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Review of the Verbal Report Data in English L2 Reading: In Memory of K. Anders. Ericsson

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INTRODUCTION

The restoration and reconsideration of introspection method for discovering the curtailed-off aspects of the human mind in the last few decades have led researchers to tackle the issue more seriously than ever. Within the field of Applied Linguistics, and to the present writer's best knowledge, the study of reading comprehension has attracted the attention of introspection researchers more than other language skills (Klopp, Schneider, & Stark, 2020). The reason for this may lie in the convolutions of reading comprehension and the inquisitiveness of man to improve his understanding of it.

Cognitive psychologists, who were interested in unravelling exactly what it means to comprehend a piece of text, began to examine mental processes involved in reading comprehension in the late 1880s (Bowels, 2010; Venezky, 1984). Psychologists were also instigating experimental studies to get access to mental processes of readers under firmly meticulous, laboratory-based conditions in which only trained subject-observers were utilized (Pritchard, 1990). Accordingly, and occasionally, the observers had to practice up to 10,000 think-aloud before they were actually involved in a formal experiment (Liberman, 1979). These conscientious efforts obviously reflect the prominence of such mental accounts for the psychologists of the time. However, soon the use of introspection as a scientific method was abandoned and disfavoured for few decades though research on reading comprehension was not stopped. Failure in replication was an important reason for its being disfavoured (Ericson & Simon, 1990; Hample, 1984). Introspective psychologists, however, believed that all mental processes were accessible to conscious observation but failed to answer replication question. The abandonment of introspection influenced reading research to the extent that no study of reading process using introspection was conducted during this time. Moreover, reading research was influenced by the rise of behaviourism during the 1930s and 1940s which emphasized overt behaviour of human cognition.

While introspection was not totally abandoned under the rigid influence of behaviourism, Duncker (1935) invented a variation of introspection paradigm called think-aloud. In fact, Duncker differentiated between introspection and think aloud which did not require the use of naïve and untrained participants. Therefore, instead of playing the role of subject-observer, it was the researcher who was to infer the participants' mental processes from their verbal reports (Newell & Simon, 1972). In the 1950s and 1960s, the cognitive psychologists re-examined the methodology of the early classical psychologists. Consequently, it was argued that the responses of highly trained participants were not natural and hence less valid. As an alternative, cognitive psychologists emphasized the use of untrained participants in introspective experiments since their natural verbal reports were more important for the cognitive psychologists. Nevertheless, reading research in first and second language studies did not receive any influence from the findings of the cognitive psychology which did not see any immediate reading classroom solution as a result of their investigations into the reading process.

The late 1960s witnessed a sharp movement which opened new vistas into cognitive research of the reading process by the work of eminent reading psycholinguists such as Goodman (1967) and Smith (1971). The early work in ESL reading viewed reading as a bottom-up process or serial decoding of letters (Ghonsooly, 2012). Within this new reading paradigm, introspection was employed as a reading process instrument in first and second language studies. In 1971, Fareed used introspection in the first language and later on Hosenfeld (1977) and Olshavsky (1976) employed it in the second language which marked a renewed interest in introspection as a powerful tool of mental



research in classical psychology. Examining problem-solving theory of reading and influenced by the work of Newell and Simon, Olshavsky employed introspection to unravel mental processes and strategies in solving mathematical and logical problems. The use of introspection became more popular in the 1980's when researchers used it in first and second language (e.g., Afflerbach & Johnston, 1984; Cavalcanti, 1983; Cohen, 1987; Rankin, 1988), to name a few. This interest is seen in ESL reading studies in the 1980's and early 1990's with more emphasis laid on cognitive psychology (Baker & Brown, 1984; Connor, 1987; Hosenfeld, 1981; Just & Carpenter, 1984; Long & Richards, 1990).

The emergence of cognitive psychology and its collaboration with reading research resulted in some changes in Applied Linguistics, which is reflected in shifts from product to process research. Scholars questioned the usefulness of product-oriented reading research and emphasized the importance of discovery, adaptation and enquiry based on the idea that education is mostly concerned with unexpected rather than predicted results. Reading researchers such as Alderson and Urquhart (1984) argued that by distinguishing and characterizing the processes and strategies which readers utilize we may find general elements across different texts which may allow us to improve their reading and that the findings of product-oriented reading research are less illuminating in terms of explaining the cause of reading problems (Garner, 1982). They also emphasized the importance of distinguishing what reading processes successful and unsuccessful readers use which give rise to the possibility to teaching strategies of successful readers to unsuccessful ones.

