

Cross-linguistic Influence among Chinese Learners of English (L2) and German (L3)

Chenghui Tan



Kellogg College

Department of Education

University of Oxford

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Abstract

Chinese, English and German have different word orders. The word order in English and Chinese is largely Subject-Verb-Object (SVO). However, the Chinese word order is more flexible, so Chinese sentences are sometimes presented as Subject-Object-Verb (SOV). The SVO order is simpler than the verb second (V2) word order system in German, which requires one of other fragments to exist before the verb in a sentence to ensure that the verb always occurs in the second position in the sentence (In subordinate clauses in German, the verb position does not fulfil the verb second rule). As such, the word order of the three languages is sometimes identical, sometimes completely different, and sometimes pairwise similar. This study aimed to investigate the effects of Chinese as a first language (L1) and English as a second language (L2) on Chinese learners' acquisition of the German word order. 30 sentences with different word orders across the three languages were selected for a set of novel multiple-choice tasks, during which participants had to choose the correct option to make the sentence having the correct word order. The task was completed by 27 undergraduate students (L1 Chinese, L2 English, L3 German) who majored in German studies and had English learning experience before attending university. The results showed that participants' knowledge of both Chinese and English had a positive effect on the acquisition of German word order and that the participants' L2 and L3 proficiency levels were not correlated with their performance in the L3 word order tasks and their L2 and L3 proficiency levels were not correlated neither. Based on these findings, it is believed that when the L1 and L2 word order is the same, participants do not tend to generalise this pattern to the L3 regardless of how proficient in their background languages they are.

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List of Abbreviations

CEFR	Common European Framework of Reference for Languages
CET	College English Test
CLI	cross-linguistic influence
CUREC	Central University Research Ethics Committee
DAAD	Deutsche Akademische Austauschdienst (German Academic Exchange Service)
DaF	Test Deutsch als Fremdsprache
DP	determiner phrase
DSD	Deutsches Sprachdiplom Stufe
IELTS	International English Language Testing System
L1	native or first language
L2	second language
L3	third language
LexTALE	Lexical Test for Advanced Learners of English (German version available)
PC	personal computer
PGG	Die Prüfung für das Grund Germanistikstudium
RQ	research question
SAS	Statistical Analysis System
SD	standard deviation
SLA	second language acquisition
SVO	Subject-verb-object
WO	word-order

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1. Introduction

1.1. German language in China

German learning in China has undergone tremendous change in recent years, as the sharp rise in students acquiring it as a third language (L3) suggests. Data from German Federal Foreign Office (2020) shows that there are now over 145,000 German learners in China, an increase of over 30%. About 23,400 high school students are currently enrolled in German language classes. Of these students, 30% are studying German as their first second language (L2) (i.e., before English), and 70% are studying German as their second L2 (after English) (German Federal Foreign Office, 2020). The number of students learning German in schools has nearly doubled in the past five years, making it the second most studied foreign language in schools, only behind English. In addition, the level of interest in learning German in academic institutions has remained the same, but there are now more German departments available. Because China continues to send more students abroad than any other nation, Germany has become an extremely popular location for international students to pursue their education (German Federal Foreign Office, 2020). According to German Federal Foreign Office's (2020) statistics, illustrated in Figure 1 (cf. German Federal Foreign Office, 2020), adults also demonstrate a strong interest in learning the German language in education and extracurricular contexts, and have a willingness to study there.

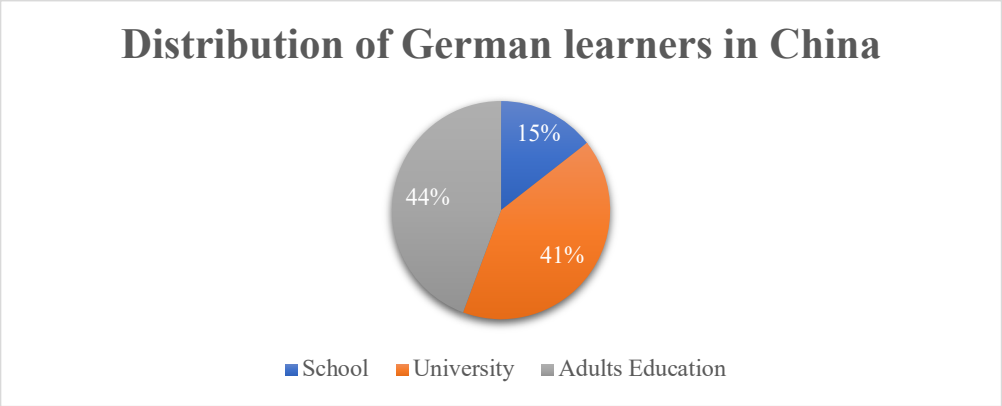


Figure 1 Distribution of German leaners in China (cf. German Federal Foreign Office, 2020)

1.2. Research Motivation

In my experience teaching German in China, I observed a pattern consistent with the statistics provided by the German Federal Foreign Office: the majority of my students had learned English previously. Their German learning was greatly assisted by this experience. The English proficiency of the students appeared to affect their rate of acquisition of grammatical features such as tenses, verb conjugation, and noun plurality.

However, students with higher English proficiency were not better at learning grammatical features that were absent from both Chinese and English. Thus, I became very interested in investigating the students' learning outcomes with regards to a grammatical feature that differs in Chinese, English, and German - in this instance, word order (WO).

1.3. Research Background

Since the turn of the century, the study of L3 acquisition has progressed substantially, as evidenced by the publication of numerous articles and books on the topic (e.g., Cenoz, 2000; Clyne, 1997; Hoffmann, 2001). In an era of globalisation, when multilingualism is becoming the norm rather than the exception, research in the field of third language acquisition is of utmost importance. The field of second language acquisition (SLA) has traditionally focused on how non-native languages are acquired, and the difference between L3 studies and traditional L2 studies is that L3 studies emphasise the order of non-native language acquisition, whereas L2 studies only divide languages into native and non-native languages (Falk & Bardel, 2010).

The aspect of L3 acquisition that has received the most attention to date is vocabulary. Numerous studies have examined the phenomenon of lexical cross-linguistic influence within the language system of a multilingual individual (e.g., Cenoz et al. 2003; Dewaele 1998). Regarding syntax, researchers have hypothesised that both the L1 and the L2 significantly contribute to the acquisition of syntax in a L3 (Flynn 1998). Numerous studies have demonstrated that cross-linguistic influence from an L2 occuwwrs if the L2 and L3 are typologically comparable, particularly if the L1 is typologically distant (Kellerman, 1995; Ringbom, 1987; Williams & Hammar, 1998).

In recent years, China has conducted extensive research in the field of L3 acquisition, particularly in the context of foreign language learning among China's ethnic minorities (Li, 2018). Li

divided the existing body of research on trilingual acquisition into three distinct domains: (1) international L3 acquisition studies; (2) research on L3 acquisition among Chinese ethnic minorities; and (3) L3 acquisition studies focusing on Mandarin Chinese native speakers. However, research on the situation where Chinese is the L1, English is the L2, and German is the L3 is scarce. The majority of existing research focuses on English acquisition among minority ethnic groups (Li, 2018). The lack of research in this particular L1-L2-L3 language combination demonstrates the need for additional investigation and serves as the basis for the focus of this study.

1.4. Aims & Scope

This study aims to investigate the effects of Chinese as a first language (L1) and English as a second language (L2) on Chinese learners' acquisition of German WO. The study employed a task-based methodology and a test consisting of 30 multiple-choice questions. These questions were all posed in German, but their Chinese and English translations featured different sentence structures. This research involved 27 students of German studies from a University in Zhejiang province in China. The LexTALE test (Lemhöfer & Broersma, 2012), a lexical decision task that provides an estimate of the participants' vocabulary size was used to evaluate their general German and English proficiency. In addition to the task and the LexTALE tests, participants were required to submit a personal information questionnaire. This data was used to control for potential confounding variables, including age, gender, and prior language acquisition experience. Using the statistical software SAS, the data collected from the task, the LexTALE tests, and the questionnaire were analysed.

1.5. Structure

The structure of this thesis is as follows. In the Literature Review, an overview of current studies pertinent to the topic at hand is presented. The Methodology chapter explains how the study's data were collected and analysed, discussing the creation and distribution of the questionnaire, as well as the data collection process. Following the Methodology is the Results chapter, which presents and analyses the study's raw data. In the Discussion chapter, the implications of these

findings are then examined. The Conclusion chapter summarises the study's key findings, makes suggestions for future research, and identifies the prospective benefits of this study.

2. Literature Review

2.1. Differences Between L2 Acquisition and L3 Acquisition

The phenomenon of multilingualism, where multiple language systems can exist in people's minds at the same time, has never been an exception, but on the contrary is a universal phenomenon (Cook, 2003). Before discussing third language (L3) acquisition, providing a clear and explicit definition is important. Scholars define an L3 as distinct from the background languages (Falk & Bardel, 2010). Background languages refer to all the languages that a person has mastered so far, and there is no limit to the number of these languages, which can be two or more than two (Falk & Bardel, 2010). The languages that are being acquired in addition to background languages, are L3s. Hammarberg (2001) used the term L3 to refer to the language that learners are currently learning, and L2 for all the languages that have been acquired after the first language (L1).

Scholars believe that L1 and L2 have a huge impact on L3 acquisition at different times, depending on the relative strength of L1 and L2 for the learner (Williams & Hammarberg, 1998). L1 has a greater influence on L3 when it comes to lexical choice and word order (WO), and L3 is influenced by an L2 because of learners' perception or the characteristics of the L2 and L3 (Williams & Hammarberg, 1998). It has also been argued that the influence of L2 over L1 in L3 learning is due to the fact that there is always a tendency to preferentially activate other known non-native languages when trying to use a foreign language (Falk & Bardel, 2010). In addition, language proficiency and typology will also largely determine which already mastered L1 or L2 influences a learner's L3 learning (Falk & Bardel, 2010). For example, if the L2 and L3 belong to the same language family, and the L1 is far apart from the L3 in terms of typology, it is more likely that the L2, rather than the L1, will affect L3 learning in this case.

Williams and Hammarberg (1998) argued that L1 and L2 play different roles in L3 learning, the instrumental role and the supplier role respectively. The former is used in functional language shifts and to support communication, while the latter is used when there is a need to provide words or morphemes without clear communicative goals. Typically, the L2 plays the supporter role and the L1 plays the instrumental role.

The acquisition of L1 occurs before all other languages. This means that it is used the most and learners have higher proficiency levels in it. Falk and Bardel (2010) summarised the factors that can influence the acquisition of L3 according to the diagrams presented in Figure 2:

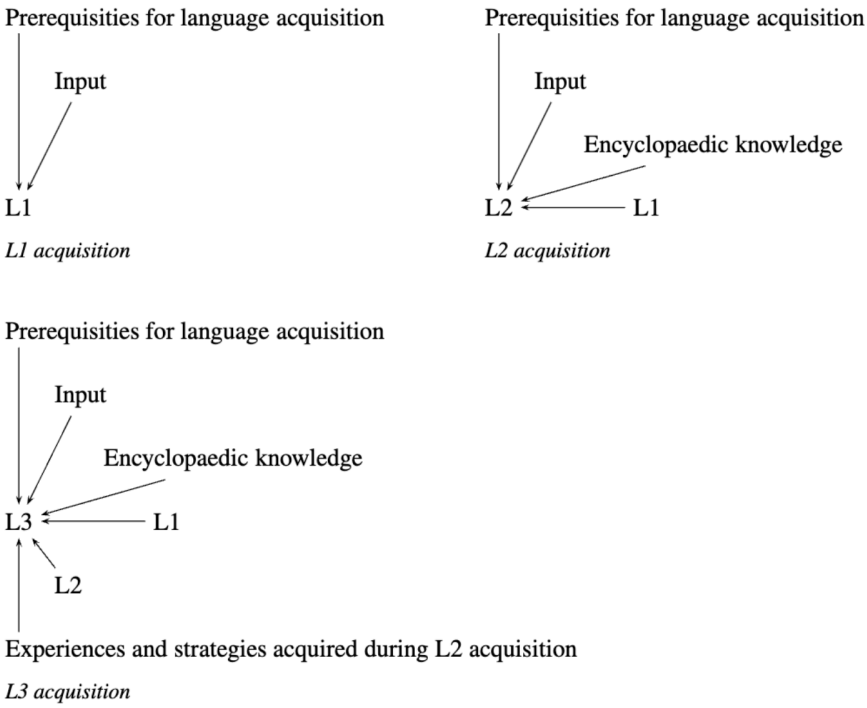


Figure 2 L1, L2 and L3 acquisition (Hufeisen ,1998; Falk & Bardel, 2010)

Compared to the acquisition of L1, the acquisition of L2 is more complex. Encyclopaedic knowledge (which is the basic knowledge about a great number of different subjects relevant) and the knowledge of L1 are two additional factors that affect the acquisition of L2. There are even more factors affecting L3 acquisition: in addition to the factors that affect L2 acquisition, the language itself and the learning strategies that the learner picks up during its acquisition can influence the learning of an L3. Particularly if the acquisition of L2 takes place in a formal setting such as in a classroom, L3 learners are more likely to be able to make use of known language learning strategies to reduce their study load (Falk & Bardel, 2010; Jessner, 2006; Bowden et al., 2005).

2.2. Typology, L2 status, and proficiency in L3 Acquisition

In the late 1980s, cross-linguistic influence was introduced to encapsulate a range of related concepts including ‘transfer’, ‘interference’, ‘avoidance’ and ‘borrowing’ (Sharwood & Kellerman, 1986). Researchers tried to find the factors that influence L3 acquisition. In many

studies, researchers emphasised the key role of typology, L2 status and L3 proficiency (Bardel & Falk, 2012; Falk & Bardel, 2011; Foote, 2009; Llama et al., 2010; Rast, 2010; Rothman, 2015). In addition to these three recognised factors, it has also been suggested that the timing of L2 acquisition, the time of the most recent use of L2 and the frequency of L2 use all affect L3 acquisition to varying degrees (Falk & Bardel, 2010). The degree of formality of the interlocutor and the conversation have also been suggested as possible factors affecting L3 acquisition (Dewaele, 2001).

Bardel and Lindqvist (2007) argue that an L2 from the same language family can easily lead to a transfer to L3. Their study was conducted with a native Swedish multilingual learner. In addition to Swedish, this language learner started learning English, French, and Spanish at the ages of 10, 13, and 16, respectively. By examining the subject's language output in L3 Italian, researchers concluded that Romance languages are more likely to transfer to Italian than English (Bardel & Lindqvist, 2007).

