

Developing and Piloting a Q-sample on Chinese Language Learners' Epistemic Beliefs

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ABSTRACT

Background. Epistemic beliefs refer to a person's viewpoints about the nature of knowledge and the process of knowing. A number of studies have explored language learners' subjective views about what knowing and learning a foreign or a second language (L2) means to them personally. For the most part, these studies adopted quantitative research designs and employed self-reported questionnaires with Likert-type scales to collect the data.

Purpose. This pilot study aimed to assess feasibility of adopting Q-methodology (Q) for explorations of language-related epistemic beliefs held by Chinese university students. A detailed account is given of the development of the research instrument (Q-sample); the findings from the Q-sample piloting are reported.

Methods. The newly-developed Q-sample consisting of 45 statements was tested among six students learning the English language in a university in Mainland China. The students were at a different level of the English language proficiency. The 11-point Q-sorting grid had the values ranging from -5 ("Most disagree") to +5 ("Most agree"). To gain deeper insights into the students' personal epistemologies, a semi-structured post Q-sorting interview was conducted with each student.

Results. The newly-developed Q-sample was found suitable for exploring language-related epistemic beliefs. Two groups of students sharing similar beliefs were distinguished. Students who clustered together to form Factor 1 held stronger viewpoints concerning certainty of knowledge; these students were at a lower English language proficiency level. The students who conglomerated on Factor 2 were at a higher level of language proficiency and they held stronger opinions relating to the authority and source of knowledge.

Implications. The findings highlighted the relevance and salience of the epistemic beliefs pertaining to the process of acquiring knowledge. Further research with larger numbers of students is required to explore the role of language proficiency in shaping language learners' personal epistemologies.

KEYWORDS

Q-methodology, Q-sample, epistemic beliefs, English language learners, Chinese students

Citation: Wang Y., Nikitina L., Kaur J., & Furuoka F. (2022). Developing and Piloting a Q-sample on Chinese Language Learners' Epistemic Beliefs. *Journal of Language and Education*, 8(3), 119-132. <https://jle.hse.ru/article/view/13590>

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Received: December 24, 2021

Accepted: September 17, 2022

Published: September 30, 2022



INTRODUCTION

Beliefs that people hold about the nature of knowledge, knowing and the process of acquiring knowledge are referred to as 'epistemic beliefs'. Important epistemological questions concerning language learning and knowing have been raised by theoretical linguists. Noam Chomsky, for example, sought the answers to the questions such as "What constitutes knowledge of languages?" and "How is knowledge of language

acquired?" (Chomsky, 1986, p. 3). As Chomsky proposed, if a person knows a language he or she "has mastered a set of rules and principles that determine an infinite, discrete set of sentences, each of which has a fixed form and a fixed meaning or meaning potential" (Chomsky, 1975, p.303). He referred to this "set of rules and principles" that govern the formation of a meaning as the generative grammar. However, at a layman's level, each person who learns – or has learnt – a new language would have his or her

own conceptions and beliefs pertaining to these deep philosophical questions. These beliefs can be approached and studied as “socially-shared intuitions” (Jehng, Johnson & Anderson, 1993, p. 24) about the nature of knowing and learning a foreign or a second language (L2). There is only a handful of studies that explored epistemic beliefs held by language learners. In most of these studies, researchers conducted questionnaire surveys to collect the data (e.g., Kahsay, 2019; Mori, 1999; Nikitina & Furuoka, 2018). Only in rare instances other methodologies, such as Q-methodology, were employed (e.g., Rock, 2013).

This study aimed to assess feasibility of adopting Q-methodology (Q) for explorations of a complex concept of epistemic beliefs among university students learning a foreign (English) language. To achieve this aim, and considering that empirical studies on language-related epistemic beliefs are scarce, this article provides a detailed account of developed an instrument (Q-sample) on epistemic beliefs related to learning an additional language. It then proceeds to report the findings from a pilot study that tested the newly-developed Q-sample with a group of English language learners in a university in Mainland China.

BACKGROUND

Q methodology in L2 research on beliefs

Beliefs is an elusive psychological construct; it has been defined in various ways. An influential study by Pajares (1992) proposed that beliefs “travel in disguise and often under alias – attitudes, values, judgements, axioms, opinions, ideology, perceptions, conceptions, conceptual systems, pre-conceptions, dispositions, implicit theories, personal theories, internal mental processes, action strategies, rules of practice, practical principles, perspectives, repertoires of understanding, and social strategy, to name but a few” (p. 309).

Literature on beliefs in the fields of general education and L2 research is extensive. Various methodological approaches have been adopted to study this topic but quantitative studies that derived their data from Likert-type questionnaires remain prevalent (Barcelos & Kalaja, 2011). Considering the construct’s complexity, its rootedness in the context and inherent subjectivity, Q-methodology would offer researchers and language educators particularly rich affordances in their explorations of language learners’ – and their teachers’ – beliefs. However, the method was rarely employed until very recently. Among the latest studies, Q was adopted to explore language educators’ and pre-service teachers’ beliefs about multilingualism (Lundberg, 2019, 2020), their pedagogical practice (Lu, Zou & Tao, 2020) and teaching competencies (Irie, Ryan & Mercer, 2018). We were able to locate only one Q study done by Rock (2013) that focused specifically on *epistemic* beliefs. This gap in re-

search literature could be due to a complexity of identifying appropriate areas and dimensions within language-related epistemic beliefs.