THE STATE OF THE ART IN VERBAL REPORT DATA IN L2 READING

Almost three decades ago, when fierce debate was growing up against verbal report data as a method to tackle mind process, one could hardly imagine that the method would survive the test of time. However, since then the field of psychology in particular and applied linguistic research in general have witnessed an upsurge of interest in the use of verbal report data, thanks to the eminent works of such cognitive psychologist as Ericsson and Simon (1990). Research in L2 reading using thinking aloud method began in the late 1970s. Reviewing the use of thinking-aloud method in language related journals from the 1980s to the present time, the present writer found that from among reading, writing, and translation skills, as well as testing and teaching fields, the reading skill received more attention from the introspection researchers.

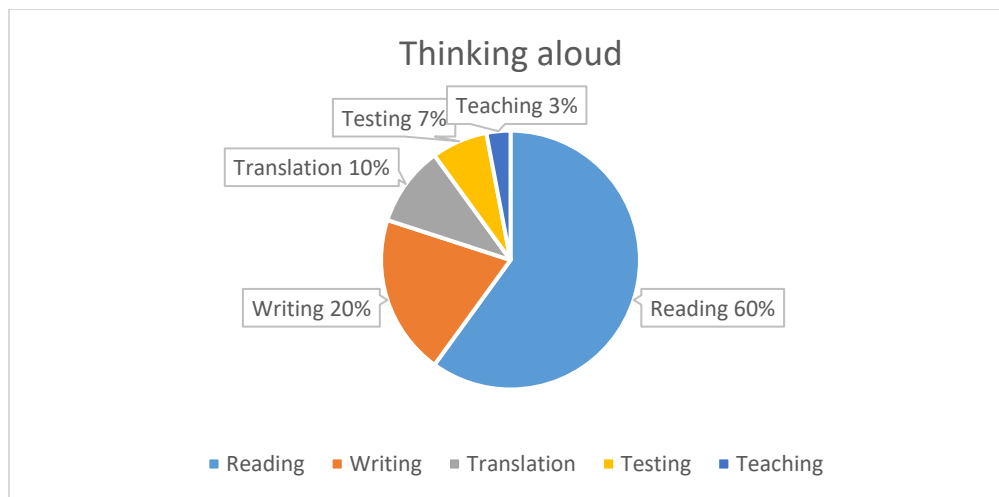


Figure 1. Percentage of published works using thinking aloud method across different areas of L2 investigation (total: 98)

The early reading research began in the United States with the pioneering study of Hosenfeld (1977) dealing with finding out what successful and unsuccessful language learners do to assign meaning to printed texts. She



examined 40 foreign language students (i.e., American students enrolled in level two French, Spanish and German classes in urban and suburban high schools in western New York). When participants became familiar with a preliminary practice session, they read a French text to think-aloud. Hosenfeld used 'reading maps' to provide graphic and visual files of each of her participants and in order to identify the strategies of successful and non-successful readers. She then designed a coding system to put reading protocols into reading maps. Her findings show that her successful readers read in rather broad chunks (or phrases) and kept the meaning of the text in mind, disregard words that seem to be insignificant to the total meaning of the text, make full use of the context to get the meaning of an unknown word, search for the meaning of the unknown word in the back of the book as a last resort, leave the word after several unsuccessful attempt and have 'a positive self-concept' as a reader. The unsuccessful reader, on the other hand, lost the meaning of the sentences, read in short phrases, failed to distinguish the importance of each word, and had a 'negative self-concept' as a reader.

Two year later, Cohen, Glasman, Rosenbaum-Cohen, Ferrara, and Fine (1979) examined a group of Jewish students' ability to read different ESP texts from Genetics, Biology, History and Political Science. The results across all four studies showed that the above students used heavy noun phrases in various syntactic functions (e.g. subject of the main clause, object of the preposition) and syntactic markers of cohesion. The students failed to understand the conjunctive words of cohesion. The result of this study confirmed Cohen and Fine's (1978) study in which ESP non-native speakers and English native speakers received three levels of questions, mainly, macro, micro, and vocabulary. The results revealed that non-native speakers failed to understand how to use reading strategies to integrate material across paragraphs (macro level) nor were they able to understand the relations within the text (micro level).

