A Study of Psycholinguistic Empirical Studies in Second Language Acquisition: Research Methods and Methods of Data Collection

Yishan GAO [1] and Yi ZHANG[2]*

[1] School of Foreign Languages, Northwestern Polytechnical University, Xi'an, China
[2] School of Foreign Languages, Northwestern Polytechnical University, Xi'an, China

*Corresponding author:
Yi ZHANG
Institution: Northwestern Polytechnical University (new campus)
Postal address: 1 DONGXIANGLU ROAD, Chang'an District, Xi'an,
Zip code: 710129, Shaanxi Province, China
E-mail: yizhang@nwpu.edu.cn

Abstract
Collecting empirical studies in second language(L2) acquisition of psycholinguistics published by two top international journals: Journal of Psycholinguistic Research and Applied Psycholinguistics over the last five years, this paper focuses on and analyzes the development trend, research methods and the methods of data collection of the 94 collected research articles. The results show: (1) In recent five years, there is a rising trend in the number of empirical studies in second language acquisition of psycholinguistics, especially in the year of 2014 and 2015. (2) Experimental methods are widely used, accounting for 93.62% of all the collected papers. The method of natural observations and the combination of these two methods take up no more than 7%. (3)41 methods of data collection are identified and nearly all of them belong to five categories: test class, task class, training class, behavior observation class and information gathering class.

Keywords: psycholinguistics; empirical studies; research methods; methods of data collection

1   Introduction

As an experimental science, psycholinguistics could not have been developed without a large number of empirical studies. From 1970s to now, with the beginning of experimental psycholinguistics, more psycholinguists advocated an exploration of realistic "mental models" through experiments (Gui, 2000:29). In the late 1970s, psycholinguistics was introduced to China by Professor Gui Shichun. The time between early 1990s and middle 1990s was the initial stage of psycholinguistics in China and empirical studies began to play a more and more important role (Li&Li, 2007). For empirical studies, the role of research method is crucial: the chosen of research method determines the level of a research to a certain degree. Scientific research methods not only can help researchers get the required data fast and efficiently, but also can control variables in case that they influence each other when combined together.

There are mainly two research methods in psycholinguistics empirical studies: natural observations and experimental methods (Gui, 1991:30). Naturalistic data are those obtained by natural observations. However, this research method is not widely seen in psycholinguistic research. This is due to the research subject of this discipline. It was pointed by Carrol (1999:4) that psycholinguistics is the psychological study of language, and the comprehension, production and acquisition of language are the main research subjects of psycholinguistics. In general, it is difficult to obtain the mental process of a participant's language production by natural observations. However, in some special issues where the learners' language system breaks down, such as hesitation, pause and self-repair (Ma, 2011), natural observations are mostly employed. Experimental methods are widely used in empirical studies of psycholinguistics, mainly including two methods of data collection—prompted production and prompted responses. Prompted production focuses on the effect of planning (Gass& Mackey, 2011:20). That is, what the language production will be like if the participants have a time to plan. Planned discourse lies somewhere between the naturalistic data and prompted responses. As the mostly used data collection method, prompted responses contain a wide range of measures, such as reaction time, elicited imitation, eye movement, moving window and stroop test, etc.

As two different research methods, both natural observations and experimental methods have their merits and demerits. Natural observations are not intrusive, that is it does not include and subjective factors of the observer (Gui, 2000:33).This makes the collected data objective in order to reflect a problem faithfully. But this method usually costs a lot of time and effort. Moreover, researchers have to infer because naturalistic data can not reflect the mental process of a participant. All human behaviors are resulted by multiple factors (Gui， 2000:33). When analyzing a certain factor's influence towards language production, researchers can employ experimental methods to control other factors which are irrelevant, and then collect required data by changing the factor which is to be analyzed. The demerit of this method is that it brings psychological hint to a participant. When a participant knows his performance will be recorded and analyzed, he may control his behavior spontaneously, thus influencing the facticity. Besides, faced with some experiment equipments, people usually get nervous, and this will aggravate the production of some language phenomena, such as slips of the tongue.

In recent years, many domestic researchers start to pay attention to the research methods of psycholinguistics. Zhao (2011) pointed that a scientific research method in psycholinguistics is an organic combination of qualitative analysis and quantitative analysis. Zhang (2013) introduced three experimental methods used in a psychological laboratory. At the same time, she made a survey of the hardware and software a psycholinguistic laboratory needed. However, there are some scholars (Li&Li, 2007) found that domestic researchers usually replicated foreign researchers' research methods, and there was a lack of innovation in China in terms of research methods. As an important component of research methods, methods of data collection do not get enough attention from domestic researchers. The writer altogether found three related articles from China National Knowledge Infrastructure (CNKI) and they are listed below. But there is almost no article in

China which pays attention to research methods and methods of data collection in empirical studies in second language acquisition of psycholinguistics.