In general education research, personal epistemologies and epistemic beliefs have been viewed as consisting of discrete but interrelated dimensions. This was initially proposed by Perry (1970) in a series of his pioneering studies. Hofer (2000) conceptualized personal epistemologies as consisting of two vast areas which pertain to “the *nature of knowledge*” (i.e., what individual people believe constitutes knowledge) and “the *nature or process of knowing*” (i.e., how we come to know what we know) (p. 380, emphasis in original). Furthermore, the ‘nature of knowledge’ dimension comprises beliefs about certainty and simplicity of knowledge, while the ‘process of knowing’ dimension relates to the sources and justification of knowledge. At the same time, as it is noted in the research literature (Hofer, 2000; Stahl & Bromme, 2007), beliefs related to the ‘*process of knowing*’ (i.e., the gaining of knowledge or learning) have been viewed as peripheral and they were often excluded by researchers from their studies. To dispute this opinion, Nikitina and Furuoka (2018) referenced Pritchard’s (2006) arguments on the importance of procedural (i.e., “know-how” knowledge). Pritchard maintained that “to have knowledge, one’s success must genuinely be the result of one’s efforts” (p.6) to seek and gain knowledge. Considering that the empirical findings of earlier studies (Mori, 1999; Rock, 2013) as well as their own research on L2 learners’ personal epistemologies supported the legitimacy of beliefs about learning (i.e., the ‘know-how’ beliefs), Nikitina and Furuoka called for a reconceptualization of epistemic beliefs in L2 research. Acknowledging these arguments, the conceptual framework that guided our efforts to develop the *concourse* and Q-sample on L2 learners’ epistemic beliefs includes the ‘process of learning’ dimension.

Q-Methodology: Its Roots and Main Features

Q-methodology (Q), an approach to investigating individual people’s viewpoints and subjectivity on any topic, phenomenon or event, was invented in the 1930s by British physicist and psychologist William Stephenson (1902–1989). Stephenson (1935a) introduced Q in a brief note published in the journal *Nature*. More extensive explanations of the method can be found in Stephenson’s numerous writings, including his seminal book *The study of behavior; Q-technique and its methodology* published in 1953. Very briefly, Stephenson noted a contradiction in contemporary psychology research on individual differences where the methods employed by researchers, such as factor analysis of data collected through Likert-scale type surveys (R-methodology), actually yielded the findings on the latent structure of a study’s *variables* for an average person in a bigger population – and not the insights on an *individual person* or groups of people with their unique individual conceptions and opinions. Stephenson (1953) proposed to ‘reformulate’ the

factor analysis so that people – and not the variables – are grouped together based on similarities and differences of the individual viewpoints (Stephenson, 1935b, 1936, 1953). With the main focus on unique and subjective, Q does not require many participants. There are single-case Q studies where several Q-sorts were collected from the same person (see Stephenson, 1953, 1992).

Over decades, Q methodology has gained recognition and popularity in a wide range of academic disciplines, including education research, environmental sciences, nursing, economics, political science and management. Some Q studies have been done in applied linguistics and L2 research (Caruso & Frascini, 2021; Damio, 2018; Damio & Hashim, 2014; Fong, 2021; Irie, 2014; Irie & Ryan, 2015; Rock, 2013; Zheng, Lu & Ren, 2019). Several detailed guides on how to conduct a Q study are available and they list typical stages in a Q study (Brown, 1980, 1993; McKeown & Thomas, 2013; Stephenson, 1953; Watts & Stenner, 2012). Generally, upon deciding a topic or phenomenon of interest a researcher would (1) compile a concourse (or wide array of 'communications' on the topic of interest), (2) select a smaller Q-sample from the concourse, (3) identify appropriate participants (P-set) in their study, (4) ask the participants to sort the Q-sample items (to get the Q-sorts that present subjective viewpoints of the people), (5) perform the factor analysis of the Q-sorts, (6) interpret the results of the statistical analysis and analyze other data (e.g., the respondents' further clarifications during interviews or their answers to written open-ended questions) and (7) produce a narrative account.

While designing our study, a search of literature revealed that there is a lack of information on developing a Q-sample on epistemic beliefs in L2 research. It should be noted that one of the main points raised by critics of Q is a perceived lack of methodological rigour and transparency in constructing a systematic Q-sample. Watts and Stenner (2012) referenced Block (2008) who opined that "a set of Q items typically is quickly assembled, structured a priori (often questionably) by the investigator, and is not itself further evaluated as to its sufficiency of meaning" (p. 110). To take note of this issue, this article provides a detailed explanation of the steps we followed and the decisions we made while compiling the concourse and selecting the ensuing Q-sample on language learners' epistemic beliefs. The research question that necessitated the development of the Q-sample was "What epistemic beliefs do Chinese language learners hold about knowing and learning the English language?" To the best of our knowledge, this is the first study that explicitly explains intellectual and decision-making processes while constructing a Q-sample on language learners' epistemic beliefs. The following sub-sections give a detailed description of the concourse development.

METHODS

Participants and Setting

This pilot study was conducted with six students learning English in a large public university in Mainland China, where the first author teaches. A Q study does not require a large number of participants; some studies had as little as six, seven and nine Q-sorters (see Lundberg, 2020). Therefore, six students was a sufficient number of Q-sorters for the purpose of piloting the research instrument.

The six students volunteered to take part in the pilot study by responding to an invitation given to all students in the first authors' English language class. The six participants were very similar to the intended participants in the main study: their age was between 19 and 20 years old and they were majoring in engineering. Even more importantly for a Q study (see Watts & Stenner, 2012), the participants were competent and well-positioned to express their viewpoints on language-related epistemologies as they all had an extensive experience of learning English.

Among the volunteer Q-sorters, three students had a higher level of the English language proficiency and other three students had a lower proficiency level. This helped to achieve some diversity of the P-set. The level of language proficiency was measured by the students' average scores on the two latest English language tests they had taken. The following subsections offer a detailed description of the steps and stages in the development of the Q-sample.

Compiling the Concourse on Language Learners' Epistemic Beliefs: Theoretical and Practical Considerations

A Q study begins with compiling a concourse, which is a wide-ranging "universe of statements for any situation or context" (Stephenson, 1986a, p. 37). Stephenson viewed the process of a concourse development through the prism of a "working theory" of communication where innumerable number of "messages" or communications about a topic are assembled in a concourse along "some broad lines" (p.43). Reminding that the word originates from the Latin *concursum* which means "running together" – of ideas and subjective opinions in a Q study – Stephenson emphasized not only the informational but also the conversational functions and qualities of a concourse. In short, a concourse need to combine a wide range of ideas that "run together" on the topic of interest. Thereafter, a Q-sample consisting of a smaller number of items is drawn from the concourse. Notably, besides textual statements a concourse may consist of drawings, photographs, paintings, music pieces and even scents and fragrances.

