

Error Analysis of Implicit Logical Cohesion in Chinese-to-English Translation by Chinese Students

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Abstract. There are still lots of problems with judgment and translation when it comes to implicit logical connections, even if Chinese students' proficiency in translating from Chinese to English is continuously growing as a result of educational breakthroughs. This study focuses on the implicit logical coherence issues in Chinese-to-English translation by Chinese students using typical translation tasks from academic writing and everyday communication as research topics. Error analysis and comparison analysis approaches are used to systematically classify the many types of implicit logical coherence faults, aiming to reveal core patterns in student mistakes. Based on this, the study proposes four types of errors that Chinese students make while translating from Chinese to English: addition error, misordering error, misconstruction error and omission error. Furthermore, among the four previously mentioned error categories, this study also examined the error rates of three fundamental implicit logic types independently: causal type, transitional type, and progressive error type, to provide targeted suggestions for translation teaching.

1 Introduction

In the current technological age, artificial intelligence has been widely applied to handle the majority of translation tasks, but this research holds the view that text translation still faces considerable challenges that need to be addressed, especially when it comes to sentences with implicit logical relations in specific texts. In the field of second language translation research, another prominent issue lies in the discrepancies of logical coherence mechanisms between Chinese and English. According to the cohesion theory developed by Halliday and Hasan and the contrastive analysis hypothesis, coherence is seen as the main linguistic characteristic of Chinese that achieves the implicit logical relationship by means of hints within the context and creation of semantic association without the involvement of any external linguistic indications. Contrary to this, English lays much stress on formal cohesion, and forms explicit logical relations using a variety of different grammatical and lexical signs. This is the basic linguistic dissimilarity, which is the main research context of the second language translation research. However, due to the influence of the negative transfer of the native language, Chinese college students tend to make logical explanation mistakes during the translation

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process from Chinese to English. The correct manifestation of logical coherence is considered to be one of the main competencies in translating Chinese into English. Miscellaneous corrections in this concern not only offer valuable directions to scaling down language training strategies, but also provide a direct measure of the quality in the translation of the second language and the communication between the cross cultures. In view of this, this research selects undergraduate students with different levels of English proficiency as the research subjects. By adopting quantitative analysis methods and translation test tasks, it conducts an in-depth investigation on the translation materials produced by these students, identifies the differences in their English proficiency, classifies the types of implicit logical coherence errors and analyzes their distribution rules systematically. The research findings derived in this study add another dimension to the research dimension of a good framework for analyzing translation errors in the second language and provide empirical evidence of investigation into the educational and teaching variables that trigger such translation errors. In this regard, this study can translate practice more specifically and help the students reduce any implicit logical errors of coherence in translation, be more aware of the differences in logical coherence between Chinese and English, and eventually increase the coherence and accuracy of discourses by incorporating both Chinese and English when practicing translation of English to Chinese.

2 Research methods

2.1 Literature review

The theoretical basis of implicit logical cohesion is largely based on the cohesion theory of Halliday and Hasan, which differentiates explicit and implicit cohesive cues of the discourse and implicit logical links that lead the reader to infer and fill in based on the scenario.

The English language is formal; hence, there is a tendency to use conjunctions and other clear devices to create logical relationships. By contrast, Chinese as a meaning-focused language, attains logical continuation between sentences primarily by natural semantic development and not external signs of form. This is the chief reason why there are issues of implicit logical coherence of Chinese-to-English translation by Chinese students [1]. Verschueren, in his theory of adaptation, also adds that translation is a dynamic process where linguistic selection takes place and psychological errors made by students are basically their inability to adapt to the linguistic features of English and cognitive habits of target readers [2]. The main peculiarities of errors have already been identified by the current empirical studies. Wang Chuming discovered that among the most frequent mistakes committed by students are the implication of causality, confusion of transitional relationships as well as absence of progressive relationships [3]. Scholars such as Huang Xing, Guo Jiaying, and Fu Lei have discovered that the underlying cause of the negative transfer is mainly due to native language negative transfer, where the students will immediately transfer the syntactic logic of coherence of the Chinese into the English translations [4-6]. According to scholars like Li Fengqi and Xu Mingwu, the problem of inadequate discourse awareness of learners also plays a critical role where the majority of students pay attention only to the grammatical correctness of sentences without considering the coherence of sentences in a logical manner [7-9]. In either the processing of English to Chinese and vice versa, an optimal translation must have logical rigor and stylistic suitability, but convey a clear meaning and accurate expression [10-12]. Nevertheless, contemporary research continues to have several issues as they involve far too extensive misclassifications and a lack of a clearly detailed study of the conversion processes between what has been termed as implicit logic and explicit coherence. Based on this assumption, the study aims to provide answers to the following questions using