Cenoz's (2001) experiment with 90 primary and secondary school students from the same school came to the same conclusion. The 90 participants were Basque and/or Spanish native speakers living in the Basque region of Spain. English was their L3, and all of these participants had four years of English language learning experience. They were shown 24 pictures that could make up a story and were asked to tell what happened in the pictures in English. After the process was videotaped and analysed, Cenoz (2001) found that Spanish, which is more similar to English than Basque in terms of genetic relatedness, was transferred.

Earlier quantitative experiments by Ringbom (1987; 2001) also found an important role for typology in language transfer. The researchers recruited nearly 600 native speakers of Swedish and an equal number of Finnish speakers, who were learning Finnish and Swedish as L2 respectively. Participants were asked to translate selected sentences from their native language to their L3, English. In both groups of participants, although transfer from L1 to L3 occurred across the board, it occurred more often in Swedish, which is more similar to English, regardless of whether Swedish was the participants' L1 or L2 (Ringbom, 1987; Ringbom 2001).

Croft (1990) suggested that even two seemingly unrelated languages may still share certain structures. This similarity can also lead to the occurrence of transfer. For example, Turkish, which belongs in with the Altaic language family, is similar to German, which belongs in with the Germanic language family, with regards to placing verbs at the end of sentences in certain

situations, such as in subordinate clauses. Kellerman (1983) argued that learners' mental perception of the similarity between two languages is also important. In other words, even if the two languages are not objectively related, if the learner mentally perceives or subjectively finds similar parts of the two languages, language transfer will become more likely to take place in this case.

The biggest difference between L3 acquisition and L2 acquisition is whether or not languages other than the L1 have been acquired at the time of language learning. Numerous scholars have argued that L2 acquisition experiences and strategies from the acquisition process can be both consciously or subconsciously used in L3 acquisition (Bardel & Falk, 2007; Flynn et al., 2004; Hufeisen, 1998; Leung, 2006). Bardel and Falk (2007) argued that in addition to L3 learners being influenced by L2 in terms of vocabulary selection, the L2 is perhaps also able to shape L3 in terms of syntax.

A longitudinal study by Williams and Hammarberg (1998) found that the L2 was more effective than the L1 in facilitating L3 production. The participant was a native English speaker who had varying degrees of proficiency in German, French, and Italian. The study found that the participant's most proficient L2, German, was activated more when she spoke in her L3, Swedish. Moreover, transfer was observed from this L2 to the participant's L1 as she produced much of the 'German-based English' that is often found in native speakers of German. Williams and Hammarberg (1998) further explained that the participants probably consciously suppressed the L1 when they attempted to use the wanted L3. The participants thought that using their L1 would cause errors in the L3 output, and that the L2 would be a better option.

Angelis (2005) attributes the reason why L3 speakers activate L2 more than L3 to *perception of correctness* and *association of foreignness*. The researcher argued that multilinguals are more inclined to use foreign words than native words in their L3 production, because they think foreign languages are closer to each other and to use foreign words can enhance the probability of producing a correct sentence in another foreign language. In order to be perceived as more correct, multilinguals consciously suppress L1 involvement in foreign language output (Angelis, 2005). Cohen's (1995) study also claimed that L3 speakers use structures in L2 to try to improve their L3 output. This is because the L2 allows language users to feel that they are using the foreign language, and using it correctly, even if the foreign language used is not the same one (Cohen, 1995).

In addition to typology and L2 status, proficiency in the background language and the target language are also important factors (Falk & Bardel, 2010). Lindqvist (2010) found that, of the many background languages used by multilinguals, only the one with the highest level of proficiency can significantly be transferred to L3. However, it has also been found that, even if L2 proficiency is low, it still affects L3 acquisition (Angelis, 2005). According to Ringbom (1987), the key factor affecting L3 acquisition is not only the proficiency in the L2, but also the stage at which L3 acquisition takes place. Transfer is more likely to occur at the start of learning the L3.

Bardel and Lindqvist (2007) found that L1 and L2 proficiencies did not work independently when affecting L3, and that the three background languages of their participant, English, French, and Spanish, in which she had varying levels of proficiency, took precedence at different times. English, the language in which the participant had the highest proficiency, was almost never activated, Spanish was used mostly during code-switching, and more influence was observed from French when the participant attempted to complete a sentence in Italian (L3). The similarity of the proficiency levels in the different L2s and L3 Italian determined whether the L2 was activated during L3 acquisition (Bardel & Lindqvist, 2007).

It has also been found that if a language learner's proficiency in a L2 is so high that the level of the L2 is close to or even exceeds the level of his/her L1, the transfer from the L2 to the L3 will usually not occur (Falk & Bardel, 2010). In this case, the L2 would no longer be regarded as an L2, but as an L1, and due to the aforementioned *perception of correctness* and *association of foreignness*, the highly proficient L2 would not be activated when producing in L3.

2.3. Cross-linguistic Influence (CLI) in L3 Syntax

Klein (1995) tested the acquisition of verb-preposition collocations (e.g., apologize for, aim at, and wait for) and preposition stranding (e.g., 'What are you talking about?' versus 'About what are you talking?') by 32 adolescent English learners in secondary school and found that multilinguals were likely to acquire new grammatical knowledge more easily than monolinguals. The participants were 17 monolinguals and 15 multilinguals. Even when none of the languages mastered by these multilinguals included the phenomenon of preposition stranding, they still performed better than monolinguals. This implies that multilinguals may have higher metalinguistic skill in terms of the acquisition of syntax in an L3 (Klein, 1995). The opposite

view is held by Bouvy (2000), who argues that transfer from the L2 does not affect the acquisition of the L3 syntax in the same way that transfer from the L1 does, and that L2 transfer remains only at the lexical level.

In order to find out whether the L1 or the L2 is the only one language that affects L3 acquisition, Flynn et al. (2004) compared the acquisition of complementizer phrases (e.g., while, as long as, sothat) in L3 English by 33 adults and 10 children from three different language background groups: L1 Kazakh-L2 Russian for the first group, and L1 Spanish-L2 English for the second group and L1 Japanese-L2 English for the third group. The results of the experiment suggested that the performance of the third group was significantly different from that of the first two groups due to the fact that the L1 of the third group, Japanese, was a head final language, which was different from the head initial background language of the first and second groups. Flynn et al. (2004) proposed the Cumulative Enhancement Model to explain the above phenomenon. Having a lot of supporters (Berkes et al., 2012; Rothman, 2011; Sadouki, 2022), this model holds that the more languages a language learner has mastered, the easier it is for him/her to acquire a new language, and every language already mastered will have a positive effect on the acquisition of a new language.

Another classic theory is the Full Transfer Full Access model, which was proposed by Schwartz and Sprouse (1996), who tested L1 Turkish speakers' acquisition of word order and case in L2 German. The researchers argued that learners' L2 initial state is derived from their L1 steady state, and that the learners' interlanguage[1] is not fully compatible with the L1 Turkish features, nor is it a fully-fledged target language, but rather something in between. They argued that only in the L2 learned initial stages, absolute transfer from L1 is possible.

In their research on Chinese native speakers acquiring English as a second language, Hawkins and Chan (1997) proposed the concept of Failed Functional Features Hypothesis for the first time. The Failed Functional Features Hypothesis makes the argument that Universal Grammar characteristics (such as a learner can deduce many sentences in specific structures from a certain grammatical rule) are unavailable to the leaner, because they are not instantiated in the L1 grammar. Thus, learners of a second language are 'stuck' with the grammar of their L1, and they

[1] Interlanguage refers to a language system that arises when a language learner are learning a new language while does not fully master it (Selinker, 1972).

are not able to acquire the formal aspects of the L2 that have not been present in their L1 (Leung, 2005).

Leung (2005) tested the acquisition of the determiner phrase (DP) in L3 French in two experiments with a total of eight groups of participants from different language backgrounds. The Full Transfer Full Access model (Schwartz & Sprouse, 1996) and the Failed Functional Features Hypothesis (Hawkins & Chan, 1997) were compared. The researcher found that neither model could explain the experimental results well. Although neither of the above theories could fully explain the experimental results, however, they both demonstrated that L3 acquisition is inherently different from L2 acquisition: syntax not only transfers from L1 to L3 but also from L2 to L3. Subsequent follow-up experiments found that syntax transfer from L2 English to L3 French would exceed that from L1 Cantonese to L2 French, because of the higher similarity between English and French (Leung, 2006).

Transfer may not only be positive but also negative (Odlin, 1989; Schachter, 1974; Selinker, 1969). Many studies have shown that Chinese to English transfer is largely negative (Bai, 2018; Dai & Wang, 2002; Wang, 2009; Yang, 2019). Odlin (1989) believes that negative transfer can appear in three different ways. The first is underproduction, which means that learners who are unfamiliar with a particular structure in the target language or who are not sure which word to choose will tend to use a structure or expression that exists in their L1 rather than an unfamiliar one in the target language. This is a strategy used by learners to avoid making mistakes when speaking in a foreign language (Schachter, 1974). The second manifestation of negative transfer is overproduction, which means that the learner produces expressions that are used very infrequently by native speakers of the target language. For example, the use of ‘sorry’ (Odlin, 1989) in American English or the overproduction of logic words, such as ‘but’, ‘because’, and ‘so’, by Chinese learners of English (Fei, 2023). The third infestation of negative transfer is production errors, which means that language learners use structures or words that exists in their native language when speaking in the L3. Production errors often occur when the learner literally translates words from the native language into the target language (Odlin, 1989), such as when a native Chinese speaker uses ‘high foot glass’ to refer to a goblet.

2.4. Recent Studies on German as a Second and Third Language

Following the classic studies on third language acquisition discussed above, the last few years of quantitative research around German as a third language will be discussed below, alongside a study exploring the acquisition of the definite article in L2 German by native Chinese speakers.

Hopp (2019) conducted an experiment with 31 monolingual German-speaking children and 31 bilingual Turkish-German speaking children learning English using a sentence repetition task and a picture story retelling task. The aim of the experiment was to investigate whether native speakers transfer grammatical knowledge from their mother tongue when learning a new language. The findings of the experiment revealed that there was no discernible gap in the level of achievement between the two groups of children, and also that there was a different degree of transfer from German grammar in both groups when learning English (Hopp, 2019). These findings imply that grammatical transfer often occurs between languages of the same or similar type.

Some studies have shown that the effect of L2 on L3 is significant, even greater than the effect of L1 on L3 (Bardel & Falk, 2007; Rothman & Amaro, 2010). Falk and Bardel (2011) divided 44 intermediate learners of German (L3) into two groups depending on their L1 (English or French), and asked them to perform grammaticality judgement or error correction tasks. Focusing on the differences in the relative position of the object and verb in the L1 of the two groups, the experimenters found significant differences in the participants' performance on the test. They reported that this difference could be attributed to their L2. The experimenters concluded that, even for intermediate learners, L3 learning is significantly influenced by L2.

Even when exposed to the German language, learners do not always learn German better if they lack motivation (Bego, 2020). Using his own questionnaire and interviews, Bego (2020) studied 51 undergraduate students from Croatia, majoring in Hotel and Tourism Management and Gastronomy, in an attempt to identify the challenges students face in learning German as an L3. The students all knew English and had attended German courses at the secondary school level. They had attended exchange programs in German-speaking countries for a few weeks to a few months, at both private and public schools, but they did not show strong motivation to learn German. The study found that the learners' actual German language skills, as well as their expectations of these skills, were lower than their English language skills (Bego, 2020).

In addition to motivation, the typology of L1 is another key factor in whether or not a learner can learn a language well. Chinese and German belong to different language families and differ considerably. As a language without definite articles, Chinese substitutes the role of the definite article through WO or other strategies. Ferraresi (2019) collected motivation letters from 80 Master's applicants (L1 Chinese, L2 German) to a German Studies course at a German University from the winter semester 2014/2015 to the summer semester 2018, and examined the noun phrases in them. The study found that even advanced Chinese speakers often omit the definite article in both spoken and written expressions.

2.5. Word Order in Chinese, English, and German

German is a typical language of V2 WO, which is common in Germanic languages. In a V2 WO, the verb is always in the second place of a sentence (Fagan, 2009), so the first place in the sentence can be occupied by any other constituent. This is illustrated by examples (1) and (2) below. English is a special case, where the dominant WO is Subject-Verb-Object (SVO) (Ehalka, 2006).

Ich	**gehe**	ins Kino	nach der Schule.	(1)
I	***go***	*to the cinema*	*after school.*	
Nach der Schule	**gehe**	ich	ins Kino.	(2)
After school	***go***	*I*	*to the cinema.*	

(I go to the cinema after school.)

In both German example sentences above, the verb "**gehe"** is in the second position and there is no difference in meaning between sentences (1) and (2). If the German example (2) is translated directly into English with the WO unchanged, the sentence would be grammatically incorrect. The situation in German is more complicated when a sentence contains more than one verb. In this case, the finite verb remains in the second position and the non-finite verb is in the last position (Fagan, 2009). The subject may be in the first place, and if the first place of the sentence is occupied by another constituent, the subject follows the finite verb. This is presented in example (3):

Die Hausaufgaben	**habe**	ich	gestern	schon	**gemacht**.	(3)

The homework ***have*** *I* *yesterday* *already* ***done****.*

(I already did the homework yesterday.)

The V2 rule in German changes again in embedded clauses, where the finite verb moves from the second position to the end of the sentence, and the non-finite verb that was at the end of the sentence automatically becomes the penultimate position (Fagan, 2009). The rest of the sentence remains unchanged during these changes, as shown in example (4)

, dass ich den Apfel gestern **gegessen** **habe**. (4)

, that I the apple yesterday ***eaten*** ***have****.*

(, that I have eaten the apple yesterday.)

If the main clause comes after the subordinate clause, the finite verb in the main clause will come first, and the non-finite verb (if any) will stay at the end of the sentence (Fagan, 2009). This is illustrated by example (5).

Da er krank war, **konnte** er nicht zu uns **kommen**. (5)

As he was ill, ***could*** *he not to us* ***come****.*

(As he was ill, he could not come to us.)

When asking a question that can be answered with 'yes' or 'no', the German verb is advanced to the first position, as example (6) shows. The subject or any other constituent that was previously in the first position will automatically move to the second position, while the position of the rest of the constituents will remain unchanged.

