning-based processing route. For example, Dam examines the lexical similarity or dissimilarity between an ST and its corresponding TTs in a consecutive interpreting corpus (1998). The data used in the study comprises one Spanish text (the ST) and five consecutive interpretations in Danish (the TTs). These transcriptions were divided into small segments, usually clauses. The results show that interpreters pay considerable attention to form-based processing during consecutive interpreting. To further test the hypothesis that meaning-based interpreting is preferred among professional interpreters, Dam (2001) examines the same variables in a simultaneous interpreting (SI) corpus, which includes two Spanish STs and five simultaneous interpretations of each in Danish. Form-based interpreting seemed to be the most dominant strategy in all target texts of both STs (ST1: similar lexical segments = 47% vs. dissimilar lexical segments = 6%; ST2: similar segments = 24% vs. dissimilar segments = 10%). In comparing ST1 and ST2, Dam finds that the meaning-based route is employed more for interpreting more difficult texts, while the form-based route is used for less difficult texts, which indicates that the interplay of the cognitive processing routes is to some degree modulated by the text difficulty. These results corroborate the findings of Dam (1998) and part of Liu (2018).

In addition, Lang et al. (2018, 2019) adopts a corpus-assisted approach to investigate the simultaneous interpreting mode and finds there is evidence showing the existence of the third route “lexical transcoding”. It is more economical and less effortful than form-based and meaning-based processing routes. For the issue of cognitive efforts, other scholars specifically conducted fNIRS-based experiments to explore which route is economical, transcoding or transphrasing (Lin et al., 2018). They concluded the former takes less resources to activate the target and thus called shortcuts while the latter “long route”. These studies on interpreting have produced interesting empirical results and findings.

In the next section, the controversy on the interplay of the cognitive processing routes

are stated, based on the findings of previous studies.

4. Controversy on Cognitive Processing Routes

Research on the cognitive processing routes matters significantly not only to Translation Studies but also to all disciplines studying the brain. The studies reviewed in the previous section systematically contribute to our understanding of form- and meaning-based processing routes, which have been investigated in the field of Translation Studies. They cover both experimental and naturalistic studies and involve as many variables as it can. It should be noted that there is a controversy we would like to make explicit in cognitive processing routes research.

The assumption of dominance is when, during the interplay of these cognitive processing routes, there is a dominant tendency. In fact, Paradis et al. (1984) already hold the view that these two processing routes, depending on their experience and professional training, are accessed in different proportions in the average bilingual.

Furthermore, de Groot (1997, p. 31) also believes that “translation and interpretation may thus both entail vertical as well as horizontal processing, albeit, possibly, in different proportions.” This can be perceived as follows: 1) vertical and horizontal processing may both take place during translation and interpretation; 2) the proportions are likely to differ among individuals. This is confirmed by de Groot (1997, p. 56)’s statement, in the later chapter, that “one of the crucial differences between translators may turn out to be the relative amounts of vertical and horizontal translation processing they exhibit.” In addition, this particular proportion has to do with the generalizability of the translation process across language pairs. If vertical processes prevail over horizontal, the ensuing findings may be independent of language pairs; otherwise, language combination plays a role under specific contexts. This is echoed by Seleskovitch (1975)’s hypothesis that one can adopt a meaning-based route (interpreting proper) more frequently than the other route. To understand this issue will probably offer further evidence of how translation processes take place.

5. Implications for Future Research

Based on the previous studies and the controversy, there are some methodological and theoretical implications for specifically cognitive processing routes research and cognitive studies of translation and interpreting in general. First, with regards to the source of the data, both experimental and naturalistic ones should be collected together to obtain the full picture of those issues. The experimental evidence contributes to identifying the variables involved in translation processes, while the naturalistic data reveal what takes place in real scenarios. It would be of considerable interest to see whether they differ in terms of the selection of these processing routes.

Second, when the translation process is explored, the translation mode should be controlled in all cases, as different modes may be independently modulated in terms of cognitive activities. Seleskovitch (1976) also argues that there is more code-switching (horizontal processing) in text-to-text translation than in interpreting. Conducting a separate analysis of the bilingual processing routes along each mode (i.e., written translation, consecutive interpreting and simultaneous interpreting) is particularly significant since different modes may best reveal the differences in cognitive processing (Dam 1998, 2001).