comparison experiments: Under this premise, when it comes to the explications of the implicit logical linkage in Chinese-to-English translation, do students of various levels of skills demonstrate any significant differences in terms of errors? What are the specific differences then? Moreover, in terms of Chinese-to-English translation, once the three basic logical relationships have been assessed, implicit causation, contrast and progression, which types of errors do the students make and in what patterns of distribution occur?

2.2 Study design

About 150 undergraduate non-English majors, based on their actual College English Test Band 4 (CET-4) scores, were selected and divided into three categories: low, medium, and high. The sample size in every group was greater than 40. The scores were distributed in the following way: high band (≥ 581 points), medium band (501-580 points), and low band (425-500 points).

Translating testing is to be done in a single, standardized environment first to ensure the same testing conditions for all subjects and subsequently, to ensure the reliability and reproducibility of the source of data. The system summarizes all responses given to the test by the participants, and the responses were translated into numerical identifiers to be used to store the data, with the comfort of further analysis. Second, upon determining the error rates of the participants within both groups as a measure of the use of the logical connectives at varying levels of skills, this research used chi-square test to test the difference in error rates across the groups, which showed the significance of the intergroup discrepancy statistically. Mean, standard deviation and frequency distribution of the error rates of groups were ultimately calculated using descriptive statistics to determine the overall features and patterns of distribution of logical connectives with word use among participants.

3 Research result

The final participants who were invited to this study were 142 valid respondents as 46 respondents were in the low-score group, 48 respondents were in the middle-score group, and 48 respondents were in the high-score group. The number of validly translated sentences amounted to 2, 130.

3.1 Type of errors

The problem addressed by the paper is the explication of implicit logical connectives using the cohesion theory and the contrastive analysis hypothesis, which has been proposed by Halliday and Hasan. Using logical connectives as the primary criterion and the data analysis, the given study categorizes the implicit errors of logical coherence in the Chinese-to-English translations by the Chinese students into four types of error omission errors, error construction errors, error addition errors, and order errors. These involve some cases when the subjects have not used important conjunctions that have either been implied in the original version or require clarification during the translation. In case of the subjects carrying conjunctions that do not conform to the original logical involvement, that is termed as error of misconstruction. The addition errors are the instances where the logicity and brevity of the translation came under fire due to the inclusion of superfluous and redundant conjunctions by the subjects. Misordering errors, the mistakes in which subjects place conjunctions wrongly when one harbors a subject translation to the other, may cause grammatical mistakes or unclear logical relations within the text. Descriptive statistics found that the frequency distribution of the four types of errors exhibited different pattern distribution among the

participants who had varying levels of English proficiency. Table 1 presents specific frequency and proportion data of the primary error groups that revealed significant variation with raising the level of language competency.

Table 1. Characteristics of all the four types of mistakes between students with different levels of English.

kind of error	Low band	Middle band	High band	Entire
Omission errors	65.55%	52.31%	39.33%	54.27%
Misconstruction errors	20.73%	28.72%	35.96%	24.05%
Addition errors	9.76%	14.36%	17.98%	11.7%
Misordering errors	3.96%	4.62%	6.74%	4.31%

