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The Correlation between First and Second Language Strategies and Reading Comprehension among Chinese International Students in an Online Reading Environment

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ABSTRACT

With the ongoing globalisation and digitisation of education, the proportion of Chinese international students in UK higher education has significantly increased. This research investigates 1) how these students' first language (L1) and second language (L2) online reading strategies differ, 2) how L1 and L2 proficiency affects strategy choice, and 3) how these strategies affect reading comprehension performance. Adopting a positivist paradigm, this study used Struck and Jiang's Lexical Decision Tasks (LDTs), Anderson's Online Survey of Reading Strategies (OSORS), and reading comprehension tests. Data were collected from 50 Chinese international students at the University of Sheffield via the Gorilla platform. Results showed that 1) online reading strategies differed significantly between L1 and L2. Participants used global reading strategies more frequently when reading in L1 and relied more on problem-solving and support reading strategies in L2. 2) Higher L1 proficiency predicted more frequent use of global and problem-solving strategies in L1 reading. Conversely, higher L2 proficiency predicted a greater frequency of using problem-solving and support reading strategies in L2 reading. 3) Reading comprehension scores were strongly influenced by strategy use. Frequent use of global and problem-solving strategies was positively correlated with better L1 comprehension performance, while support reading strategies were negatively correlated. In L2 reading, regular use of problem-solving and support reading strategies significantly enhanced comprehension performance. This study enriches the theoretical framework concerning how reading strategies and L1/L2 proficiency affect comprehension performance and validates related measurement scales, providing insights for cross-cultural education for international students.

Keywords: L1 Proficiency; L2 Proficiency; Reading Strategy Selection; Reading Comprehension Performance

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1. Introduction

As the globalization of education accelerates, a growing number of overseas students are opting to study in the United Kingdom (UK). Data from Study in the UK [1] indicates that international students comprised approximately 23.75 percent of all enrollments in UK higher education institutions, with Chinese students representing the largest single group, over 150,000, even exceeding the combined total from all European Union (EU) countries and accounting for roughly 22.31 percent of all international students. These students are often bilingual or even multilingual, possessing the ability to communicate effectively and flexibly in diverse linguistic and cultural environments [2]. They are exposed to and use their first language (L1) from an early age and acquire their second language (L2) or even more at a later stage through education, work, or within multilingual communities [3,4]. This research focuses on the Chinese international students whose L1 is Chinese but who leave China to attend higher education institutions in the UK and are educated in English as their L2.

The language proficiency of these Chinese international students, a dynamic and multidimensional construct, encompasses not only their levels of pronunciation, vocabulary, and grammar but also their ability to apply this knowledge in real-world communication [5]. Moreover, L1 proficiency refers to the language skills that individuals naturally acquire in their native environment, while L2 proficiency is the mastery of a non-native language through systematic education and learning. Language proficiency is crucial in research related to English as an Additional Language (EAL), particularly for students whose L1 is not English but who are actively learning and using English [6].

A significant aspect of this research is reading comprehension, a complex cognitive process that involves the decoding of textual information, the understanding and evaluation of its meaning, and subsequent reflection and application [7]. The strategies that readers consciously employ to activate background knowledge, enhance comprehension, and improve reading efficiency are known as reading strategies. These strategies are essential for effectively understanding textual content, extracting and retaining information, and overcoming challenges encountered during the reading process. A longstanding focus for researchers has been the comparison of strategies for L1 and L2 reading. L1 reading strategies are often associated with higher-order thinking and critical analysis, incorporating the use of cultural background knowledge and the automatisation of language processing [8]. In contrast, L2 reading strategies tend to focus more on the foundational aspects of language, including the understanding of linguistic forms and structures and the decoding of basic vocabulary and sentences [9].

Currently, the ongoing digitisation of educational resources is transforming students' traditional paper-based reading into digital reading of online texts [10]. Reading activities via digital platforms accessed through the Internet, i.e., the online reading environment, are becoming increasingly important, adding extra dimensions such as hyperlinks and multimedia elements. This not only changes the format of reading but also challenges the selection and effectiveness of reading strategies.

In light of this, this research explores the selection and effectiveness of online reading strategies among Chinese international students in L1 and L2 reading.

This research intends to explore the L1 and L2 strategies for reading comprehension adopted by Chinese international students in online reading environments, to analyse the effects of L1 and L2 proficiency on the selection and effectiveness of these strategies, and to assess the comprehension outcomes of using L1 and L2 strategies in online reading environments. Therefore, the three research questions are posed as follows:

1. What are the predominant online reading strategies used by Chinese international students in their L1 and L2 reading?

2. How does proficiency in L1 and L2 influence the selection and effectiveness of online reading strategies among Chinese international students?

3. Are there significant differences in comprehension outcomes when Chinese international students employ online reading strategies in their L1 and L2 reading?

This research could have significant theoretical and practical implications, as well as considerable sociocultural value. Theoretically, this research could enrich the existing empirical data on Chinese international students' L1 and L2 online reading strategies and language learn-

ing outcomes and expand the understanding of reading proficiency's impact. In terms of practice, this research expects to guide educators in crafting effective instructional methods for Chinese international students. Additionally, analysing online reading strategies could foster the development of curricula in light of current trends in digital education.

This research could also be beneficial to socio-cultural implications in the era of globalisation and digitisation of education. Its findings could not only support the academic success of international students but also facilitate their social and cultural integration. In the long run, this research could promote the advancement of educational theories and the innovation of educational practices, contributing to the construction of a more open and pluralistic educational environment.

Section 2 provides a literature review of current research with Chinese international students, L1 and L2 proficiency, reading comprehension, and their interrelated effects. Section 3 describes the methods utilised, including participants, design, materials, procedure, data analysis and ethical considerations of this research. Section 4 reports the results, and Section 5 discusses them in the context of existing research. Finally, the major findings and suggestions for future related studies are summarised in the conclusion.

2. Literature Review

2.1. Studies of Chinese International Students

Chinese international students not only constitute the largest proportion of international students studying in the United Kingdom (UK), but also have made the UK one of the most popular destinations to study. Consequently, the existing research with this group is quite rich. Many of these studies were primarily concerned with the impacts on the UK economy and the adaptation of Chinese international students [11].

On the one hand, regarding the UK economy, scholars have mainly adopted quantitative research methods to collect data on the expenditures of Chinese international students on tuition fees, accommodation fees, and living expenses for analysis [12]. These studies have focused on the impacts of the influx of Chinese international students on the UK economy and the policies issued by the UK government accordingly. Specifically, overseas students made significant contributions estimated at £41.9 billion annually, substantially boosting the local economies of university cities, supporting many jobs, and generating considerable tax revenues [13]. However, Beech [14] warned of potential risks in the UK's economic dependence on international students, particularly amid possible geopolitical tensions or policy changes. To maintain steady economic growth, the UK government has made certain adjustments in visa policies and work restrictions to attract a steady flow of Chinese international students [15].

On the other hand, researchers have identified and explored the personal experiences and feelings of Chinese international students from several perspectives of academic, socio-cultural, and psychological adaptation through qualitative methods such as semi-structured interviews, case studies, and thematic analysis. However, these studies have some limitations in sample size and generalisability of results. Academically, Zhou and Todman [16] found that language proficiency was a barrier that significantly impacted students' understanding, engagement, and performance in the academic environment, though their study relies on self-reporting, which may be biased. Smith and Khawaja [17] pointed out that the prevalence of exam-centred learning methods in China often made it difficult for Chinese overseas students to get used to the educational expectations of the UK, which emphasized critical thinking and participatory learning.

In terms of socio-cultural adaptation, Bodycott and Lai [18] discussed that interculturality primarily referred to cultural identity, where individuals embraced the cultural norms and values of the UK while maintaining their own cultural heritage, but the outcomes of such identity vary from person to person. Smith and Khawaja [17] believed that it was beneficial for Chinese international students to be more involved in interactions with local or other international students in the UK, including clubs, societies, and informal social activities, which might otherwise lead to adverse effects such as isolation.

Turning to psychological adaptation, Montgomery and McDowell [19] claimed that due to the dual pressures of academic performance and acculturation, Chinese international students might experience feelings of isolation and

stress, and in more severe cases, could lead to anxiety and depression.

Overall, existing studies have emphasised the impact that Chinese international students have brought to the economy and have also focused on many aspects of their adjustment to the UK. However, this review notes that while the role of language was frequently mentioned in studies concerning both academic and life adjustment, their primary focus was the effects of language barriers on students' academic performance, social communication, and mental well-being. In other words, when reviewing studies in which the participants were Chinese international students, there is relatively little literature addressing the development of language proficiency. In addition, studies have mainly used qualitative research methods, potentially limiting the generalizability of the findings.

2.2. Studies of L1 and L2 Proficiency

The Chinese international students of interest in this research are bilingual or even multilingual, with Chinese as their L1 and English as their L2. When it comes to language, its proficiency has naturally become one of the key research themes focused on by scholars, mainly centred on the influencing factors and ways of measurement.

Scholars have consistently shown that the structure of L1 significantly affects the proficiency of both L1 and L2. Odlin [20] introduced the Transfer Theory, stating that the linguistic structure of the L1 could facilitate or inhibit the learning process of the L2. When there is structural similarity, the knowledge and skills of L1 could be smoothly transferred to L2, resulting in positive transfer. Conversely, when the grammar, vocabulary or pronunciation rules of L1 are incorrectly applied to L2, leading to misunderstandings, negative transfer occurs. For example, much of modern Chinese vocabulary, especially in science and culture, is borrowed or directly derived from English, which is conducive to positive transfer [21]. In contrast, the differences in grammar and pronunciation between Chinese and English, especially in structure, articles, numbers, and syllable rhythms, often trigger negative transfer [4]. However, some scholars have pointed out that Transfer Theory might oversimplify the complexity of language learning and fail to adequately take into account individual differences, cognitive abilities, and affective factors [22]. In response to these limitations, Cultural Transfer Theory has emerged, suggesting that cultural contexts influence individuals' behaviour, cognitive styles, and choice of learning strategies in new cultural environments, believing that when individuals move from a familiar cultural environment to a different cultural context, pre-existing cultural knowledge and behavioural patterns might affect their adaptation to the new culture and the application of strategies [23]. Although this theory provides an extensive perspective for understanding learner behaviour in cross-cultural contexts, difficulties in quantifying how cultural context affects the selection of learning strategies and their implementation in multicultural contexts remain [24].

Language proficiency is an abstract concept that is not easy to measure. The commonly accepted ways of measuring it include Lexical Decision Tasks (LDTs) and standardised language tests. The former are widely used experimental tasks in the field of psycholinguistics to measure the ability to identify words and non-words [25]. They are effective in assessing the degree of automatisation of language processing, and reaction times and error rates are useful in demystifying the cognitive processes of language and how various factors affect the rapid and accurate use of language. However, the fact that some of the vocabulary in the task is unnatural and not commonly used in everyday life limits the ecological validity of any results, and the fact that only a single cognitive dimension is captured through "yes" and "no" responses does not provide a comprehensive assessment of language proficiency [26]. Standardised language tests are a set of tasks or items designed to systematically assess an individual's language proficiency, usually in a controlled environment, with the aim of evaluating and comparing examinees' language proficiency through quantitative methods [27]. These tests quantify abstract concepts such as L1 and L2 proficiency into data that can be measured and further analysed, promoting the scientific and effective conduct of experiments, the harmonisation of assessment criteria and test conditions, and the high reliability and consistency of results from repeated tests. However, effective assessment of participants' creativity and adaptability in language use, especially in open communication and real-life language use contexts, still needs to be improved [27].

According to research on L2 acquisition, there is a

considerable positive link between learners' language proficiency and reading comprehension outcomes in L1 and L2. For example, Perfetti's [28] Language Quality Hypothesis claimed that the quality of language processing, such as the automatisation of lexical access and the ability to process grammatical structures, constrained the efficiency and effectiveness of reading comprehension. Cummins's [29] Cognitive Academic Language Proficiency Theory (CALP) further elaborated that academic language mastery in L1 and L2 settings required in-depth language processing skills, whose development was linked to extensive reading experiences, which in turn depended on effective language input and interaction. Consequently, further research on L1 and L2 reading comprehension is warranted.

2.3. Theoretical Frameworks for Reading Comprehension

Studies on reading comprehension are extensive and intensive, covering a variety of viewpoints from linguistics, psychology, and education, mainly dividing into research on reading comprehension itself and its applications.

A well-defined theoretical framework can provide objective guidance for research based on established theories. In this research, various proven reading models and reading strategies, as well as studies on online reading environments serve this purpose, providing rigorous and scientific theoretical support.

2.3.1. Reading Models

Reading models have been explored from both cognitive and neuroscientific dimensions, with cognitive studies predominantly focusing on the sources of reading information and the cognitive processes involved in reading comprehension.

In terms of reading information sources, the top-down and bottom-up reading models are widely accepted. For example, Goodman [30] proposed the Top-Down Model, which promotes active prediction and interpretation of textual information by readers using their prior knowledge, experiences, and expectations. He described reading as a "psycholinguistic guessing game", emphasising that readers actively make continuous guesses based on the clues provided by the text and verify whether these guesses are correct through further reading, rather than passively receiving information. In Goodman's model, reading is not only the decoding of text but, more importantly, the construction of textual meaning. Contemporary empirical research has shown that readers who possess a wealth of prior knowledge have demonstrated superior performance when reading complex texts. This further supports Goodman's model and highlights the significance of background knowledge in enhancing reading comprehension performance [31]. However, the model might not be sufficient to explain the reading process of readers with little background knowledge or unfamiliarity with the subject matter [32]. Thus, although the Top-Down Model emphasises the reader's ability to actively construct meaning, its effectiveness may be limited when applied to complex and unfamiliar texts.