Gehen Sie schnell? (6)

Walk *you fast?*

(Do you walk fast?)

Like English, Chinese as a whole is a SVO language. In a typical sentence, the verb is located after the subject, and the object (if any) is located after the verb. But at the same time, in some structures, Chinese has a high tolerance for SOV (Sun, 2006). In this case, the verb and its modifiers will be located after the object. For example, a sentence with the "把 [make, get]" structure is presented in example (7):

我　把　**衣服**　**洗好了**。　(7)

I got ***the clothes*** ***washed****.*

(I got the laundry done.)

Unlike English, Chinese is a head-final language, a phenomenon often found in SOV languages. This means that in Chinese the modified word often comes after the modifier (Sun, 2006). For example, in a noun phrase, the Chinese noun appears after the modifier, as can be observed in example 8 below:

今年的　彩票中奖者。　(8)

This year's *lottery winners.*

(Instead of "lottery winners of this year")

To summarise, Chinese and English WO is SVO and relatively simple. German WO conforms to the V2 rule as a whole but has more variations and is a more complex system. Certain sentence structures in Chinese are very forgiving of WO other than SVO, which leads to the changing similarity of WO between each other among the three languages. Except for the simplest case where all three languages have the same word order, the relations of WO in the three languages can be broadly classified into four categories: the WO is identical between each pair of the three languages, and the three languages have all different word orders from each other (also See 3.3.3):

Relations of WOs in the three languages in four groups

language	Chinese	English	German
Group A	different		
Group B		different	
Group C			different
Group D	WOs in all three languages are different from each other		

Table 1 Relations of WOs in the three languages in four groups

3. Methodology

3.1. Research Design

A quantitative design was used in order to answer the three research questions below. A web-based questionnaire was used to collect personal information from the participants due to its efficient dissemination. To avoid the low reliability of self-reports (Paulhus & Vazire 2007), the researcher designed a German word-order (WO) test consisting of 30 single multiple-choice questions (See 3.3.4) to assess the participants' knowledge of the structure in their third language (L3), German, and the influence of the first language (L1), Chinese, and/or the second language (L2), English on their performance.

In addition to the task mentioned above, completing the study required a testing tool that could quickly and efficiently test participants' overall proficiency in English and German. The LexTALE (Lemhöfer and Broersma, 2012), which is available in both English and German, was selected to estimate the vocabulary of the testees (See 3.3.1&3.3.2). Therefore, the entire experiment system consisted of three parts: the WO task, the LexTALE test, and the collection of personal information. Based on the previous discussion, the research questions for this study were designed as follows:

RQ1: Is there a statistically significant correlation between German (L3) proficiency and English (L2) proficiency for native Chinese speakers?

> **H_0**: There is a statistically significant correlation between German (L3) proficiency and English (L2) proficiency for native Chinese speakers.
>
> **H_1**: There is no statistically significant correlation between German (L3) proficiency and English (L2) proficiency for native Chinese speakers.

RQ2: Is there a statistically significant correlation between German (L3) proficiency and performance in German (L3) WO tasks for native Chinese speakers?

> **H_0**: There is a statistically significant correlation between German (L3) proficiency and performance in German (L3) WO tasks for native Chinese speakers.
>
> **H_1**: There is no statistically significant correlation between German (L3) proficiency and performance in German (L3) WO tasks for native Chinese speakers.

RQ3: Is there a statistically significant correlation between English (L2) proficiency and performance in German (L3) WO tasks for native Chinese speakers?

> **H_0**: There is a statistically significant correlation between English (L2) proficiency and performance in German (L3) WO tasks for native Chinese speakers.
>
> **H_1**: There is no statistically significant correlation between English (L2) proficiency and performance in German (L3) WO tasks for native Chinese speakers.

RQ4: How does the transfer of WO from background languages Chinese (L1) and English (L2) to the target language German (L3) happen?

In order to answer the first research question, proficiency in German and English was operationalised as the score obtained in the LexTALE test. Participants' scores in the English test were set as the independent variable, and scores in the German test as the dependent variable. Proficiency in English and German in RQ2 and RQ3 were again set as the independent variable. After the dependent variable (performance in the WO tasks) is analysed as a whole, it will be divided into four categories to investigate transfer effects (See 3.3.4).

3.2. Participants

The target population of this study was undergraduate students who are native speakers of Chinese and have had a previous experience of learning English and who are major in German studies.

A power analysis performed in a similar study (Koban, 2022) showed that a total sample size of 100 was required for a medium to large effect to be obtained (with 80% of power, which is often used in foreign language acquisition). However, because of practical issues and limited resources, the final sample size was 20-30 participants This sample size is acceptable given the exploratory nature of the present study.

3.2.1. Recruitment

Between the 25th of April and the 25th of May, a total of 52 participants were recruited to this study through the distributed poster (See Appendix 8.2) on three social media platforms: WeChat, ZJU Cloud, and CC98. Snowball sampling was also used. The recruited participants were all

native Chinese speakers who majored in German. They had studied English for at least six years prior to attending university, and had studied German for between 8 and 31 months at the time of the study. According to the training programme for German majors at the University, their German proficiency corresponded to a level between CEFR A2 and C1. (Only one of them obtained a certificate at the C1 level, and the rest of the participants who reported their level of German had a proficiency level between A2 and B2.) After some participants were excluded (See 3.2.2), a total of 27 responses were collected: 21 came from female, five from male, and one from a non-binary participant. This distribution is generally in line with the overall gender distribution in the German studies course at the university.

3.2.2. Initial Exclusions

In the 52 questionnaires received, 17 were not fully completed. Since completing both the WO tasks and the LexTALE test was essential, the 17 incomplete experiments were considered invalid and excluded from the study. In addition, six participants took less than ten minutes to complete the experiment, which is a significantly shorter amount of time than the recommended 30 minutes. It was assumed that completing the entire questionnaire within the ten-minute timeframe was almost impossible, and suggested that these participants randomly clicked their mouse during part or all of the questions in the task or test; therefore, these responses were not recorded as valid data either. Another response was excluded because it indicated obvious fraudulent behaviour: according to the answers provided, the participant was between 18 and 20 years old, yet he claimed to have studied German for 40 years. There was one more highly suspicious questionnaire, which was submitted four minutes after another one had been collected, and which showed the exact same answers as the one before it. Since students from the University in the same major usually live in shared dormitory rooms, the suspicious submission time and response content suggested that this questionnaire could have been completely copied from someone else's results and was, therefore, considered invalid. In the end, 27 out of 52 questionnaires were found to be valid and were used for further analysis.

3.2.3. Age

All 27 valid responses were from current undergraduate students, with 25 of the participants reporting that they were all between the ages of 18-25. Two participants did not wish to disclose their age.

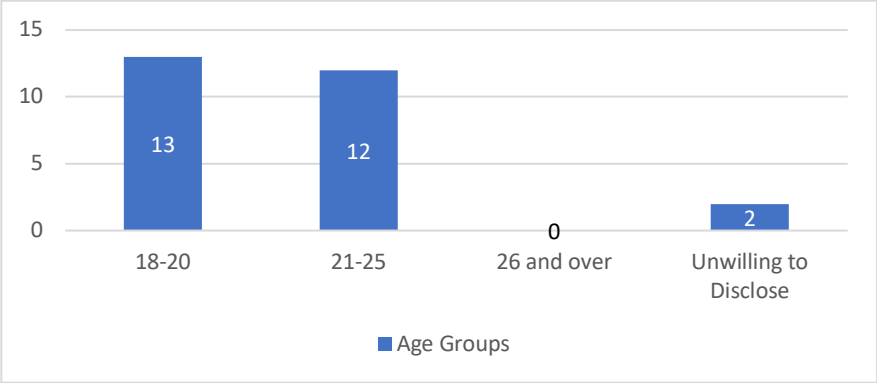


Figure 3 Number of participants in three age groups

3.2.4. Qualifications and Language learning experiences

A total of five participants did not want to disclose the number of months they had spent learning German. Of the remaining participants, half (N=11) had studied German for between 8 and 19 months. Slightly more than a third of the participants (N=8) had been learning German for about two years, and a further 14 percent had been learning German for at least 25 months.

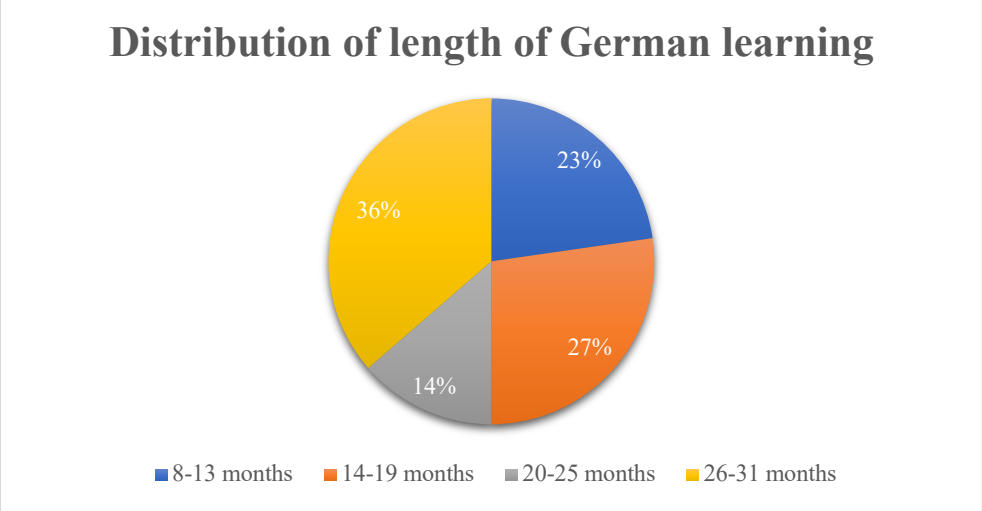


Figure 4 Distribution of length of German learning

Ten of the participants had the PGG German certificate, which is awarded and developed by the School of Foreign Languages at Nanjing University and corresponds approximately to the B1

level of the CEFR. One of the participants had a DSD II C1 certificate in German. According to the regulations of the exam organiser, only students from schools registered with the German education authorities are eligible to sit for the exam (Federal Office of Administration, 2012). Thus, this student had German language training before entering the university. Another person had taken the DaF exam and reached DaF 16, corresponding to the B2 level of the CEFR.

According to the PGG exam regulations, the exam is only available to sophomores. As a quarter of the participants (N=13) in this experiment were younger than 20 years old, it is reasonable to assume that they are not yet eligible for the reference. All participants had studied German for more than eight months, so it can be inferred that the German level of this group of participants without certificates was between A2 and B1.

Highest German language certificates owned	**Count**
None	15
PGG (pass)	5
PGG (DISTICTION)	3
DSD C1	1
DaF 16+	1
Unwilling to Disclose	2

Table 2 Highest German language certificate owned by participants

A total of six participants did not want to disclose the length of time they had been learning English. Of the remaining 21 participants, a quarter (N=5) had been learning English for 14 years. This means that they started learning English in primary school. Almost a third of the participants (N=6) had been learning English for 10 years. Another three participants reported that they had been learning English for less than 10 years: two for six years and one for seven years, which totalled 14 per cent of all participants.

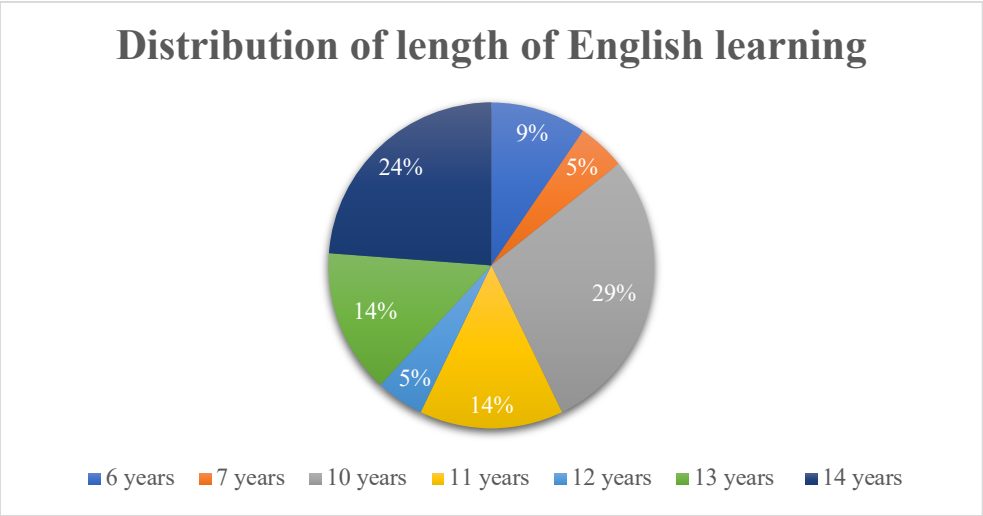


Figure 5 Distribution of length of English learning

The number of participants without any English language certificates was only 3, which contrasts with the 15 people without German language certificates. Four people obtained an IELTS score of 7 and above, which corresponds to a C1 level in the CEFR according to the Cambridge Assessment's score comparing table (See Appendix 8.5). A further 15 obtained the CET 6 certificate and five obtained a CET 4 certificate. This corresponds to CEFR levels B1, B2 respectively. The three individuals who did not obtain any certificates did not necessarily have less than B1 English proficiency, which may be due to the fact that they did not take any exams up to the time of their participation in the experiment. Participants' English proficiency was higher compared to their German proficiency (B1-C1)

Highest English language certificates owned	**Count**
CET-6	15
CET-4	5
IELTS 7+	4
None	3

Table 3 Highest English language certificate owned by participants

3.2.5. Learning Motivation

Likert scales are a common type of scale used in questionnaires and were first introduced in 1932 by the American social psychologist Likert (Likert, 1932). The scale usually consists of a set of

statements that can be answered with “strongly agree, agree, neither agree nor disagree, disagree, strongly disagree”. Based on Likert scale, the researcher set “very much enjoy, enjoy, neither enjoy nor do not enjoy, do not enjoy, very much do not enjoy” and “very motivated, motivated, neither motivated nor not motivated, not motivated, not very motivated” as the participants’ possible answers regarding their motivation to learn German.



Figure 6 Motivation of German learning

The majority of participants (N=25) considered themselves “motivated” or “neither motivated nor unmotivated” while learning German. Only two reported that they were not motivated at all.