1. An analysis of the methodology in studies on dictionary use by Chinese EFL learners (He& Zhang, 2009)

2. A comparative study of empirical pragmatic studies at home and abroad: data types and methods of collection (Ji& He, 2014)

3. A review of Data Elicitation for Second Language Research (Ma, 2011)

As a big country whose population is over one billion, the number of English learners in China is increasing everyday. Thus, more and more researchers begin to pay attention to studies in second language acquisition. Compared with research articles which analyze a certain native language, the empirical studies in second language acquisition are more useful for domestic researchers in psycholinguistics. For all the above reasons, in order to know the selection of research methods and the use of data collection methods from foreign studies, this study will make a survey of empirical studies in second language acquisition of psycholinguistics published by international journals. It is hoped that this study can offer a useful reference for domestic researchers who are interested in this topic.

2   Research Methods
2.1   The collection of research articles
This study selects two top international journals Journal of Psycholinguistic Research and Applied Psycholinguistics. The former is published by a German press called *Springer, and the influencing factor of this journal is* 0.633; the latter is published by Cambridge University Press, *and the influencing factor of this journal is* 1.580. Both of these two journals are included by Social Sciences Citation Index (SSCI).So empirical studies from them can represent the research direction of foreign studies of psycholinguistics.

The author logged in the official websites of these two journals and downloaded all the articles published from 2011 to 2015. Each article was given a number. In the first round of skimming, theoretical researches and articles of literature review were excluded. Only empirical studies in second language acquisition were left. In the second round of careful reading, the author paid attention to research methods of each study. First, the author determined which kind of research methods was used, natural observations or experimental methods, and then analyzed the methods of data collection. The above data were recorded while analyzing each paper. After a calculation and summary, research results were gotten.

2.2   Research questions
Based on the above data, this study mainly focuses on three research questions:
(1)   In recent five years, what is the number of empirical studies in second language acquisition of psycholinguistics published by international journals?
(2)   In the collected papers, what is the distribution of natural observations and experimental methods?
(3)   In experimental methods, what methods of data collection are used and what is the distribution of these methods?

3   Results and Discussion
3.1   The number of empirical studies in second language acquisition
From 2011 to 2015, 176 papers were published by Journal of Psycholinguistic Research (Journal 1). Among these papers, 26 are empirical studies in second language acquisition; Applied Psycholinguistics (Journal 2) published 228 papers, and 68 are empirical studies in second language acquisition. The total number of papers in the two journals in recent five years are 404, and 94 are what we need, empirical studies in second

language acquisition, accounting for 23.3%. Table 1 shows the specific number of empirical studies in second language acquisition the two journals published each year.

Table 1 Number of empirical studies in second language acquisition

Journals	*2011*	*2012*	*2013*	*2014*	*2015*	*L2 acquisition*	**Total**
Journal 1	4	2	3	11	6	26	176
Journal 2	7	7	16	16	22	68	228

Adding the number of empirical studies in second language acquisition every year and drawing the data into a line chart, we can see the development trend more clearly (Figure 1). In recent five years, there is an increasing trend of empirical studies in second language acquisition. The number of articles in 2015 is 2.5 times of 2011's. It can be found that foreigner psycholinguistic scholars pay more and more attention to empirical studies in second language acquisition. This brings a future direction to domestic researchers, who should put more focus on this field.
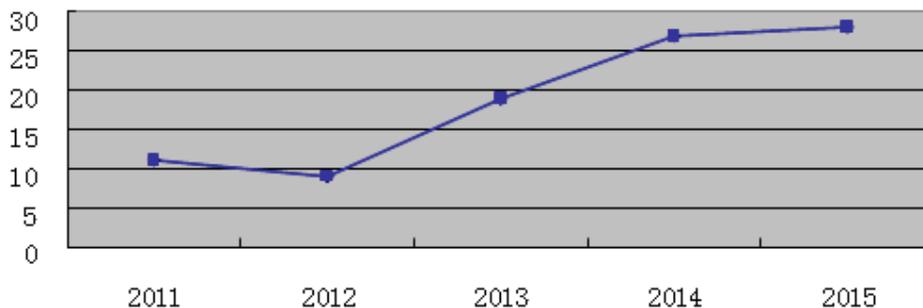

Figure 1 The development trend of empirical studies in L2 acquisition

3.2 The selection of research methods

The research methods in psycholinguistics can be divided into two kinds: natural observations and experimental methods. In the collected 94 papers, 88 papers use experimental methods, accounting for 93.62%. 4 papers use natural observations, accounting for 4.25%. Two articles use a combination of two methods, accounting for 2.13 % (Figure 2). From the percentages we can see that most of the collected papers use experimental methods. Natural observations and a combination of two methods are not widely used. This result is in accordance with the result of Gass& Mackey (2011:16).