Rumelhart's [33] Schema-Theoretic Model supports the Top-Down Model by arguing that schemas are pre-stored frameworks of structured knowledge in the reader's mind, which are used in reading to make sense of and store reading information. Perfetti's [28] Concept-Driven Model develops Goodman's model by further specifying the type of readers' prior knowledge, i.e., conceptual knowledge, and also further highlights the active nature of readers' reading. The Top-Down Model provides insights into the proactive nature of readers' background experience in interpreting, inferring and reflecting on texts, and has a profound impact on subsequent reading research. However, over-reliance on background knowledge might lead to blocked comprehension when readers are confronted with new information that does not match what they knew [34]. Additionally, over-reliance on readers' predictions might lead to ignoring the actual information in the text, especially when the predictions are incorrect, which could misinterpret the true meaning of the text [35].

In contrast, Gough, Kavanagh and Mattingly [36] proposed the Bottom-Up Model, believing that reading for comprehension starts with the most basic elements of the text. They argued that readers first identify letters and words and then progressively construct the meaning, leading to comprehension of the entire text. Contemporary empirical research has supported Gough, Kavanagh and Mattingly's model by demonstrating the role of vocabu-

lary recognition fluency in reading comprehension [37]. The Reading Fluency Model posited by LaBerge and Samuels [38] supports Gough, Kavanagh and Mattingly's reading model to a certain extent because they asserted that reading comprehension needs to identify words accurately and rapidly. Thus, readers could automate word recognition through extensive practice, putting more cognitive resources into higher-level language comprehension. The Bottom-Up Model recognises the fundamental role of words in reading and is beneficial to the learning and teaching of beginning, non-native and struggling readers. Nevertheless, this model reduces reading to linear information processing and ignores its complexity [39].

Rumelhart [40] criticised the Bottom-Up Model, arguing that it oversimplifies the reading process by ignoring the interaction of multiple cognitive processes. He suggested the Interactive Model, which synthesised the Top-Down Model and the Bottom-Up Model, considering that the two could dynamically alternate. Specifically, if the reader's expectations or the textual information are unclear, the two processing modes could keep alternating, complementing each other to facilitate comprehension. This model promotes a more comprehensive framework for reading comprehension, recognising that reading is a complex cognitive activity that requires a combination of cognitive resources. Contemporary empirical research has suggested that readers with weaker reading skills have compensated for their vocabulary recognition deficits by enhancing their contextual reasoning skills, which has supported Rumelhart's model, although there still needs to be clear guidance on effectively balancing the two strategies in concrete operational and pedagogical practice [41].

Stanovich's [42] Interactive Compensation Model shared some similarities with the Interactive Model. He also suggested that different cognitive processes could complement each other, but with the focus more on individual differences, emphasising that inefficient word recognition skills could be compensated for by efficient contextual reasoning skills, and vice versa. Stanovich's model is widely regarded as effective in explaining differences in cognitive behaviour during reading among people with different reading abilities, although some studies contended that it might be overly reliant on contextual effects.

Both the Interactive Model and the Interactive Compensation Model took into account the dynamic complementarity of the reading process, leading to another direction of research on the cognitive dimension of the reading model—the complex cognitive processes of reading. Kintsch [43] created the Construction-Integration Model, which asserted that the process of reading comprehension could be divided into two phases, namely, constructing meaning and integrating information. In the former phase, the reader extracts information from the text, activating relevant words, concepts, and background knowledge. In the latter phase, the reader adapts the activated information, resolving contradictions and deepening understanding to form a coherent and consistent network of meanings. Kintsch's model focuses on the dynamic process of integrating new information with the existing knowledge base, which is of great significance to the understanding of the complex cognitive activities in the reading process. Nevertheless, there are challenges in validating its specific mechanisms and predicting the process of text comprehension in empirical studies. For example, McNamara and Magliano [44] pointed out that Kintsch's model was highly dependent on complex computational processes, which might limit its generalisability and applicability.

With the rise of neuroscience and the development of technology, scholars have tended to study reading models from new perspectives. Dehaene and Cohen [45], based on the findings of neuroimaging techniques such as fMRI, proposed that the Visual Word Form Area Model (VWFA) is a visual modality specialised in the recognition of letters and words, which rapidly and automatically activates linguistic and semantic information associated with known words. Despite the important role of the VWFA model in explaining letter and word recognition, some scholars have questioned its applicability to broader language processing, arguing that reducing language processing to the function of a single visual region might overlook the synergistic effects of other brain regions [46]. As such, Price and Devlin [47] suggested that the VWFA might also be crucial to the processing of a wider range of linguistic inputs, providing an important neurobiological basis for understanding reading disorders such as developmental dyslexia. However, its applicability to different linguistic backgrounds and individual differences remains to be further validated, a limitation that might pose a challenge in explaining the complexity

and diversity of dyslexia [48].

In summary, researchers have presented numerous models of reading and have continued to refine them over time. There is a growing tendency to further deepen the study of reading models from a perspective that combines cognitive and neuroscientific areas. These models are important theoretical guides for research in reading, particularly in elucidating various reading strategies.

2.3.2. Reading Strategies

Reading strategies specifically address how readers construct and understand textual meaning, unlike reading models that discuss the information and process of reading at a macro level. These strategies are categorised according to various criteria.

To begin with, closely related to the Top-Down and Bottom-Up Models mentioned above, strategies are classified as either high-level or low-level based on the complexity of cognitive information processing. High-level strategies involve complex cognitive processes such as analysis, synthesis, evaluation, and critical thinking. These strategies require in-depth processing of information, including reasoning and interpreting implicit meanings. Conversely, low-level strategies focus on the fundamentals of decoding and word processing, essential for text identification and basic elements understanding, like phoneme-grapheme mapping and syntactic feature analysis [49]. This categorization emphasizes that reading is a multidimensional cognitive activity, yet it necessitates further exploration concerning the impact of individual differences and text types.

Besides, reading strategies are categorised into cognitive and metacognitive strategies based on the mode of action [50]. Cognitive strategies primarily address the immediate and surface meanings of texts, involving text processing that aids in understanding and memorising content, including decoding vocabulary, extracting key information, and reasoning about logical relationships. Metacognitive strategies, on the other hand, monitor and regulate the reading process, helping readers set goals, monitor comprehension progress, and adjust strategies to overcome difficulties [51]. Contemporary empirical research has suggested that readers continuously monitor their comprehension status during reading and adjust their strategies as needed, and superior reading comprehension performance reflects, in part, readers' efficient allocation of cognitive resources during reading, findings that support Flavell's view [52]. This categorisation distinguishes between different levels of mental activity that enhance reading comprehension, though challenges remain in explicitly teaching and assessing these strategies in practice.

Furthermore, Mokhtari and Reichard [53] noted that metacognitive strategies could be further divided into global, problem-solving, and support reading strategies according to distinct functions and goals. Among them, global reading strategies enable readers to understand and manage texts at a macro level during the reading process, including setting goals, predicting content, and overviewing text structure, which help readers grasp the overall meaning and structure of the text. These strategies enhance readers' comprehension and assessment of the text; however, an over-reliance may result in neglecting text details, especially in situations where precise comprehension or analysis is necessary [54]. Problem-solving reading strategies are employed to cope with specific comprehension problems encountered during reading, including rereading unclear sections and looking up word meanings. These strategies improve readers' active problem-solving skills but demand high cognitive engagement or teacher guidance to effectively tackle reading challenges [55]. Support reading strategies facilitate comprehension by taking notes and consulting references. These strategies foster readers to organise and consolidate reading material, which in turn improves memory and comprehension, but excessive dependence may lead readers to rely too much on external tools rather than their own parsing abilities when reading, affecting reading efficiency and the development of deeper understanding [56].

In conclusion, reading strategies have been deeply researched from different perspectives and are of great value in improving reading comprehension performance and teaching quality. In the digital era, research on reading strategies is richer, offering new changes and opportunities for study and application.

2.3.3. Online Reading Environments

With the advent of online reading, metacognitive strategies gained more attention within the scope of reading strategies. Mokhtari and Reichard [53] created the

Metacognitive Awareness of Reading Strategies Inventory (MARSI) to evaluate English as an EAL students' use of global, problem-solving, and support reading strategies. Anderson [57] further developed MARSI into the Online Survey of Reading Strategies (OSORS) for counting online reading strategies in academic settings, which has only minor changes to adapt to the online environment. For example, the addition of overview web page information to the global reading strategies and searching the web for help to the problem-solving reading strategies. Currently, the OSORS has become one of the commonly used instruments in empirical research on online reading strategies [58,59]. It is validated as a standardised scale with proven reliability and validity, useful for educators and researchers to understand how individuals adapt and manage online reading behaviour [60]. However, due to its reliance on self-reported data, the OSORS is suspected of having bias with users possibly overestimating or underestimating the strategy use frequency. In addition, the OSORS is not fully applicable outside of academic online reading environments, such as casual and non-formal environments. Existing research has mainly applied it to reading strategy use, assessment of the effectiveness of reading strategy training, and cross-cultural and cross-linguistic studies [61].

It is worth mentioning that differences between online digital reading and traditional book reading environments have also been the subject of research. Bresó-Grancha, Jorques-Infante and Moret-Tatay [62] argued that, firstly, online reading environments are usually non-linear whereas traditional reading environments are not, because digital texts include hyperlinks and multimedia that make reading more fragmented. Secondly, online reading environments may increase cognitive load compared to traditional reading, because readers may maintain shorter attention spans due to more distractions online. Thirdly, online reading environments provide readers with a new sensory experience by scrolling and clicking, whereas the tactile experience of turning pages in traditional reading environments may affect the engagement and impact of reading. Fourthly, online reading environments are more accessible and convenient than traditional reading environments because they provide instant access to tools like dictionaries, but may lead readers to engage in more surface reading than textual content.

To sum up, online reading environments have become increasingly prevalent in the current context of technological development. Although they differ in format from traditional reading environments, both fundamentally require readers to employ effective reading strategies.

2.4. Studies of Interrelated Effects

In academic research, there is a significant crossover between research areas, which should not be viewed in isolation. The following synthesis encompasses the studies mentioned previously.

2.4.1. L1 and L2 Proficiency on Reading Strategies

Learners with high language proficiency tend to have better-developed metacognitive skills, meaning that they can monitor and regulate the reading process more effectively. Reading comprehension outcomes are positively correlated with language proficiency [9].

Droop and Verhoeven [63] have found that L1 and L2 proficiency significantly affects the variety and effectiveness of reading strategies choices and the speed and depth of reading comprehension. Through an experiment with Turkish or Moroccan students in the Netherlands, they advocated that students with high language proficiency were: first, more flexible in utilising multiple strategies for multiple readings, which helps them choose appropriate reading strategies according to their needs. Second, more purposeful in selecting reading strategies, which benefits them in comprehending the text more effectively. Third, quicker to recognise words and phrases, which in turn improves their reading speed and their efficiency of learning and work. Fourth, they engage more deeply in critical thinking by linking textual information with prior knowledge, which enabled them to understand the text in-depth.

Droop and Verhoeven's study clearly clarified the positive correlation between language proficiency and reading strategies, which is instructive for educational practice. However, it fails to adequately consider other complex factors affecting reading comprehension, including an individual's cognition, prior knowledge, interest and motivation.

2.4.2. L1 and L2 Proficiency and Online Reading Environments on Reading Strategies

Scholars' research in interrelated studies of L1 and L2 proficiency and online reading environments has focused on online reading strategies. Therefore, this section directly probes these three elements together.

In their studies on reading models, Droop and Verhoeven [63], through an experiment with students in the Netherlands, found that learners predominantly followed a Top-Down Model rather than a Bottom-Up Model in L2 online reading environments, which may be related to the emphasis on reading strategies in the Dutch education system. However, Taki [64], through an experiment with Canadian students, concluded that high-strategy users mainly followed the Top-Down Model but medium-strategy users mainly followed the Bottom-Up Model. This difference may stem from the differences in the education systems of the two countries and may also be related to differences in research methodology. Specifically, Taki's more detailed categorisation of strategy use reveals model selection at different strategy levels, but consequently fails to delve into the dynamic alternation process of strategy use. In addition, Taki's study also suffers from the limitation of not exploring enough of the cognitive mechanisms behind strategy use and failing to reveal in depth the underlying reasons for strategy choice [65]. Although the results of Droop & Verhoeven's [63] and Taki's [64] studies reflect the complexity and diversity of reading strategy use.

Regarding reading strategies, contemporary empirical research has indicated that readers predominantly adopt global reading strategies in L1 reading [52,66]. However, conclusions have not yet been fully harmonised regarding the online reading strategies used in L2 reading. For example, Tavakoli [67], through an experiment with Iranian students, posited that students' online reading strategies were significantly influenced by language proficiency, and that supportive reading strategies, followed by global reading strategies, and lastly problem-solving strategies were most commonly used in L2 reading. However, Kuo and Yu [68] found that students used problem-solving reading strategies more frequently through an experiment with Chinese students. Cultural background and educational system may be one of the important reasons for the different findings. Specifically, the Iranian educational system places more emphasis on grasping the overall meaning, so support and global reading strategies are more common in L2 reading [69]. In contrast, the Chinese educational system may be more focused on solving specific problems, which may lead students to use problem-solving reading strategies in L2 reading more frequently.

In summary, scholars' interrelated studies encompassed a wide range of different countries and languages, mainly using Anderson's [57] OSORS standardised scales. However, the selection of online reading strategies by participants varies across different cultural backgrounds and educational systems.

2.5. Summary

Among the existing studies, most of the literature concerning Chinese international students, with Chinese as their L1 and English as their L2, focused on the impact of language on academic, social, and psychological adjustment rather than on the language itself. In addition, these studies predominantly employed qualitative research methods and thus had limitations in terms of generalised adaptation. Furthermore, prior research has emphasised differences in cognitive processes, the influence of language structure, and readers' adaptation to digital formats, but has mainly focused on single studies of L1 or L2 reading strategies and has not yet comprehensively compared the effectiveness of these strategies in an online environment.

Thus, this research aims to fill these gaps by examining the online reading strategies of Chinese international students across different L1 and L2 proficiency levels through a quantitative approach, which not only tests the prior theories and findings to enhance the practical applicability of the study through the addition of empirical data but also may reveal the specific effects of different L1 and L2 proficiency levels on the selection and effectiveness of online reading strategies, which may, in turn, provide language teaching and learning with more targeted strategy recommendations for language teaching.