3.2 Frequency, distribution of errors

The data analysis identifies three main mistake patterns among the research participants, namely misconstruction, addition, and sequence disruption, which are relatively rare in the low-scoring group, but omission mistakes take nearly 65 percent of the places. This indicates that the primary reason behind problems experienced by the students in this competency area is the ignorance of logical manifestation. They often mechanically translate Chinese syntactic logic into English translations where they do not realise that implicit Chinese logic requires literal translation using English conjunctions. Misconstruction error grouping to intermediate level: The level of misconstruction errors has significantly grown to become the second most common error category, and the omission errors remain the most common, with their percentage much reduced. This implies that intermediate students are likely to make logical connection errors since they have the fundamental knowledge of manifesting logic but do not have effective judgment of implicit logic in the source texts and command over English conjunctions. High-level group: Misconstruction errors were on the top position, whereas the percentage of omission errors still decreased. While the percentage of misordering mistakes stayed low, it showed a tiny rising trend, and additional errors also increased. These results show that although high-level students have a great knowledge of logical explication, they nevertheless struggle with accurate evaluation of sophisticated logic, contextualized conjunction selection, and syntactic conjunction placement.

Furthermore, according to the overall data, misordering errors accounted for the lowest percentage of errors, while omission errors were the most common error type across all subjects. This suggests that the fundamental problem with implicit logical cohesion in Chinese-to-English translation among Chinese students is not the ability to position conjunctions but rather a lack of logical explication awareness.

Additionally, among the four error categories mentioned above, this study performed independent statistical analyses and chi-square tests on error rates for three fundamental implicit logic types: causal, conditional, and progressive logic. The three participant groups' mistake rates for each of the three logic types showed significant between-group variations ($P<0.05$). Additionally, students at various skill levels showed unique traits in terms of processing difficulty for these sorts of logic; Table 2 presents particular error rate data (unit:%).

Table 2. Distribution characteristics of error rates for various implicit logic types among students at different proficiency levels.

Study group	Causal logic	Transition logic	Progressive logic
low-scoring group	51.23	45.82	45.57
middle-scoring group	30.14	25.69	25.37
high-scoring group	15.28	10.42	9.72

According to the overall trend, the error rates of causal logic among the three subject groups were the highest of the three types of logic, whereas the error rates of transitional logic and progressive logic were comparable and marginally lower than those of causal logic. This implies that Chinese students often find it difficult to articulate implicit logical links when translating from Chinese to English. Inter-group analysis revealed that the low-scoring group consistently displayed high error rates in all three logical reasoning areas, with minimal variance across them. This implies that students with lower ability levels have a poorer explicit understanding of implicit logical structures and lack distinct preferences in logical processing strategies. While the gap with causal logic mistake rates gradually increased, progressive and transitional logic error rates decreased more sharply with greater performance levels in the intermediate and high-score groups. This indicates that although advanced students are better at handling progressive and transitional logic, they still struggle greatly to understand causal reasoning.

4 Discussion

It turned out that the rate of implicit logical coherence mistakes was significantly different in the study concerning the Chinese to English translation when students of differing rates of English competence were involved. As the level of English proficiency increases, there is a drastic reduction in the error rates. The three factors of this disparity include discourse coherence awareness, English language proficiency and native language negative transfer. All these factors affect the various groups of proficiency to some extent. Among them, the negative transfer of the native language gradually reduces with the increase in proficiency. The syntagmatic nature of Chinese is the main reason why Chinese students face problems of logical coherence in translation between Chinese and English. The low-level students use their native language thinking more when they translate because they are less fluent in English and not as fully aware of the contrasts between syntagmatic cohesion and semantic cohesion in Chinese and English. They cause omissions and recurrent high error rates by directly translating latent patterns of logical expression between Chinese and English language translations. Nevertheless, as they acquire English syntagmatic language cognition over time through the significant intake of English and study, intermediate and advanced students strive to apply conjunctions in demonstrating logic. As a result, error rates decrease and the impact of negative transfer from the native language decreases. Logical expression is fundamentally based on proficiency in the English language. Examinees' overall language proficiency is reflected in their College English Test Band 4 (CET-4) results. High-scoring groups have greater vocabulary reserves, understanding, and conjunction mastery than mid- and low-scoring groups. They are more adept at identifying implicit logical connections in texts and have richer English conjunctions, which results in more accurate logical expression. Conversely, students with lower proficiency levels employ conjunctions less frequently. Their incapacity to use proper linguistic forms frequently results in insufficient expression, which raises error rates even when they have a rudimentary logical understanding. During translation, students in lower groups ignore logical coherence between phrases and are unaware of discourse-level cohesion in favor of concentrating only on the grammatical correctness of individual sentences. As a result, their main problem is omission errors. Students at the intermediate and advanced levels show increasingly improved discourse awareness, which allows them to identify logical connections at the textual level. However, advanced pupils struggle with sophisticated logical expression skills, while intermediate learners show inadequate logical judgment and conjunction matching ability. The primary issues arising from these limitations are precision-oriented deviations and misconstructured errors, respectively. Lots of individuals had significantly higher error rates in causal logic