Figure 7 Experience of German lessons

Half of the participants (N=13) enjoyed or very much enjoyed the German course, and three people did not enjoy or very much did not enjoy the German course offered by the University. 41% of participants (N=11) reported that they had no feeling for the German course.

3.3. Instruments

3.3.1. LexTALE English Version

Although self-reports are one of the most commonly used methods of data collection in many areas of research (Podsakoff & Organ, 1986), they have low reliability. Thus, a standardised and efficient approach to language proficiency testing is indispensable. The LexTALE is a measure of vocabulary size for L2 speakers of English with intermediate to advanced proficiency. It consists of 40 real words and 20 fictitious words selected from a vocabulary test containing 240 items proposed by Meara and colleagues (Meara, 1996).

In a large-sample experiment that included 72 Dutch people 87 Koreans, Lemhöfer and Broersma (2012) used participants' scores on the LexTALE test to estimate their English vocabulary size and overall English proficiency. The LexTALE takes only about five minutes to complete and is very easy to perform on different devices and platforms. According to Lemhöfer and Broersma (2012), the LexTALE has higher accuracy and reliability than self-assessment. Participants are presented with 60 strings, some of which are real words and some of which are not. The number of real and fictitious words is not visible to the participant. Participants need to click different keys to give feedback on whether they think the words that appear are real or not.

The online questionnaire platform used for this experiment was Qualtrics. For technical reasons, switching from one question to the next in Qualtrics requires clicking a button at a specific location on the screen. This meant that after participants had clicked on the button to feedback their judgement on the word shown, the next word waiting to be judged would not automatically appear. The LexTALE test consisted of 60 words and completing the test in the manner described above would require participants to drag and click the mouse at least 59 extra times, which would make completing the test slow and tiresome.

To save time and avoid participants losing concentration, the LexTALE test was designed as a drag-and-drop, such that words were moved to a designated area on the screen. Participants were presented with two areas labelled with the instructions "I think this is a real English word" and "I don't think this is a real English word". The participants made a judgement by dragging and dropping the words that appeared on the screen to the area they considered appropriate; this triggered the next word to appear automatically (See Appendix 8.3.4).

The final LexTALE score was determined by the percentage of correct responses. Since the percentage of correct and incorrect words varies, average correctness should be used to balance the inequity (Lemhöfer & Broersma, 2012). The final score was calculated as follows: ((number of words correct/40*100) + (number of nonwords correct/20*100))/2.

3.3.2. LexTALE German Version

In addition to the English version, the LexTALE is also available in German. In order to maintain experimental consistency, the German version of LexTALE was used in this study to test participants' German vocabulary size and to estimate their overall German proficiency. Same as the testing procedure for the English version of LexTALE (See 3.3.1), the German version of the test was also modified to drag-and-drop tasks in order to save time and maintain participants' concentration. The final score was calculated same as the English score: ((number of words correct/40*100) + (number of nonwords correct/20*100))/2.

3.3.3. Word-order Task

As discussed in the previous chapter, the same sentence can have a different WO in German and in its English and Chinese translation. To test participants' knowledge of the structure in German (L3), and the influence of Chinese (L1) and/or English (L2) on their performance, the researcher developed 30 German sentences (See Appendix 8.6), each of which contained nine words in order to maintain the consistency of the experiment.

These sentences can be categorised into groups A, B, C and D (See Appendix 8.6). Group A contains eight sentences, which keep the same WO as their English translations, but their Chinese translations have a different WO, for example:

Es gibt ein Buch auf dem <Tisch>$_1$ <Nummer>$_2$ <eins>$_3$.

There is a book on <table>$_1$ <number>$_2$ <one>$_3$.

有 一本 书 在 <一>$_3$ <号>$_2$ <桌子>$_1$ 上。

Groups B and C likewise contain eight sentences each. In group B, the German sentences have the same WO as their Chinese translations, but the English translations have a different WO, for example:

Er plante, <den Sommerurlaub>$_1$ <in anderen Städten>$_2$ zu <verbringen>$_3$.

He planned to <spend>$_3$ <the summer holiday>$_1$ <in other cities>$_2$.

他 计划，<这个 暑假>$_1$ <在 其他 城市>$_2$ <度过>$_3$。

In group C, the Chinese and English translations of the sentences have the same WO, but the German sentences themselves have a different WO than their translations, for example:

Sie sucht nach einem anderen Weg, <das>$_1$ <zu schaffen>$_2$.

She looks for another way <to achieve>$_2$ <it>$_1$.

她 寻找 另一种 方法 <来 办到>$_2$ <这>$_1$。

Group D contains a total of six sentences. They and their English and Chinese translations are all different in WO from each other, for example:

Sie mag nur den Hund, der <keine>$_1$ <Haare>$_2$ <hat>$_3$.

She only likes the dog that <has>$_3$ <no>$_1$ <hair>$_2$.

她 只 喜欢 <没>$_1$ <有>$_3$ <毛>$_2$ 的 狗。

The vocabulary used in this task is of CEFR B1 difficulty level. Certain components of these sentences were taken out and their order was disrupted to form four options for participants to choose from. The participants were not allowed to create their own sentences from scratch, because in German, sometimes new sentences formed by swapping the order of particular words still make sense. For example:

Er machte große Fortschritte, damit <ist>$_1$ <sein Lehrer zufrieden>$_2$.

He made great progress, and his teacher is satisfied with that.

Er machte große Fortschritte, damit <sein Lehrer zufrieden>$_2$ <ist>$_1$.

He made great progress so that his teacher would be satisfied.

To avoid this characteristic of German confusing the participants and affecting the results, the four options for all questions were carefully scrutinised so that one and only one option could make sense.

3.3.4. Personal Information

In addition to the WO tasks and the LexTALE test, the questionnaire contained a personal information component. This section contained nine questions which are used to collect the necessary personal information from the participants. When answering each question, the participant was informed that he/she could answer the question by using “Unwilling to disclose”.

The questionnaire was in the form of multiple-choice questions asking about age and gender for statistical purposes. A modified Likert scale (See 3.2.5 & Appendix 8.3.6) was used to investigate the participants’ motivation to learn German. The questionnaire used open questions to collect information of the length that participants had studied German and English as well as of the language certificates they possessed.

3.4. Data Collection

3.4.1. Pilot

Prior to the start of the formal study, a pilot was conducted among three Chinese students at the University of Oxford who had had no less than six months of German language study experience. Based on the results of the pilot test, two methodological adjustments were made: Firstly, the format of the WO task was changed from sorting to multiple choice. Testers spent almost five times as much time per question on the sorting task as they did on the multiple-choice task, and completing each question required them to click or drag the mouse an additional 10 times. For time-saving reasons, the WO task was set to multiple-choice in the formally distributed questionnaire.

Secondly, words in the LexTALE German Vocabulary Test were capitalised. A student participating in the pilot reported that, because of the fact that German nouns begin with a capital letter, keeping the nouns beginning with capital letter and other words not may have affected the student’s performance on the LexTALE German vocabulary test. For beginners, capitalising the first letter of a word is consistent with the capitalisation of German nouns and increases the chances of a word being judged to be a real word. To avoid this misdirection, all real and made-up words were all written in capital letters.

3.4.2. Procedure

The entire experiment was designed and distributed on Qualtrics. The experiments needed to be done on a PC or Mac, as using mobile phones or tablets could have led to compatibility issues. For example, in the LexTALE test, the words that are dragged and dropped into the designated area were always visible and took up screen space as they were stacked on smaller screens, which made them unsuitable for completing the LexTALE test. Prior to participating in the experiment, participants were told in the recruitment poster to use a computer rather than a mobile phone or tablet to complete the experiment (See Appendix 8.2).

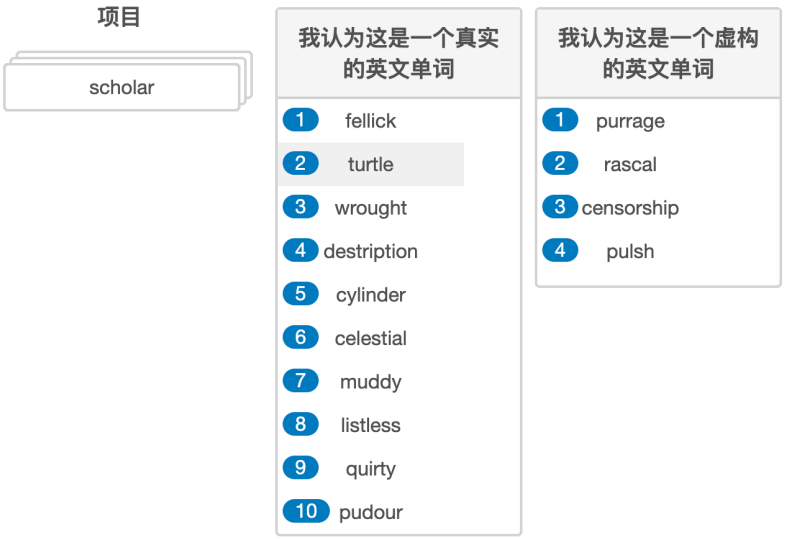


Figure 8 Screenshot of LexTALE test

Prior to the start of all questions, participants were presented with an informed consent form. The experiment only started if the participant selected the "I agree, please start the survey" option that appeared at the bottom of the screen and clicked on the blue button that appeared in the lower right corner of the screen pointing to the right (See Appendix 8.3.1). At this point, if the participant selected "I disagree, I do not want to participate", a pop-up window indicated the end of the experiment.

Once the experiment officially started, the first part was the WO task. Prior to starting the task, instructions appeared on the screen to inform participants of the estimated time needed for this part and to give them simple operation instructions (See Appendix 8.3.2).

A text prompt appeared on the screen at the end of the first part, which also informed the participants that there were different numbers of real words and fictitious to avoid

misrepresentation and they should drag and drop words that appear into the designated area to complete the test. At this point, participants could take a break if they wished (See Appendix 8.3.3). Once they were ready to answer the questions, they clicked on the blue button at the bottom right of the screen to continue.

Once the above steps were completed, participants were informed with a pop-up message that the language test section was over, and that personal information section was about to begin. Participants were informed that the subsequent questions were personal and that he or she has the right to answer any question with “uwilling to disclose”.

After the questionnaire was fully answered, the experiment ended officially. Then the screen prompted participants to enter their Alipay account number to receive 50 Yuan as a reward for their participation.

3.4.3. Analytical Strategy

Since the adaptation of the LexTALE test used in the present study required participants to drag and drop words to a fixed area instead of hitting the keyboard to give feedback on word authenticity, the data exported did not correspond to the number of correct choices made by testers, but to 108 cells (27 correct + 27 incorrect groups in the German versions + 27 correct + 27 incorrect groups in the English versions = number of participants 108) cells. To solve this problem, the researcher first opened the exported LexTALE test results in Excel to obtain the four columns of data groups: correct English words group, correct English nonwords group, correct German words group, and correct German nonwords. There are comma-separated strings in each cell that cannot be counted for comparison. The researcher disaggregated and transposed the words in each of the four groups of data cells. Disaggregation allowed for information in a cell that is separated by a character (e.g., comma, space, tab, etc.) to be broken down into multiple cells. Transposition can convert a row of data into a column, or a column of data into a row. After disaggregation and transposition, four vertically arranged tables of collections of selected strings (words) per person were obtained. The words in each data cell column were checked against the LexTALE answer column, and the string was scored as 1 if it was included in the standard answer (which contains correct answer of both real and fictitious words), or 0 if it is not included. The number of words selected by each person that matched those in the standard answer was

eventually added up. The number calculated was placed into the LexTALE score formula (See 3.3.1) to give the LexTALE score for that participant.

The other results collected from Qualtrics and the calculated scores from LexTALE tests were then cleaned using Excel 2016 and the data were imported into SAS 9.4 software for statistical analysis. Non-numerical information was substituted with relative numbers. Pearson correlation coefficients were used to explore the association between English language proficiency and German language proficiency, and Spearman correlation analyses were used to explore whether English and German language proficiency affects the learning of sequences. Two-sided tests were conducted with a test level of $\alpha = 0.05$.

Firstly, descriptive statistics were used to describe the socio-demographic characteristics of the overall students participated (See 3.2.3, 3.2.4, 3.2.5), their scores in WO tasks, and their LexTALE scores. Then, the Shapiro-Wilk test was used to test the distribution of the data. The association between English LexTALE scores and German LexTALE scores had a normal distribution, which was analysed using the Pearson correlation coefficients. The association between WO tasks scores and LexTALE scores had a non-normal distribution, which was analysed using the Spearman's correlation coefficient. The Spearman's correlation coefficient was chosen based on the type and distribution of the data, and the correlation between WO tasks component scores and LexTALE scores was analysed separately.

3.5. Ethics

This study was approved by the Central University Research and Ethics Committee (CUREC) of Oxford University (See Appendix 8.1). The data collected during all experimental phases complied with the CUREC data protection policy. All participants of this study were asked to complete an informed consent form (See Appendix 8.3.1) before participating in the experiments, and their participation in the experiments was voluntary and anonymous. The participants were allowed to answer questions concerning their privacy with the words "unwilling to disclose". Participants were told how their data was collected and how it would be used. The online survey software Qualtrics was used to collect the questionnaires according to CUREC's recommendations.

4. Results

4.1. Global Results & RQ4

Group A contained eight multiple-choice questions where the English translation had the same Word Order (WO) as the German original, but the Chinese translation had a different WO. As can be seen from the table below, more than half (N=15) of the participants avoided the wrong answer in at least seven of the questions. One third (N=9) of the respondents got five questions right, while one and two people got only three and five questions right, respectively.

Distribution of correct answer in group A (8 Questions)

Correct answer	3	5	6	7	8
Correct answer rate	37.5%	62.5%	75%	87.5%	100%
Number of participants	1	2	9	5	10
Proportion of participants	3.7%	7.4%	33.3%	18.5%	37.0%

Table 4 Distribution of correct answer in group A

Group B contained eight multiple-choice questions with the same WO in the Chinese translation and the German original, and a different WO in the English. More than half (N=15) of the participants scored full marks in this part of the test, and around a quarter (N=7) got only one question wrong. Although the majority of participants got more than 50 per cent correct, three people got only two or three questions right.