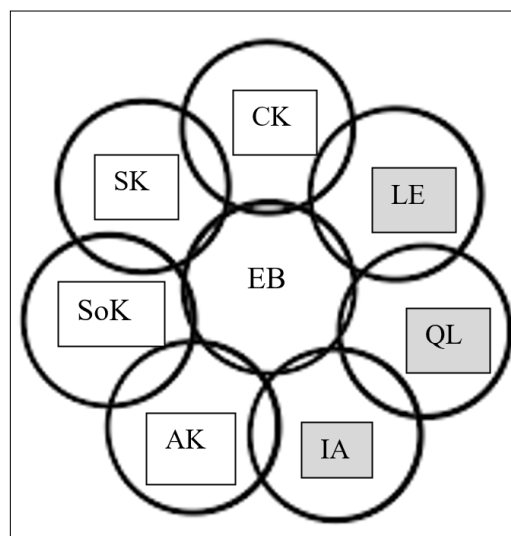
As a 'universe' of communications on a topic, a concourse has no limits for the number of statements it can comfortably accommodate. However, all of the statements must be referrals to the object of a study and thus clearly belong to this particular 'universe'; moreover, they must enable the respondents to share their own feelings about the object or phenomenon under study and provide ample affordances for the respondents' expressing their subjective viewpoints (Brown, 1980; Watts & Stenner, 2012). In short, while developing a concourse researchers must ensure that they preserve a 'self-reference' quality of the concourse, and of the Q-sample that stems from it. As Stephenson (1988/89) put it, a concourse "is a hot bed of self-referential potentials" (pp. 7-8 as cited in Watts & Stenner, 2012, p.34).

Stephenson (1986) stated that "a concourse is arrived at empirically" (p. 44). Statements in a concourse are sourced from a variety of sources, including scholarly literature (e.g., books, articles and ready-made questionnaires), official documents, the mass media, the social media, interviews and focus groups with experts and potential participants in a Q study and even from every-day conversations and discourses (Brown, 1993; McKeown & Thomas, 2013). In addition, developing a concourse requires including conversational elements that would enable the individual people to express their viewpoints. Researchers may want to adopt a conceptual or a theoretical framework to guide the development of the concourse (Watts & Stenner, 2012). In this approach, dimensions or sub-themes in the matter of a study's interest are firstly identified. Having a framework could enhance credibility of the process of item selection and also lessen the possibility of omitting important aspects concerning the study's subject.

Due to a complexity of the topic 'epistemic beliefs', we decided to have a conceptual framework to guide our concourse building efforts (see Figure 1). For this, important literature on epistemic beliefs in the field of education was consulted, including studies that conducted surveys using self-reported Likert-type scales (Chan & Elliott, 2002; Hofer & Pintrich, 1997; Jehng et al., 1993; Schommer, 1998; Schraw, Bendixen & Dunkle, 2002; Wood & Kardash, 2002). We also consulted very scarce studies on language learners' epistemic beliefs (Mori, 1999; Nikitina & Furuoka, 2018; Rock, 2013).

Based on the literature review presented earlier in this article, the framework to guide the selection of items for the Q-sample incorporated three main dimensions relating to epistemic beliefs, namely, (1) the nature of knowledge, which pertains to beliefs in simplicity and/or certainty of knowledge and knowing, (2) the nature of knowing, which concerns beliefs regarding the source of knowledge and a belief in an omnipresent authority of knowledge and (3) the nature and process of learning, which incorporates beliefs pertaining to quick learning, learning effort and a belief in innate or fixed ability to learn, as shown in Figure 1.

Figure 1
Conceptual framework for the concourse development



Notes: EB = Epistemic Beliefs; CK = Certainty of Knowledge; SK = Simplicity of Knowledge; SoK = Source of Knowledge; AK = Authority of Knowledge; IA = Innate/Fixed Ability; QL = Quick Learning; LE = Learning Effort. The shaded boxes indicate the learning-related dimensions.

In total, 290 statements on epistemic beliefs were sourced from the empirical studies. In addition, in order to include the "conversational" element in the concourse, we collected the opinions of English language learners and teachers in China. The students were asked the open-ended question "What does knowing a foreign language mean personally to you?". The discussions with the language instructors centered on the question "What do we know when we know a foreign language (English)?". This step yielded another 95 items to the concourse. Altogether, we gathered 385 statements pertaining to epistemic beliefs in the concourse (see Table 1).

Upon further scrutiny, we noted that not all of the statements provided by the students pertained to personal epistemologies. Furthermore, there were statements that did not align with the conceptual framework depicted in Figure 1. For example, there were several statements that concerned the importance of learning the target language culture. These statements were removed. In addition, we noted that the statements collected from the various questionnaires were often recurring, i.e., a different wording was used to express essentially the same point. As advised in methodological literature on Q (Watts & Stenner, 2012), the repetitive items were discarded. As a result, there remained 200 workable statements in the concourse pool where 157 statements came from the questionnaires and 43 statements were obtained during the brainstorming sessions with the language learners and discussions with English language instructors in China. Each of the remaining statements aligned well with one of the dimensions in the conceptual framework presented in Figure 1.

The discourse serves as a raw material in a Q study. It usually contains a large number of statements, which would be too cumbersome, if not impossible, for the respondents (P-set) to sort. Therefore, a representative subset of 40 to 80 statements called 'Q-sample' needs to be drawn from the discourse. As Watts and Stenner (2012) noted, the Q-sample "need only contain a representative condensation of information to do its job effectively" (p. 65). The next subsections give a detailed information on the Q-sample development.

Constructing the Q-Sample

To yield meaningful insights, a much condensed Q-sample must preserve the breadth and depth of the original discourse (Brown, 1980; Stephenson, 1953; Watts & Stenner, 2012). Methodological literature distinguishes two types of Q-samples – structured and unstructured (Watts & Stenner, 2012). The structured approach requires that the Q-sample statements cluster around pre-determined theoretically based dimensions, which was the case in the current study. An approximately equal number of items should capture each dimension. The main advantage of adopting a struc-

tured approach is that it helps ensuring that the Q-sample is balanced and representative (Watts & Stenner, 2012). The unstructured approach does not require that the components or sub-themes are predetermined.