Based on a series of existing studies and findings, as well as the research questions proposed in the introduction, this study hypothesises that:

1. There is a significant difference between Chinese

international students' online reading strategies for L1 and L2 reading. They may use global reading strategies more frequently in L1 reading, while they may rely more on support reading strategies in L2 reading.

2. There is a significant effect of Chinese international students' L1 and L2 proficiency on the selection and effectiveness of online reading strategies. Specifically, as language proficiency increases, the number of online reading strategies selected may increase and may be utilised more effectively.

3. There is a significant effect of Chinese international students' L1 and L2 online reading strategies on reading comprehension outcomes.

3. Methods

This research adopted a positivist paradigm to quantify the data on the proficiency of L1 and L2, the selection of global, problem-solving and support reading strategies, and the outcomes of L1 and L2 reading comprehension performance. This is achieved through tasks, scales and tests that have been widely used and verified. Based on the previous section's theoretical framework of reading models, the relationship between L1 and L2 proficiency, reading strategies, and reading comprehension performance is quantitatively investigated.

3.1. Participants

50 participants (19 males and 31 females) were Chinese international students from the University of Sheffield aging from 22 to 28 years (M = 24.3, SD = 1.2). All participants' L1 was Chinese (Mandarin), and they were born and raised in mainland China, where they obtained their Bachelor's degrees. They are currently studying for their Master's degrees at the University of Sheffield, England. This educational background indicates that they are at least EAL students, although at different levels of language proficiency. Participants were recruited by four researchers who shared the link to the experiment among their peers. It was confirmed prior to the experiment that all participants had no history of learning difficulties or dyslexia.

3.2. Design

This research employed a correlational experimental design, with the primary objective of exploring the relationships among variables rather than manipulating them to establish causality. The variables under investigation included L1 and L2 proficiency, reading strategies, and reading comprehension test outcomes. Additionally, age and gender were collected to facilitate subsequent analyses, and the similar educational backgrounds of participants provided a degree of control over their reading comprehension abilities.

3.3. Materials

Standardised measurement instruments are referenced in this research.

3.3.1. Lexical Decision Tasks

Lexical Decision Tasks (LDTs) were used to assess the proficiency of L1 and L2 In these tasks, participants needed to identify whether an item presented on the screen was a real word or a nonsense word. Scoring was based on the accuracy of the participant's response, with one point awarded for each correctly identified item. Additionally, the system recorded reaction times for each task, as speed is an important indicator. The Chinese and English stimuli were derived from the lists used by Struck and Jiang [25] and included 101 words and 101 pronounceable non-words, respectively (**Appendix A**).

Chinese items were disyllabic and comprised two characters. The words were nouns with an average frequency of 7.64 occurrences per million (OPM; SD = 0.96, range 6.10–9.45). Non-words were random combinations of two characters that were checked by native speakers and dictionaries to ensure they were not words or colloquialisms. All Chinese items had no repeated characters.

English items contained five to eight letters. The words were nouns with an average frequency of 24.32 OPM (SD = 7.30, range 14.64–43.16). Non-words were noun-like, with one or two letters changed from real words, and were checked by dictionaries and native speak-

ers to confirm their non-word status. All English items had no orthographic neighbours.

3.3.2. The Online Survey of Reading Strategies

The Online Survey of Reading Strategies (OSORS) [57] was used to evaluate the selection of metacognitive reading comprehension strategies (**Appendix B**). The OSORS measured three categories: global reading strategies (18 items), problem-solving reading strategies (11 items), and support reading strategies (nine items). A 5-point Likert scale was employed, and the overall score indicated the frequency of reading strategy use, and the mean score of each category showed the most frequently chosen strategies.

3.3.3. Reading Comprehension Tests

Chinese and English reading comprehension tests were used to assess the L1 and L2 reading comprehension performance (**Appendix C**). This study selected three English and three Chinese cloze reading comprehension tests from the Chinese College English Test Band 4 (CET-4) and the Hanyu Shuiping Kaoshi (HSK), respectively, as experimental materials. During the selection process, preference was given to highly narrative texts to ensure contextual completeness and semantic clarity, thereby creating a reading environment that closely resembles natural reading conditions. This approach facilitates the analysis of participants' reading comprehension strategies and performance across different language contexts.

These tests were drawn from narrative texts also due to their relatively uniform structure and predictable discourse patterns, which generally better guide readers to master the overall meaning [70]. The missing words in both the Chinese and English tests were carefully controlled to ensure that differences in comprehension performance could account for language proficiency rather than differences in text or topic difficulty [71]. Additionally, a pilot study was conducted with two randomly recruited Chinese international students from the University of Sheffield. The pilot aimed to assess the time allocation for reading tasks, participants' comprehension of test items, and the overall feasibility of the study, thereby enhancing the validity and reliability of the data.

For L1 reading, three Chinese texts were provided, each followed by five gap-filling multiple-choice questions, totalling 15 questions. For L2 reading, three English texts were provided, each followed by ten gap-filling multiple-choice questions, totalling 30 questions. For example, one of the questions in the tests was: "Many people believe that passion and commitment are the foundations of strong romantic relationships. But a relationship is made of two individuals." Participants were asked to choose the most relevant word to fill in the space from 15 alternatives provided. The L1 and L2 reading comprehension test results were determined by the number of successfully answered questions, with one point awarded for each correct response.

The psychometric properties of the Chinese and English reading comprehension tests were assessed. The Chinese Reading Comprehension Test (M = 12.58, SD = 1.885) and the English Reading Comprehension Test (M = 25.80, SD = 2.942) were administered to 50 participants. Reliability analysis revealed low internal consistency, with Cronbach's alpha values of –0.431 and –0.384, respectively. Regarding construct validity, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was .500, indicating marginal suitability for factor analysis. Bartlett's Test of Sphericity ($\chi^2 = 1.518$, df = 1, p = 0.218) suggested that the correlation matrix did not significantly deviate from an identity matrix, and the inter-item correlation was negative (r = –0.177, p = 0.218). Nevertheless, Principal Component Analysis explained 58.87% of the total variance, with component loadings of .767 for the Chinese test and –0.767 for the English test, suggesting that the tests still reflect different response patterns.

3.4. Procedure

All L1 and L2 LDTs, OSORS, and reading comprehension tests were administered online through the Gorilla platform (www.gorilla.sc), with the entire process taking approximately 45 minutes (see **Figure 1**).

Firstly, researchers shared the Gorilla research link after determining that the voluntary participants were eligible. Upon accessing the link, participants first reviewed the information sheet and consent form, provided electronic consent, and filled in demographic information.

Secondly, participants clicked on the link and were

automatically taken to the L1 and L2 LDTs task. In the LDTs, participants first completed two practice exercises and then performed the main experiment consisting of 200 trials. Each trial started with a 500 ms fixation cross (+) displayed in the centre of the screen, followed by the stimulus which remained until the participant made a choice. Participants were required to quickly and accurately determine whether the stimulus was a word or a non-word by clicking a button. Including the practice exercises, participants did not know whether their answers were correct or not.

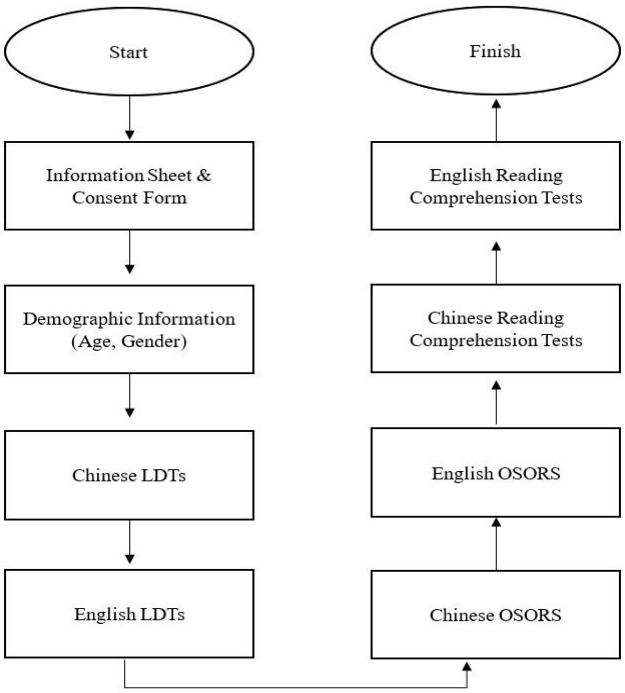

Figure 1. The procedure of this research.

Thirdly, participants were automatically taken to the OSORS in L1 and L2, where they reported their metacognitive reading comprehension strategy choices by completing a five-point scale.

Finally, participants were automatically taken to the L1 and L2 reading comprehension tests. Three L1 reading texts were displayed on the screen in turn, and participants were asked to select the answer for each gap, followed by three L2 reading texts in turn. There was no time limit until the participant finished.

3.5. Data Analysis

All data collected were analysed using IBM SPSS Statistics version 29.0.

Descriptive statistics summarised the performance of each measure. The Wilcoxon signed rank test was used to compare the selection of reading comprehension strategies in the first and second languages. Spearman's correlation was utilised to determine the correlations between L1 and L2 proficiency, reading comprehension tactics, and reading comprehension outcomes. Regression analyses were performed to examine how L1 and L2 proficiency influence the selection of various reading comprehension techniques, as well as how that selection influences reading comprehension performance.

3.6. Ethical Considerations

Ethical approval for this research was obtained from the University of Sheffield (application number: 058699). Participants were provided with informed consent and their data confidentiality and anonymity will be ensured. This research does not involve sensitive or emotionally challenging topics for either the participants or the researchers and strictly follows the ethical guidelines for social research, including respecting participants, ensuring their interests, and fair treatment. Participants were informed of the purpose of the study, their right to withdraw at any time, and that their responses will be treated confidentially. Data will be stored securely and will only be accessible to the research team.

4. Results

This research aims to elucidate the differences in the selection of L1 and L2 online reading strategies, the impact of L1 and L2 proficiency on this strategy selection, and the subsequent effects of these strategies on reading outcomes of Chinese international students. Specifically, standard subtotal scores for each participant's L1 and L2 global, problem-solving, and supporting reading strategies, respectively, were derived from standardised scales. In contrast, raw accuracy scores for each participant's L1 and L2 proficiency were assessed via the LDTs, calculated as the number of correct responses, with one point awarded per correct answer. Similarly, raw accuracy scores for their L1 and L2 reading comprehension performance were measured through the reading comprehension tests, also calculated as the number of correct answers, with one

point awarded per correct response.

4.1. Descriptive Statistics

Descriptive statistics were calculated to summarise the key variables in this research, providing comprehensive insights into the concentration and dispersion within the data set (see **Table 1**).

Table 1. Descriptive statistics of all indicators.

Variable	*n*	*M*	*SD*	Min	Max	Max Possible
Chinese Lexical Decision Tasks	50	195.5	2.3	192	200	200
English Lexical Decision Tasks	50	195.0	3.6	180	200	200
Chinese Global Reading Strategies	50	4.1	0.2	3.6	4.4	-
English Global Reading Strategies	50	3.6	0.2	3.3	3.9	-
Chinese Problem-Solving Strategies	50	3.8	0.2	3.4	4.1	-
English Problem-Solving Strategies	50	4.1	0.2	3.3	4.4	-
Chinese Support Reading Strategies	50	3.1	0.4	2.2	3.9	-
English Support Reading Strategies	50	4.0	0.2	3.7	4.4	-
Chinese Reading Comprehension Test	50	12.6	1.9	9.0	15	15
English Reading Comprehension Test	50	25.8	2.9	20.0	30	15

Note: Max Possible = Maximum Possible Score.

4.1.1. Lexical Decision Tasks

According to **Table 1**, participants' mean scores in the Chinese tasks were slightly higher compared to in the English tasks, which may indicate marginally better performance in the Chinese tasks. The higher standard deviation and broader range of scores in the English tasks compared to the Chinese tasks further imply that participants exhibited more consistent performance with less dispersion in the L1 tasks than in the L2 tasks.

4.1.2. The Online Survey of Reading Strategies

First, in terms of global reading strategy selection, participants' mean scores on the Chinese scales were higher than the English scales. This may suggest that participants chose these strategies more frequently during L1 than L2 reading. The relatively small standard deviations for both the Chinese and English scales indicate a high degree of consistency and stability in their selection of the global reading strategies. However, the score range on the Chinese scales was slightly larger than that on the English scales, indicating a slightly greater dispersion in the use of these strategies in L1 compared to L2 reading.

Second, regarding problem-solving reading strategy selection, participants' mean score on the Chinese scales was lower than the mean score on the English scales. This may indicate that participants utilised these strategies more frequently in L2 than L1 reading. The wider score range on the English scales compared to the Chinese scales suggests that participants' use of the problem-solving reading strategies was less consistent and more dispersed in L2 than in L1 reading.

Lastly, in terms of selecting the supporting reading strategies, the mean score on the Chinese scales was lower than the English scales. This may reflect a more frequent use of these strategies during L2 than L1 reading. Furthermore, the greater standard deviation and broader score range on the Chinese scales compared to the English scales indicate that participants demonstrated higher consistency and lower dispersion when selecting the supporting reading strategies in L2 reading, while their use of these strategies was more varied in L1 reading.

4.1.3. Reading Comprehension Tests

Since the number of questions and total scores differed between the Chinese and English tests, the raw scores were standardised using z-scores in this research, and boxplots were subsequently generated (see **Figure 2**). By calculating the deviation of each participant's score relative to the within-group mean in terms of standard deviations, the comparability of scores across the tests could be ensured.

