

The Application of Think-Aloud Protocols on L2 Writing Research

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Abstract: Think-aloud Protocols are an important research method in language teaching and research, applied in listening, speaking, reading, translation and writing. In the field of second language writing research, however, methodological perspective paper about TAPs is still rare. Therefore, this paper reviewed relevant paper of TAPs in L2 writing research, introduced the procedures of conducting TAPs and analyzed the cautions in applying, in hope of providing some thoughts for the future application of TAPs in L2 writing research.

1. Introduction

In order to have a better understanding of people's inner information processing during cognitive activities, cognitive psychologists began to use "Think-Aloud Protocols" (TAPs) as an important research method in the early 1970s. The experimental method of thinking aloud is to let the subjects speak the thinking process while performing a complex cognitive activity. It is a way to understand the mental process, that is, "think aloud". In recent years, the experimental method of aural thinking has gradually attracted the attention of second language writing researchers. Yang Luxin et al. pointed out that the research method of aural report is the most effective in investigating the process of reading comprehension and composition writing [1]. The experimental method of thinking aloud is convenient to observe the occurrence of conceptual activities, such as planning, thought generation, evaluation, etc. in the writing process [2], which helps us understand the writer's thinking process [3], and is the study of the instant cognitive process when learning occurs. The most direct and ideal tool[4] can provide more useful data for the study of second language writing[5][6][7], thus greatly promoting the progress of the writing process research. In short, the aural thinking experiment provides rich data for studying students' cognition and thinking processes, and these data cannot be collected by other methods [8], and the research confirms that the aural thinking method does not affect the author's writing Overall writing quality [9]. For writers who use national languages, the vocal thinking experiment may have a positive impact. For example, the composition of the vocal thinking group has higher language accuracy than the composition of the non-sound thinking group [10].

The aloud thinking experiment has certain advantages in studying cognitive processes, but it also has certain limitations. Researchers also need to pay attention to reducing factors and variables that may lead to the invalidity of the experiment in all aspects of experiment implementation. However, in the published research on second language writing, there are few comprehensive discussions on how researchers concretely implement the process of aloud thinking experiment and how to reduce its potential problems [6]. This article intends to give a detailed introduction and analysis of the specific process of the aural thinking experiment in the study of second language writing teaching and the potential problems that need attention from the perspective of methodology.

2. Operation Steps of the Second Language Writing Aloud Thinking Experiment

The method of thinking aloud is widely used in the field of second language writing research, and it is mainly used in the study of the process of foreign language writing, strategy research and the study of factors affecting the process of foreign language writing [11]. Compared with other commonly used methods, such as questionnaire survey method and interview method, the sound thinking method enables us to more directly understand the thinking of student writers in the

writing process, such as the use of mother tongue, the choice of writing strategies, etc.; and the writer's writing. The idea of time is more relevant, there is no time interval, and therefore more effective [2]. The following describes the specific operation steps of the aloud thinking experiment.

The use of the voice thinking experiment mainly includes two links: data collection and data analysis.

2.1 Data Collection

Brown and Rodgers pointed out that the data collection of aloud thinking experiments should follow some principles, such as allowing foreign language learners to use their own mother tongue in order to reduce the cognitive burden in the thinking process; researchers try not to disturb the research object during the experiment, and deal with the research object. Observe and record the nonverbal behavior and verbal behavior of the subject, and be aware that it is impossible to discover the subject's automatic or subconscious thought process in an audio report [12].

When collecting data using the voiced thinking method, McKay suggests paying attention to the following points: train the research subject to be familiar with the voiced thinking experiment method; give concise requirements; try not to disturb the research subject during the experiment; when the research subject is not speaking, you can remind softly; remind the research subjects to say what they are thinking, do not ask some guiding questions; pay attention to the non-verbal behavior of the research subjects, etc. [13]. The following is a specific introduction.