Examining the reading strategies of a Spanish non-native speaker of English compared to his L1 reading, Cavalcanti (1983) used a pause protocol to inform her informant to verbalize. The point was that each pause reflected a reading problem. She used three methods including a title study, an interventionist procedure and retrospection. The participant in the title study needed to look at the title of a paper and say what the title was about. The interventionist procedure required the reader to do immediate retrospection about what he was doing when he was stopped. In the retrospection method, the reader was required to provide brief summaries at the end of the paragraph. She then analysed the protocols and found that her reader used strategies for prediction purposes, descriptive vocabularies related to the beyond information given. These strategies did not have any relation to comprehension problems.

In 1984, Hosenfeld scrutinized a high school student whose second language was Spanish. The student was taught by an audio-lingual method which emphasized memorization of dialogues and use of pattern drills. Several half-hour sessions were devoted to collection of data which required the boy to think-aloud. The data collected before and after instruction were then analysed. Ricky, the boy, guessed the meaning of a new word by using '(1) known words in sentences, (2) his knowledge of cognates, (3) his knowledge of the world, (4) context and (5) his knowledge of grammar' (P:242). Hosenfeld's research was soon criticized by Alderson and Urquhart (1984), who contended that her work did not examine her reader's strategy when facing an unfamiliar syntactic construction and when various kinds of texts are used.

Investigating the reading processes of a group of ESL students who were non-skilled readers and a group of native speakers of English, Block (1986) selected nine Spanish and Chinese English language learners and three native speakers of English. The students were given two cloze tasks. To specify if the non-native speakers of English were competent in their first language, Block gave them translated texts as well as English texts. The native speaker, on the other hand, read both texts in English. Three methods were used in this study which included a think-aloud task, a test of memory or retelling and a test of reading comprehension. Block classified the think-aloud strategies into general comprehension and local linguistic strategies. General strategies include comprehension-gathering (such as recognition of text structure and integrating information) and comprehension-monitoring strategies (such as correction behaviour and reacting to the text). The linguistic strategies included rereading and paraphrasing. Moreover, she identified two types of readers; integrators and non-integrators. The integrators were aware of text structure, and consistent monitoring of understanding. The non-integrators, on the other hand, were characterized as mostly relying on their personal experiences to help them develop a version of the text, and focusing on details. It was also found that the Chinese did not use strategies different from the native speakers of Spanish and even English native speakers meaning that strategy use is not influenced by language features



A few years later in 1986, Padron, Knight, and Waxman examined differences in the cognitive strategies that bilingual and monolingual students use while reading. Thirty-Eight third and fifth grade bilingual and monolingual students from an inner-city public school located in the United States were examined. Twenty-three students were bilingual in English and Spanish and fifteen were English mono-lingual. The students were interviewed individually for 30 minutes to determine what strategies they used while reading texts. Each student's independent reading level was assessed by The San Diego Quick Assessment. The children then read an appropriate passage from the *Ekwall Reading Inventory*, each approximately 120 words long stopping at regular intervals to describe the strategies they were using to comprehend text. The type and frequency of the strategies were identified which included rereading, selective reading, imaging, changing speed, assimilating to personal experiences, concentrating, assimilating to passage events, noting/searching for salient details, summarizing, predicting outcomes, self-generated questions, student's perceptions of teacher's expectations, rehearsal, and other. While bilinguals' most utilized strategy was their perceptions of the teacher's expectations (that is, reading to answer questions that the teacher might ask), monolinguals reported strategies such as concentrating (or thinking about the story, remembering it). Padron et al. reported that monolinguals used almost twice as many cognitive strategies as bilinguals. The reason for this was argued to be bilinguals' preoccupation with decoding strategies which caused them not to develop the cognitive strategies needed for understanding text.

Using introspection to investigate reading processes of L1 and L2 reading of a group of Jewish high school non-native speakers of English, Sarig (1987) asked her students to report their thought processes when constructing the main idea of an EST text. She identified four main types of strategies including: a) technical-aid moves like skimming, scanning, b) clarification and simplification moves such as utterance substitution, decoding meaning of words, c) coherence-detecting moves such as identification of macro frame of the text strategy and d) monitoring moves including conscious change of planning and carrying out the tasks, etc. she then classified these reading strategies into comprehension promoting and comprehension deterring strategies. She further found that success/failure in reading tasks in both Hebrew and English was shown to be almost identical. Moreover, she found relationship between task performance processes in both languages. This data was in line with the cross-language transfer of reading strategies from L1 and L2 (see Koda, 1987).