The number of statements in the Q-sample needs to be manageable and usually the number would be between 40 and 80 items, though it is possible to have a smaller Q-sample (Brown, 1980; Watts & Stenner, 2012). In order to retain a good balance and clarity of the finalized Q-sample, we removed the statements that could be difficult or unclear for the sorters as well as the repetitive or very similar in essence statements. We took particular care to retain statements that are likely to draw emotional reaction from the participants and that retained a 'conversational' element (Stephenson, 1953; Watts & Stenner, 2012). As a result, the discourse of 200 workable statements was reduced to 54 statements. At this stage, we refined the wording of the statements to reflect the object of the study, namely, epistemic beliefs held by language learners. A particular care was taken to ensure that (1) each remaining item fits one of the epistemic beliefs dimensions depicted in Figure 1, (2) each dimension contains approximately the same number

Table 1

Sources for discourse development

Types of information	Sources / persons	Number of statements
Questionnaires on general epistemic beliefs	Schommer (1998)	63
	Schraw et al. (2002)	32
	Wood and Kardash (2002)	38
	Jehng et al. (1993)	15
Questionnaires on language learners' epistemic beliefs	Mori (1999)	53
	Rock (2013)	36
	Nikitina and Furuoka (2018)	53
Brainstorming sessions with students in China	10 volunteer students	89
Personal discussions with language instructors in China	2 language instructors	6
Total		385

Table 2

Q-sample statements and their domain mapping

Dimensions	Sub-dimensions	Number of statements
Nature of Knowledge (n=15)	Simple knowledge/Seek single answer	7
	Certain knowledge	8
Nature of Knowing (n=15)	Authority to knowledge	9
	Sources of knowledge	6
Learning Process (n=15)	Innate ability	4
	Quick learning	7
	Learning effort	4
Total		45

of items and (3) the statements are relevant in a Chinese educational context, the Q-sample was further reduced to include 45 statements (see Table 2). An English version of the Q-sample is included in the appendix.

As can be seen from the table, there was some variability in the number of statements in the sub-dimensions. For example, among the 15 statements in the Learning Process dimension, 4 statements related to innate ability for learning a foreign language, 7 statements pertained to the belief in quick learning while 4 statements concerned the learning effort. Such mild imbalances are acceptable since, overall, the Q-sample was representative of the concourse and it retained the theoretical depth and breadth (Stephenson, 1953; Watts & Stenner, 2012).

When the Q-sample was finalized, the statements were translated from English to Chinese. We followed recommendations in the methodological literature (Dörnyei & Taguchi, 2009) to ensure that the statements in the translated version sound natural in Chinese and that no statements would invite idiosyncratic interpretations by the respondents. Two language experts were invited to verify the Chinese version.

Evaluating and Refining the Q-Sample

Two domain experts were invited to evaluate the Q-sample. Based on their feedback, 2 statements were deleted from the proposed Q-sample. These were the statements “Knowledge of English is tentative and evolving rather than static” and “Native speakers of English are the source to seek help when students encounter difficult problems with English”. Two new statements were added, namely, “The best thing about English knowledge is that there is always one right answer” and “Language learners who disagree with native speakers about grammar or vocabulary usage are over-confident”. The wording of 18 statements was refined. For example, the item “Memorizing vocabulary and grammar is all that is needed to perform well in exams” was reworded as “Memorizing vocabulary and grammar is all that is needed to know English”. This re-oriented the statement’s focus

toward epistemic matters from its initial concerns with their exam performance. Accordingly, some changes were done to the translated version of the Q-sample (see Table 3). Following this, a language expert was invited to do reverse translation.

We then prepared 45 cards with the statements and proceeded to piloting the Q-sample. The next section gives more details of the pilot study.

Piloting the Q-Sample

The six students who had volunteered to take part in this pilot study were instructed to place each card in the distribution grid prepared by the first author. The prompt given to the Q-sorters was as follows: “People have various ideas and opinions of what it means to know a foreign language, such as the English language. These cards contain some of these opinions. With which opinions do you agree? With which do you disagree? About which statements do you feel less certain? Please sort the cards accordingly”. As noted in methodological literature on Q, the individually held viewpoints are expressed and collected during the process of Q-sorting.

We used 11-point sorting grid for the 45-item Q-sample. The values ranged from -5 (“Most disagree”) to +5 (“Most agree”). Regarding the grid for Q-sorting, researchers would need to decide whether its shape (i.e., the curve or slope) should be steeper or flatter. Brown (1980) recommended a steeper distribution if the topic is not very familiar to the participants; this way more of the Q-sample items could be placed at or near the middle of the grid. In our study, we targeted the participants with an extensive experience of learning a foreign (English) language. Such participants would have well-formed subjective views concerning knowing – and learning – a new language. Therefore, we decided to have a flatter (*platykurtic*) distribution of the Q-sort grid; this also would allow for a more granular view of the respondents’ ‘extreme’ opinions (i.e., the statements placed at or near the end points of the grid) (Brown 1980; Watts

Table 3

Examples of revisions in the English–Chinese translation

English statements	Original Chinese statements	Revised Chinese statements
English language never changes. In the future, it will be the same as today.	英语永远不会改变：现在如此，将来也会如此。	英语语言永远不会改变：将来的英语与现在的英语会完全相同。
I never doubt information about English language use that I receive from native speakers of English.	我从不怀疑从以英语为母语的人那里获得的有关英语使用的信息。	我从不怀疑从英语本族人那里获得的有关英语使用的信息。
To gain knowledge you need to discover how to learn.	要获得知识，你需要发现如何学习。	要获得知识，你需要找到如何学习的方法。
People can study English language for years and still not have a good knowledge of it.	人们可以学习英语多年，但仍然不了解这门语言。	有人可能学习英语多年，但仍然不能把这门语言学好。

& Stenner, 2012). The optimal slope (*kurtosis*) of the distribution grid (see Figure 2) was calculated using EViews 10.0 statistical package.