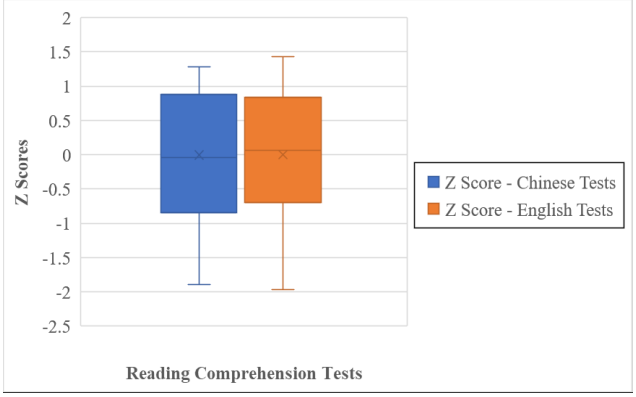

Figure 2. Boxplot of standard scores for Chinese and English reading comprehension tests.
Note: This boxplot illustrates the median, quartiles, and range of scores for both tests.

According to **Figure 2**, the mean z-score for the Chinese tests was -0.002, which is close to 0, indicating that the majority of participants scored near the average. The mean z-score for the English tests was 0.002, similarly close to 0, suggesting that participants performed comparably on both tests overall. The range of scores for the Chinese tests was –1.89 to 1.28, which is smaller than the range for the English tests, –1.97 to 1.43. Combined with the standard deviation of the raw scores shown in **Table 1**, where the standard deviation for the Chinese tests is 1.89 and for the English tests is 2.94, it can be observed that there is greater variability in the scores of the English tests.

However, the interquartile range (IQR) indicates that the IQR for the Chinese test is from –0.84 to 0.8825, while the IQR for the English test ranges from –0.695 to 0.835. The slightly larger interquartile range for the Chinese test suggests that its scores have more variability within the middle 50%.

4.2. Inferential Statistics

Before performing inferential statistics, conducting normality tests is essential to ensure that the data meets the prerequisites for parametric tests, select appropriate statistical methods, and enhance the accuracy and reliability of the analysis results [72]. Given the sample size of 50, which is considered small to medium, the Shapiro-Wilk test is recommended for its superior performance with such sample sizes. (see **Table 2**).

According to the results of the Shapiro-Wilk test, most of the data were not normally distributed. Exceptions were observed for the selection of problem-solving reading strategies in L2 reading (w (50) = 0.96, $p = 0.062 > 0.05$) and the selection of support reading strategies in L1 reading (w (50) = 0.98, $p = 0.494 > 0.05$), where the null hypotheses could not be rejected, suggesting that the data may conform to a normal distribution.

Table 2. Tests of normality for all indicators.

Variable	Shapiro-Wilk Statistic	*df*	*p*
Chinese Global Reading Strategies	0.95	50	0.024
English Global Reading Strategies	0.81	50	0.000
Chinese Problem-Solving Strategies	0.95	50	0.046
English Problem-Solving Strategies	0.96	50	0.062
Chinese Support Reading Strategies	0.98	50	0.494
English Support Reading Strategies	0.95	50	0.040
Chinese Lexical Decision Tasks	0.92	50	0.002
English Lexical Decision Tasks	0.94	50	0.014
Chinese Reading Comprehension Tests	0.91	50	0.001
English Reading Comprehension Tests	0.94	50	0.014

Based on these normality test results, this research further explored the relationship between online reading strategies, language proficiency, and reading comprehension performance in L1 and L2 reading, with non-parametric tests primarily being applied.

4.2.1. Differences in Online Reading Strategy Selection for L1 and L2 Reading

Due to the natural pairwise relationship in the data on each participant's choice of online reading strategies in L1 and L2 reading, and because most of the data did not conform to a normal distribution, the Wilcoxon signed-rank test was chosen as the preferred method for measuring these differences (see **Table 3**).

Participants' choices of online reading strategies for L1 and L2 reading differed significantly, according to the results of the Wilcoxon signed-rank test. In particular, when reading in L1 as opposed to L2, students used the global reading strategies more frequently. On the other hand, when reading in L2, participants selected the problem-solving reading strategies more frequently than when reading in L1. Furthermore, compared to L1 reading, individuals used the support reading strategies far more frequently while reading in L2.

Table 3. The results of Wilcoxon signed-rank test.

		n	Mean Rank	Sum of Ranks	Z	Asymp. Sig. (2-Tailed)
L2 - L1 Global Reading Strategies	Negative Ranks	49	25.96	1272.00	–6.13	<0.001
	Positive Ranks	1	3.00	3.00		
	Ties	0				
L2 - L1 Problem-Solving Strategies	Negative Ranks	8	12.44	99.50	–4.73	<0.001
	Positive Ranks	37	25.28	935.50		
	Ties	5				
L2 - L1 Support Reading Strategies	Negative Ranks	1	1.50	1.50	–6.09	<0.001
	Positive Ranks	48	25.49	1223.50		
	Ties	1				

4.2.2. Effects of L1 and L2 Proficiency on Online Reading Strategy Selection

Given the non-normal distribution of the data and the small sample size in this research, language proficiency was not categorised further into high, medium and low levels. Instead, Spearman's correlation was employed to examine the relationships between L1 and L2 proficiency, reading strategies, and reading comprehension performance (see **Table 4**).

The statistical results revealed that L1 proficiency was significantly and positively correlated with the selection of the global reading strategies and problem-solving reading strategies. Conversely, L1 proficiency demonstrated a significant negative correlation with the frequency of selecting support reading strategies.

Regarding L2 reading, no significant correlation was identified between L2 proficiency and the selection of global reading strategies. However, L2 proficiency exhibited significant positive correlations with both the selection of problem-solving and support reading strategies.

To further determine the extent to which L1 and L2 proficiency predict the selection of the three online reading strategies, multiple regression analysis was employed. (see **Tables 5** and **6**).

Table 4. The results of Spearman's rho.

Variable	1	2	3	4	5	6	7	8	9	10
L1 Proficiency	-									
L2 Proficiency	–0.204	-								
Chinese Global Reading Strategies	0.693**	–0.064	-							
Chinese Problem-Solving Strategies	0.888**	–0.194	0.533**	-						
Chinese Support Reading Strategies	–0.281*	0.383**	–0.216	–0.214	-					
English Global Reading Strategies	–0.030	–0.003	0.138	–0.088	0.234	-				
English Problem-Solving Strategies	–0.209	0.942**	–0.099	–0.149	0.493**	0.027	-			
English Support Reading Strategies	–0.119	0.623**	0.035	–0.085	0.304*	–0.040	0.561**	-		
Chinese Reading Comprehension	0.951**	–0.256	0.724**	0.873**	–0.347*	0.008	–0.249	–0.137	-	
English Reading Comprehension	–0.135	0.827**	–0.001	–0.132	0.330*	–0.119	0.755**	0.738**	–0.188	-

Note: * $p < 0.05$. ** $p < 0.01$.

Table 5. Multiple regression analysis of L1 proficiency on online reading strategy selection.

Model	Predictor	B	95% CI		*SE* B	β	R^2	AR^2
			LL	*UL*				
Chinese Global Reading Strategies	L1 Proficiency	0.050**	0.031	0.068	0.009	0.612	0.374	0.361
Chinese Problem-Solving Strategies	L1 Proficiency	0.067**	0.056	0.079	0.005	0.871	0.759	0.754
Chinese Support Reading Strategies	L1 Proficiency	–0.043	–0.092	0.007	0.025	–0.243	0.059	0.039

Note: ** $p < 0.01$.

Table 6. Multiple regression analysis of L2 proficiency on online reading strategy selection.

Model	Predictor	B	95% CI		*SE* B	β	R^2	AR^2
			LL	*UL*				
English Global Reading Strategies	L2 Proficiency	–0.004	–0.018	0.010	0.007	–0.080	0.006	–0.014
English Problem-Solving Strategies	L2 Proficiency	0.059**	0.049	0.068	0.005	0.874	0.764	0.759
English Support Reading Strategies	L2 Proficiency	0.032**	0.017	0.047	0.007	0.526	0.276	0.261

Note: ** $p < 0.01$.

Compared to the support reading strategies, L1 proficiency has a more significant impact on global and problem-solving reading strategies in L1 reading. Specifically, for each unit increase in L1 proficiency, the frequency of selecting the global reading strategies increases by 0.050 units, and the frequency of selecting the problem-solving reading strategies increases by 0.067 units. However, L1 proficiency does not significantly predict the frequency of using the support reading strategies.

In L2 reading, L2 proficiency significantly impacted the frequency of using problem-solving and support reading strategies. Specifically, for each unit increase in L2 proficiency, the frequency of selecting the problem-solving reading strategies increases by 0.059 units, and the frequency of selecting the support reading strategies increases by 0.032 units. However, L2 proficiency does not significantly predict the frequency of using the global reading strategies.

4.2.3. Effects of L1 and L2 Online Reading Strategy Selection on Reading Comprehension Performance

The results of the Spearman correlation analysis in **Table 4** also illustrate the relationship between the selection of reading strategies and the performance of reading comprehension in both L1 and L2 reading. For L1 reading, the frequency of selecting the global reading strategies and the problem-solving reading strategies was significantly positively correlated with L1 reading comprehension outcomes. However, there was a negative correlation between the frequency of selecting the support reading strategies and L1 reading comprehension outcomes.

In L2 reading, the frequency of choosing problem-solving and support reading strategies showed significant positive correlations with L2 reading comprehension performance. Conversely, no significant correlation was found between the selection of the global reading strategies and L2 reading comprehension performance.

To further determine the extent to which the selection of the three online reading strategies predicts reading comprehension performance, multiple regression analysis was conducted on these variables (see **Tables 7** and **8**).

In L1 reading, for each unit increase in the frequency of selecting global and problem-solving reading strategies, reading comprehension performance improves by 3.295 units and 7.503 units respectively. Conversely, each unit increase in the frequency of selecting support reading strategies results in a decrease of 0.645 units in reading comprehension performance.

In L2 reading, for each unit increase in the frequency of selecting problem-solving and support reading strategies, reading comprehension performance increases by 6.686 units and 5.520 units respectively. However, the frequency of selecting global reading strategies does not significantly predict L2 reading comprehension performance.

Table 7. Multiple regression analysis of online reading strategies selection on L1 reading comprehension performance.

L1 Reading Comprehension	B	95% CI		*SE* B	β	R^2	AR^2
		LL	*UL*				
Model						0.851	0.842
Constant	–27.362**	–33.668	–21.057	3.133			
Chinese Global Reading Strategies	3.295**	1.984	4.607	0.651	0.320		
Chinese Problem-Solving Strategies	7.503**	6.121	8.884	0.686	0.697		
Chinese Support Reading Strategies	–0.645*	–1.203	–0.088	0.277	–0.136		

Note: * $p < 0.05$. ** $p < 0.01$.

Table 8. Multiple regression analysis of online reading strategies selection on L2 reading comprehension performance.

L2 Reading Comprehension	B	95% CI		*SE* B	β	R^2	AR^2
		LL	*UL*				
Model						0.727	0.709
Constant	–16.114*	–29.591	–2.637	6.695			
English Global Reading Strategies	–2.026	–4.669	0.616	1.313	–0.119		
English Problem-Solving Strategies	6.686**	4.491	8.882	1.091	0.552		
English Support Reading Strategies	5.520**	3.085	7.955	1.209	0.411		

Note: * $p < 0.05$. ** $p < 0.01$.

5. Discussion

5.1. Major findings

This research investigates the selection and effectiveness of online reading comprehension strategies among Chinese international students with varying proficiency levels in their L1 and L2, addressing the initial research questions.

The results reveal that when it comes to choosing online reading strategies for L1 and L2 reading, Chinese international students show significant differences. Their selection of these tactics is strongly influenced by and predicted by their level of L1 and L2 proficiency. Similarly, their selection of online reading strategies has a major influence on and forecasts their success in reading comprehension. The results are outlined in the sections that follow, and possible explanations for the data are examined with reference to earlier research.

5.2. Differences in Online Reading Strategy Selection for L1 and L2 Reading

According to the results of this research, Chinese international students exhibit distinct preferences in their choice of online reading strategies when engaging with texts in their L1 compared to L2. Specifically, students are significantly more inclined to adopt global reading strategies during L1 reading, while they tend to favour problem-solving and support strategies in L2 reading. This clearly demonstrates the critical role of language proficiency in the selection of online reading comprehension strategies, supporting the initial hypothesis that Chinese EAL international students exhibit different online reading strategy selection when reading texts in their L1 and L2. In L1, they are more likely to use global reading strategies, while in L2, they rely more on support reading strategies.

To properly comprehend this finding, the theoretical background of this research must be considered—reading models. This section is organised according to the categorisation of different researchers' models as outlined in Section 2.

5.2.1. Source of Information Acquisition

Chinese international students can effectively utilise their rich background knowledge and high-level language proficiency in L1 reading, employing global reading strategies to swiftly identify and comprehend the main ideas and details of the text. This aligns with Goodman's [30] Top-Down Model, which emphasises the use of background knowledge, experience, and expectations to predict and interpret textual information. Faced with familiar content

in L1 reading, students rely on global strategies to quickly grasp the macrostructure and core information of the text, continuously generating and validating hypotheses through further reading—engaging in what Goodman describes as a "psycholinguistic guessing game". This tendency to use global reading strategies in L1 reading reflects their ability to leverage background knowledge and language skills for effective comprehension. Furthermore, the observation that compared to L2 students perform significantly better in L1 tests is consistent with Goodman's theory. Empirical studies have demonstrated that readers with rich background knowledge perform better when reading complex texts and that such knowledge significantly enhances reading comprehension [31,32].

In L2 reading, due to lower language proficiency, Chinese international students start with basic letter and word recognition, gradually building up the meaning of sentences and paragraphs to comprehend the text. Consequently, they more frequently employ problem-solving and support reading strategies. This aligns with Gough, Kavanagh and Mattingly's [36] Bottom-Up Model, which emphasises the role of word recognition in comprehension. When engaging with unfamiliar content in L2 reading, students rely heavily on these strategies to incrementally understand the text. They continuously identify and decode words, using context clues, consulting dictionaries, and taking notes to overcome comprehension obstacles. Through these strategies, students gradually construct an understanding of the text, ultimately achieving comprehensive meaning. Thus, Chinese international students demonstrate a greater tendency to use problem-solving and support strategies in L2 reading, reflecting their reliance on word recognition and syntactic structure, as well as their use of support reading strategies to compensate for lower language proficiency. This also aligns with empirical research supporting Gough's theory, which shows that the automation and fluency of word recognition are crucial for improving reading comprehension, particularly among second language learners [37].