A few years later, Alderson (1990) used introspection study to examine reading processes of two Spanish foreign language learners while answering a reading test. Test items were constructed to test higher order and lower order skills of reading comprehension of the testees. The participants were then interviewed to report their strategies when answering the reading items. The result of the study revealed that the participants used different strategies in answering the reading items. Alderson identifies several reasons for the variation in their performance including, subjects' unfamiliarity with particular lexical items, failure to answer an item correctly while using the skill supposedly required by that item, and conversely responding correctly to items without displaying the skill(s) in question particularly with those items which require test-taking skills such as matching.

The study of good and poor readers continued to become an interesting topic for the researchers in the 1990's. For example, Kletzien (1991), examined a number of school students who were half good readers and half poor readers. Kletzien classified some reading passages into independent (7th grade), instructional (11th grade) and frustration (14th grade) levels for the good readers. He then simplified the same texts by modifying sentence structures and vocabulary. These passages were then converted into cloze texts. The participants were then asked to fill in the blank spaces and think-aloud. Based on the data, Kletzien reports a series of reading comprehension strategies including: focus on vocabulary, reprocessing previous text, making inference, and activating previous knowledge. The results also showed that both groups use similar strategies. As for the different levels, the data showed that the two groups were indistinguishable at the independent level, while at the instructional level, good readers showed a better ability to change types of strategies. Good readers at the frustration level used different strategies than the poor readers. Readers in both groups used more strategies at the independent level. Also, the difficulty level of task caused the readers to partially adapt their reading strategy use to the difficulty level of the text.

Young (1993) investigated second language learners' cognitive and affective responses to one authentic and three edited texts. The participants were forty-nine college students at four levels of language learning who read the same Spanish authentic passage and an edited passage written for their course level. After silent reading, they performed think-aloud tasks in their native language (English) to provide data on reading strategy use, and



recall protocols to provide reading comprehension scores. Participants were then interviewed to assess their affective responses to each text. Results indicated that all students comprehended significantly more from the authentic passage than from the edited ones. Think aloud protocols were coded along the lines of systems used in previous studies. Young does not report whether she did any warm-up session before asking her subjects to think aloud. Also, it is not clear which level of verbalization was used to elicit information from the subjects. She does not talk about reading theory and it is not clear what reading theory her subjects used.

In the late 1990s, Cheng (1999) examined reading processes of ten Chinese ESL students through the think aloud method. The subjects were trained before taking the experiment. He used Block's coding system to classify the strategies and measured the frequency of strategies used. Furthermore, as in the Young's study, the think aloud method was used to reveal the participants' attitudes toward the test passages, though the way he measured attitude is obscure. Cheng's research suffers from the same deficiencies as those identified in Young's. Also, it is not clear which level of verbalization was used to elicit information from the subjects. She does not talk about reading theory and it is not clear what reading theory her subjects used.

Concerned with rereading as an effective strategy, Brown (2002) asked two Japanese ESL students to do think-aloud protocols while individually reading a section of an introductory linguistics textbook for non-specialists. The subjects were free to think-aloud either in English or Japanese. Browns' research suffers from the same deficiencies as those identified in Young's. Also, it is not clear which level of verbalization was used to elicit information from the subjects. He does not talk about reading theory and it is not clear what reading theory his subjects used.

Investigating reading strategy differences, Rao, Gu, Zhang, and Hu (2007) studied the strategy difference of two groups of good and poor Singaporean students and found that good readers used deep level processing strategies such as inferencing, prediction, reconstruction while poor readers used surface-level processing strategies such as re-reading, paraphrasing, and questioning word meaning.