As Brown (2008) noted, "There is no correct way to do a Q sort" (p. 700) because a completed Q-sort would reflect each individual participants' unique subjective opinion. However, in order to give some 'technical' guidance on the sorting process, we designed a booklet with instructions to the participants. We also prepared open-ended questions for the post-Q sorting interviews (e.g., "Could you explain why you have most agreed with these statements?", "What about these statements?", "Would you like to add anything else?").

It took between 30 and 45 minutes for each participant to complete the Q-sort. The researcher was present at all times during the sorting in order to be available to answer any possible queries from the participants. Each completed Q-sort configuration was photographed to retain it for further analysis. Following this, a brief interview was conducted during which the participants were asked to share their general views on the study topic and explain the configurations they had produced, particularly pertaining to the items placed at or just next to the extreme ends of the grid. Each interview lasted about 20 minutes.

After all the Q sorts had been collected, the numerical data were keyed-in into a Microsoft Excel file to enable further statistical analysis where the Q sorts were firstly inter-correlated and then subjected to a factor analysis which involved factor extraction and factor rotation. The factor analysis in Q places respondents with similar views (as evidenced by their Q sorts) in the same factor (Brown 1980; Stephenson 1953; Watts & Stenner, 2012). According to Stephenson (1986a), the purpose of the factor analysis in Q is to distinguish "schemata" or an individual's subjective viewpoints concerning the study's matter. Hence, Q factors "are indicative of schemata" (p. 53) which are derived from a Q-sample by each individual Q-sorter. These schemata allow researchers to penetrate further into each individual respondent's subjectivity because the schemata are developed from the individual person's past experience and present situation (see Stephenson, 1986a for further discussion). Since all schemata are highly subjective, the researcher would need to use abductive reasoning and try to situate oneself in the mind of the Q-sorters when interpreting a Q factor (p. 54).

Besides, the researcher would need to make decisions regarding the statistical procedure and software. After the

Figure 2

Q-sort grid distribution

Value	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
No. of statements	2	3	4	5	5	7	5	5	4	3	2

correlation analysis of the Q-sorts was done, this study performed centroid factor analysis (Brown, 1980) with varimax rotation. KADE software (Banasick, 2019) designed specifically for analysing Q-sorts aided in the construction of the factor arrays. A factor array is a single Q sort that represents the essence of a relevant factor; one factor array is produced for each of the factors that transpired in the course of the analysis. A Python code was written to visualize the findings from the factor rotation with regard to the students' academic achievement.¹ The findings from the pilot study are reported in the next section.

RESULTS

The results from the correlation analysis are shown in Table 4. Higher correlations indicate a higher degree of similarity in the respondents' subjective opinion, such as their epistemic beliefs. As can be seen from the table, the correlations among the Q-sorts were rather high, except for Participant 3 (P3). Table 5 shows the findings on the factors extracted by the centroid method. All of the six participants' Q-sorts had high loadings on Factor 1. This factor has an eigenvalue of 3.267 and explains 54% of the total variance. Only Q-sorts obtained from Participant 1, Participant 4 and Participant 5 had positive loadings on Factor 2 that has an eigenvalue 0.292 and explains 5% of the study variance. These results suggest the existence of two groups of language learners whose epistemic beliefs are similar.

Table 6 shows rotated with the varimax procedure factors and their loading. The varimax procedure suggested a 45 degree clock-wise rotation. As Table 6 shows, each factors had Q-sorts with significant loading, which was calculated as 0.39 in this study (the formulas for this calculation can be found in Brown, 1980, pp. 222-223). However, there were two confounded Q sorts (1 and 6) and one non-significant Q-sort (4).

The findings concerning the factors' eigenvalues (which are recommended to exceed 1.00) and their significant loadings (at least two such loadings on a factor are desirable) can help researchers to make decisions about the number of factors to retain for a further analysis. The final decision, however, rests with the researcher (Watts & Stenner, 2012). This is because this decision would be rooted in the researcher's own knowledge, his or her understanding of the situation and participants and it will be guided by abductive reasoning with regard to the data. We decided to retain two

¹ The Python code is available at: <https://sites.google.com/view/homepageforeconometricpython/paper-1>

factors for further analysis. The two factors accounted for 59% of total variance. We also took note that the presence of the confounded and non-significant Q-sort loadings indicated the need for improvements in the Q-sample context. To gain further insights, factor arrays for each of the two factors were produced, as shown in Figure 3 and Figure 4. -

The findings revealed that the students’ personal epistemologies were rather uniform: the majority of the statements in the two factors were consensus statements. These statements are highlighted in colour. For example, the opinions that knowledge of English cannot be acquired at once (statement #39) received a strong endorsement. Quite logically, there was a disagreement with the opinion that is contrary to this viewpoint (statement #38).

Furthermore, both factors expressed a strong support of the opinion that even if someone has a good knowledge of English there would remain many things to be learned (statement #10), that one needs to discover how to learn (statement #30) and that one needs to persevere in learning English (statement #44). At the same time, the two factors conveyed a strong disagreement that talent plays the major role in learning English (statement #43).

Next, in order to identify the main characteristics of each factor we compared their distinguishing statements, as recommended in methodological literature (Albright, Christofferson, McCabe & Montgomery, 2019; Watts & Stenner, 2012). This analysis indicated that Factor 1 affirmed a collective belief in certainty of linguistic knowledge. The statement that linguistic knowledge is certain as it has been agreed upon by linguists and language experts was a distinguishing statement which received a comparatively strong endorsement in Factor 1 (15; +2). Accordingly, a statement contrary to this viewpoint was among the distinguishing statements that had a strong disagreement (8;-3). As Participant 2, whose Q-sort was strongly associated with Factor 1 and thus represents an exemplar opinion of this group of students, explained,

“As I see it, a knowledge of English language that language learners receive must be established knowledge and not uncertain one.”