Distribution of correct answer in group B (8 Questions)

Correct answer	2	3	4	6	7	8
Correct answer rate	25%	37.5%	50%	75%	87.5%	100%
Number of participants	2	1	1	1	7	15
Proportion of participants	7.4%	3.7%	3.7%	3.7%	25.9%	55.6%

Table 5 Distribution of correct answer in group B

Questions in group C had the same WO in the Chinese and English translations, and their WO in the original German text differs from its Chinese and English translations. Around three-quarters

(N=20) got full marks in this section, a significantly higher figure than in groups A and B. The results from this group were more spread out, with almost 90 per cent of participants (N=24) getting more than 50 per cent correct.

Distribution of correct answer in group C (8 Questions)

Correct answer	2	3	5	6	7	8
Correct answer rate	25%	37.5%	62.5%	75%	87.5%	100%
Number of participants	1	2	1	1	2	20
Proportion of participants	3.7%	7.4%	3.7%	3.7%	7.4%	74.1%

Table 6 Distribution of correct answer in group C

The questions in group D had a different WO in all three languages. A decrease in the percentage of correct questions in this group can be observed. The number of participants who got all of them correct was eight, which is the lowest value among four groups. Another twelve and four got one and two questions wrong respectively. It is worth noting that there was one participant in group D, who answered all the questions incorrectly, which had not happened in the previous three groups of questions.

Distribution of correct answer in group D (6 Questions)

Correct answer	0	1	3	4	5	6
Correct answer rate	0%	16.7%	50%	66.7%	83.3%	100%
Number of participants	1	1	1	4	12	8
Proportion of participants	3.7%	3.7%	3.7%	14.8%	44.4%	29.6%

Table 7 Distribution of correct answer in group D

Looking at the results for groups A, B, C, and D together, about 90% of the participants (N=24) got at least two-thirds of the questions right, and four of them got all 30 questions right. Although the numbers are more spread out, three-fifths of the people (N=16) got more than 90% of the questions correct, and there were three, four and five people getting 27, 28 and 29 questions right respectively. There were also two participants who got a total of nine questions correct and one person who got only 15 questions correct.

Distribution of correct answer in WO tasks as a whole

Correct answer	9	15	20	25	26	27	28	29	30
Correct answer rate	30%	50%	66.7%	83.3%	86.7%	90%	93.3%	96.7%	100%
Number of participants	2	1	1	4	3	3	4	5	4
Proportion of participants	7.4%	3.7%	3.7%	14.8%	11.1%	11.1%	14.8%	18.5%	14.8%

Table 8 Distribution of correct answer in WO tasks as a whole

Group A had the lowest rate of correctness, group C had the highest rate of correctness, and the participants' performance in questions in group B was in between group A and group C. Questions in group D were the most difficult for the participants, and their rate of correctness was more than 10 per cent lower compared to Group B, which had the highest rate of correctness. the total rate of correctness of the 27 participants was 85.06% out of 30 questions, which means that everyone got an average of 25.5 questions correct.

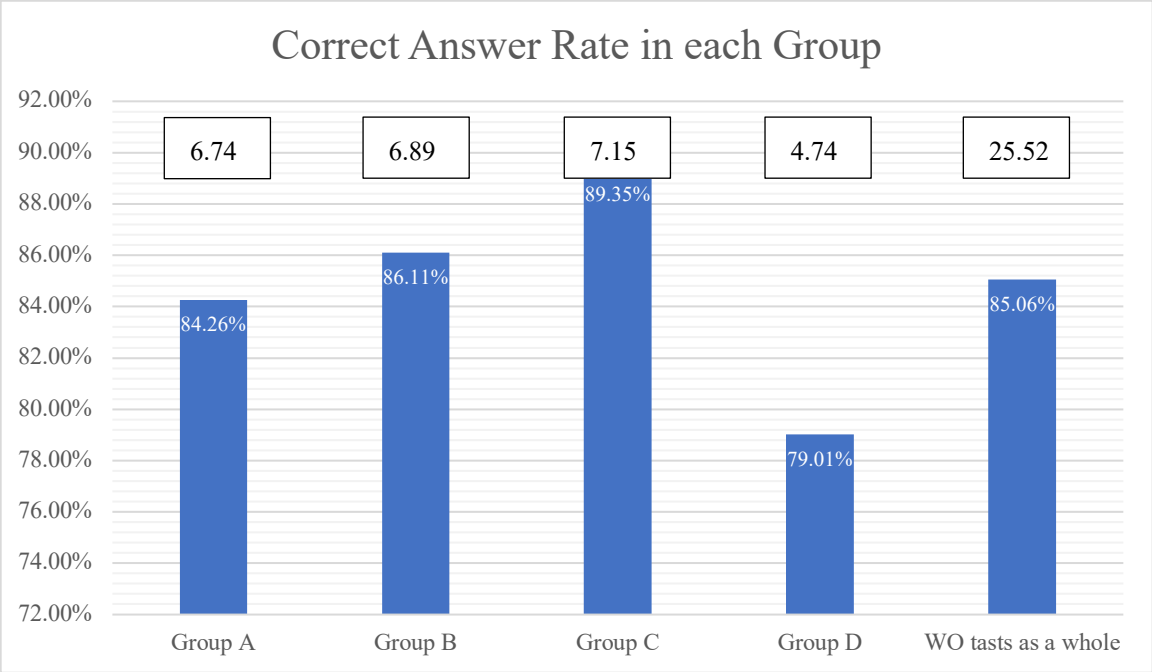


Figure 9 Correct answer rate in WO tasks

After counting the number of times a participant dragged a word to the correct area in LexTALE test, it was possible to calculate a final score for each participants using the LexTALE calculating formula (See 3.3.1). The table below shows the mean and standard deviation of the participants' scores in the two language versions.

Mean and SD of LexTALE scores

	LexTALE German	LexTALE English
Mean	56.20	65.93
Standard Deviation	±8.49	±11.58

Table 9 Mean and SD of LexTALE scores

Participants' mean scores in the German LexTALE (56.20) were significantly lower than in the English LexTALE (65.93). According to Lemhöfer and Broersma's study, a LexTALE score of less than 59 means that the participants' language proficiency is approximately equivalent to level CEFR B1, and a score between 60 and 80 indicates that the participants' language proficiency is higher, corresponding to level CEFR C1. This is consistent with the participants' self-reported language proficiency (See 3.2.1, 3.2.4). Compared to their scores on the English version, participants performed more consistently on the German LexTALE (SD=8.49, 8.49<11.58). In other words, their level of English in this experiment was more variable than their level of German.

4.2. Normality Tests

The Shapiro-Wilk test (Shapiro & Wilk, 1965) is a statistical test used to check whether a data set conforms to a normal distribution. Razali and Wah (2011) found the Shapiro-Wilk test to be the most powerful test of normality after comparing the Shapiro-Wilk test, the Kolmogorov-Smirnov test, the Lilliefors test and the Anderson-Darling test (Razali & Wah, 2011). After performing the Shapiro-Wilk test in SAS, a W-value and a p-value were obtained. The W-value is a measure between 0 and 1, and it indicates how well the data fits a normal distribution. The closer the value is to 1, the closer the data is to a normal distribution. The p-value is used to determine the probability that an observed outcome occurred by chance. In most cases, the original hypothesis is rejected if the p-value is less than the chosen level of significance ($\alpha = 0.05$), which means that the data conforms to a normal distribution. If the p-value is greater than or equal to the chosen level of significance, the original hypothesis is not rejected, which means that the data does not conform to normal distribution.

Shapiro-Wilk Tests for Normality

Variable	Statistic		p Value	
CH	**W**	0.838177	**Pr < W**	0.0007
ENG	**W**	0.635521	**Pr < W**	<0.0001
GER	**W**	0.551204	**Pr < W**	<0.0001
DIF	**W**	0.738545	**Pr < W**	<0.0001
SUM	**W**	0.692154	**Pr < W**	<0.0001
LexTALE_Eng	**W**	0.970107	**Pr < W**	0.6046
LexTALE_Ger	**W**	0.976647	**Pr < W**	0.7801

Table 10 Results of Shapiro-Wilk normality tests

Based on the results of the Shapiro-Wilk test above, if the p-value is greater than 0.05 and the W-value is close to 1, then the dataset can be considered to follow a normal distribution. Conversely, if the p-value is smaller than 0.05, the dataset can be considered not normally distributed. If the W value is far from 1, the data is not well fitted to the normal distribution. Therefore, the scores in both the English (0.6046 > 0.05; W=0.970107) and the German (0.7801 > 0.05; W=0.976647) version of the LexTALE conform to a normal distribution, while the scores from all four groups of WOs in the WO task ($p < 0.05$) and of the WO tasks as a whole ($p < 0.0001 < 0.05$; W=0.692154) do not conform to a normal distribution.

When quantitative data are normally distributed, using Pearson's correlation coefficient as an estimate of the population parameter to test the correlation between two sets of data is a common method of correlation analysis in correlation analysis. Rather, when the data violates the assumption of normal distribution, the Spearman's correlation coefficient ρ is commonly estimated as a correlation index in place of the Pearson's correlation coefficient (Myers & Sirois, 2004). Compared to using the Pearson's coefficient to measure the correlation of two sets of data when the data are not normally distributed, using the Spearman's coefficient might result in a lower probability of occurrence in terms of Type I errors (Myers & Sirois, 2004).

4.3. RQ1: Correlation between L3 proficiency and L2 proficiency

The Pearson correlation coefficient is a measure of the strength and direction of a linear relationship between two variables. This relationship is known as a linear correlation or Pearson's correlation (Pearson correlation coefficient). The Pearson's correlation coefficient can take values

between -1 and 1. A correlation coefficient value of 1 indicates a perfect positive linear relationship between two variables. An increase in the value of one of the variables increases the value of the other variable in the same proportion. A correlation coefficient value of -1 indicates a perfect negative linear relationship between the two variables. Similarly, an increase in the value of one variable decreases the value of the other variable in the same proportion. A correlation coefficient value of 0 indicates that there is no linear relationship between the two variables.

However, it is important to note that the absence of a linear relationship between two variables does not mean that they do not have any relationship with each other. For example, they may have a non-linear relationship. The correlation between two variables with correlation coefficients between |0.1| and |0.3| is generally considered to be a weak correlation, between |0.3| and |0.5| is considered to be a moderate correlation, and over |0.5| is considered to be a strong correlation (Cohen, 1995).

LexTALE scores were used to indicate the participants' overall language proficiency in English and German. The correlation between the English version of the LexTALE scores and the German version of the LexTALE scores in this study was r= 0.13496, p=0.5021. This finding suggests that there was a weak positive linear relationship between the two variables that was not significant. In other words, when one variable increases, there is a slight tendency for the other variable to increase as well, but this tendency is not significant. Based on the Pearson correlation coefficient and p-value, there is not enough statistical evidence to reject the original hypothesis (which assumes that there is no correlation between the two variables). It can be concluded that there is a linear relationship between the scores on the English version of the LexTALE and the scores on the German version of the LexTALE, but this relationship is weak. This weak positive correlation may simply be due to random variation rather than any real, meaningful relationship.

Pearson Correlation Coefficient, N = 27

Prob > |r| under H0: Rho=0

Variables	**Rho**	**p Value**
LexTALE_Ger LexTALE_Eng	0.13496	0.5021

Table 11 Spearman's rank correlation tests between LexTALE German and LexTALE English

Figure 10 is a scatter plot presenting the relationship between participants' scores on German and English version of LexTALE. It is easy to see from the graph that there is a very weak positive correlation between the two variables as described above.

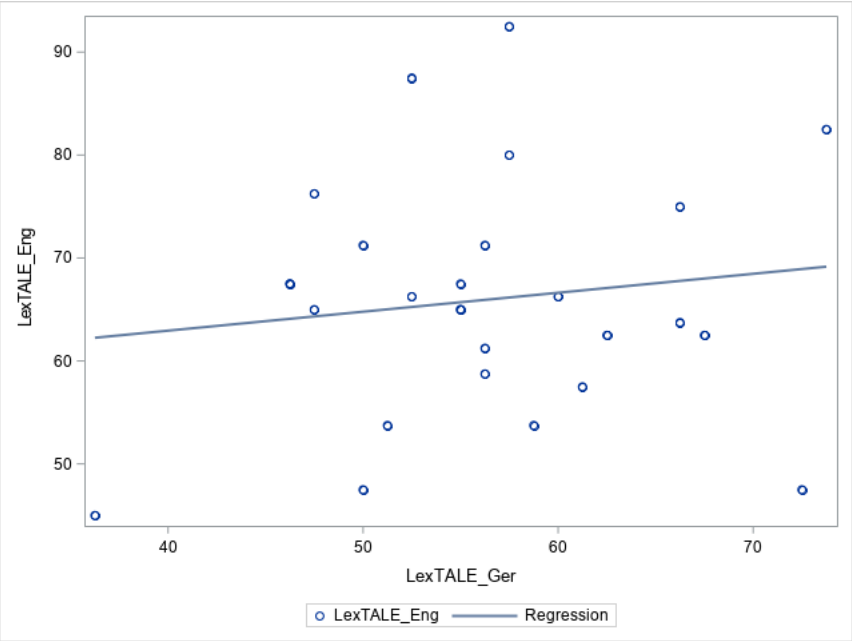


Figure 10 Scatter plot of correlation between LexTALE English and LexTALE German

it seems that a very weak positive correlation between L2 proficiency and L3 proficiency can be inferred, and that L2 proficiency can be predictive of L3 proficiency.

4.4. RQ2: Correlation between L3 proficiency and performance in WO tasks

Spearman's rank correlation coefficient is a non-parametric rank correlation statistic that measures the strength and direction of a monotonic relationship between two variables. Spearman correlation analysis is applicable not only to continuous variables, but also to ordinal variables; moreover, it does not require that the two variables follow a normal distribution or a linear relationship (Schober et al., 2018).

The Spearman correlation coefficient takes values between -1 and 1. A positive Spearman ρ means that as the value of one variable increases, the value of the other also increases. A correlation coefficient of 1 indicates a perfect positive correlation (i.e., the rank of one set of data is exactly the same as the rank of the other set of data). A negative Spearman ρ indicates that as the value of one variable increases, the value of the other variable tends to decrease. A correlation coefficient of -1 indicates a perfect negative correlation (i.e., the rank of one set of data is exactly opposite to the rank of the other set of data). A Spearman ρ of 0 indicates that there is no linear relationship between the two sets of data (cf. Spearman's rank correlation coefficient).

When performing a Spearman correlation test, a p-value is also obtained in the statistical results, which can be used to determine if the observed correlation is statistically significant.