THINK-ALLOUD RESEARCH EXAMINING L1/L2 READING DIFFERENCES

Examining how L1 and L2 strategy use in reading differ, Davis and Bistodeau (1993) used think aloud method to explore the issue. Sixteen paid volunteers participated in the study, half of whom were native readers of English, while the other eight were native readers of French. They used Olson, Duffy and Mack methodology for getting the think aloud data. They typed each sentence, the title and source of the newspaper article on a separate card. The participants then read the text and commented while reading each card and mentioned whatever came to their mind. Davis and Bistodeau used Olson, Duffy, and Mack's procedures concerning what participants were required to say such as comments on the participants' own behaviour, confirmation of the prediction, making inferences, using background knowledge, self-questioning, and focus on individual words. At the end of think aloud session, there was a brief interview about any comments in their protocols. They used Pearson Product moment correlations to identify any relationships between the frequency of each of the thirteen individual strategies and performance on the recall protocols, as measured by the number of idea units written. The results indicated that the L1 native readers used more top-down strategies than in their L2. In contrast, the participants used more bottom-up strategies when they read in their L2 than in their L1. The language or topic of the text did not make any difference in their meta-cognitive comments.

Upton (1997) examined 11 Japanese native speakers who were taking ESL classes at the University of Minnesota to determine the roles of the L1 and L2 in the reading strategies of L2 readers or how these roles vary at different proficiency levels. Think aloud protocols and retrospective interviews were performed in order to examine how subjects used their L1 and their L2 during the actual act of reading. After the training session, the participants were told to think-aloud either in L1 or L2 as they read the text. After tape recording the protocols, subjects were asked to listen to their protocols they were asked to say why they were thinking in either English or Japanese. A Kappa inter-rater reliability value of $K = 0.97$ was calculated. ESL subjects relied heavily on their first language to solve problems they had in the L2 text while the academic participants seem to feel much more relaxed with understanding the text using their L2. Also, the findings show that reading comprehension strategies and the use of the L1 and L2 in the comprehension process differ between individuals. The ESL participants relied on the L1 when faced unknown vocabulary. The students checked the English word and translate it into Japanese to facilitate their comprehension. Nevertheless, as proficiency in the L2 increased, the more proficient readers



seemed to decline to use translation as a reading comprehension strategy. Moreover, text-based strategies were most frequently utilized by the ESL participants, while the academic group relied more on text-based strategies and top-down strategies equally.

Testing the effectiveness of two different methodologies mainly thinking aloud and strategic questionnaire, Levine and Reves (1998) examined reading and writing strategies of two non-native speakers of Hebrew who were learning Hebrew as their second language. Using Block's categories, they identified the following reading strategies, word by word reading, use of background knowledge of Hebrew morphology, use of more linguistic schemata than content schemata, and resorting to translation into L1. They found some differences and similarities between the thinking-aloud data and strategic questionnaire. The subjects' comments on their activities are probably more authentic and less structured than their answers on a formal questionnaire which is by nature a guiding instrument. Levine and Reves' research suffers from the same deficiencies as those identified in Young's. Also, it is not clear which level of verbalization was used to elicit information from the subjects. They do not talk about reading theory and it is not clear what reading theory their subjects used.

Exploring the relationship between reading strategy use of L1 and L2 and affective factors covering readers' ideas and beliefs about their mother language and their reading, YangQi-Gu (2003) examined four L2 college readers of Spanish and English who were all from an immigrant background and were not academically prepared for college. The researcher used a series of method including think-aloud protocols, interviews, self-assessment inventories and reading comprehension tests in Spanish and English. The results showed that readers' attitudes toward their home language influenced their reading performance. While two of the readers viewed their L1 as a problem, the other two readers considered their L1 as a resource and consequently translated what they read in the L2, irrespective of their L2 reading proficiency and length of English study. Qualitative data also revealed that readers' reading behaviour was to some extent influenced by their belief about reading.

Using retrospective protocols and exploring how metacognitive strategy training influences a group of ESP students' declarative and procedural knowledge, Deib-Henia (2003) found a significant difference between pre-test and post-test of the study indicating the effect of such training. Her subjects showed use of top-down processing and enhanced awareness of research article as a genre.