After the subjects have been trained and have a certain degree of psychological comfort for the sound thinking experiment, the formal experiment can be carried out. The environment during the experiment, the familiarity of the researcher and the subject, etc. may affect the subject's voice thinking process and results. The ideal approach is to let the subjects test in a familiar, undisturbed environment, such as a quiet office, classroom, language room, etc. Try to eliminate the possible adverse effects of the researcher and recording equipment on the subjects. It is a good practice to have a simple communication between the researcher and the subject before the start of the experiment. On the one hand, they can get acquainted with each other and reduce the sense of strangeness. Participate in the experiment in a relaxed mood; on the other hand, the researcher can re-emphasize that the main purpose of the experiment is to understand the subjects' natural and true thinking in the process of writing, which is more direct and reliable in their "short-term memory". Information, be careful not to deliberately say what they think is useful to the researcher, or the strategies they think should be used in the writing process [14].

Each time a subject meets with the researcher alone to complete one or more vocal thinking writing tasks. The experiment requires students to keep talking about any ideas that flash in their minds from the moment they get the questions. No matter what the student writes, reads, or thinks of, they have to say it [3]. There is no restriction on spoken language. If ideas appear in English, just speak English, and if ideas appear in Chinese, just speak Chinese. The researcher observes and records the writing of the subjects, and conducts audio or video recording throughout the process. The researcher avoids communicating with the subjects so as not to interfere with the writing process of the subjects. When the subject is silent for more than 9-15 seconds, the researcher can remind the subject to speak the thoughts in his head. Common prompts are: "What are you thinking" or "Please speak". Just say the idea, no need to explain the reason. In addition to verbal reminders, a note with "please speak" can also be posted on the front as a reminder [23]. The subjects can use pen and paper, a computer, or a mixture of the two when completing the verbal thinking composition.

The difficulty of the writing topic in the aloud thinking experiment should not be too large, because when it is difficult to use as an essay topic, due to the limited working memory and attention resources, the subjects cannot take care of the task of writing while talking, and it is easy to produce a negative effect on writing. Strength, that is, interfere with the writing process, and familiar writing topics will increase students' participation [6]. In the literature, the writing topics with sound thinking are characterized by being close to students' lives and of suitable difficulty. For example, "unforgettable experiences", "pros and cons of the Internet", and "the influence of family and

school on successful education” are all familiar topics for students. The essay question with the highest citation rate for the writing topic of the aural thinking experiment is Success in education is influenced more by the student's home life and training as a child than by the quality and effectiveness of the educational program. Do you agree or disagree? [3]

The duration of the formal test of voice thinking composition usually ranges from 30 minutes to 90 hours. For example, Xu Fang requires the testee to complete a 300-word narrative in 45 minutes [15]; the experimental time of Van Weijen, et al. is for each voice thinking composition The planned 30 minutes, the actual average time for L1 is 23.46 minutes, and the average for L2 is 37.64 minutes [2]; Wong's voice thinking composition has no time limit [25]. But generally speaking, the writing time of the sound thinking composition in the literature is mostly 60 minutes[19][20][26].

2.2 Data Analysis

After the recording of the voiced thinking experiment, the researcher needs to transcribe the recording of the oral report into text to facilitate later data analysis. Data transliteration in the aloud thinking experiment is very important and is the basis of data analysis. After the recording of the oral report is transcribed into text, it is best to ask the subject to confirm it, and to modify the unclear and incorrect parts in the transcribing process in time to better perform the next step of coding. In the existing research, this point is rarely paid attention to by researchers. Some researchers ask the subjects to transcribe by themselves to ensure the accuracy of the data transcribing [27]. Regarding the transliteration specifications, Wu Hongyun summarized 5 rules for transliteration: First, the transcribing does not make any additions, deletions or modifications to the recording; second, if the interruption lasts for a long time, use the symbol ...; third, the researcher observes The content that arrives but does not appear in the voiced thinking is marked with []; fourth, after completing the first transfer, the researcher listens to the recording again and checks the transferred materials; fifth, listening to the second During the recording, use a timer to divide every 5 minutes of tape recording into 1 section in order to understand the subjects' writing speed and writing schedule strategy [14]. Wu Hongyun's transliteration rules are more detailed. Her first three transliteration rules involve texts and have also received attention from other researchers. For example, the researchers pointed out that the spoken discourse characteristics should be preserved when transcribing, such as wrong beginnings, hesitations, and repetitions. , Pauses and sub-language, etc., use parentheses to mark the length of the pause, etc.[6][7]. The fourth rule concerns the internal consistency of transcribers. Conditional researchers should consider asking the second transcriber to perform a peer review to achieve a higher consistency between transcribers [28][29]. In addition, other transliteration rules that have been widely adopted include: 1) Distinguish between writing content (underlined) and thinking process; 2) Distinguish between readback and repetition (marked in italics); 3) Mark any modification in the test's writing process section.