Participants' different proficiency levels in English and German may affect their performance in different types of WO tasks, but it turns out that this statement is not correct. In this study, no correlation coefficients between scores on German version of the LexTALE and any groups of WO tasks was observed that were close to either 1 or -1 (ρ=0.12996, 0.26603, 0.09531, -0.01383), and there were no p-values smaller than 0.05 (p=0.5182, 0.1798, 0.6363, 0.9454). Therefore, the monotonic relationship between German version LexTALE scores and WO tasks was not significant in this study.

Spearman Correlation Coefficients, N = 27
Prob > |r| under H0: Rho=0

Variables	Rho	p Value
SUM LexTALE_Ger	0.07934	0.6941
CH LexTALE_Ger	0.12996	0.5182
ENG LexTALE_Ger	0.26603	0.1798
GER LexTALE_Ger	0.09531	0.6363
DIF LexTALE_Ger	-0.01383	0.9454

Table 12 Spearman's rank correlation tests between LexTALE German and WO tasks

The above results imply that even if participants have a higher level of proficiency in German, they are not necessarily able to perform well in the WO task.

4.5. RQ3: Correlation between L2 proficiency and performance in WO tasks

In this study, no correlation coefficients between scores on English Version LexTALE and any groups of WO tasks was observed that were close to either 1 or -1 (ρ=-0.10938, 0.14089, 0.14333, -0.11922), and there were no p-values less than 0.05 (p=0.5871, 0.4833, 0.4757, 0.5536). Therefore, there was no significant monotonic relationship between English version LexTALE scores.

Spearman Correlation Coefficients, N = 27
Prob > |r| under H0: Rho=0

Variables	Rho	p Value

SUM LexTALE_Eng	0.06142	0.7609
CH LexTALE_Eng	-0.10938	0.5871
ENG LexTALE_Eng	0.14089	0.4833
GER LexTALE_Eng	0.14333	0.4757
DIF LexTALE_Eng	-0.11922	0.5536

Table 13 Spearman's rank correlation tests between LexTALE English and WO tasks

From the above results, it is clear that the participants' proficiency in L2 English was not related to their performance in the WO tasks.

5. Discussion

The purpose of this study was to explore the cross-linguistic influences encountered by native Chinese speakers with English learning experience when learning German as a third language (L3). This chapter will attempt to explain the results of the experiment in the previous section and compare them with the results of similar previous experiments. This chapter is divided into three parts, the first part will explain the results of the word-order (WO) task to answer RQ4, and the second part will provide answers to RQ1, RQ2 and RQ3. Part 3 will point out the systematic shortcomings of this study that reduce its reliability.

5.1. Further Explanations for Participants' Performance in WO tasks

RQ4 asked how does the transfer of WO from background languages Chinese (the first language, L1) and English (the second language, L2) to the target language German (L3) happen. Recalling the results of the experiment, participants performed less well on the WO task with regards to group A sentences than with regards to group B sentences (correctness rate: 84.26% < 86.11%, See 4.1). For group A, the German (L3) sentences that the participants saw had the same WO as their English (L2) equivalents; the Chinese equivalents of these sentences would have different WOs. As such, group A sentences could explore transfer from the L2 to the L3. In group B, the German sentences that the participants saw had the same WOs as their Chinese equivalents; the English equivalents were different in terms of WO. As such, group B sentences could reveal transfer from the L1 to the L3.

Assuming that WO transfer always occurs among the participants, then the above results suggest that the transfer from the L2 to the L3 (which occurred in group A) was not as strong as (correctness rate: 84.26% < 86.11%) the transfer from L1 to L3 (which occurred in group B). This seems to be consistent with the findings of Williams and Hammarberg (1998), mentioned in 2.2, that the relative strength between L1 and L2 determines which language will transfer to L3. Similarly, Lindqvist (2010) argues that only the background languages with the highest proficiency will be involved in L3 transfer.

However, this conclusion seems untenable when looking at the participants' performance on the questions in groups A, B, and C together. Participants performed best in group C, where the original German version of the questions differed in WO from both their Chinese and English

equivalents. The high performance in group C sentences cannot be the product of positive transfer from the L1, Chinese, or the L2, English. It can suggest, however, that the participants were not affected by negative transfer from their first and second languages.

Two assumptions can be used to interpret the data. These are that:

1) the valence of transfer from the background languages to the target language L3 is stable across background languages (i.e., if the transfer from any one background language is positive, then transfer from all background languages will also be positive; if transfer from any one background language is negative, the transfer from all background languages will also be negative); and

2) positive transfer is only possible if the WO of one/both of the background languages is similar to the target language, and that negative transfer is only possible if the WO of one/both of the background languages is different from the target languages.

Based on these assumptions, the interpretation of the results from group A and B and the interpretation of the results from group C sentences are contradictory:

1. If transfer is always positive, the results in groups A and B can be interpreted to mean that positive transfer from the L1 and the L2 occurs, but the positive transfer from the L2 (Group A) is weaker than that from the L1 (Group B). Participants performed the worst in group D, which contained sentences that would have different WO in all three languages. When all three languages are different from each other, neither the L1 nor the L2 can be transferred; then it is reasonable that the participants scored the lowest in group D. Since, in group C sentences, the WO of the L1 and L2 differs from the WO of the L3, then participants should not have experienced any positive transfers, and they should have scored lower in group C than they did in group A and B – which is not what the findings suggested.

2. If transfer is always negative, the results in groups A and B can be interpreted as transfer occurring from both the L1 and the L2, but the negative transfer from L1 (Group A) is stronger than L2 (Group B). When all three languages are different from each other, the L1 and the L2 lead to negative transfer. This explanation still accounts for the fact that participants scored the lowest in group D. However, since the WO in both the L1 and the L2 is different from that of the L3, then participants should also experience negative

transfer from the two background languages in their L3, and have lower scores in group C sentences than in group A and B sentences – which, once again, is not reflective of the findings from the task.

Thus, both of the inferences above are inconsistent with the fact that participants scored higher in group C than in groups A and B, and therefore the valence of transfer was not stable. Thus, background language transfer is sometimes positive and sometimes negative. Based on the above reasoning, it is reasonable that even if positive transfer (which happens when the WO is the same in the background language and the target language) and negative transfer (which happens when the WO is different in the background language and the target language) occur at the same time, the participants' scores in group D (where all languages' WOs are different) are lower than those in group A (where the L1 WO is different from the L2 and L3), and that the scores in group A are lower than those in group B (where the L2 WO is different from the L1 and L3). But the explanation for the highest scores in group D remained unclear.

People sometimes deliberately suppress L1 activation when trying to express in a third language (Williams & Hammarberg, 1998; Angelis, 2005). They may subconsciously believe that the native language they are familiar with is different from the target language, and that the first step to mastering a non-native language is to discard the structural expressions in their native language. In group C, the L1 had the same sentence WO as the L2. Given that the participants generally had a high level of English proficiency (their mean LexTALE score was 65.93), their L2 knowledge may have been suppressed and not activated by the participants; this is what happens to their L1 knowledge when using L3 (Williams & Hammarberg, 1998; Angelis, 2005). In other words, if people find that a WO pattern is the same in all of their background languages, they will tend to think that this WO pattern cannot be generalised to the unfamiliar target language. This could explain why participants gained the highest score in group C.

5.2. Interpretation of Statistical Results

5.2.1. Weak Correlation between L2 and L3 proficiency

According to the results of the experiment, there was a weak positive correlation between the participants' proficiency in English (L2) and German (L3), but this positive correlation was very weak (ρ=0.13496). The existence of a positive correlation between background language and

target language proficiency is in line with common sense. This is because the more languages a person has learnt or has mastered, the more experienced they are in the matter of learning languages than monolinguals, and therefore their ability to learn a new language is higher. The correlation between the participants' proficiency in English and German is consistent with the Cumulative Enhancement Model (Flynn et al, 2004). But this positive correlation was so weak that the slope of the line in the depicted scatterplot was very close to horizontal. This weak relationship was abnormal.

This experiment used the participants' scores in the LexTALE (Lemhöfer & Broersma, 2012) as a proxy for their language level. However, LexTALE scores may not be wholly representative of the participants' language level. Bonvin and his colleagues (2023) claimed that there is a lack of researchers demonstrating that the German version of the LexTALE score can or cannot represent one's general language proficiency in German.

The 27 participants recruited for this experiment had on average far more experience of learning English than German. The shortest time of English learning among the participants was six years, while the longest time of learning German was 31 months. After a period of time, the participants' English proficiency may have stagnated. German, on the other hand, was a newer language for all participants, and everyone was at a beginner or intermediate stage of learning. This suggests that the participants' proficiency in German will likely increase rapidly as their length of study and exposure increases. The difference between the learners' L2 and L3 learning experiences results in a non-representative sample. The results might have been different if the sample included learners who were at a more elementary level in both English and German.

These two reasons, that the sample has a low representativeness and that the LexTALE scores are not fully representative of overall language proficiency, could explain the weak and non-significant correlation between L2 and L3 proficiency.

5.2.2. Statistical irrelevance between L2 & L3 proficiency and performance in WO tasks

The results of the experiment demonstrated that there was no monotonic relationship between participants' proficiency in English and their performance in the WO tasks. Even when participants were confronted with sentences that had the same WO in English and German, there was no significant relationship between L2 proficiency and the participants' accuracy rate on

these questions. This finding contradicts Croft (1990), who suggested that similar syntactical structures between the two languages would lead transfer.

The results of the experiment also showed that there was no significant monotonic relationship between proficiency in German and participants' performance in the WO tasks. This suggests that participants with a higher level of German proficiency did not always answer more questions correctly in the WO tasks. The most important reason for this is that participants' higher scores on the LexTALE do not mean that they also have a better grasp of German grammar and a clearer understanding of German word order. This logic also applies to the English LexTALE score.

On the other hand, since the LexTALE test appeared in the second part of the experiment, participants could have lost concentration as the first part of the experiment (the WO task) took about 20 minutes. Moreover, participants may have skipped the instructions about the LexTALE (which were presented in a conspicuous place and gave participants a brief introduction to test and the precautions to be taken in answering it) before starting the test.

Furthermore, the questions in the WO tasks all contained a total of nine German words in order to reduce bias by making it impossible for participants to guess the true purpose of the experiment (See Appendix 8.6). Although the researcher used B1 level vocabulary as much as possible, in order to make the sentences fit the length required for the experiment, some grammatical structures that beginners of German may have not been exposed to were included. These unfamiliar grammatical structures and the verb and noun inflections resulting from these grammatical structures may have confused participants having low German proficiency. At the same time, the B1 level vocabulary and the grammatical structures that c be formed with this vocabulary may have been too simple for another group of participants. This group might have been so familiar with the vocabulary and structure of the sentences in the WO task that they could select the correct option in a very short response time without thinking too much. Thus, the scores that participants with different levels of proficiency in the German obtained in the WO task may not truly reflect their mastery of German WOs.

Finally, although the sample excluded participants who completed the WO test in a very short amount of time (shorter than 10 minutes, see 3.2.2), the sample may still contain answers from participants with a strong sense of anti-reconnaissance consciousness. These participants randomly clicked the mouse in order to win the experimental incentive and deliberately stayed longer in each question to disguise that they were thinking when they answered the question. The

above phenomena may have led to a non-monotonic relationship between LexTALE scores and participants' scores on the WO task.

5.3. Limitations

This section will identify five areas that may affect the reliability and validity of this study.

Sampling

The online dissemination and snowball sampling used for this study allowed for participants to be recruited regardless of time and space constraints. However, this method of data collection made it difficult to effectively control the participants' identity . Participants who did not satisfy the conditions of participation may have disguised their identity to participate in the experiment for incentives. In addition, participants' behaviour during their participation in the experiment is difficult to monitor online.

An small sample size can directly affect the validity and reliability of a study. A similar study (Koban, 2022) suggested that the participation of 100 participants would be required to ensure that a statistical relationship between language proficiency in L1, L2 and L3 would be found, if ever such a relationship existed. The final collection of 27 valid data points for this study was considerably less than the number above. It is far from being representative of the entire population of native Chinese speakers with English language learning experiences who are~ majoring German studies.

The selected University is one of the top universities in China with the strictest admission standards. This means that the overall academic level of the University students is higher than the average academic level of Chinese university students. Furthermore, in addition to university students, there are also secondary school students and other adults learning German in China. The data collection of the whole experiment was carried out at the Institute of German Studies of one University in Zhejiang. Therefore, the sample is insufficiently representative of the total population.

Participant bias

Although the entire experiment was conducted anonymously, the experiment suffered from social desirability bias (Nederhof, 1985). Recruitment poster for the experiment were posted in WeChat

group and on the university's on-campus online platform. Since the recruitment posters were visible to all German students at the university, this may have led to students discussing the possible results of the experiment with each other. Despite being explicitly told not to use any aids, including dictionaries, and to complete the experiment independently, participants might have wanted to obtain the highest possible scores in the experiment in order to win the approval of others around them.

Native language testing

This study did not test participants' native language proficiency. In general, participants' proficiency in their mother tongue should be much higher than in L2 English and L3 German. If a person shows exceptional language learning ability, this may be because the learning experience of L2 helps L3 to a great extent. But this can also be interpreted as the person being linguistically talented, which can be verified through native language proficiency test. Learning a new language can be influenced by both the native language and the previously acquired language. Therefore, in future studies, the estimation of participants' language proficiency should be more multifaceted and include native language proficiency tests.

Lack of qualitative data

Quantitative studies can explain the statistical relationship between participants' different levels of language proficiency and their performance on WO task. However, the reasons behind this relationship cannot be explained by quantitative data. An interview with some participants following the questionnaire would be meaningful. The qualitative study could not be conducted due to time constraints and limted resources of a master's study. In future studies, interviews with selected participants who performed the best and worst in the WO tasks regarding their learning routine could compensate for this methodological limitation.

Outliers

There were still outliers in the data. For instance, one participant completed the full WO task in a very short period of time and achieved a perfect score. This participant fulfilled the condition of being a German major with English learning experience. However, he had taken an immersion German class in high school, which could have made him perform significantly better than the other participants.

Moreover, the Scope of this study is rather narrow, focusing only on a single grammatical feature. Future research could be conducted on other grammatical features, such as tenses and articles, which occur widely in both German and English but not in Chinese.