THINK-ALoud RESEARCH ACROSS DIFFERENT PROFICIENCY LEVELS

Katib (1997) examined comprehension monitoring reading strategies of a group of low and high proficiency Thai students through think-aloud methodology. He identified 28 strategies which were then arranged into six categories according to their functional purposes namely understanding the meaning of the text, rationalization, interaction with the text, enquiring clarification, comprehension monitoring and text structure and vocabulary. He identified that understanding the meaning of the text and comprehension monitoring categories had the highest frequency of use by both groups of students. Both students resorted to translation and rereading strategies more often than other strategies. However, weaker readers used more translation and rereading strategies than higher proficiency readers. He also found that differences in English proficiency did not have much impact on strategy use by Thai readers. In addition, a two years' time difference in academic setting between the second- and fourth-year students would not have much difference in strategy use between these groups. Addressing individual differences of reading behaviours, he counted the number of strategies of each reader and placed them into five types of categories. Katib misses to address the reading model of his readers. Besides, his analysis of readers' individual difference is totally statistically based (i.e., different frequencies of the strategy usage by each participant). However, the study deserves attention, since there is much think-aloud preparation and his readers were given enough practice to reveal their thought processes. Yet, it is not known which level of verbalization was actually used in this study.

Investigating the relationship between reading strategies of a group of Iranian ESL readers with their language proficiency, Ghonsooly (1997) correlated the number of reading strategies employed by a group of novice Iranian EFL learners with their TOEFL reading component scores. He found an inverse correlation ($r:-0.53$; $p: 0.90$) that demonstrates reading strategies has a negative non-significant relationship with language proficiency. This suggests that number of reading strategies cannot be considered very important in distinguishing a novice from a



skilled reader. In this regard, an important element which must be taken into account when comparing good and poor reading comprehension, is an examination of *types* of problem-solving strategies the readers employ rather than merely the *number* of strategies.

Using think-aloud method to examine the effect of multiple-choice glosses and periodic second language text reconstruction on lexical acquisition, Rott and Williams (2003) asked a group of English L1 readers who were learning German as their second language to verbalize their reading strategies for different reading tasks. Two groups of readers were given two texts; one group received a text that contained multiple-choice glosses for four unfamiliar words, while the other one lacked the multiple-choice glosses for the unfamiliar words. Results showed that the two groups differed, suggesting that glosses triggered a search for concrete meaning and firm form-meaning mapping and that a lack of glosses corresponded with global text processing, skipping of words and shallow meaning mapping. Verbal protocols showed that the use of context was primarily local. The protocols provided little evidence of rereading or the integration of information from the previous and the current paragraph as a goal-oriented strategy. The study also showed that the +gloss readers were more likely to verbalize the form-meaning connections they made for the unfamiliar words.

To investigate language learners' cognitive processes in on-line ESP courses at Ferdowsi University of Mashhad, Ghonsooly and Shams (2012), used think-aloud protocol analysis, screen capture analysis and correlation analysis. The results of qualitative and quantitative analyses show that design features have a meaningful effect on the users' performance in four phases of cognitive interaction with e-learning systems.

Investigating the effect of teaching reading strategies through thinking aloud as an instructional tool on Iranian EFL students' reading comprehension, Baradaran Khaksar (2014) explored the effect of teaching reading strategies on her students' self-efficacy in reading. For this purpose, 47 secondary students from three classes in two junior high schools in Koohsorkh were selected as participants of the study. Before beginning the training session, a reading comprehension test was given to the subjects as a pre-test to ensure that there is no significant difference between control and experimental groups in terms of reading ability. The participants were also given a questionnaire to assess their reading self-efficacy prior the experiment. There were three groups in this experiment, a control group in which students remain in their regular classes except for testing, and two experimental groups which in the first one, the comprehension strategies were explained to the students and modelled by the teacher using thinking aloud method. The second experimental group had essentially the same treatment, minus the explanation and explicit identification of strategies. At the end of the experiment all the three groups received the same post-test of reading comprehension. At the end the experiment, they were also given a self-efficacy questionnaire to assess their self-efficacy in reading. The results of the study showed that students in the experimental groups who received instruction in using reading strategies, showed greater improvement on the reading comprehension test than students in the control group. It was found that teaching comprehension strategies, significantly improved the academic achievement of third-grade students in the domain of reading comprehension. This study further provides evidence to support the positive effect of comprehension achievement due to strategy instruction on students' self-efficacy in reading.

Recently, Zayed (2021) also used thinking aloud in an online setting to investigate if the method could improve her EFL learners' reading comprehension. The results showed that her students viewed think-aloud positively and their reading comprehension compared to a control group was much better.

Table 1.