5.2.2. Dynamic Process of Information Acquisition

Despite the numerous theories proposed by various researchers, this research finds Stanovich's Interactive-Compensatory Model to be the most suitable explanatory framework. In L1 reading, Chinese international students' proficiency in their native language allows them to more easily extract information during the construction phase and efficiently integrate this information with their rich background knowledge during the integration phase. This enables them to rely more on global reading strategies, further underscoring the importance of background knowledge in the reading comprehension process. However, in L2 reading, due to unfamiliarity with the language, students face greater challenges during the integration phase. They encounter lexical and syntactic obstacles when extracting information in the construction phase, which increases the difficulty of integration. Consequently, students must rely more on problem-solving and support strategies to overcome language barriers and aid in information integration. These strategies play a crucial role in enhancing comprehension and memory, compensating for their lower language proficiency, and helping them gradually construct and integrate text information to achieve comprehensive understanding.

It is worth noting that the phenomenon of Chinese international students adjusting their reading strategies according to the context and demands in L1 and L2 reading also corroborates Rumelhart's [40] Interactive Model, which posits that the reading process is a dynamic interaction where readers continuously adjust their strategies.

This finding is consistent with empirical research, which indicates that readers with lower reading abilities enhance their contextual inference skills to compensate for deficiencies in word recognition [41].

5.2.3. Results Comparison

The findings of this research align with existing empirical studies mentioned above. This research, consistent with prior studies, focuses on the differences in online reading strategy selection between L1 and L2 readers. By validating and analysing these differences, this research further consolidates existing research conclusions and provides robust empirical support for the field.

In terms of research hypotheses, this research synthesises and extends previous findings. Jeon and Yamashita [73] argued that L2 readers rely more heavily on bottom-up processing strategies compared to L1 readers. Birch and

Fulop [74] suggested that higher language proficiency is associated with a greater use of advanced, top-down reading strategies. Drawing on these studies, this research hypothesised that L1 readers predominantly use top-down global strategies, whereas L2 readers are more reliant on bottom-up problem-solving and support strategies. While this hypothesis aligns with existing literature, it also integrates different perspectives, thereby enriching the theoretical framework. However, this approach may risk oversimplifying the complexities of L1 and L2 reading processes, potentially overlooking other influential factors such as individual cognitive differences and the specificities of the reading material.

Besides, this research employs Anderson's [57] OSORS for data collection, similar to Jusoh and Abdullah [58] and Öztürk [59], though with different participant groups. While previous studies focused on students from Malaysia, and Turkey, this research examines Chinese international graduate students at the University of Sheffield, UK. Despite the different backgrounds of participants, the findings align with those researches, showing that students predominantly use global reading strategies in L1 reading, while problem-solving and support strategies are more frequently employed in L2 reading. This consistency suggests that learners from various cultural backgrounds may adopt similar strategy patterns in L1 and L2 reading, highlighting the broad applicability of these strategies in cross-cultural language learning contexts.

However, the findings of this research contrast with those of Tavakoli [60], who, in research with Iranian students, found that their online reading strategies were significantly influenced by language proficiency, with support reading strategies being the most commonly used in L2 reading, followed by global strategies, and lastly, problem-solving strategies. Cultural background and educational systems are likely key factors contributing to this difference. Specifically, the Iranian educational system places a greater emphasis on grasping the overall meaning of texts, which might explain why support and global strategies are more prevalent in L2 reading [69]. In contrast, the Chinese educational system may focus more on solving specific problems, which could lead to a higher frequency of problem-solving strategy use in L2 reading. These differences further underscore the importance of considering cultural backgrounds and educational systems in cross-cultural research to better understand and explain the reading strategy choices of different learners.

5.3. Effects of L1 and L2 Proficiency on Online Reading Strategy Selection

The findings of this research indicate that the L1 and L2 proficiency of the Chinese international students significantly influences their selection of online reading strategies. Specifically, higher L1 proficiency correlates with a greater frequency of selecting global and problem-solving reading strategies in L1 reading, and this proficiency serves as a significant predictor of strategy choice. Conversely, higher L1 proficiency is associated with a lower frequency of choosing support reading strategies. Additionally, higher L2 proficiency correlates with a greater frequency of employing problem-solving and support reading strategies in L2 reading, and this proficiency is also a significant predictor of strategy choice. These findings support the initial hypothesis that as language proficiency increases, the selection and frequency of certain reading strategies will be optimised to meet the demands of an online reading environment.

This finding closely aligns with the previous discussion on Chinese international students' strategy selection in L1 and L2 reading, with the key distinction being that students with higher L1 proficiency not only more frequently select global reading strategies in L1 reading but also exhibit a significantly greater use of problem-solving strategies. However, unlike the previous section, this section seeks to further elucidate the relationship between such strategy selection and L1 and L2 proficiency, drawing upon the Cultural Transfer Theory outlined in the literature review. Additionally, this section provides an in-depth analysis of why students with higher L1 proficiency not only prefer global reading strategies but also frequently employ problem-solving strategies in L1 reading.

5.3.1. Effects of L1 Proficiency on Online Reading Strategy Selection

Existing research has widely validated the significant impact of L1 proficiency on the selection of reading strategies. Grabe and Stoller [75] highlight that students with

higher L1 proficiency typically develop a strong holistic cognitive approach within their native cultural context. This approach relies on existing background knowledge and an overall grasp of textual meaning, closely aligning with the global reading strategies. Consequently, in L1 reading, these students tend to favour the use of global reading strategies. However, when transitioning to L2 reading, the effectiveness of global reading strategies may be constrained by limitations in L2 vocabulary and grammatical knowledge, as Koda and Miller [76] have observed. This constraint forces these students to rely more heavily on problem-solving and support reading strategies to navigate the linguistic challenges of L2 reading. Consistent with these findings, the results of this study also indicate that while students with high L1 proficiency attempt to transfer their L1 reading strategies to L2 reading, the insufficiency of L2 linguistic knowledge often necessitates a strategic adjustment to accommodate the new language environment.

Furthermore, students with higher L1 proficiency tend to rely less on support reading strategies during L1 reading, likely because they have internalised effective top-down reading strategies within their native language context, enabling them to comprehend texts without additional support. Ke and Chan [77] similarly observed that students with an L1 background similar to Chinese relied less on support reading strategies in L2 reading. This finding aligns with the present study, which shows that students with higher L1 proficiency demonstrate greater autonomy in L1 reading and are more inclined to use problem-solving reading strategies in L2 reading to address linguistic challenges.

5.3.2. Effects of L2 Proficiency on Online Reading Strategy Selection

Students with higher L2 proficiency tend to use problem-solving and support reading strategies more frequently in L2 reading, consistent with the findings of Habók and Magyar [78] and Ke and Chan [77]. These researches collectively demonstrate that as L2 proficiency increases, learners become more adept at selecting and applying strategies to effectively manage linguistic challenges, thereby enhancing their reading comprehension abilities. This phenomenon reflects the adaptive nature of cultural transfer; while L1 culture initially influences L2 learning, increased exposure to L2 prompts learners to develop new strategic competencies within the L2 framework. However, although these findings support the general trends observed in the current study, individual learner differences and varying degrees of cultural transfer may lead to variations in strategy use. Additionally, other studies with different participant characteristics or methodologies may yield results that do not entirely align, further highlighting the complexity and diversity of L2 strategy application across different learning contexts.

5.3.3. Results Comparison

This research examines the effects of L1 and L2 proficiency on the selection of reading strategies, a focus that aligns with a substantial body of empirical research mentioned above. However, this research differs slightly in its approach to data analysis.

Specifically, this research employed Spearman's correlation to assess the relationship between L1 and L2 proficiency and reading strategy selection due to the small sample size and non-normal data distribution. In contrast, Ke and Chan [77] and Habók and Magyar [78] utilised Pearson's correlation , which is better suited for their larger, normally distributed datasets. Although Spearman's correlation is appropriate for this research, it generally has lower statistical power, which could limit the sensitivity of the findings. Despite these differences, the results are consistent across studies, supporting the robustness of the conclusions.

Furthermore, Habók and Magyar [78] employed a more complex Structural Equation Modelling (SEM) to analyse multiple dependent and latent variables simultaneously. While SEM offers sophisticated analytical capabilities, it demands larger sample sizes and higher data quality, making it less applicable to this research and potentially leading to model fitting errors. Multiple regression analysis, as used in this research, while simpler, effectively addresses the direct impact of L1 and L2 proficiency on strategy selection without such risks.

5.4. Effects of L1 and L2 Online Reading Strategy Selection on Reading Comprehension Performance

The results of this research show that the more fre-

quently Chinese international students use global and problem-solving reading strategies in L1 reading, the higher their reading comprehension performance. In contrast, a higher frequency of adopting support reading strategies is related to lower reading comprehension scores. The use of all three online reading strategies has a strong predictive influence on reading comprehension scores. In L2 reading, this research reveals that a higher frequency of using problem-solving and support reading strategies is positively correlated with improved reading comprehension outcomes, and the frequency of these strategies also has a significant predictive capacity for reading comprehension performance. These results support the initial hypothesis that there is a significant relationship between the use of reading strategies and reading comprehension performance in both L1 and L2 reading.

The observation that students employed different reading strategies in L1 and L2 contexts, resulting in varied outcomes, indicates that their strategy selection was carefully regulated. This observation is consistent with Flavell's [51] Metacognitive Theory, which posits that using reading strategies is fundamentally a reflection of the reader's self-monitoring and self-regulation processes. Thus, it is essential to examine these findings through the lens of Metacognitive Theory.

5.4.1. Effects of Strategy Selection on Online Reading Comprehension Performance in L1 Reading

According to Metacognitive Theory, Chinese international students continuously engage in self-monitoring of their comprehension during reading and adjust their strategies accordingly [52]. In the context of L1 reading, when students recognise the need to understand the overall structure of the text, they tend to employ global reading strategies to swiftly capture the main ideas and structure. Conversely, when faced with comprehension difficulties, students are likely to shift to problem-solving reading strategies, focusing on resolving specific comprehension challenges. This finding aligns with existing empirical research, which indicates that students who frequently employ global and problem-solving reading strategies tend to achieve superior reading comprehension performance. For instance, Villanueva [52] found that university students who regularly use metacognitive strategies, including global and problem-solving strategies, significantly outperformed their peers in reading comprehension. Similarly, Fitrisia, Kok and Yusuf [66] also investigated the relationship between metacognitive awareness and students' reading performance, confirming that students with higher metacognitive awareness and frequent strategy use tend to excel in reading comprehension tasks.

Therefore, it is evident that through effective strategy selection and adjustment, students can significantly enhance their reading comprehension performance. Higher levels of comprehension not only reflect students' comprehensive understanding of the text but also demonstrate their ability to efficiently allocate cognitive resources during the reading process.

However, Metacognitive Theory also suggests that when readers lack confidence in their understanding or overly rely on certain support reading strategies, this can lead to distraction and increased cognitive load, thereby impairing overall comprehension [79]. In L1 reading, frequent use of support reading strategies may indicate uncertainty in students' self-monitoring or an excessive focus on comprehension. Specifically, over-reliance on support reading strategies may suggest that students may be overly cautious, attempting to compensate for perceived gaps by repeatedly consulting references or taking notes. This process can interfere with their ability to grasp the text as a whole, leading to reduced comprehension efficiency.

5.4.2. Effects of Strategy Selection on Online Reading Comprehension Performance in L2 Reading

According to Metacognitive Theory, students continuously monitor and regulate their comprehension and strategy use during the reading process [79]. In L2 reading, unfamiliar vocabulary, complex grammatical structures, and cultural differences significantly increase the cognitive load, presenting greater challenges to students' comprehension. Consequently, students tend to rely on problem-solving and support strategies to effectively manage and allocate their cognitive resources.

Empirical research indicates that problem-solving strategies play a crucial role in addressing linguistic complexity and overcoming comprehension barriers in L2

learning [80]. Through these strategies, students can focus on resolving specific issues when encountering comprehension difficulties, thereby effectively reducing cognitive load [57]. For instance, Par [81], employing correlation analysis, investigated the relationship between reading strategies and reading achievement among EAL students, finding that students who frequently used problem-solving and support strategies performed better in reading comprehension tests. This finding is consistent with existing research, demonstrating a positive correlation between metacognitive strategies, particularly problem-solving and support strategies, and students' reading comprehension performance. Furthermore, support strategies provide necessary external assistance, enabling students to maintain coherence and continuity in comprehension even when cognitive resources are insufficient. The use of these strategies not only reflects students' ability to rationally allocate cognitive resources during self-regulation but also significantly enhances their reading comprehension performance [82].

5.4.3. Results Comparison

This research examines how reading strategy selection affects reading comprehension performance, aligning with the research direction of prior studies. As previously noted, the findings of this research are consistent with those of several empirical studies mentioned above. However, this research diverges from some of them in its methods of data collection and interpretation.

Specifically, this research collected data through online reading comprehension tests with multiple-choice questions, a method consistent with those used by Fitrisia, Kok and Yusuf [66]. However, Oxford [80] employed a more comprehensive approach by incorporating interviews to gain a deeper understanding of students' performance. While multiple-choice questions facilitate standardised and efficient data collection, they may not fully capture the complexity of students' comprehension and reading strategies. On the other hand, Oxford's inclusion of qualitative methods, such as interviews, classroom observations, and student journals, provided a richer and more holistic understanding of students' language learning processes, although these methods may introduce subjectivity and require more resources for data collection and analysis.

Moreover, this research primarily draws on Metacognitive Theory [51] to explain how strategy selection influences reading comprehension through self-monitoring and self-regulation, consistent with Carrell [79]. However, Oxford [80] integrated Metacognitive Theory with Language Learning Strategy Theory, providing a more comprehensive perspective. While such an approach may be more comprehensive, it may also introduce a complex theoretical framework that is challenging to apply effectively in practice.