6. Conclusion and Implications

The goal of this study was to explore the Cross-linguistic influence faced by Chinese people who have had experience in learning English (L2) while learning German (L3). Despite the limitations mentioned above, this study still gave rise to results. A weak positive correlation was found between L2 proficiency in English and L3 proficiency in German in the sample. The positive correlation between the two variables is due to the fact that English and German are typologically similar, while the weak relationship is due to the underrepresentation of the sample and the inability of LexTALE scores to totally reflect language proficiency. Neither L2 nor L3 proficiency in the sample was related to the participants' performance in the WO task. Those who scored higher on the LexTALE were likely to perform even worse on the WO task, which could be attributed to the inability of the LexTALE scores to fully represent the participants' L3 grammatical proficiency and some of the participants' lower proficiency in L3 German.

It was also found that there was some transfer from both the L1 and L2, and that this transfer was both positive and negative. It appears that when the WO is the same in the participants' L1 and L2, participants repress activation in both languages during output L3. This is similar to the findings of other scholars (Williams & Hammarberg, 1998; Angelis, 2005).

The findings of this study will be of positive help to Chinese learners of German, to those who teach German, and to those who develop teaching materials. The findings of this study could also be extended to Chinese learners of other foreign languages, especially if the foreign language is typologically similar to German. Teachers should incorporate these findings into their teaching to target and improve their teaching methods. They could prompt students when a grammatical structure is present in at least one of their background languages. When teachers want their students to produce in the target language, they could ask students to do so based on the acquired knowledge of their background languages. For the developer of materials, materials that are specifically designed for learners of the same target language with the same background languages should give clear instructions to inform users of the presence and similarity of each grammatical features in the target language and the background languages.

In future studies, other researchers could increase the sample size, develop different test questions for participants with different levels of language proficiency, test the participants' native language level, administer the task under supervision, select other tests of language proficiency that are

more representative of the participants' overall language proficiency, and design a qualitative component for the study to challenge or support the reliability and validity of this study. In addition, WO is only a small grammatical feature of the syntax, and future research could be extended to other grammatical features.

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8. Appendix

8.1. CUREC approval

Department of Education
Social Sciences Division
University of Oxford

28 March 2023

Dear XXX,

Research ethics approval

Research title:
Cross-linguistic influence among Chinese learners of English (L2) and German (L3)

Research ethics reference:
EDUC_C1A_23_141

The above application has been considered on behalf of the Education Departmental Research Ethics Committee (DREC) in accordance with the University's procedures for ethical approval of all research involving human participants.

I am pleased to confirm that, on the basis of the information provided to the DREC, ethics approval has now been granted for this study.

Please note the following:
Personal data: It is the responsibility of the PI to ensure that all personal data collected during the project is managed in accordance with the University's guidance and legal requirements.

In-person activities: Any data collection involving in-person interactions with participants must have an up-to-date fieldwork risk assessment in place; further guidance is available from the Safety Office's website.

Amendments: Please notify the committee if you intend to make any amendments to the information in your ethics application as submitted at date of this approval, as all changes must receive ethical approval prior to implementation. The amendment form is available on the SSH IDREC webpage.

We welcome feedback on your experience of the ethical review process and suggestions for improvement.

Please email any comments to staff.curec@education.ox.ac.uk / student.curec@education.ox.ac.uk or ethics@socsci.ox.ac.uk.

Yours sincerely
Liam Francis Gearon
DREC Chair

8.2. Participant Recruitment Poster



Figure 11 Recruitment poster

8.3. Questionnaire

8.3.1. Participant Information Sheet

本实验的目的是探索有英文知识储备的中国人在学习德语时受到的来自中文和英文的影响。非常感谢你对参与这项实验的兴趣！你被邀请参加实验是因为：1. 你是以中文为母语的成年人。2. 你具备英语知识。3. 你在大学里以德语为专业。

该实验首席研究员是 Chenghui Tan（谭程辉），隶属于牛津大学的教育系。这项实验是在 Faidra Faitaki 博士的指导下完成的。这项实验已经过牛津大学伦理委员会[EDUC_C1A_23_141]审查，并获得了伦理许可。 在这项研究中，你将被要求完成单项选择任务以及一个英语和德语词汇表现测试（LexTALE）。之后，你将填写一份关于你的年龄、性别和语言学习经历的表格。

整个过程大约需要 20-30 分钟。完成实验后，请留下你的支付宝账号，你将通过支付宝获得 50 元人民币的报酬！再次感谢!

Q&A:

---我一定要参加吗?

不，参与是自愿的。如果你决定参加，你可以在实验的任何时候退出 Qualtrics。未完成实验的参与者的数据将被删除。然而，由于在线实验不可记录可识别的个人信息，一旦测试任务和测试后的问题完成，退出研究将不再可能。如果你退出，你将不会得到实验的报酬。

---我的数据将如何被使用?

我们不会收集任何可以直接识别你的数据。所有数据将被匿名化，并将被分析和写成学位论文。我们将采取一切合理措施，确保数据保密。

---如果我有疑问或者我想投诉，我应该联系谁?

如果你对这项研究的任何方面有疑问，请与我本人（chenghui.tan@kellogg.ox.ac.uk）或我的导师 Faidra Faitaki 博士（仅英文）（faidra.faitaki@education.ox.ac.uk）联系。

请注意，只有年满 18 岁或以上的人才能参与本调查！ 如果你已经阅读了上述信息，并同意参与，并理解你提交的数据将得到相应的处理，请勾选下面的方框开始。

☒ 我同意，开始调查
☒ 我不同意，我不想参与

>>

8.3.2. Word-order Tasks

由于兼容性问题，请尽量使用电脑/mac 来完成实验，否则可能导致完成问卷时间更长。
第一部分是 30 个单项选择题。这大概会花费 10-20 分钟时间。
如果你准备好了，点击下方按钮继续！

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Es gibt ein Buch auf dem ___.

- Tisch Nummer eins
- Tisch eins Nummer
- eins Nummer Tisch
- Nummer eins Tisch

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Herr Schmidt zieht sich ___ an.

- ein in Rot Kleid
- ein Kleid in Rot
- in ein Rot Kleid
- ein Rot in Kleid

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Ich freue mich auf meinen ___.

- in kommenden Urlaub Spanien
- in kommenden Spanien Urlaub
- kommenden Urlaub in Spanien
- in Spanien kommenden Urlaub

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Meine Schwester studiert Medizin an ___.

- einer Berlin in Universität
- in einer Universität Berlin
- einer in Berlin Universität
- einer Universität in Berlin

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Meine Eltern wohnen in einer kleinen ___.

- Fluss am Stadt
- am Stadt Fluss
- am Fluss Stadt
- Stadt am Fluss

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Sie kommt in ein Zimmer, ____.

- worin ein Hund sitzt
- worin sitzt ein Hund
- worin ein sitzt Hund
- ein Hund sitzt worin

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Frau Müller hat einen ___.

- mit dem Hund Namen Anna
- Hund mit dem Namen Anna
- mit dem Namen Anna Hund
- mit dem Namen Hund Anna

>>

请选择你认为有意义的句子。

- Um zu Schlafen, er sucht nach einem großen Bett.
- Er sucht um zu Schlafen nach einem großen Bett.
- Er sucht nach einem großen Bett, um zu Schlafen.
- Er um zu Schlafen sucht nach einem großen Bett.

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Sie soll nicht ___.

- kritisiert werden wegen ihrer vorherigen Taten
- wegen ihrer vorherigen Taten kritisiert werden
- werden kritisiert wegen ihrer vorherigen Taten
- wegen ihrer vorherigen Taten werden kritisiert

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Herr Schneider mag es, ___.

- zu spielen Fußball mit Freunden
- mit Freunden zu spielen Fußball
- zu spielen mit Freunden Fußball
- mit Freunden Fußball zu spielen

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Leute sollen etwas tun, ___.

- um die Umwelt zu schützen
- zu schützen um die Umwelt
- um zu schützen die Umwelt
- die Umwelt um zu schützen

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Er machte große Fortschritte, ___.

- damit ist zufrieden sein Lehrer
- damit zufrieden ist sein Lehrer
- damit ist sein Lehrer zufrieden
- sein Lehrer zufrieden damit ist

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Er ___, deshalb war er traurig.

- wurde von Mitschülern gemobbt
- wurde gemobbt von Mitschülern
- von Mitschülern gemobbt wurde
- wurde Mitschülern von gemobbt

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Er plante, ___.

- den Sommerurlaub in anderen Städten zu verbringen
- den in anderen Städten Sommerurlaub zu verbringen
- zu verbringen den Sommerurlaub in anderen Städten
- zu verbringen in anderen Städten den Sommerurlaub

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Ich muss mich ___.

- auf den bald kommenden Feiertag vorbereiten
- vorbereiten auf den Feiertag kommenden bald
- auf den kommenden bald Feiertag vorbereiten
- vorbereiten auf den bald kommenden Feiertag

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Frau Fischer möchte ___.

- sprechen mehr auf Englisch im Alltag
- im Alltag mehr auf Englisch sprechen
- auf Englisch im Alltag mehr sprechen
- sprechen im Alltag mehr auf Englisch

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Können Sie ___, meine Hausaufgaben zu erledigen?

- mir dabei helfen
- mir helfen dabei
- helfen mir dabei
- dabei mir helfen

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Die Eltern sollen sich ___.

- kümmern um das Kind mehr
- mehr kümmern um das Kind
- kümmern mehr um das Kind
- mehr um das Kind kümmern

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Sie haben sich auf das ___.

- neue Abenteuer sehr gefreut
- gefreut neue Abenteuer sehr
- sehr neue Abenteuer gefreut
- sehr gefreut neue Abenteuer

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Der Lehrer sagt, dass sie ___.

- muss die Aufgabe machen
- muss machen die Aufgabe
- die Aufgabe muss machen
- die Aufgabe machen muss

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Er vertraute ganz darauf, dass ___.

- ihr gelingen es würde
- es ihr gelingen würde
- es würde ihr gelingen
- würde es ihr gelingen

>>

请选择你认为正确的单词排序，使下面这句话有意义。
In dem letzten Urlaub hat ___.

- er abgefahren ganz Deutschland
- abgefahren er ganz Deutschland
- er ganz Deutschland abgefahren
- er Deutschland abgefahren ganz

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Der gelbe Bus ___.

- ist vorbeigefahren und hat nicht gehalten
- vorbeigefahren ist und nicht gehalten hat
- ist vorbeigefahren und hat gehalten nicht
- ist vorbeigefahren und nicht hat gehalten

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Sie sucht nach einem anderen Weg, ___.

- schaffen zu das
- das zu schaffen
- zu das schaffen
- zu schaffen das

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Er möchte nicht, ___.

- die Gegenstände da kaputt zu machen
- kaputt zu machen die Gegenstände da
- zu machen die Gegenstände da kaputt
- die da Gegenstände kaputt zu machen

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Die Jugendlichen lernten, ___.

- was war hier vor Jahren los
- hier vor Jahren was war los
- was hier vor Jahren los war
- hier vor Jahren los war was

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Sie mag nur den Hund, ___.

- der hat keine Haare
- keine Haare hat der
- keine Haare der hat
- der keine Haare hat

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Er hat viel gesprochen, aber ___.

- gar nichts hat gesagt
- hat gar nichts gesagt
- nichts hat gar gesagt
- gesagt gar nichts hat

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Ich habe gestern ___.

- meine zwei roten Autos lassen reparieren
- lassen reparieren meine zwei roten Autos
- meine zwei roten Autos reparieren lassen
- lassen meine zwei roten Autos reparieren

>>

请选择你认为正确的单词排序，使下面这句话有意义。
Wir haben ___ getroffen.

- in dem gestern neuen Restaurant uns
- uns gestern in dem neuen Restaurant
- in dem neuen Restaurant uns gestern
- gestern uns in dem neuen Restaurant

>>

8.3.3. LexTALE Introduction Sheet

第一部分的测试题结束了！辛苦啦，下面是一个关于英文和德文单词能力的测试。

首先是英文单词测试：我准备了 63 个英文单词（LexTALE），他们中的部分是真实的，部分是虚构的（这意味着某些单词根本不存在！是编出来的！）。请辨别这些单词并将他们分类！
接下来是德文单词测试：我同样准备了 63 个德文单词（LexTALE），他们中的部分是真实的，部分是虚构的。同样请辨别这些单词并将他们分类！

！！！注意：真实单词和虚构单词并非平均分布，这意味着他们的比例不是 1:1，完全按照感觉来完成！！！

这一部分大约耗时 10 分钟，如果准备好就继续吧！

8.3.4. English LexTALE Test

请拖拽左侧的63个单词至右侧分类框。---英文单词测试---

！！！注意：真实单词和虚构单词并非平均分布，这意味着他们的比例不是1:1，完全按照感觉来完成！！！

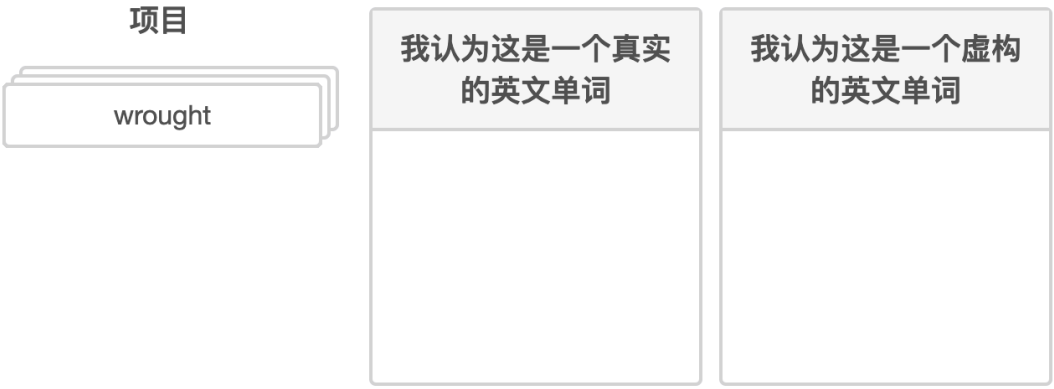


Figure 12 LexTALE English test

>>

8.3.5. German LexTALE Test

请拖拽左侧的63个单词至右侧分类框。---德文单词测试---

由于大小写可能会透露单词信息（例如大写往往意味着这是一个名词），所以你看到的单词全是大写。

！！！注意：真实单词和虚构单词并非平均分布，这意味着他们的比例不是1:1，完全按照感觉来完成！！！

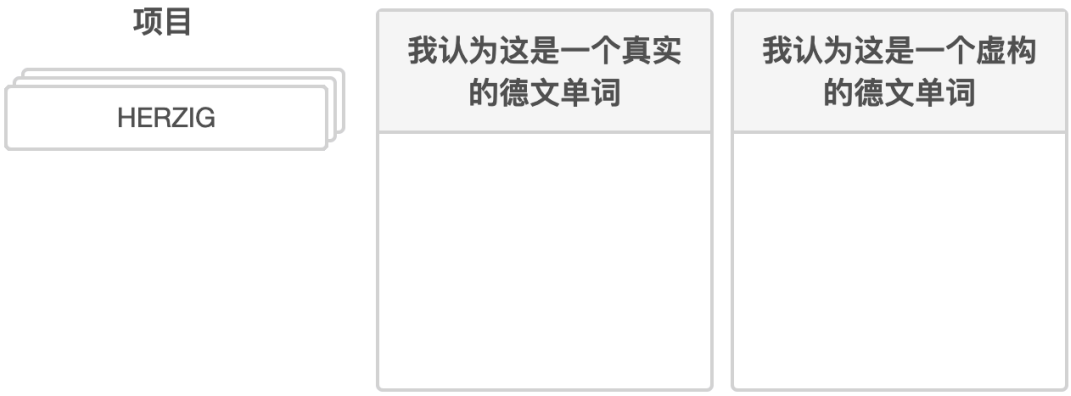


Figure 13 LexTALE German test

>>

8.3.6. Personal Information Sheet

第二部分的测试题结束了！

辛苦啦，最后是一些参与者特征问题。这些问题涉及个人隐私，如果你不愿意透露，可以在选择题中点击最后的“不愿透露”选项或者在填空题中输入“不愿透露“。

这一部分有 9 个问题，大约耗时 3 分钟，如果准备好就继续吧！

>>

你的年龄是？

- 18-20
- 21-25
- 26 及以上
- 不愿透露

>>

你的性别是?