A selective summary of think-aloud studies in L2 reading

Researcher	Research agenda	Findings
Hosenfeld (1977)	Successful vs. unsuccessful	Successful readers read in rather broad chunks (or phrases) and keep the meaning of the text in mind, while unsuccessful reader loses the meaning of the sentences as soon as s/he decodes them, reads in short phrases, skips words as unimportant
Cohen et.al., (1979)	Reading in ESP	Problems with heavy noun phrases in various syntactic functions and syntactic markers of cohesion.



Cavalcanti (1983)	Reading strategies	Overt occurrences of strategies were not related to comprehension problems.
Block (1986)	Non-native ESL beginners and native speakers	Two distinct patterns of strategy use were identified viz. integrators and non-integrators. The integrators were characterized by awareness of text structure, consistent monitoring of understanding. The non-integrators were identified as mostly relying on their personal experiences to help them develop a version of the text, and focusing on details. Also, language background (i.e., Chinese and Spanish) did not account for different patterns of strategy use.
Padron et al. (1986)	Bilingual vs. monolingual readers	While monolinguals more often reported strategies such as concentrating (or thinking about the story, remembering it), bilinguals' most utilized strategy was their perceptions of the teacher's expectations (that is, reading to answer questions that the teacher might ask). Monolingual students used noting, searching for salient details, and self-generated questions strategies. Monolinguals used almost twice as many cognitive strategies as bilinguals.
Sarig (1987)	Reading processes in L1 and L2	Four types of reading strategies were identified, a) technical-aid moves including strategies such as skimming, scanning, b) clarification and simplification moves covering such strategies as utterance substitution, decoding meaning of words, c) coherence-detecting moves including identification of macro frame of the text strategy and d) monitoring moves comprising conscious change of planning and carrying out the tasks.
Kletzien (1991)	Good and poor readers	Both groups used some similar strategies which included focusing on vocabulary, rereading previous text, making inference, and using prior knowledge. good comprehenders showed a better ability to change types of strategies. They were aware of organization structure of the text than did the poor readers.
Young (1993)	L2 readers/ authentic vs. edited texts	All students comprehended significantly more from the authentic passage than from the edited ones.
Rao, et.al., (2007)	Good and poor ESL readers	Good readers used deep level processing strategies such as inferencing, prediction, reconstruction while poor readers used surface-level processing strategies such as re-reading, paraphrasing, and questioning word meaning.
Davis & Bistodeau (1993)	L1 and L2 strategies	Native readers reading in L1 reported using more top-down strategies than in their L2. However, when they read in their L2, exactly the opposite pattern was observed; they used more bottom-up strategies than in their L1.
Abraham & Vann (1996)		Good readers focused on main ideas and deep-level processing strategies while poor readers focused on isolated elements of text and surface-level processing strategies
Upton (1997)	L1 and L2 strategies	ESL subjects appear to rely heavily on their first language to help them think through and wrestle with the L2 text. The process of checking the English word by translating it into Japanese was an attempt to facilitate her understanding. The ESL group relied more on local, text-based strategies to attempt to gain understanding of the text.
Levine and Reves (1998)	L2 reading	Word by word reading, use of background knowledge of Hebrew morphology, use of more linguistic schemata than content schemata, and resorting to translation into L1



YangQi-Gu (2003)	L1 and L2 strategies	L1 as a resource to purposefully translate mentally into their home language when reading in the L2
Katib (1997)	High and low language proficiency	Understanding the meaning of the text and comprehension monitoring categories had the highest frequency of use by both groups of students. Both students resorted to translation and rereading strategies more often than other strategies. However, weaker readers used more translation and rereading strategies than higher proficiency readers. Differences in English proficiency did not have much impact on strategy use by Thai readers.
Ghonsooly (1997)	High and low language proficiency	Reading strategies make a negative non-significant relationship with language proficiency. <i>Types</i> of problem-solving strategies poor and good readers employ are more important than the <i>number</i> of strategies.
Rott and Williams (2003)	Lexical learning	Glosses triggered a search for concrete meaning and firm form-meaning mapping and that a lack of glosses corresponded with global text processing, skipping of words and shallow meaning mapping.
Johnstone, Bottsford-Miller & Thompson (2006)	Science reading of students with disability	Think aloud methods did not produce informative data for very difficult mathematics items because students had difficulty verbalizing their thoughts while solving problems. The think aloud method appears to be an effective way to determine the effects of item design for a wide variety of students (with the exception of students with cognitive disabilities) and for items with low to moderate difficulty levels
Julie Coiro (2011)	online reading comprehension strategies,	A four-stage flexible online reading plan: Approaching online reading tasks. Navigating and negotiating online texts. Monitoring comprehension of and pathways through online texts. Responding to online texts.
Ghonsooly and Shams (2012)	cognitive processes in on-line ESP courses	Results of qualitative and quantitative analyses show that design features have a meaningful effect on the users' performance in four phases of cognitive interaction with e-learning systems.
Baradaran Khaksar (2014)	L2 reading and self-efficacy	Students in the experimental groups showed greater improvement on the reading comprehension test than students in the control group. Teaching comprehension strategies significantly improved the reading achievement of third-grade students. The study showed the positive effect of thinking-aloud instruction on students' self-efficacy in reading.
Zayed (2021)	L2 reading	Findings show that learners improved their reading comprehension.