The analysis method of qualitative data is closely related to research design and research questions [4], that is, how to analyze voice thinking data depends on the purpose of the experimental research on voice thinking [11]. Therefore, different research types usually adopt different analysis modes. For example, in the study of He Wanguan's second writing process, the data analysis is based on the theoretical framework proposed by Hayes and Rowers (1980). Summarize the four steps included in the second writing process, namely discovering problems, analyzing problems, revising the composition and completing the composition, and observe the performance of different students [38]. Xu Fang conducts multiple rounds of qualitative analysis on the transcribed text of voiced thinking. Through repeated reading of the oral report, he identifies and classifies the chunks of students' writing process, and then examines it in the text of voiced thinking [15]. Wang Wenyu and Wen Qiufang made a quantitative and qualitative analysis on the records of voice thinking [39].

It is important to note that not all oral thought reports collected need to be analyzed. The researcher only needs to select the most relevant oral part of the research question for analysis. For example, the researcher focuses on the text output, and does not need to analyze the plan and revise the oral thought report when analyzing the data.

3. Factors That Should Be Paid Attention to in the Experimental Research of Aural Thinking in Second Language Writing

The controversy of the experimental method of thinking aloud has been around for a long time. Although the method is widely used in the field of second language writing, the academic circles do not agree on it. Some scholars criticize the reactionary force of the writing experiment of sound thinking [40], that is, sound thinking will affect the writing process and writing effect; while supporters believe that this method, like other research methods, has both its unique advantages and its own advantages. Limitations [6] [24] [29], such as the individual's unique habits and styles of the research subjects, the completeness of oral statements, the time spent in writing (although there is a uniform time), language expression ability, etc. will affect the study Have an impact [33]4. Although there is a potential threat to validity, as long as researchers pay attention to reducing and controlling the factors that threaten its validity when using it, the vocal thinking experiment can be a good way to collect data in the study of second language writing [6][7][9]. Therefore, when using this method, researchers should be as objective as possible, and carefully avoid factors that may affect the validity of the voiced thinking experiment.

When using voiced thinking for writing research, it is recommended that the control group and experimental group that use non-voiced thinking to write at the same time be compared with the experimental group to verify the effectiveness of the voiced thinking method.

Because vocal thinking is “incomplete under certain circumstances” [16], thinking and oral reports are not completely equivalent, and the specific cognitive process needs to be further inferred and explained based on oral reports [34][33]. Therefore, it is particularly necessary to use the support of multi-party data to compensate for the incompleteness of the voice thinking experiment [41]. However, the literature shows that not all research on writing with sound thinking is supplemented by other research methods. The supplementary methods used in existing research on writing with sound thinking include retrospective interviews, stimulating recall, retrospective questionnaires, oral text analysis, etc. The first two are the most common[18][23].

There should be a pre-test before the formal experiment to ensure that the testee's second language writing level is at the same level, so as to increase the comparability between the test subjects. The scope of the research object should be wider, and the selection of the research object should meet the standard of random sampling and be representative, such as different second language proficiency, overall writing level, etc. In addition, the individual differences of the subjects should also be taken into consideration, and the students' personality, expression ability and other factors need to be investigated in advance. When Wen Qiufang and Guo Chunjie chose to take the test, they noticed that some students are not suitable for this research method due to their personality. For example, those whose silent time is greater than 20% of the total experimental time are regarded as unqualified subjects.[32] ; Wu Hongyun found that some subjects were not due to personality reasons, but because the target language level was high, the language was highly automated, and they were not suitable for writing with voice thinking [14].