- 女士
- 男士
- 其他
- 不愿透露

>>

你学英语多久了？我学习英语已经__月（注意是月!!）。(你可以选择输入“不愿透露”)

>>

你有任何英语证书嘛？我有__。(比如 CET-4/6, TEM-4/8, IELTS, TOEFL，如果可以的话请注明成绩）(你可以选择输入“我没有”或者“不愿透露”)

>>

你学德语多久了？我学习德语已经__月（注意是月!!）。(你可以选择输入“不愿透露”)

>>

你有任何德语证书嘛？我有__。(比如 Goethe Zertifikat, DSH, DaF，如果可以的话请注明成绩）(你可以选择输入“我没有”或者“不愿透露”)

>>

除了普通话之外，你可以流利的说任何其他语言或者方言嘛？我会说__。(你可以选择输入“我不会”或者“不愿透露”)

>>

你对学习德语感到有动力嘛?

- 超级无敌有动力
- 有动力
- 一般
- 没有动力
- 超级无敌没动力
- 不愿透露

>>

你享受学校所提供的德语语言课程嘛？（最后一个问题啦!）

- 我超级无敌享受
- 我享受
- 一般
- 我不享受

- 我超级无敌不享受
- 不愿透露

>>

8.4. LexTALE Words List

The columns contain the following information:

- First column: Item number. (Note that the first three items are dummies.)
- Second column: Item.
- Third column: word status; 0=nonword, 1=word.

0	platery	0
0	denial	1
0	generic	1
1	mensible	0
2	scornful	1
3	stoutly	1
4	ablaze	1
5	kermshaw	0
6	moonlit	1
7	lofty	1
8	hurricane	1
9	flaw	1
10	alberation	0
11	unkempt	1
12	breeding	1
13	festivity	1
14	screech	1
15	savoury	1
16	plaudate	0
17	shin	1
18	fluid	1

19	spaunch	0
20	allied	1
21	slain	1
22	recipient	1
23	exprate	0
24	eloquence	1
25	cleanliness	1
26	dispatch	1
27	rebondicate	0
28	ingenious	1
29	bewitch	1
30	skave	0
31	plaintively	1
32	kilp	0
33	interfate	0
34	hasty	1
35	lengthy	1
36	fray	1
37	crumper	0
38	upkeep	1
39	majestic	1

40	magrity	0
41	nourishment	1
42	abergy	0
43	proom	0
44	turmoil	1
45	carbohydrate	1
46	scholar	1
47	turtle	1
48	fellick	0
49	destription	0
50	cylinder	1
51	censorship	1
52	celestial	1
53	rascal	1
54	purrage	0
55	pulsh	0
56	muddy	1
57	quirty	0
58	pudour	0
59	listless	1
60	wrought	1

Figure 14 LexTALE English words list

The columns contain the following information:

- First column: Item number. (Note that the first three items are dummies.)
- Second column: Item.
- Third column: word status; 0=nonword, 1=word.

0	WOLLE	1
0	TERMITÄT	0
0	ENORM	1
1	WELSTBAR	0
2	REUEVOLL	1
3	ZUOBERST	1
4	RUPPIG	1
5	PETURAT	0
6	KLAGLOS	1
7	ZUGIG	1
8	TURBULENZ	1
9	ZEHE	1
10	DEGERATION	0
11	UNTIEF	1
12	ZÜCHTUNG	1
13	PENSIONAT	1
14	ZAPFEN	1
15	STAKSIG	1
16	STALMEN	0
17	MALZ	1
18	FEIGE	1

19	FÜRREN	0
20	RASEND	1
21	FEIST	1
22	KLEMPNER	1
23	AUSREBEN	0
24	KANNIBALE	1
25	SCHWACHHEIT	1
26	ERBARMEN	1
27	VERMASTIGEN	0
28	SUBVERSIV	1
29	SATTELN	1
30	PLANG	0
31	EIMERWEISE	1
32	SCHEIL	0
33	STOCKFEST	0
34	MEHLIG	1
35	DÄMMRIG	1
36	GAREN	1
37	TRACHTER	0
38	ANPROBE	1
39	MONSTRÖS	1

40	SONITÄT	0
41	SPEICHERUNG	1
42	MALODIE	0
43	NARKE	0
44	STRÄHNE	1
45	DESTILLATION	1
46	LEUCHTE	1
47	FLINTE	1
48	MACKEL	0
49	ENTSACHTUNG	0
50	GEOGRAPH	1
51	SUMMIERUNG	1
52	WAGHALSIG	1
53	ZIERDE	1
54	FAUNIK	0
55	LUDAL	0
56	KLAMM	1
57	DRAUNIG	0
58	FLISTOR	0
59	UNSTETIG	1
60	HERZIG	1

Figure 15 LexTALE German words list

8.5. IELTS Score Comparing Table

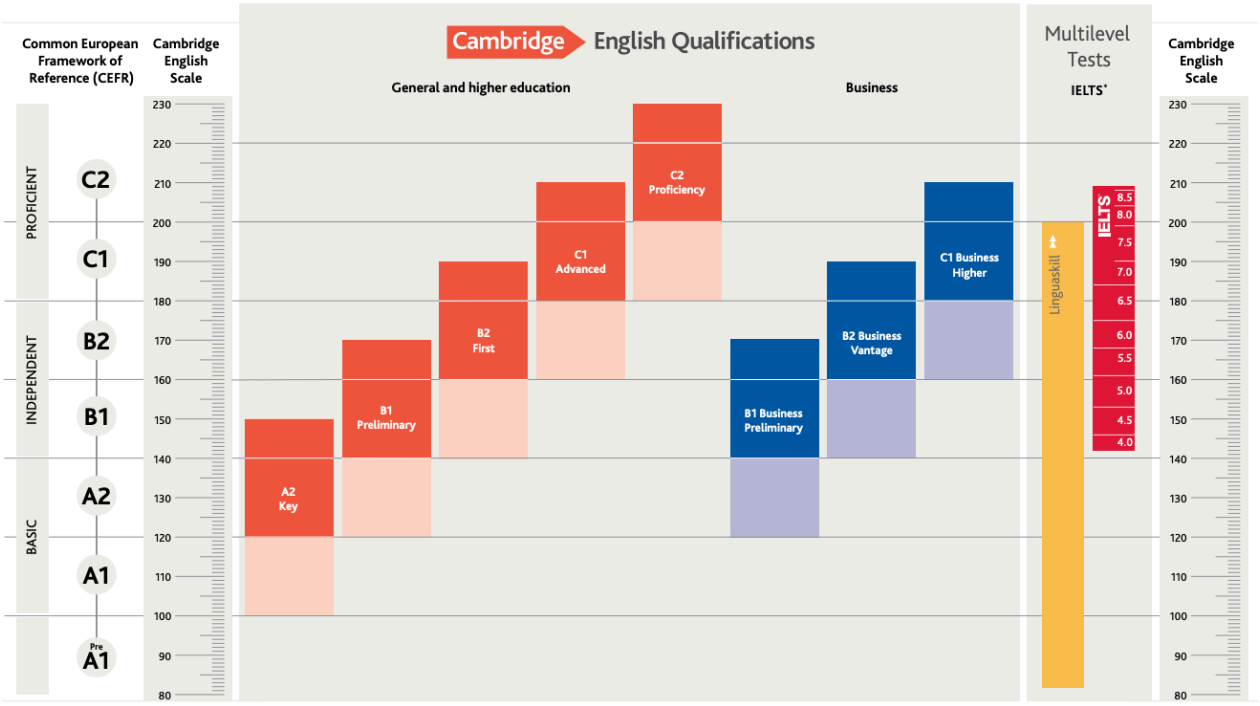


Figure 16 Comparing scores to IELTS (Cambridge Assessment, 2019)

8.6. Material for Word Order Tasks

Group A

German sentences	English translation	Chinese translation
Es gibt ein Buch auf dem Tisch Nummer eins.	There is a book on table number one.	有一本书在一号桌子上。
Herr Schmidt zieht sich ein Kleid in Rot an.	Mr. Schmidt puts on a dress in red.	施密特先生穿上一件红色的衣服。
Er sucht nach einem großen Bett, um zu Schlafen.	He looks for a big bed to sleep.	为了睡觉，他寻找一张大床。
Ich freue mich auf meinen kommenden Urlaub in Spanien.	I am looking forward to my upcoming holiday in Spain.	我很期待即将到来的西班牙假期。
Meine Schwester studiert Medizin an einer Universität in Berlin.	My sister studies medicine at a university in Berlin.	我妹妹在柏林的一所大学学习医学。
Meine Eltern wohnen in einer kleinen Stadt am Fluss.	My parents live in a small city by the river.	我的父母住在河边的一个小城市上。
Sie kommt in ein Zimmer, worin ein Hund sitzt.	She comes into a room where a dog is sitting.	她来到一个房间，里面坐着一只狗。
Frau Müller hat einen Hund mit dem Namen Anna.	Mrs. Müller has a dog called Anna.	穆勒夫人有一只叫安娜的狗。

Table 14 Sentences for WO tasks Group A

Group B

German sentences	English translation	Chinese translation
Herr Schneider mag es, mit Freunden Fußball zu spielen.	Mr. Schneider likes to play football with friends.	施耐德先生喜欢和朋友一起踢足球。
Leute sollen etwas tun, um die Umwelt zu schützen.	People should do something to protect the environment.	人们应该做一些事情，为了环境保护。
Er machte große Fortschritte, damit ist sein Lehrer zufrieden.	He made great progress, and his teacher is satisfied with that.	他取得了很大的进步，对此他的老师满意。

Sie soll nicht wegen ihrer vorherigen Taten kritisiert werden.	She should not be criticised for her previous actions.	她不应该因为她以前的行为而受到批评。
Er wurde von Mitschülern gemobbt, deshalb war er traurig.	He was bullied by classmates, so he was sad.	他被同学们欺负，所以他伤心。
Er plante, den Sommerurlaub in anderen Städten zu verbringen.	He planned to spend the summer holiday in other cities.	他计划，这个暑假在其他城市度过。
Ich muss mich auf den bald kommenden Feiertag vorbereiten.	I have to prepare for the holiday coming soon.	我必须为即将到来的假期做准备。
Frau Fischer möchte im Alltag mehr auf Englisch sprechen.	Ms. Fischer would like to speak more in English in everyday life.	费舍尔女士希望在日常生活中更多地用英语交流。

Table 15 Sentences for WO tasks Group B

Group C

German sentences	English translation	Chinese translation
Können Sie mir dabei helfen, meine Hausaufgaben zu erledigen?	Can you help me to do my homework?	您能帮助我做功课吗?
Die Eltern sollen sich mehr auf das Kind kümmern.	The parents should pay more attention to the child.	父母应该更多地关注孩子。
Sie haben sich auf das neue Abenteuer sehr gefreut.	They very much looked forward to the new adventure.	他们非常期待新的冒险。
Der Lehrer sagt, dass sie die Aufgabe machen muss.	The teacher says that she has to do the task.	老师说，她必须做这个任务。
Er vertraute ganz darauf, dass es ihr gelingen würde.	He trusted completely that she would succeed.	他完全相信她会成功。
In dem letzten Urlaub hat er ganz Deutschland abgefahren.	On the last holiday, he travelled all over Germany.	在他的最后一个假期，他走遍了德国。
Der gelbe Bus ist vorbeigefahren und hat nicht gehalten.	The yellow bus drove past and did not stop.	黄色公交车驶过且没有停。

Sie sucht nach einem anderen Weg, das zu schaffen.	She looks for another way to achieve it.	她寻找另一种方法来办到这。

Table 16 Sentences for WO tasks Group C

Group D

German sentences	English translation	Chinese translation
Er möchte nicht, die Gegenstände da kaputt zu machen.	He doesn't want to break the objects there.	他不想破坏那里的物体。
Die Jugendlichen lernten, was hier vor Jahren los war.	The young people learned what was going on here years ago.	年轻人知道这里几年前发生了什么。
Sie mag nur den Hund, der keine Haare hat.	She only likes the dog that has no hair.	她只喜欢没有毛的那只狗。
Er hat viel gesprochen, aber hat gar nichts gesagt.	He spoke a lot but didn't say anything.	他说了很多，但（又）什么都没有说。
Ich habe gestern mein neues rotes Auto reparieren lassen.	I had my new red car repaired yesterday.	我昨天修了我的新的红色的车。
Wir haben uns gestern in dem neuen Restaurant getroffen.	Yesterday, we met each other at the new restaurant.	昨天我们在那个新餐厅见面了。

Table 17 Sentences for WO tasks Group D