Factor 2 reflects a greater endorsement of the opinions regarding the source and authority of knowledge. Its distinct viewpoint was that the source of linguistic knowledge mainly comes from the language teachers (27; +2). Interestingly, with regard to the authority of knowledge, the students who conglomerated on this factor found acceptable to doubt

Table 4

Findings from the correlation analysis

	P1	P2	P3	P4	P5	P6
P1	1.00	0.62	0.52	0.65	0.69	0.63
P2	0.62	1.00	0.48	0.53	0.48	0.64
P3	0.52	0.48	1.00	0.36	0.46	0.50
P4	0.65	0.53	0.36	1.00	0.61	0.41
P5	0.69	0.48	0.46	0.61	1.00	0.50
P6	0.63	0.64	0.50	0.41	0.50	1.00

Note: P = participant / sorter

Table 5

Findings from centroid factor analysis

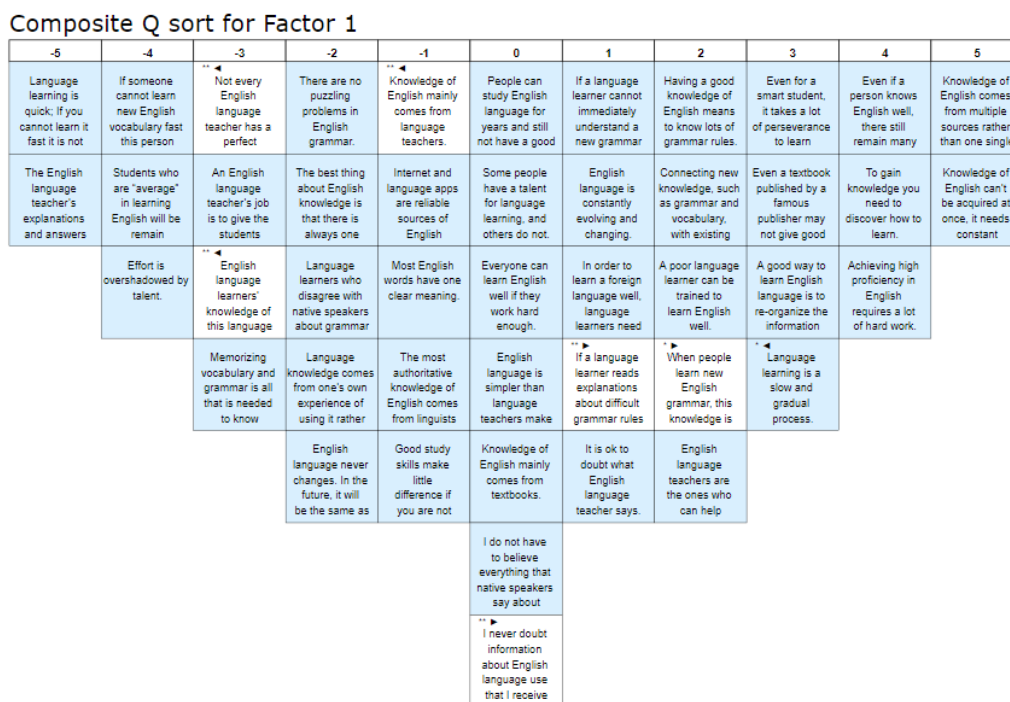
Sorters	Factor 1	Factor 2
P1	0.873	0.132
P2	0.752	-0.212
P3	0.614	-0.131
P4	0.654	0.273
P5	0.744	0.238
P6	0.728	-0.282
Eigenvalue	3.267	0.292
Variance explained	54%	5%

Table 6

Rotated factors and their loadings

Sorters	Factor 1	Factor 2
P1	0.533	0.704
P2	0.687	0.371
P3	0.531	0.334
P4	0.301	0.273
P5	0.367	0.649
P6	0.718	0.690

Figure 3
Factor array for Factor 1



Note: All Q-sample statements were in Chinese. Consensus statements are highlighted in colour.

Factor 1

Threshold	Z-score	Q Sort Value	Number	Statement
P < 0.005	-1.18	-3	8	English language learners' knowledge of this language can never be certain.
P < 0.05	0.815	2	15	When people learn new English grammar, this knowledge is certain and has been agreed upon by linguists and language experts.
P < 0.01	-0.287	0	17	I never doubt information about English language use that I receive from native speakers of English.
P < 0.0005	-1.019	-3	19	Not every English language teacher has a perfect knowledge of the language they teach.
P < 0.0005	-0.297	-1	27	Knowledge of English mainly comes from language teachers.
P < 0.05	0.989	3	36	Language learning is a slow and gradual process.
P < 0.01	0.496	1	40	If a language learner reads explanations about difficult grammar rules many times, he or she will be able to understand and learn these rules well.

information about the use of English received from native speakers of this language (17; -2). As respondent 1, who was strongly associated with this factor, elucidated,

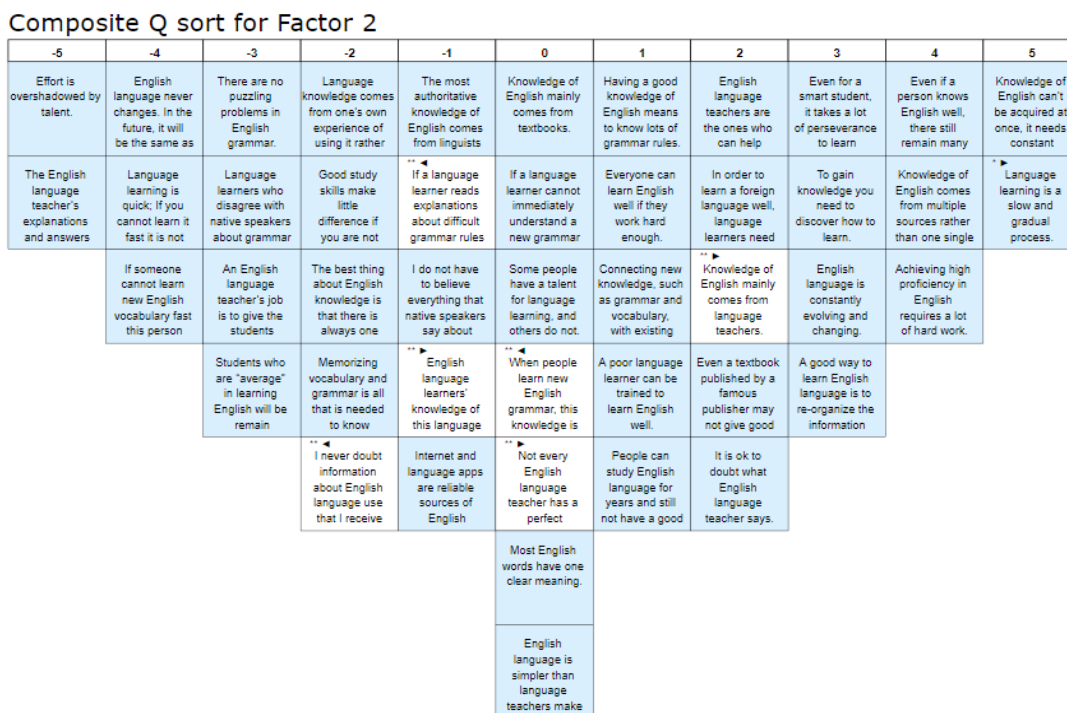
"In contrast to the older days, Chinese language learners today do not blindly believe in so-called 'authority' of language regardless whether it is a native or non-native speaker of English. Everyone makes mistakes no matter who they are".