4. Conclusion

At present, the method of thinking aloud has received widespread attention in academia and is used by many researchers, especially for the study of the writing process. As long as you pay attention to standardization when using it, the research method has good reliability and validity, and It can provide useful data that cannot be collected by other methods. This article introduces the specific operating procedures of the voice thinking experiment, combs the related literature on the voice thinking experiment in the study of second language writing, points out the factors that should be paid attention to in the implementation of the voice thinking experiment, and hopes to provide future research on the voice thinking of second language writing New ideas.

References

- [1] Yang Luxin, Wang Su'e, Chang Haichao, Sheng Jing. *Qualitative Research and Analysis in Applied Linguistics*. Beijing: Foreign Language Teaching and Research Press, 2013.
- [2] Van Weijen, D., Bergh, H., Rijlaarsdam, G., & Sanders, T. L1 use during L2 writing: an empirical study of a complex phenomenon. *Journal of Second Language Writing*, 2009, (18): 235-250.
- [3] Raimes, A. Language proficiency, writing ability, and composing strategies: A study of ESL college students writers. *Language Learning*, 1987, 37(3): 439-468.
- [4] Gu, Y. To code or not to code: Dilemmas in analyzing think-aloud protocols in learning strategies research. *System*, 2014, (43): 74-81.
- [5] Krapels, A. R. An overview of second language writing process research [A]. In Kroll, B. (ed.). *Second Language Writing: Research Insights for the Classroom*. Cambridge: Cambridge University Press, 1990.
- [6] Manchön, RM, Murphy, L, & Roca, J. Using concurrent protocols to explore L2 writing processes: methodological issues in the collection and analysis of data. In Paul Kei Matsuda, Tony Silva. Mahwah, (eds.), *Second Language Writing Research: perspectives on the process of knowledge construction*. New Jersey: Lawrence Erlbaum Associates, Inc., Publishers, 2005.
- [7] Roca, J., Manchön, RM, & Murphy, L. Generating text in native and foreign language writing: A temporal analysis of problem-solving formulation processes. *The Modern Language Journal*, 2006, 90 (1): 100–114.
- [8] Bowles, M. A. Task type and reactivity of verbal reports in SLA: a first look at a L2 task other than reading. *Studies in Second Language Acquisition*, 2008, (30): 359-387.
- [9] Yang, C., Hu, G., & Zhang, L. J. Reactivity of concurrent verbal reporting in second language writing. *Journal of Second Language Writing*, 2014, (24): 51-70.
- [10] Yanguas, I. & Lado, B. Is Thinking Aloud Reactive when Writing in the Heritage Language? *Foreign Language Annals*, 2012, 45(3): 380-399.
- [11] Guo Chunjie. *The application of vocal thinking in foreign language teaching research*[M]. Beijing: Foreign Language Teaching and Research Press, 2015.
- [12] Brown, J. D., & Rodgers, T. S. *Doing second language research*. Oxford: Oxford University Press, 2002.
- [13] McKay, S. L. *Research second language classrooms*. Mahwah, NJ: Lawrence Erlbaum Associates, 2006.
- [14] Wu Hongyun. *An empirical study on the metacognitive theory of second language writing* [M]. Beijing: Foreign Language Teaching and Research Press, 2006.
- [15] Xu Fang. The thinking characteristics of English majors in second language limited-time writing extraction chunks. *Foreign Languages and Foreign Language Teaching*, 2010, (1): 22-26.
- [16] Ericsson. K. A., & Simon, H. A. *Protocol Analysis: Verbal Reports as Data* (rev.ed.). Cambridge, MA: MIT Press, 1993.
- [17] Suzuki, M. Japanese learners' self-revision and peer revisions of their written composition in English. *TESOL Quarterly*, 2008, 42(2): 209-233.
- [18] Wang, L. Switching to first language among writers with differing second-language proficiency. *Journal of Second Language Writing*, 2003, (12): 347-375.
- [19] Roca de Larios, J., Manchön, RM, & Murphy, L. Generating text in native and foreign language writing: A temporal analysis of problem-solving formulation processes. *The Modern Language Journal*, 2006, 90(1) , 100–114.