COMMON AREAS OF STRATEGY USE

An interesting area of investigation which has rarely, if any, been addressed in almost all think-aloud ESL reading research is the pursuit of common areas of strategy use. The prominence of the issue can be expressed in terms of a universal approach to strategy identification and its implication for a possible teaching and learning



orientation. While reading strategies so far identified do show areas of common orientation, yet it is hard to make strict generalizations about their application in teaching reading. In fact, there are diverse L2 reading areas that have been diversely explored by different researchers. While some researchers have been particularly interested in comparing strategy use of learners with different proficiency levels (e.g., Ghonsooly, 1997; Katib, 1997), other researchers have explored other aspects of reading strategy and process. Generally, there are three main categories of think-aloud research in the studies reviewed so far which include: 1. comparison of good and poor ESL/EFL readers (Ghonsooly, 1997; Hosenfeld, 1977; Katib, 1997; Kletzien, 1991; Rao et. al., 2007), 2. comparison of reading processes and strategies in L1 and L2 (Davis & Bistodeau, 1993; Padron, et.al., 1986; Sarig, 1987; Upton, 1997; YangQi-Gu, 2003), and 3. addressing all the other aspects of reading strategies and processes which include, comparison of native vs. non-native readers (Block, 1986), L2 reading strategies (Levine & Reves, 1998; Zayed, 2021), online reading comprehension strategies (Coiro, 2011; Ghonsooly & Shams, 2012) and ESP reading (Cohen, et.al., 1979).

The findings on the comparison of good and poor ESL/EFL readers show that good readers read in broad chunks, have better ability to change types of strategies, awareness of organization structure of the text than, using inferencing, prediction, and reconstruction and more focus on main ideas and deep-level processing strategies, while poor readers read in small chunks, used surface-level processing strategies such as re-reading, paraphrasing, questioning word meaning, more focus on isolated elements of text and surface-level processing strategies and more translation strategies. The findings on the comparison of reading strategies in L1 and L2 show that reading in L1 is linked to more top-down strategies while reading in L2 requires more bottom-up strategies, more reliance on text-based strategies, and translate mentally into their home language when reading in L2. The findings on the third category of reading comprehension strategies indicate a wide variety of strategy use which still requires more investigations to generalize the findings to the related issues.

SUMMARY

Nonetheless, with regard to the introspective reading research mentioned above, it appears to be difficult to draw any strict conclusion about the findings. The reason can be attributed to the small number of such studies in ESL/EFL reading research. The diversity of human languages each with specific linguistic features and the need to conduct more introspective research is the justification for arguing for more qualitative research in reading English as a second/foreign language. Regardless of reaching a common frame of reference in strategy use in L2 reading, we need to address a lot of cultural and psychological factors which may play a role in L2 readers' use of reading strategies. Even the introspective method, which has seen an upsurge of interest in the recent decades, is in need of more evidence and verification to answer painstaking criticisms of its data validity such as the reactivity, or the extent to which cognitive processes are affected by the verbalization while subjects are reporting their cognitive processes in reading a text. While Fox, Ericsson, and Best (2011) and Leow and Morgan-Short (2004) found non-significant role of reactivity in a group of ESL subjects' reading comprehension, intake and controlled reading production, we still need more studies to verify the validity of the think aloud data.

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