5.5. Research Strengths and Potential Future Beneficiaries

5.5.1. Research Strengths of This Study

Following an in-depth analysis and comparison of the research findings, it is essential to explore the strengths of this research to fully illustrate its contributions to the academic field and its practical implications.

Firstly, this research provides a valuable supplement to existing research by examining the relationship between L1 and L2 proficiency, online reading strategy selection, and online reading comprehension performance. Prior research has predominantly focused on the cognitive processes involved in reading comprehension, the influence of linguistic structures, and readers' adaptation to textual formats. However, these studies have largely concentrated on isolated L1 or L2 reading strategies without systematically comparing their effectiveness in online reading environments. This research fills that gap by identifying the primary strategies employed by Chinese international students in L1 and L2 online reading contexts, investigating the effects of language proficiency on strategy selection and effectiveness, and evaluating the comprehension outcomes across different language settings. Consequently, this research offers new perspectives and empirical support to the field.

Moreover, this research employed standardised instruments, including Struck and Jiang's [25] LDTs and Anderson's [57] OSORS, to collect data. This approach not only minimises subjective bias, thereby enhancing the objectivity, consistency, and reliability of the data, but also validates the applicability of these instruments across different cultural contexts. By focusing on Chinese international students, this research enriches the empirical application of these scales in cross-cultural settings and provides valuable

insights for future cross-cultural research.

Furthermore, despite the small sample size and non-normal data distribution, this research utilised non-parametric methods, yielding results consistent with prior studies. This indicates that the research employed appropriate analytical methods for the conditions at hand, reducing potential errors while confirming the robustness of the findings. It also demonstrates the broader applicability of the research methods in similar contexts, offering useful insights and guidance for small sample studies.

Finally, the interpretation of the data is closely tied to the literature review in Section 2, utilising Reading Models, Cultural Transfer Theory, and Metacognitive Theory. This theoretical grounding provides a comprehensive and systematic explanation and analysis of the research data, offering deeper insights into the effects of L1 and L2 reading strategy selection on comprehension performance.

5.5.2. Potential Future Beneficiaries of This Research

The findings of this research underscore the critical effects of online reading strategy selection on the reading comprehension performance of Chinese international students in both L1 and L2 contexts. These results have significant potential implications for several key groups.

Firstly, for future researchers in the field of reading comprehension, this research not only supplements existing theoretical frameworks but also enriches the empirical data underpinning related scales. Researchers can build upon these findings by employing diverse methods to further explore the influence of cultural backgrounds and language proficiency on the selection of reading strategies. This could broaden and deepen the scope of research in this area, providing a solid foundation for the design and implementation of future studies, the specifics of which will be elaborated upon in the following section.

Secondly, for Chinese international students, this research offers valuable guidance on the selection of reading comprehension strategies across different linguistic environments, thereby assisting them in optimising their reading strategies and improving their academic performance. This research specifically highlights the differences in strategy selection between L1 and L2 reading and their significant impact on comprehension outcomes. This has considerable practical value for students facing diverse linguistic and cultural learning environments, enabling them to overcome challenges in reading comprehension, enhance reading efficiency and comprehension, and reduce feelings of frustration and anxiety during the learning process. As a result, students may become better equipped to adapt to cross-cultural learning environments and achieve academic success. Moreover, the conclusions of this research align with the broader trends of globalisation and digitalisation in education. As an increasing number of students pursue international education, understanding and effectively employing reading strategies across different linguistic contexts has become a crucial factor in academic success. The strategy guidance provided by this study will assist students in better navigating the linguistic and cultural differences inherent in international learning environments, bolstering their academic confidence and sense of achievement [75].

Finally, for educators and curriculum designers, the findings of this research emphasise the importance of incorporating reading comprehension strategies into educational programmes and provide a solid theoretical basis for designing more effective reading instruction. Educators can tailor their teaching strategies according to students' language proficiency and reading strategy preferences to enhance their reading comprehension performance [75]. This research not only aids teachers in implementing more targeted instruction in the classroom but also serves as a valuable resource for teacher training and guidance. By understanding the strategy use characteristics of students with varying levels of language proficiency, teachers can better meet students' needs in both L1 and L2 reading, allowing them to develop more personalised and effective instructional plans that cater to individual differences and learning requirements.

6. Conclusions

This research investigates the differences in the selection of L1 and L2 online reading strategies, the effects of L1 and L2 proficiency on strategy selection, and the subsequent effects of these strategies on the reading performance. The findings are as follows:

Firstly, there are significant differences in the online reading practices used by Chinese international students in

L1 and L2. In particular, participants are more likely to use global reading strategies in L1 reading, but problem-solving and support reading strategies are used more frequently in L2.

Furthermore, L1 and L2 proficiency significantly influence the selection of reading strategies. Higher L1 proficiency is connected with a larger frequency of using global and problem-solving reading strategies in L1 reading, with this proficiency having a strong positive predictive influence on the use of these strategies. In contrast, support reading strategies are selected less frequently. Higher L2 proficiency, on the other hand, leads to more frequent use of problem-solving and support reading strategies in L2 reading, with proficiency also positively influencing the frequency with which these strategies are chosen.

Finally, the selection of different reading strategies significantly influences reading comprehension performance. In L1 reading, higher frequencies of selecting global and problem-solving reading strategies are positively associated with better reading comprehension performance, indicating a positive predictive effect. However, higher frequencies of selecting support reading strategies are associated with lower reading comprehension performance, indicating a negative predictive effect. Correspondingly, in L2 reading, higher frequencies of selecting problem-solving and support reading strategies significantly enhance reading comprehension performance, demonstrating a positive predictive effect.

This research has theoretical and practical implications for assessing the impacts of L1 and L2 proficiency on reading strategy selection and the consequent influence on reading comprehension ability. Further research in this area is critical, especially in light of globalisation and digitalisation of education, where the number of international students is rapidly increasing. Based on the observations, this research indicates that future research should be broadened and developed in the following areas:

Firstly, future research could improve the external validity and generalisability of the findings by increasing the sample size and recruiting participants from more diverse cultural and language backgrounds. By examining the adaptability of reading strategies across different cultural contexts, researchers can gain deeper insights into the impact of cultural background and language proficiency on strategy selection, thereby providing robust empirical support for cross-cultural reading education.

Secondly, future research could consider employing more diverse methodologies. Beyond the use of various standardised questionnaires and tests, researchers might consider using tools such as eye-tracking technology and think-aloud protocols to capture participants' actual behaviours and cognitive processes during reading. Integrating both quantitative and qualitative data would allow for a more comprehensive understanding of reading strategy use, thereby enhancing the credibility and external validity of the research findings.

Thirdly, future research could consider involving more refined stratification of participants' language proficiency levels. By categorising participants into high, medium, and low proficiency groups and analysing strategy use across different reading tasks, researchers could uncover the multi-level impact of language proficiency on strategy selection. This approach would enable a more precise understanding of the effectiveness of strategies and their applicability in various contexts.

Finally, future research could consider adopting longitudinal designs to track changes in language proficiency and reading strategies over time. Such an approach would help to reveal the dynamic trajectories of strategy use, providing valuable insights into the long-term relationships between language development and strategy use, and offering empirical evidence to inform improvements in language education and strategy instruction.

In conclusion, by building upon the foundations of this research, further research could not only expand the theoretical framework of our understanding of how reading strategies are influenced by language proficiency and cultural context, but also advance the development of more effective educational practices for cross-cultural learning strategies in an increasingly globalised and digitalised educational environment.

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Institutional Review Board Statement

The study was conducted in accordance with the

Declaration of Helsinki, and approved by the Ethics Committee of the University of Sheffield (protocol code: 058699 and date of approval is February 16, 2024).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data supporting the findings of this study are stored securely. Once participant responses were completed and submitted, the data were automatically anonymized. They are stored in Gorilla, SPSS, and Google Drive, which are secured by the University of Sheffield. Only the research team have access to this data, which will be used solely for the researchers' MSc dissertations under the supervisor's guidance.

No personally identifiable data such as names or email addresses were collected. Gorilla assigned unique participation IDs to participants, and these IDs were used for data management and analysis to protect participants' identities. As the study does not involve any sensitive topics, upon completion of the research, the data will be immediately destroyed to prevent any potential misuse. Since the data cannot be shared due to privacy and ethical considerations, no publicly accessible datasets are available.

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Conflicts of Interest

The authors declare no conflict of interest.

Appendix A

The following are the stimuli used in the Lexical Decision Tasks (LDTs).

Table A1. *Stimuli used in the Lexical Decision Tasks (LDTs).*

English Words	English Nonwords	Chinese Words	Chinese Nonwords
glory	kayuk	暴雨	伶如
accent	bywoy	宫廷	酣体
bonus	gazzo	卵巢	原蛤
buddy	cyrrh	石块	傣环
treasure	gauvy	边疆	宇考
romance	puffaw	辣椒	注弧
rocket	phlugm	被告	拚兴
elder	uddue	牛奶	冈式
worry	ajoid	制品	者求
toilet	fudsy	宴会	息稚
angel	fauze	池塘	汞声
parade	muggod	顾问	流尔
handle	gownud	集合	国憎
giant	buzzad	喜剧	碎而
pillow	sludgo	蜡烛	维袭
pizza	buoyad	基督	夫谐
cabin	gockjaw	四处	颠即
chaos	snulpt	副业	搓北
needle	fugua	溶剂	钊吃
magic	sylvad	时节	栅按
rebel	aupumn	出身	运媳
guitar	daiku	珍珠	虽瘦
canvas	jight	邮票	几塞
temple	muzzlo	僧侣	萤则
motive	dowsy	针灸	保泣
monster	subgue	专题	直肤
curtain	fumdum	偏见	家奢
collapse	kegfug	芭蕾	觅段
favour	aweign	旅馆	饵青
organ	fuxom	同胞	曙用
candy	cuckao	玩具	赋展

Table A1. *Cont.*

English Words	English Nonwords	Chinese Words	Chinese Nonwords
domain	gnowy	威信	曼易
logic	ahuck	双眼	没缫
legend	skyduve	磁铁	臂别
insect	ofium	医药	斟你
salmon	gosque	困境	六刮
horror	huirk	档案	马淑
tunnel	tweezad	听众	力侃
captain	humbup	思路	半玄
soccer	ahaze	童年	允依
uncle	snobba	食堂	李止
blanket	dogty	常识	完谅
cookie	bofty	汽油	过吼
complex	feigy	诗意	满续
summit	dowwow	喉咙	持抛
powder	guccumb	各方	亨由
humour	waximum	指令	五他
valley	woodcug	修辞	访突
cotton	buggek	铅笔	助典
delay	murkt	谈判	褶事
motor	azimuck	肝脏	看尉
tennis	adruft	前景	线亢
volume	godry	萌芽	超镜
lemon	bambiko	岛屿	转鹰
flavour	snugglo	手掌	使润
meter	snump	钥匙	黄劫
fabric	bluawk	婚礼	复豹
comfort	ciazza	郊区	夕着
shelter	adgue	座位	仓兵
license	clueeze	德育	瞳此
honey	jujitbu	挫折	命桐
assault	wookyurd	新娘	佐紧
leather	bilabiak	茶叶	舍进
platform	sluggew	开关	虾越
finance	aquepuct	规矩	鲢但
fiction	vidweek	灰尘	斐属
burden	foday	纪录	自枚
salad	tugboap	幻觉	热栏
cousin	hubna	王朝	锄先
apple	dopknot	预算	福引
dispute	epify	强弱	势芳
wonder	hurfew	春秋	周邱
drama	knobblu	视野	将椅
heaven	dolcy	肚皮	认虎
label	busgy	资产	休子
button	mottje	律师	盾欧

Table A1. *Cont.*

English Words	English Nonwords	Chinese Words	Chinese Nonwords
index	bowwot	泥沙	曾舶
award	umfurl	实例	们臀
onion	baggod	概率	与莽
essay	pazebo	西瓜	肘决
tower	augir	甲烷	至幅
clinic	ruldy	橡胶	叫潭
silver	eupogize	都市	铃之
habit	frucifix	男孩	也茧
total	geflux	举动	近蠢
symbol	oubfox	足球	似九
passion	goiey	寡妇	役提
entry	dumult	老乡	月够
butter	gruwth	条款	斯兔
jacket	snaze	简称	虞改
passage	exuct	司法	验肩
cycle	druba	电器	何氯
error	adday	参谋	呜就
offer	paxim	治安	米磷
honour	lulmox	鼻孔	源漓
asset	guidod	趋向	三朔
sentence	spawd	成份	知罕
travel	moyeur	宝贝	贪候
witness	puildup	遗嘱	随弘
sequence	affex	宗旨	充设

Note. The last item in each category was a designated warm-up item used either at the beginning or after the break in each list.

Appendix B

The following is the Chinese Online Survey of Reading Strategies (OSORS) scale.