- [20] Roca, J., Murphy, L., & Manchön, R. The use of restructuring strategies in EFL writing: a study of Spanish learners of English as a foreign language. *Journal of Second Language Writing*, 1999, 8 (1): 13-44.
- [21] Gass, S. M. & Mackey, A. *Data Elicitation for Second and Foreign Language Research*[M]. Beijing: Foreign Language Teaching and Research Press, 2011.
- [22] Murphy, L.& Roca, J. Searching for words: one strategic use of the mother tongue by advanced Spanish EFL writers. *Journal of Second Language Writing*, 2010, (19): 61-81.
- [23] Yang, L. & Shi, L. Exploring six MBA students summary writing. *Journal of English for Academic Purposes*, 2003, (2): 165-192.
- [24] Guo Chunjie, Liu Fang. A dynamic study of the influence of mother tongue in foreign language writing. *Modern Foreign Languages*, 1997, (4): 31-38.
- [25] Wong, A T. Y. Writers' mental representations of the intended audience and of the rhetorical purpose for writing and the strategies that they employed when they composed. *System*, 2005, (33): 29-47.
- [26] Wang, W. & Wen, Q. L1 use in the L2 composing process: an exploratory study of 16 Chinese EFL writers. *Journal of Second Language Writing*, 2002, (11): 225-246.
- [27] Lou Jie. On the influence of network corpus assistance on the ability to use chunks in English writing. *Foreign Languages and Foreign Language Teaching*, 2011, (6): 61-64.
- [28] Wang Chuming. How can reading follow-up writing effectively promote learning. *Foreign Language Teaching and Research*, 2015, 47(5): 753-762.
- [29] Xiu Xudong, Xiao Defa. The relationship between the cognitive process and performance of English majors' writing in Grade 8 from the aural thinking experiment. *Foreign Language Teaching and Research*, 2004, 36(6): 462-466.
- [30] Babbie, E. *The Practice of Social Research* (11th edition). Belmont: Thomson Wadsworth. 2007.
- [31] Flower, L. S. & J. R. Hayes. The dynamics of composing: Making plans and juggling constraints//L W. Gregg &E. PL Steiberg. *Cognitive Processes in Writing*. Hillsdale. NJ: Lawrence Erlbaum, 1980: 31-50.
- [32] Wen Qiufang, Guo Chunjie. The relationship between mother tongue thinking and foreign language writing ability: A study of the process of high school students' English reading and writing. *Modern Foreign Languages*, 1998, (4): 44-56.
- [33] Smagorinsky, P. Introduction: Potential problems and problematic potentials of using talk about writing as data about writing process. In Smagorinsky, P. (ed.) *Speaking About Writing: Reflections on Research Methodology*. London: SAGE Publications, 1994.
- [34] Kasper, G. Analysing verbal protocols. *TESOL Quarterly*, 1998, 32(2), 358-362.
- [35] Han Baocheng, Zhao Peng. A Comparative Study of College Students' English Composition Self-evaluation and Teacher Evaluation. *Foreign Languages Circle*, 2007, (5): 28-37, 67.
- [36] Green, A. *Verbal Protocol Analysis in Language Testing Research: A Handbook*. Cambridge: Cambridge University Press, 1998.
- [37] McCulloch, S. Investigating the reading-to-write processes and source use of L2 postgraduate students in real-life academic tasks: An exploratory study. *Journal of English for Academic Purposes*, 2013, (12): 136-147.
- [38] He Wanguan. Research on the Second Writing Process. *Modern Foreign Languages*, 2007, 30(4): 375-386.

- [39] Wang Wenyu, Wen Qiufang. The relationship between native language thinking and foreign language composition scores. *Foreign Languages and Foreign Language Teaching*, 2002, (10): 17-20.
- [40] Sachs, R., & Polio, C. Learners' uses of two types of written feedback on a L2 writing revision task. *Studies in Second Language Acquisition*, 2007, (29): 67-100.
- [41] Jourdenais, R. 2001. Cognition, instruction and protocol analysis. In Robinson, P. (ed.). *Cognition and Second Language Instruction*. Cambridge: Cambridge University Press.