than in transitional and progressive logic when it came to the explicitation of implicit logical cohesion in Chinese-to-English translation.

This implies that Chinese students often have difficulties with causal logics. The key reason is that the reasoning behind causality is highly convoluted and obscured when compared to the two other factors. It is not a complex challenge to be familiar with three types of implicit logic, as causal logic patterns are more diverse. Causal logic of the Chinese is in numerous forms such as causal inversion, sufficient condition causality, needed condition causality, indirect causality and direct causality. Due to the fact that some correlations could be hidden with the help of semantic structures when there are no obvious hints in terms of context, the participants should rely on the knowledge of context.

Due to the lack of explicitness and the presence of more obvious semantic properties, transitional logic and progressive logic can be identified more easily by the participants. Moreover, the use of causal conjunctions is more influenced by the context. The different causal logics will need corresponding conjunctions and English causal conjunctions have their own different syntax and register. Since it is less involved, and possesses fewer register differences, the conjunctive form of progressive and contrastive argumentative technique is easier to learn on the part of the pupils.

Lastly, the Chinese causal logic is more expressive. The use of word order and semantics enables real-time communication in the absence of unambiguous factors. Since transitional and progressive logic usually have subtle semantic contrasts or progressive indicators, learners can detect them simply when they do the learning and they are implicit. Although low-level students have a problem with determining causal logic behind something, middle and advanced students can find it, but it is often misinterpreted because of the incorrect contextualization of conjunctions. As a result, the error of causal reasoning is always high. In the distribution of the four categories of errors that students in different levels make, there are some differentiating trends: low level: the most significant ones are the omission errors, intermediate level: Omission + Misconstruction errors, and high level: the most significant one is the Misconstruction errors as the main type. It is a developmental process in which the implicit logical coherence ability of the Chinese students when translating Chinese into English changes to explicit logical coherence ability, but lacks precision, as shown in this trend of no explicit awareness, explicit awareness, but inadequate ability.

Consequently, the logic of coherence should be instructed in Chinese-to-English translation along the lines of the individualized education strategy where the objectives of teaching and their methods can vary depending on the level of English proficiency of Chinese learners.

5 Conclusion

In this research, the errors committed by Chinese students in Chinese-to-English translation were analyzed based on the levels of English proficiency of the students, and the errors that were committed were grouped. The distribution pattern of errors among different students in implicit logic cohesion was found in an effort to offer future research directions and instructions. Future studies can enhance the sample size to include other students with various professional experiences and academic levels in order to enhance the external validity of the research results. As well, revealing underlying mental processes that aid in error creation, eye tracking and audio-based thinking can help the students explore more on cognitive processes related to logical coherence processing. According to the hierarchical patterns, which were revealed during the research, it has come up with certain training materials and modules have been developed. Some of them utilize technology like corpora and AI-aided writing instruments in order to generate instant feedback regarding the logical coherence of the students. Peer review and project-based learning can be considered some examples of

interactive teaching methods that support the independence of students in reflection and the application of logic. Furthermore, it is possible to construct a more thorough evaluation system of logical coherence in translating Chinese into English by including the aspects of errors and distribution in the evaluation measures. This will give teachers objective feedback on the success of the stratified instruction so that they can effectively detect the problems of students and modify their instructional methods.

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