Table A2. *Chinese Online Survey of Reading Strategies (OSORS) Scale.*

No.	Statement
1	当我在线阅读时，我心里有一个目的。
2	我参与与其他英语学习者的实时聊天。
3	我参与与英语为母语的人的实时聊天。
4	我在网上阅读时做笔记，以帮助我理解所读内容。
5	我思考我所知道的知识来帮助我理解我在网上阅读的内容。
6	在阅读之前，我会对在线文本进行整体观察，了解其内容。
7	当在线文本变得困难时，我会大声朗读以帮助我理解所读的内容。
8	我思考网上文字的内容是否符合我的阅读目的。
9	我缓慢而仔细地阅读，以确保我理解我在网上阅读的内容。

Table A2. *Cont.*

No.	Statement
10	我首先查看在线文本，注意其长度和组织等特征。
11	当我注意力不集中时，我会努力回到正轨。
12	我打印出在线文本的硬拷贝，然后在信息下划线或圈出以帮助我记住它。
13	我根据网上阅读的内容调整阅读速度。
14	在线阅读时，我会决定仔细阅读哪些内容以及忽略哪些内容。
15	我使用参考资料（例如在线词典）来帮助我理解我在网上阅读的内容。
16	当在线文本变得困难时，我会更加注意正在阅读的内容。
17	我出于学术目的在互联网上阅读网页。
18	我在在线文本中使用表格、图形和图片来增加我的理解。
19	我时不时地停下来思考我在网上阅读的内容。
20	我使用上下文线索来帮助我更好地理解我在网上阅读的内容。
21	我会转述（用自己的话重述观点）以更好地理解我在网上阅读的内容。
22	我尝试用图片或可视化信息来帮助记住我在网上读到的内容。
23	我使用粗体和斜体等排版特征来识别关键信息。
24	我批判性地分析和评估在线文本中提供的信息。
25	我在在线文本中来回翻阅，寻找其中观点之间的关系。
26	遇到新信息时，我会检查自己的理解。
27	当我阅读时，我会尝试猜测在线文本的内容是什么。
28	当在线文本变得困难时，我会重新阅读以加深理解。
29	我向自己提问，希望能在在线文本中找到答案。
30	我检查我对在线文本的猜测是正确还是错误。
31	当我在线阅读时，我会猜测未知单词或短语的含义。
32	在选择阅读之前，我会先浏览一下在线文本，对其是否符合我的目的有一个基本概念。
33	我在互联网上阅读网页是为了消遣。
34	在选择使用网上阅读的信息之前，我会批判性地评估在线文本。
35	我能区分在线文本中的事实和观点。
36	在网上阅读时，我会寻找能涵盖问题正反两面的网站。
37	在线阅读时，我会将中文翻译成其他语言。
38	在线阅读时，我会同时考虑中文和其他语言的信息。

The following is the English Online Survey of Reading Strategies (OSORS) scale.

Table A3. *English Online Survey of Reading Strategies (OSORS) Scale.*

No.	Statement
1	I have a purpose in mind when I read on line.
2	I participate in live chat with other learners of English.
3	I participate in live chat with native speakers of English.
4	I take notes while reading on-line to help me understand what I read.
5	I think about what I know to help me understand what I read on-line.
6	I take an overall view of the on-line text to see what it is about before reading it.
7	When on-line text becomes difficult, I read aloud to help me understand what I read.
8	I think about whether the content of the on-line text fits my reading purpose.
9	I read slowly and carefully to make sure I understand what I am reading on-line.
10	I review the on-line text first by noting its characteristics like length and organization.
11	I try to get back on track when I lose concentration.
12	I print out a hard copy of the on-line text then underline or circle information to help me remember it.
13	I adjust my reading speed according to what I am reading on-line.
14	When reading on-line, I decide what to read closely and what to ignore.
15	I use reference materials (e.g. an on-line dictionary) to help me understand what I read on-line.
16	When on-line text becomes difficult, I pay closer attention to what I am reading.
17	I read pages on the Internet for academic purposes.
18	I use tables, figures, and pictures in the on-line text to increase my understanding.
19	I stop from time to time and think about what I am reading on-line.
20	I use context clues to help me better understand what I am reading on-line.
21	I paraphrase (restate ideas in my own words) to better understand what I read on-line.
22	I try to picture or visualize information to help remember what I read on-line.
24	I critically analyze and evaluate the information presented in the on-line text.
25	I go back and forth in the on-line text to find relationships among ideas in it.
26	I check my understanding when I come across new information.
27	I try to guess what the content of the on-line text is about when I read.
28	When on-line text becomes difficult, I re-read it to increase my understanding.
29	I ask myself questions I like to have answered in the on-line text.
30	I check to see if my guesses about the on-line text are right or wrong.
31	When I read on-line, I guess the meaning of unknown words or phrases.
32	I scan the on-line text to get a basic idea of whether it will serve my purposes before choosing to read it.
33	I read pages on the Internet for fun.
34	I critically evaluate the on-line text before choosing to use information I read on-line.
35	I can distinguish between fact and opinion in on-line texts.

Table A3. *Cont.*

No.	Statement
36	When reading on-line, I look for sites that cover both sides of an issue.
37	When reading on-line, I translate from English into my native language.
38	When reading on-line, I think about information in both English and my mother tongue.

Appendix C

The following are three texts and fifteen gap-filling multiple-choice questions for the Chinese reading comprehension tests.

Chinese Reading Comprehension Tests

说明：*以下有三段短文，每段短文中有 5 个空格。请从每段短文上方的方框中选择词语，并将其对应的字母填到空格处，每个选项最多选一次。*

（一）

A) 一直
B) 脱不了
C) 日益
D) 尽管
E) 得以

从 15 世纪开始，欧洲便出现了手抄报纸，报导有关政治、战争、市场、船期等消息，　1　它突破了传统私人信件的形式，但传播的范围还很小；　2　要等到印刷技术进步，报纸才；　3　大量发行。报纸之所以普及，也跟近代商业的发展；　4　关系。经济快速地成长，使得不同地区、不同国家间的关系更为密切，人们需要互相了解，资讯需要快速传播，人们对报纸的依赖也就；　5　加深，报业因此蓬勃发展。

（二）

A) 一如
B) 非得
C) 费力
D) 心思
E) 九死一生

人之所以冒险，主要有两种动力：第一种是当追求基本的生存需求都倍感，　6 渐渐走向穷途末路，7 冒险突破目前的困境时，这属于对抗现实的动力。 8 当年的祖先，离乡背井，横渡惊险的海峡到另一边陌生的土地上，那样的冒险无疑是 9；第二种冒险则完全相反，当人在生活饱暖、安定时，便会有 10 去寻找人生不凡的价值，为实践自己的梦想而冒险，这属于自我实现的动力。

（三）

A) 随心所欲
B) 必
C) 结晶
D) 缜密
E) 可见

对许多人来说，挥洒艺术的过程应是无所拘束、11　的，但在纸雕的世界里，每个折痕、下刀位置都得经过精确的计算、　12　的思量。试想，以纸张做出一架工整的立体钢琴，难免涉及平衡、架构等概念，计算　13　不可免，纸雕专家马克斯将之称为纸雕工程学。他认为：纸雕好比钻石，一件成品可谓科学与艺术的　14，除折痕要算得精准，刻画、打磨皆有功夫所在。　15，想在纸上创造美学玩物，其实谈何容易。

The following are three texts and thirty gap-filling multiple-choice questions for the English reading comprehension tests.

English Reading Comprehension Tests

Directions: *There are three passages with ten blanks of each. You are required to select one word for each blank from a list of choices given in a word bank following the passage. Read the passage carefully before making your choices, each choice in the bank is identified by a letter. You may not use any of the words in the bank more than once.*

Questions 1 to 10 are based on the following passage.

A) acknowledge
B) assess
C) confused
D) endure
E) extremely
F) genius
G) highly
H) permanent
I) possess
J) presence
K) puzzled
L) status
M) surprising
N) thoroughly
O) unique

Many people believe that passion and commitment are the foundations of strong romantic relationships. But a relationship is made of two 1 individuals. And the personality traits (特性) these individuals 2 or lack can often make a relationship more- or less- likely to 3. Recent research has found that one trait in particular-humility (谦逊) -is an important indicator of successful relationships.

Humility can sometimes be 4 with a lack of confidence. But researchers have come to realize that being humble generally indicates the 5 of deeply admirable personal qualities. Being humble means you have the ability to accurately 6 your deficiencies without denying your skills and strengths. For example, you might recognize that you are intelligent, but realize that you are not a 7. Thus, humility leads to an honest view of one's own advantages and shortcomings. Humble people do not ignore, avoid, or try to deny their limits or deficiencies. They can 8 mistakes, see value in things that are far from perfect and identify areas for improvement.

Perhaps it is not 9, then, that humility appears to be a huge asset to relationships. One study found that people tend to rate this quality 10 in their spouse. The study also found that someone who is humble is more likely to initiate a romantic relationship, perhaps because they are less likely to see themselves as "too good" for someone else. Thus, a humble partner might be your ideal partner.

Questions 11 to 20 are based on the following passage.

A) captured
B) classical
C) conclusively
D) emergence
E) exact
F) generated
G) particular
I) precision
J) probably
K) quality
L) scarcity
M) senior
N) separated
O) systematically
H) position

It is commonly believed that the great English dramatist and poet William Shakespeare was born in Stratford-on-Avon on April 23, 1564. But it is impossible to know the 11 day on which he was born.

Church records show he was baptized (施洗) on April 26, and three days was a customary amount of time to wait before baptizing a newly born baby. Shakespeare's date of death is 12 known, however: it was April 23, 1616. He was 52 and had retired to Stratford three years before.

Although few plays have been performed or analysed as extensively as the 38 plays Shakespeare wrote, there are few surviving details about his life. This 13 of biographical information is due primarily to his social 14, he was not a noble, but the son of a leather trader.

Shakespeare 15 attended the grammar school in Stratford, where he would have studied Latin and read 16 literature. He did not go to university and at age 18 married Anne Hathaway, who was eight years his 17. They had four children, including the twins, Hamnet and Judith. Nothing is known of the period between the birth of the twins and Shakespeare's 18 as a dramatist in London in the early 1590s.

In a million words written over 20 years, he 19 the full range of human emotions and conflicts with a 20 that remains sharp today. As his great contemporary the poet and dramatist Ben Jonson said, "He was not of an age but for all time.

Questions 21 to 30 are based on the following passage.

A) amount
B) answer
C) avoid
D) aware
E) depart
F) drastically
G) fear
I) mechanical
J) result
K) review
L) rigorous
M) tend
N) timidity
O) typically
H) limited

The sheets are damp with sweat. You're cold, but

your heart is racing as if a killer just chased you down a dark street. It was just a nightmare, you tell yourself; there's nothing to be afraid of. But you're still filled with 21.

Given how unsettling and haunting nightmares can be, is there a way for dreamers to 22, or even turn off, these bad dreams as they happen?

Research is 23, but some studies suggest that people who can master lucid dreaming-that is, the ability to be 24 that a nightmare is happening and possibly even control it without waking up may hold the 25.

Nightmares are part of the human experience, especially for kids. Doctors 26 don't consider occasional nightmares a problem. They can just be symptoms of a sleep disorder that can 27 from an unpleasant experience, stress, or certain drugs.

To treat the disorder, there are a number of medicines and therapies that are backed by 28 research, according to the American Academy of Sleep Medicine, which analyzed the available research on the treatment of nightmare disorder in a recent 29 published in the Journal of Clinical Sleep Medicine.

However, nightmares are complicated, and researchers are still struggling to understand them, said Dr. Rachel Salas, an expert on sleep disorders and an associate professor at Johns Hopkins Medicine in Baltimore. What we do know is that people 30 to have different kinds of nightmares at different points during the sleep cycle.

References

[1] Study in the UK, 2023. International student statistics in UK 2023. Avaialble from: https://www.studying-in-uk.org/international-student-statistics-in-uk/ (cited 14 May 2024).

[2] Grosjean, F., 2012. Bilingual: Life and Reality. Harvard University Press: Cambridge, MA, USA.

[3] Cummins, J., 2000. Language, Power and Pedagogy: Bilingual Children in the Crossfire, 1st ed. Multilingual Matters: Bristol, UK.

[4] Ellis, R., 1997. Second Language Acquisition. Oxford University Press: Oxford, UK.

[5] Richards, J.C., Schmidt, R.W., 2010. Longman Dictionary of Language Teaching and Applied Linguistics, 4th ed. Longman: London, UK.

[6] Sharples, R., 2023. What do we mean when we say "EAL"? In: Brooks, G., Clenton, J., Fraser, S. (eds.). EAL Research for the Classroom. Routledge: London, UK. pp. 14–32. DOI: https://doi.org/10.4324/9781003274889

[7] Dixon, M., (2019, June 28). Reading comprehension: illustrations help us get the picture. TES Magazine. Avaialble from: https://www.tes.com/magazine/archived/reading-comprehension-illustrations-help-us-get-picture (cited 30 April 2024).

[8] Koda, K., 2005. Insights into Second Language Reading: A Cross-Linguistic Approach. Cambridge University Press: Cambridge, UK.

[9] Alderson, J.C., 2000. Assessing Reading. Cambridge University Press: Cambridge, UK.

[10] Van Der Weel, A., Mangen, A., 2022. Textual reading in digitised classrooms: Reflections on reading beyond the internet. International Journal of Educational Research. 115, 102036. DOI: https://doi.org/10.1016/j.ijer.2022.102036

[11] Huang, R., Turner, R., 2018. International experience, universities support and graduate employability - perceptions of Chinese international students studying in UK universities. Journal of Education and Work. 31(2), 175–189. DOI: https://doi.org/10.1080/13639080.2018.1436751

[12] Amuedo-Dorantes, C., Romiti, A., 2024. International student applications in the UK after Brexit. Journal of Economic Geography. 24(5), 637–662. DOI: https://doi.org/10.1093/jeg/lbae019

[13] Universities UK, (2023, May 16). International students boost UK economy by £41.9 billion. Avaialble from: https://www.universitiesuk.ac.uk/latest/news/international-students-boost-uk-economy (cited 14 May 2024).

[14] Beech, S.E., 2019. The Geographies of International Student Mobility: Spaces, Places and Decision-Making. Springer: Berlin, Germany.

[15] Universities UK, (2023, October 4). International facts and figures 2022. Universities UK. Avaialble from: https://www.universitiesuk.ac.uk/universities-uk-international/insights-and-publications/uuki-publications/international-facts-and-figures-2022 (cited 14 May 2024).