Third, as can be seen in the above studies, various language pairs investigated have contributed a great deal to the same inquiry objective. However, Translation Studies just begun to prioritize research on the interplay of cognitive processing routes in translation processes twenty years ago. It seems that TS scholars may need to pay more attention to this issue and test relevant hypothesis using more various language pairs. Specifically, the pair of the same SL corresponding to different TLs need to be researched, e.g., the same Chinese source to English and Japanese translations at the same time.

Fourth, there are implications related to the number of cognitive processing routes. As some of the above theoretical discussions (Section 2) and empirical studies (Section 3) reveal, there are two processing routes with different names, for example, transcoding and interpreting proper (Seleskovitch, 1976), or horizontal and vertical translation (Christoffels & de Groot, 2005), or form-based and meaning-based routes (Dam, 1998; Fabbro, Gran, Basso, & Bava, 1990; Liu, 2018), transcoding and conceptually mediated transfer (Paradis, 1994; 2004), or conceptual mediation and interlingual transfer (He, 2017; Lang et al., 2019). However, a question arises from this dichotomous thinking: is there a third route or not? According to the previous theoretical construct, the SL-TL

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transfer does not necessarily go through the conceptual mediation process or the structural route; it may be directly retrieved from the memory system. Simply put, the ST items are paired with the TT items, which involves no conscious processing in the translator's brain, hence called memory-pairing (He, 2017, 2019). Indeed, this must be empirically tested, either with naturalistic or experimental data in addition to Lang et al. (2018)'s lexical pairing in simultaneous interpreting.

Fifth, future studies may need to give more thoughts to the stimuli and the subjects in experimental designs. The first question worth considering in experiments is associated with the nature of the stimuli, e.g., their grammatical complexities and other related syntactic features. Liu (2018) has explored the grammatical complexities in the processing of proper names in consecutive interpreting and finds that form-based processing routes prevail irrespective of the grammatical features of the proper names. However, research could be extended to other stimuli excluding proper names. The next question is related to the participants employed for the experiments. As Liu & Li argue, the issue of participants has not been well addressed (2019). Researchers in this regard have employed few participants and those participants often greatly differ in translation experiences.

Lastly, there is a strong thirst to understand the cognitive mechanism behind the cognitive processing routes, one that is closely related to the cognitive effort invested in those routes. Grounded in theoretical discussions of those routes, a meaning-based route involves a conceptually mediated transfer, as a result of which it may be labeled the "long route," while a form-based route is labeled "the shortcut," since it directly links translation equivalents between two languages. As Lin et al. (2018) argue, transphrasing is more costly than pairing, as evidenced by the strongest activation in the brain areas of the left prefrontal cortex. Theoretically speaking, there may be a processing economic mechanism at work behind these routes. However, more empirical and experimental evidence may be needed to further address this issue.

6. Concluding Remarks

Studies on interlinguistic cognitive processing routes illustrate how much progress has been made in Translation Studies. This exploration once again proves that an

understanding of cognitive processing routes remains unclear in terms of theoretical constructs and empirical studies. Although the number of routes for SL-TL transfer in the translators' or interpreters' brain is suggested, i.e., there are two cognitive processing routes, more specifically the form-based processing and meaning-based processing routes. However, one issue arises from those studies: which route is predominantly employed, which deserves more attention of the TS field. In summary, Translation Studies does not provide the whole picture of the cognitive processing routes specifically and translation processes in general. However, it does contribute to a further understanding of the process of interlinguistic SL-TL transfer of interdisciplinary nature.

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Author's email address

18063868429@163.com

934590502@qq.com

About the author

Xiaodong Liu (First author/Corresponding author) is Director of the Center for Studies of Translation and Cognition, Hunan University of Humanities, Science and Technology, China. He received his Ph.D in Translation Studies from the University of Macau. His main research interests include translation process research, corpus-assisted translation studies, and translation teaching research. He has (co-)initiated numerous translation process research projects at various levels, and published articles on translation studies in national and international journals, such as *Babel: International Journal of Translation*, *Digital Scholarship in the Humanities*, *Chinese Science & Technology Translators Journal*, and *Translation Research and Teaching*.

Xiangyan Zhou is Deputy Director of the Center for Studies of Translation and Cognition (Hunan University of Humanities, Science and Technology), Deputy Secretary General of Loudi Association of Translators and Interpreters, as well as member of the Translators Association of China. She received her Master's Degree in English Language and Literature from Shanghai International Studies University. Her main research interests include translation process research and translation teaching research. With over 10 years' teaching and translation experience, she has (co-)conducted many translation projects and translation research projects.

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