Next, we considered the findings regarding similarities and differences in the epistemic beliefs between language learners with a different level of academic achievement; the findings are visualized in Figure 5. As the figure shows, the Q-sorts obtained from the language learners whose academic performance was lower tended to have higher loadings on the first factor; only one such Q-sort had a low loading of 0.3. At the same time, these students' Q-sorts tended to have relatively low factor loadings on the second factor, except for one Q-sort with the 0.65 factor loading.

In short, the factor analysis indicated the language learners tended to share the epistemic beliefs with their peers at the same level of academic achievement. Overall, the findings supported suitability of the Q-sample for gathering subjective views and epistemic beliefs concerning knowing and learning a foreign language among Chinese language learners. We also received some valuable feedback from the participants. For example, several students asked to explain the statement "A good way to learn English language is to re-organize the information according to one's own personal understanding". Also, the students commented that some statements were repetitive. Based on these remarks, some modifications to the Q-sample were done in the following main study.

As to the post Q-sorting interview protocol, though the respondents had no difficulty to answer the questions we still needed to develop a more focused interview and include probing questions of various types. More importantly, when

Figure 4
Factor array for Factor 2



Note: All Q-sample statements were in Chinese. Consensus statements are highlighted in colour.

Factor 2

Threshold	Z-score	Q Sort Value	Number	Statement
P < 0.005	-0.338	-1	8	English language learners' knowledge of this language can never be certain.
P < 0.05	0.094	0	15	When people learn new English grammar, this knowledge is certain and has been agreed upon by linguists and language experts.
P < 0.01	-1.011	-2	17	I never doubt information about English language use that I receive from native speakers of English.
P < 0.0005	0.033	0	19	Not every English language teacher has a perfect knowledge of the language they teach.
P < 0.0005	0.695	2	27	Knowledge of English mainly comes from language teachers.
P < 0.05	1.652	5	36	Language learning is a slow and gradual process.
P < 0.01	-0.286	-1	40	If a language learner reads explanations about difficult grammar rules many times, he or she will be able to understand and learn these rules well.

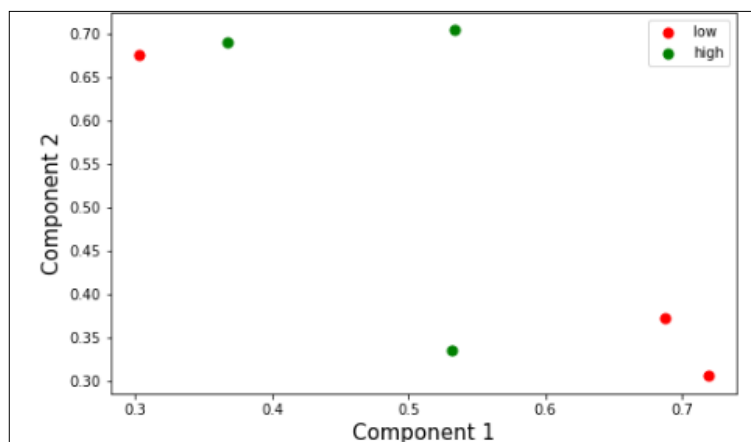
keying-in the Q-sort data, we discovered that some photos of the completed Q sorts were not very sharp and it was difficult – though still possible – to read the statements. Originally, we had decided against putting numbers at the back of the cards as we felt this might misguide the sorters. However, after encountering this problem we realized that the numbers at the back of the cards were very much needed to avoid jeopardizing the keying-in of the data in the main study. Otherwise, no major issues were encountered during the study.

DISCUSSION

Studies on epistemic beliefs are abundant in education research. For the most part, these studies adopted quantitative research approaches (Chan & Elliott, 2002; Hofer & Pintrich, 1997; Jehng et al., 1993; Schommer, 1998; Schraw, Bendixen & Dunkle, 2002; Wood & Kardash, 2002). Q methodology has

been rarely adopted in explorations of students' personal epistemologies. In L2 research literature, only one study by Rock (2013) investigated language learners' vocabulary-related epistemic beliefs. The Q study reported in this article is broader in scope as it assessed a variety of language-related epistemic beliefs that people learning a new language might hold. Its findings suggest the existence of two dimensions within the language learners' epistemic beliefs. Students clustering on Factor 1 gave a greater endorsement to the views concerning certainty of knowledge, while those conglomerating on Factor 2 held distinct beliefs relating to the authority and source of knowledge.

The findings also indicated that the epistemic beliefs did not diverge greatly at the intra-individual level as the majority of the statements forming each factor were consensus statements. Notably, the viewpoint that learning a new language, such as English, is a slow and gradual process received a strong endorsement from the students. This is an important

Figure 5*Visualisation of factor loadings**Note: the rotated factor loadings are shown*

result stemming from this pilot study. It highlights the relevance and salience of the epistemic beliefs concerning the procedural knowledge and gives support to the arguments advanced in the earlier theoretical and empirical studies on the need to consider such beliefs as integral part of individual people's personal epistemologies (Mori, 1999; Nikitina & Furuoka, 2018; Pritchard, 2006).