As an experimental science, most of the researches in psycholinguistics employ experimental methods, because natural observations can hardly reveal the processing of language. By controlling some variables, researchers make the observing behavior appear in a clearer way. (Gui, 1991:30). In other words, experimental methods help researchers eliminate many influencing factors, and get the required data. Another advantage of this method is that it can save time and effort for researchers. In most researches, researchers can finish experiments in a relatively short time instead of fighting a "protracted war" in natural observation. This is of great importance in modern society, because in a long-term study, the efficiency of data may be lost with time passing by.
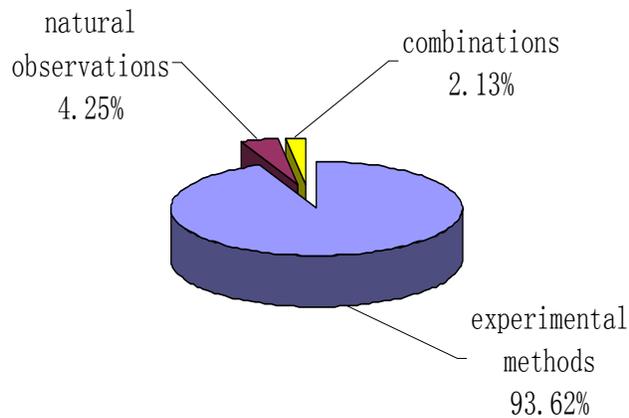
Figure 2 The distribution of different research methods

In collected papers, natural observations and a combination of two methods are not widely used. This is due to the characteristics of this method. In natural observations, participants' behaviors are usually recorded by tapes and videos. First, compared with experimental methods, natural observations take a much longer time to carry out. The implementation time is between several weeks and a few years. For example, in the sixth issue of Applied Psycholinguistics in 2014, the title of one article is "English exposure in the home and classroom: Predictions to Spanish-speaking preschoolers' English vocabulary skills". In this study, research-ers make a one-year observation of preschool children. Second, the recording measures are either by manual work or by equipment. The former is through personal diary or reports from parents and teachers; the latter is through electronic equipments, such as tape recorder and video camera. No matter which measure is adopted, it costs researchers a huge amount of manpower, material resources and financial resources. For researchers who do not have plenty of time or financial fundings, the method of natural observations is not a good choice. But we can not say this method is not of importance, because in some special topics, such as speech error and language development, natural observations are more appropriate.

3.3   The distribution of methods of data collection

Susan M. Gass and Alison Mackey are co-authors of the book Data Elicitation for Second Language Re-search. This book introduces methods of data collection in researches of second language systemically. The second chapter is a summary of methods of data collection that are commonly used in previous studies from the perspective of psycholinguistics. In this book, experimental methods include two methods of data collec-tion—prompted production and prompted responses. And prompted responses can be further divided into ten kinds: reaction time, sentence interpretation, elicited imitation, word association, priming, lexical deci-sion, cross-modal priming, eye movement, moving window, stroop test. However, in the collected studies, many new methods are found. Some of these methods are even more widely used than those ten methods. Ranked by the appearing times of each method, Table 2 lists all the methods of data collection appear in the collected papers.

Table 2 A summary of methods of data collection

No.	methods of data collection	times	No.	methods of data collection	times
1	moving window	8	22	discrimination task	1
2	eye movement	7	23	language switching	1
3	lexical decision	6	24	reaction time	1
4	pretest-training-posttest	6	25	ERPs	1
5	questionnaire	5	26	speech perception	1
6	speaking task	5	27	listening span test	1
7	word learning	4	28	priming	1
8	elicited imitation)	4	29	stroop test	1
9	picture naming	3	30	concept-identification	1
10	proficiency test	3	31	memory span test	1
11	word repetition	3	32	sentence matching	1
12	assessment	3	33	spelling dictation	1
13	cross-modal priming	2	34	story retelling	1
14	translation experiment	2	35	recognition task	1
15	grammaticality judgment	2	36	information-gap task	1
16	narrative task	2	37	emergent literacy measures	1
17	reading span test	2	38	definition task	1
18	picture description	2	39	paper and pencil test	1
19	free recall	2	40	constrained test	1
20	prompted production	1	41	sentence interpretation	1
21	comment				

Looking at the overall number, it can be seen that 41 data collection methods are found in empirical studies in second language acquisition, much more than the ten methods mentioned above. This result shows that methods of data collection are used flexibly in psycholinguistic researches. Domestic researchers should make innovations to find suitable data collection methods.