[16] Zhou, Y., Todman, J., 2009. Patterns of adaptation of Chinese postgraduate students in the United Kingdom. Journal of Studies in International Education. 13(4), 467–486. DOI: https://doi.org/10.1177/1028315308317937

[17] Smith, R.A., Khawaja, N.G., 2011. A review of the acculturation experiences of international students. International Journal of Intercultural Relations. 35(6), 699–713. DOI: https://doi.org/10.1016/j.ijintrel.2011.08.004

[18] Bodycott, P., Lai, A., 2012. The influence and implications of Chinese culture in the decision to undertake cross-border higher education. Journal of Studies in International Education. 16(3), 252–270. DOI: https://doi.org/10.1177/1028315311418517

[19] Montgomery, C., McDowell, L., 2009. Social networks and the international student experience: An international community of practice? Journal of Studies in International Education. 13(4), 455–466. DOI: https://doi.org/10.1177/1028315308321994

[20] Odlin, T., 2003. Cross-linguistic influence. In: Doughty, C.J., Long, M.H. (eds.). The Handbook of Second Language Acquisition. Blackwell Publishing Ltd.: Oxford, UK. pp. 436–486. DOI: https://doi.org/10.1002/9780470756492

[21] Koda, K., 2005. Learning to read across writing systems: Transfer, metalinguistic awareness, and second language reading development. In: Cook, V., Bassetti, B. (eds.). Second Language Writing Systems. Multilingual Matters: Bristol, UK. pp. 311–334. DOI: https://doi.org/10.21832/9781853597954-014

[22] Ortega, L., 2014. Understanding Second Language Acquisition. Routledge: London, UK. DOI: https://doi.org/10.4324/9780203777282

[23] Berry, J.W., 1997. Acculturation and adaptation. In: Berry, J.W., Segall, M.H., Kagitcibasi, C. (eds.). Handbook of Cross-Cultural Psychology. Allyn & Bacon: pp. 291–326.

[24] Fantini, A.E., 2020. Reconceptualizing intercultural communicative competence: A multinational perspective. Research in Comparative and International Education. 15(1), 52–61. DOI: https://doi.org/10.1177/1745499920901948

[25] Struck, J., Jiang, N., 2021. Language switch costs in a lexical decision task: Symmetry and cognitive correlates. Second Language Research. 38(4), 813–838. DOI: https://doi.org/10.1177/0267658321998740

[26] Perfetti, C.A., Hart, L., 2002. The lexical quality hypothesis. Language and Reading. pp. 189-213. DOI: https://doi.org/10.1075/swll.11.14per

[27] Shohamy, E., Or, I.G., May, S., 2017. Language Testing and Assessment. Springer: Cham, Switzerland. pp. 441–454.

[28] Perfetti, C.A., 1985. Reading Ability. Oxford University Press: Oxford, UK.

[29] Cummins, J., 1981. Age on arrival and immigrant second language learning in Canada: A Reassessment1. Applied Linguistics. 2(2), 132–149.

[30] Goodman, K.S., 1967. Reading: A psycholinguistic guessing game. Literacy Research and Instruction. 6(4), 126–135. DOI: https://doi.org/10.1080/19388076709556976

[31] Ahmadi, M.R., Ismail, H.N., Abdullah, M.K.K., 2013. The importance of metacognitive reading strategy awareness in reading comprehension. English Language Teaching. 6(10), 235–244. Available from: https://eric.ed.gov/?id=EJ1077125

[32] Smith, R., Snow, P., Serry, T., et al., 2021. The role of background knowledge in reading comprehension: A critical review. Reading Psychology. 42(3), 214–240. DOI: https://doi.org/10.1080/02702711.2021.1888348

[33] Rumelhart, D.E., 1980. On evaluating story grammars. Cognitive Science. 4(3), 313–316. DOI: https://doi.org/10.1207/s15516709cog0403_5

[34] Blasi, D.E., Henrich, J., Adamou, E., et al., 2022. Over-reliance on English hinders cognitive science. Trends in Cognitive Sciences. 26(12), 1153–1170. DOI: https://doi.org/10.1016/j.tics.2022.09.015

[35] Msaddek, M., 2024. Moroccan EFL university students' reliance on goal-setting and background knowledge in processing English (L3) written texts: An exploratory case study. European Journal of Education Studies. 11(3), 115–131.

[36] Gough, P.B., Kavanagh, J.F., Mattingly, I.G., 1972. One Second of Reading. MIT Press: Cambridge, UK. pp. 331–358.

[37] Lawrence, J.F., Knoph, R., McIlraith, A., et al., 2022. Reading comprehension and academic vocabulary: Exploring relations of item features and reading proficiency. Reading Research Quarterly. 57(2), 669–690. DOI: https://doi.org/10.1002/rrq.434

[38] LaBerge, D., Samuels, S.J., 1974. Toward a theory of automatic information processing in reading. Cognitive Psychology. 6(2), 293–323. DOI: https://doi.org/10.1016/0010-0285(74)90015-2

[39] Mittal, S., Lamb, A., Goyal, A., et al., 2020. Learning to Combine Top-Down and Bottom-Up Signals in Recurrent Neural Networks with Attention over Modules. Proceedings of The International Conference on Machine Learning; July 13–18, 2020; Vienna, Austria. pp. 6972–6986.

[40] Rumelhart, D.E., 1977. Toward an interactive model of reading. In: Dornič, S. (ed.). Attention and Performance VI, 1st ed. Routledge: London, UK. pp. 31. DOI: https://doi.org/10.4324/9781003309734

[41] Farris, E.A., Cristan, T., Bernstein, S.E., et al., 2021. Morphological awareness and vocabulary predict reading resilience in adults. Annals of Dyslexia. 71(2), 347–371. DOI: https://doi.org/10.1007/s11881-021-00236-y

[42] Stanovich, K.E., 1980. Toward an interactive-compensatory model of individual differences in the development of reading fluency. Reading Research Quarterly. 16(1), 32–71. DOI: https://doi.org/10.2307/747348

[43] Kintsch, W., 1988. The role of knowledge in discourse comprehension: A construction-integration model. Psychological Review. 95(2), 163.

[44] McNamara, D.S., Magliano, J., 2009. Toward a comprehensive model of comprehension. Psychology of Learning and Motivation. 51, 297–384. DOI: https://doi.org/10.1016/S0079-7421(09)51009-2

[45] Dehaene, S., Cohen, L., 2011. The unique role of the visual word form area in reading. Trends in Cognitive Sciences. 15(6), 254–262. DOI: https://doi.org/10.1016/

j.tics.2011.04.003

[46] Heim, S., Pape-Neumann, J., van Ermingen-Marbach, M., et al., 2015. Shared vs. specific brain activation changes in dyslexia after training of phonology, attention, or reading. Brain Structure and Function. 220, 2191–2207. DOI: https://doi.org/10.1007/s00429-014-0784-y

[47] Price, C.J., Devlin, J.T., 2011. The interactive account of ventral occipitotemporal contributions to reading. Trends in Cognitive Sciences. 15(6), 246–253. DOI: https://doi.org/10.1016/j.tics.2011.04.001

[48] Dehaene-Lambertz, G., Monzalvo, K., Dehaene, S., 2018. The emergence of the visual word form: Longitudinal evolution of category-specific ventral visual areas during reading acquisition. PLoS Biology. 16(3), e2004103. DOI: https://doi.org/10.1371/journal.pbio.2004103

[49] Pearson, P.D., Gallagher, M.C., 1983. The instruction of reading comprehension. Contemporary Educational Psychology. 8(3), 317–344. DOI: https://doi.org/10.1016/0361-476X(83)90019-X

[50] Pressley, M., Afflerbach, P., 2012. Verbal Protocols of Reading: The Nature of Constructively Responsive Reading. Routledge: New York, NY, USA. DOI: https://doi.org/10.4324/9780203052938

[51] Flavell, J.H., 1979. Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. American Psychologist. 34(10), 906–911. DOI: https://doi.org/10.1037/0003-066X.34.10.906

[52] Villanueva, J.M., 2022. Language profile, metacognitive reading strategies, and reading comprehension performance among college students. Cogent Education. 9(1), 2061683. DOI: https://doi.org/10.1080/2331186X.2022.2061683

[53] Mokhtari, K., Reichard, C.A., 2002. Assessing students' metacognitive awareness of reading strategies. Journal of Educational Psychology. 94(2), 249–259. DOI: https://doi.org/10.1037//0022-0663.94.2.249

[54] Sheorey, R., Mokhtari, K., 2001. Differences in the metacognitive awareness of reading strategies among native and non-native readers. System. 29(4), 431–449. DOI: https://doi.org/10.1016/S0346-251X(01)00039-2

[55] Afriani, Z.L., Anggraini, M., Riswanto, R., 2020. The effect of Question Answer Relationship (QAR) Strategy in enhancing students' reading comprehension. Journal of English Education and Teaching. 4(4), 548–558. DOI: https://doi.org/10.33369/jeet.4.4.548-558

[56] Azmuddin, R.A.A., Nor, N.F.M., Hamat, A., 2020. Facilitating online reading comprehension in enhanced learning environment using digital annotation tools. IAFOR Journal of Education. 8(2), 7–27. Available from: https://eric.ed.gov/?id=EJ1265756

[57] Anderson, N.J., 2003. Scrolling, clicking, and reading English: Online reading strategies in a second/foreign language. The Reading Matrix. 3(3), 1–33.

[58] Jusoh, Z., Abdullah, L., 2015. Online Survey of Reading Strategies (OSORS): Students' online reading in academic context. Malaysian Journal of Distance Education. 17(2), 67–81.

[59] Öztürk, S.Y., 2018. Use of metacognitive online reading strategies by student teachers of English. European Journal of Foreign Language Teaching. 3(3), 17–32.

[60] Li, J., 2020. Development and validation of second language online reading strategies inventory. Computers & Education. 145, 103733. DOI: https://doi.org/10.1016/j.compedu.2019.103733

[61] Pardede, P., 2022. Online Reading Strategies in EFL: A Review. Journal of English Teaching. 8(2), 329–339. DOI: https://eric.ed.gov/?id=EJ1355554

[62] Bresó-Grancha, N., Jorques-Infante, M.J., Moret-Tatay, C., 2022. Reading digital- versus print-easy texts: A study with university students who prefer digital sources. Psicologia: Reflexão e Crítica. 35, 10. DOI: https://doi.org/10.1186/s41155-022-00212-4

[63] Droop, M., Verhoeven, L., 2003. Language proficiency and reading ability in first-and second-language learners. Reading Research Quarterly. 38(1), 78–103. DOI: htttps://doi.org/10.1598/RRQ.38.1.4

[64] Taki, S., 2016. Metacognitive online reading strategy use: Readers' perceptions in L1 and L2. Journal of Research in Reading. 39(4), 409–427. DOI: https://doi.org/10.1111/1467-9817.12048

[65] Lieder, F., Griffiths, T.L., 2020. Resource-rational analysis: Understanding human cognition as the optimal use of limited computational resources. Behavioral and Brain Sciences. 43, e1. DOI: https://doi.org/10.1017/S0140525X1900061X

[66] Fitrisia, D., Kok, E.T., Yusuf, Y.Q., 2015. Investigating metacognitive awareness of reading strategies to strengthen students' performance in reading comprehension. The Asia Pacific Journal of Educators and Education (Formerly Known as Journal of Educators and Education). 30(1), 1–16.

[67] Tavakoli, H., 2014. The effectiveness of metacognitive strategy awareness in reading comprehension: The case of Iranian university EFL students. Reading. 14(2), 314–336.

[68] Kuo, Y.L., Yu, P.S., 2014. L1 and L2 online reading strategy usage of advanced Chinese learners. Journal of Technology and Chinese Language Teaching. 5(1), 1–17.

[69] Tavakoli, M., Tavakol, M., 2018. Problematizing EAP education in Iran: A critical ethnographic study of educational, political, and sociocultural roots. Journal of English for Academic Purposes. 31, 28–43. DOI: https://doi.org/10.1016/j.jeap.2017.12.007

[70] Reed, D.K., Vaughn, S., 2012. Retell as an indicator of reading comprehension. Scientific Studies of Reading. 16(3), 187–217. DOI: https://doi.org/10.10

80/10888438.2010.538780

[71] Kessler, M., Ma, W., Solheim, I., 2022. The effects of topic familiarity on text quality, complexity, accuracy, and fluency: A conceptual replication. Tesol Quarterly. 56(4), 1163–1190. DOI: https://doi.org/10.1002/tesq.3096

[72] Shapiro, S.S., Wilk, M.B., 1965. An analysis of variance test for normality (complete samples). Biometrika. 52(3–4), 591–611.

[73] Jeon, E.H., Yamashita, J., 2014. L2 reading comprehension and its correlates: A meta-analysis. Language learning. 64(1), 160–212. DOI: https://doi.org/10.1111/lang.12034

[74] Birch, B.M., Fulop, S., 2020. English L2 Reading: Getting to the Bottom. Routledge: New York, NY, USA. DOI: https://doi.org/10.4324/9780429397783

[75] Grabe, W., Stoller, F.L., 2019. Teaching and Researching Reading, 3rd ed. Routledge: London, UK. DOI: https://doi.org/10.4324/9781315726274

[76] Koda, K., Miller, R.T., 2018. Cross-linguistic interaction in L2 word meaning inference in English as a foreign language. In: Pae, H.K. (ed.). Writing Systems, Reading Processes, and Cross-Linguistic Influences: Reflections from the Chinese, Japanese and Korean Languages. John Benjamins: Amsterdam, the Netherlands. pp. 293–312.

[77] Ke, S., Chan, S.D., 2017. Strategy use in L2 Chinese reading: The effect of L1 background and L2 proficiency. System. 66, 27–38. DOI: https://doi.org/10.1016/j.system.2017.03.005

[78] Habók, A., Magyar, A., 2019. The effects of EFL reading comprehension and certain learning-related factors on EFL learners' reading strategy use. Cogent Education. 6(1), 1616522. DOI: https://doi.org/10.1080/2331186X.2019.1616522

[79] Carrell, P.L., 1989. Metacognitive awareness and second language reading. The Modern Language Journal. 73(2), 121–134. DOI: https://doi.org/10.2307/326568

[80] Oxford, R.L., 2016. Teaching and Researching Language Learning Strategies: Self-Regulation in Context. Routledge: New York, NY, USA. DOI: https://doi.org/10.4324/9781315719146

[81] Par, L., 2020. The relationship between reading strategies and reading achievement of the EFL students. International Journal of Instruction. 13(2), 223–238.

[82] Zhang, L., Seepho, S., 2013. Metacognitive strategy use and academic reading achievement: Insights from a Chinese context. Electronic Journal of Foreign Language Teaching. 10(1), 54–69.