As to the role of the language learners' proficiency in English, the findings indicated that the students at the same proficiency level tended to share similar epistemic beliefs. The Q-sorters at a lower level of the language proficiency were associated with Factor 1, while their more proficient peers shared the viewpoints expressed by Factor 2. However, due to a small number of the participants and a lack of prior studies on this phenomenon the conclusions regarding the role of language proficiency in shaping the epistemic beliefs structure must be taken with caution. Further research would be required to gain deeper insights.

A considerable attention has been given in this article to developing the research instrument (Q-sample). As noted in the methodological literature on Q, compiling a concourse and constructing a Q-sample requires perseverance and effort (Brown, 1980; Watts & Stenner, 2012). In the case of the current study, the Q-sample development had lasted 6 months: from May, 2021 to November, 2021. It should also be noted that, as Watts and Stenner (2012) observed, "There is no single or correct way to generate a Q set" (p. 57) and a perfect Q-sample "is probably a thing of fantasy and fiction" (p. 63). This is an important point to consider. In contrast to widely employed in educational research quantitative methodology, known as R methodology, where a standardized instrument is employed, the research instrument in a Q study needs to be custom made in order to suit the context of each particular study. In other words, the Q-sample development – or rather crafting – would be guided not by the

standardization demands embedded in R methodology but by weighing nuances of an immediate and specific setting of a Q study, its aims and the research questions it hopes to answer.

CONCLUSION

The main aim of this study was to assess feasibility of adopting Q methodology to explore a complex topic of language-related epistemic beliefs held by Mainland Chinese English language learners. While research on L2 beliefs held by language learners is abundant there is a lack of studies that adopted Q methodology. Considering this gap and recognizing specific features of Q methodology this article highlighted important methodological and theoretical issues that researchers need to be aware of. From a practical application perspective, a particular attention was given to the development of the study concourse and Q-sample. This Q study also considered whether the epistemic beliefs would differ among the language learners at a different level of English language proficiency. A Python code was written to enable a visualization of the findings, which was not done in earlier available Q studies.

The findings from this study provided deeper insights into Chinese L2 learners' subjectively held opinions. They also endorsed the applicability of Q methodology for exploring a complex, multidimensional subject of language-related epistemic beliefs. Moreover, the findings highlighted the prominence within personal epistemologies of the beliefs pertaining to the process of acquiring knowledge of a new language. To conclude, it is hoped that the present study with its detailed account of the concourse and Q-sample development and the insights from piloting the newly-developed instrument would be informative and useful for L2 researchers who wish to conduct their own Q study.

DECLARATION OF COMPETING INTEREST

None declared.

Larisa Nikitina: conceptualization, methodology, supervision, writing - original draft, writing - review & editing

Jagdish Kaur: supervision, writing - review & editing

Fumitaka Furuoka: formal analysis, software, visualization

AUTHOR CONTRIBUTIONS

Yanyan Wang: investigation, methodology, formal analysis, writing - original draft, writing - review & editing

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APPENDIX

English version of the Q-sample on language learners' epistemic beliefs

1. English language is simpler than language teachers make you think.
2. An English language teacher's job is to give the students answers and not ask them to find the answers for themselves.
3. A good way to learn English language is to re-organize the information according to one's own personal understanding.
4. Connecting new knowledge, such as grammar and vocabulary, with existing knowledge is a good way to learn English.
5. Memorizing vocabulary and grammar is all that is needed to know English.
6. Most English words have one clear meaning.
7. The best thing about English knowledge is that there is always one right answer.
8. English language learners' knowledge of this language can never be certain.
9. The English language teacher's explanations and answers must be exactly the same as in the textbook.
10. Even if a person knows English well, there still remain many things to be discovered about this language.
11. English language never changes. In the future, it will be the same as today.
12. There are no puzzling problems in English grammar.
13. English language is constantly evolving and changing.
14. Having a good knowledge of English means to know lots of grammar rules.
15. When people learn new English grammar, this knowledge is certain and has been agreed upon by linguists and language experts.
16. It is ok to doubt what English language teacher says.
17. I never doubt information about English language use that I receive from native speakers of English.
18. English language teachers are the ones who can help students when they have difficult problems with English.
19. Not every English language teacher has a perfect knowledge of the language they teach.
20. In order to learn a foreign language well, language learners need to be able to distinguish reliable sources of knowledge from unreliable.
21. I do not have to believe everything that native speakers say about English.
22. The most authoritative knowledge of English comes from linguists and language experts.
23. Language learners who disagree with native speakers about grammar or vocabulary usage are over-confident.
24. Even a textbook published by a famous publisher may not give good knowledge of English.
25. Knowledge of English comes from multiple sources rather than one single source.
26. Knowledge of English mainly comes from textbooks.
27. Knowledge of English mainly comes from language teachers.
28. Internet and language apps are reliable sources of English language knowledge.
29. Language knowledge comes from one's own experience of using it rather than from books.
30. To gain knowledge you need to discover how to learn.
31. Some people have a talent for language learning, and others do not.
32. A poor language learner can be trained to learn English well.
33. Good study skills make little difference if you are not naturally good at learning languages.
34. Students who are "average" in learning English will be remain "average" in learning other languages.
35. If someone cannot learn new English vocabulary fast this person will never learn it.
36. Language learning is a slow and gradual process.
37. If a language learner cannot immediately understand a new grammar rule he or she should keep trying to understand it.
38. Language learning is quick. If you cannot learn it fast it is not worth trying.
39. Knowledge of English can't be acquired at once, it needs constant accumulation.
40. If a language learner reads explanations about difficult grammar rules many times, he or she will be able to understand and learn these rules well.
41. People can study English language for years and still not have a good knowledge of it.
42. Achieving high proficiency in English requires a lot of hard work.
43. Effort is overshadowed by talent.
44. Even for a smart student, it takes a lot of perseverance to learn English.
45. Everyone can learn English well if they work hard enough.