From the appearing times of every method, we can find there is an obvious difference between them. As the mostly used data collection method, moving window appears 8 times，and 22 methods only appear once. The other widely used methods include eye movement, lexical decision, pretest-training-posttest, questionnaire, speaking task, etc. Whether a data collection method is often used or not is determined by the level of wideness of this method. Psycholinguistics involves a wide range of topics, including psychological mechanisms, language perception, mental lexicon, sentence comprehension and memory, conversational interaction, etc. A widely used method of data collection can usually be employed in several topics. For example, as the mostly used method, moving window includes self-paced listening and self-paced reading, etc. This method can be employed into topics like grammaticality, ambiguity, sentence analyzing and sentence processing. But methods like spelling dictation involve comparatively less topics.

Based on the nature of every method of data collection, the author classified these methods. Although there are 41 methods, they can all be classified in to five classes: test class, task class, training class, behavior observation class and information gathering class. Test class includes methods like proficiency test、 memory span test and constrained test. The purpose of this class is to know the level of a certain ability of participants by tests. Task class includes a wide range of methods, like word repetition, recognition task and story retelling. Methods in this class ask participants to finish a required task, and the researchers will record the completion of this task and the behavior of participants. Methods in training class, for example, pretest-

training-posttest and word learning, are often used with methods in other classes, investigating whether participants' level of an ability is raised or not after training. Behavior observation class includes methods like eye movement、reaction time and ERPs. Researchers use them to observe participants' behavior and their reaction towards a stimulus in experiments. Information gathering class contains methods like questionnaire, gathering participants' personal information, health condition, education level, etc.

4   Conclusions

To a certain degree, the selection of research methods determines whether a research is successful or not and appropriate methods of data collection guarantee the completement of this research. Thus, the present study focuses on and analyzes the development trend, research methods and the methods of data collection of the 94 collected research articles.

The results show:

(1) In recent five years, there is a rising trend in the number of empirical studies in second language acquisition of psycholinguistics, especially in the year of 2014 and 2015. This suggests that foreign psycholinguistic scholars pay more and more attention to empirical studies in second language acquisition. This brings a future direction to domestic researchers, who should put more focus on this field.

(2) In collected papers, experimental methods are widely used, accounting for 93.62%. The method of natural observations and the combination of these two methods take up no more than 7%. From this it can be seen that foreigners are more likely to use experimental methods. But we can not say natural observations are not of importance. Researchers should select research methods based on their real need.

(3) 41 methods of data collection are identified in the collected papers and nearly all of them belong to five categories: test class, task class, training class, behavior observation class and information gathering class. This result shows that methods of data collection are used flexibly in psycholinguistic research. Domestic researchers should make innovations to find suitable data collection methods.

In the process of data collection, the author also writes down the topic of each study but this is not discussed in the present paper due to the limitation of length. In next period, the author will try to find the relationship between research topic and the selection of research methods, especially methods of data collection.

References:

David Carrol. 1999. Psychology of Language. Foreign Language Teaching and Research Press, Beijing, China.

Di Zhao. 2011. On Scientific Method of Psycholinguistic Research. Theory and Practice of Education, 31(1):44-45.

Francisco Palermo. 2014. English exposure in the home and classroom: Predictions to Spanish-speaking preschoolers' English vocabulary skills. Applied Psycholinguistics, 35(6):1163-1187.

Guanghui Ma. 2014. A review of Data Elicitation for Second Language Research. Foreign Language Education in China, 4(3):64-71.

Jianing He and Wenzhong Zhang. 2009. An analysis of the methodology in studies on dictionary use by Chinese EFL learners. Modern Foreign Languages, 32(1):94-101.

Li Sun. 2014. An exploration of qualitative analysis in pragmatic research. Foreign Language Learning Theory and Practice, 36(2):9-33.

Li Zhang. 2013. The Application of On-line Psycholinguistic Research Techniques and Resources in SLA Research. Overseas English, 14(17):37-39.

Qiufang Wen. 2001. Research Methods and Thesis Writing. Foreign Language Teaching and Research Press, Beijing, China.

Shaoshan Li and Zhixue Li. 2007. The Development of Psycholinguistics in China: Review and Prospects. Journal of PLA University of Foreign Languages, 30(2):27-33.

Shichun Gui. 1991. An Outline of Experimental Psycholinguistics. Hunan Education Press, Changsha, China.

Shichun Gui. 2000. Psycholinguistics (New Edition). Shanghai Foreign Language Education Press, Shanghai, China.

Susan Gass and Alison Mackey. 2011. Data Elicitation for Second Language Research. Lawrence Erlbaum Associates, Inc., New Jersey, USA.

Xiaomin Ji and He He. 2014. A comparative study of empirical pragmatic studies at home and abroad: data types and methods of collection. Foreign Language Learning Theory and Practice, 36(2):27-33.