

# Exploring the Evolution of Applied Linguistics: A Bibliometric Survey of Major Research Paradigms



Dahui Dong  and Ming Yuan Dong 

## 1 Introduction

### 1.1 Defining Paradigm

Thomas Kuhn proposed the term “paradigm” in *The Structure of Scientific Revolutions* to refer to shared beliefs of research groups, including assumptions, models, values, and principles (Kuhn 1962). From a philosophical standpoint, Kuhn’s “paradigm” has been viewed as a worldview due to its essential characteristic of “incommensurability”, which means that the difference between successive paradigms is irreconcilable (Masterman 1970). This view involves a process of emergence and changing paradigms and is considered a “revolution” with different mental states and not formed by transformation (Kuhn 1962). According to Kuhn (1962, 10), the development of science involves the replacement of old paradigms with new ones, such as the shift from Aristotelian to Galilean physics or the shift from the phlogiston theory to the oxygen theory of combustion, which occurs through phases of emergence, development, and decline. These paradigm shifts represent a constant revolution providing a problem-solving framework (Kuhn 1962).

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D. Dong (✉)

Department of Translation and Interpretation Studies, Chang Jung Christian University,  
Tainan City, Taiwan

e-mail: [dongdahui@mail.cjcu.edu.tw](mailto:dongdahui@mail.cjcu.edu.tw)

M. Y. Dong

Department of German, Tamkang University, Taipei, Taiwan

## ***1.2 Research of Paradigms in Humanities and Social Sciences***

Kuhn employs the term “paradigm” to describe the humanities and social sciences (HSS) infrequently, and he feels that “branches of the social sciences, if any, have already achieved such paradigms remains entirely open” (Kuhn 1962, 12). Although it is widely acknowledged that HSS disciplines lack a cohesive paradigm, this does not imply that there is no paradigm. In reality, new and old paradigms (or schools) can coexist and compete (Giddens 1986; Laudan 1996). Kuhn’s idea of “paradigm” has been extensively utilized in HSS research to address the three essential philosophical concerns that must be answered in any field of study: ontology, epistemology, and methodology (Bettis and Gregson 2001; Creswell et al. 2018; Guba and Lincoln 1994). While ontology attempts to answer the question, “What does the world consist of?” and methodology focuses on how to realize reality, epistemology investigates the relationship between the researcher and the world. Additionally, research paradigms also include axiology and rhetoric. Axiology considers values and ethics and how they impact the research process (Maxwell 2013), while rhetoric refers to the persuasive language used in research, such as the framing of research questions, the interpretation of data, and the presentation of findings (Yanow and Schwartz-Shea 2015). By considering all these components, researchers can comprehensively understand their research paradigm and its implications for their work.

Humanities and social sciences research categorizes paradigms positivism, post-positivism, interpretivism, critical theory, constructivism, and participatory (Guba and Lincoln 1994, 2005). Each paradigm has its own understanding of the universe and its own set of underlying assumptions. Positivism assumes that the world is a measurable and observable objective reality and often uses quantitative methods (Popper 1959). Interpretivism posits that social interaction produces meanings in the universe (Gadamer 2013) and uses qualitative methodologies to study these meanings. Critical theory and post-positivism are two postmodernist paradigms used in HSS research that share some similarities. While critical theory assumes that the world consists of power relations that can be used to oppress and marginalize certain people (Marcuse 1964), post-positivism assumes that the universe is composed of various realities that can be understood from multiple perspectives (Guba and Lincoln 2005). Both paradigms employ mixed-methods to investigate the world, drawing from a combination of quantitative and qualitative research techniques.

The current usage of “post” in the HSS indicates a trend of deconstructing existing paradigms and establishing new ones (Wexler 1995). This trend is also evident in the convergence of several specific sciences, with the mutual penetration of categories, ideas, and methodologies between natural and social sciences resulting in the formation of comprehensive disciplines that employ multiple disciplines to investigate difficult topics (Chadha and Thomas 2022).

Concerns also stem from the failure to acknowledge that paradigms are not research approaches (Crotty 1998). This is evident in the theoretical perspective of research paradigms, which directly informs the research’s overall design, showing

itself in data collecting and analysis techniques. Wallerstein (1996), Crotty (1998), and Case (1998) have all concluded that researchers have improperly understood, evaluated, selected, and utilized paradigms. Many cannot identify the philosophical assumptions behind their study (Bryman 2006; Gorard et al. 2004). Symbolic interactionism, ethnography, and constructionism, for instance, are listed as “methodologies”, “approaches”, “perspectives”, etc., by Crotty (1998), who remarked that many researchers conflate research methods with paradigms. Similarly, Case (1998) discovered a broad variety of opinions regarding the goals and methods of education and a lack of consensus regarding the nature of knowledge itself.

### *1.3 Exploring the Paradigms of AL*

Applied Linguistics is a field that utilizes linguistic theories and methods to examine real-world issues in language use and education, focusing on language teaching, language planning, and language policy (Ellis and Shintani 2014). It is also concerned with developing language education policies and practices and examining how social, political, and economic factors influence the use and teaching of languages (Kaplan and Baldauf 1997). Recent years have witnessed a methodological turn and an increased awareness of research paradigms in AL, leading to an unprecedented “golden age” of research growth (McKinley 2019; Plonsky 2013, 2017). This growth is attributed to numerous studies accounting for AL research paradigms from various philosophical perspectives (Ahmed et al. 2021; Farsani et al. 2021; Hashemi 2019; Lian and Sussex 2018; McKinley and Rose 2019) and the recognition of the importance of research methods in AL (Brown 2014; Plonsky 2013, 2015, 2017). McKinley (2019), for instance, describes research paradigms as the philosophy underpinning the knowledge or reality a researcher employs to comprehend a phenomenon, and prevalent research paradigms in AL include positivism, post-positivism, interpretivism, critical inquiry, pragmatism, and participative. While AL paradigms were categorized as positivism and post-positivism in the early works of Jacobs and Farrell (2001) and Torabi (2011), Lian and Sussex (2018) explored the pragmatist paradigm, Ahmed et al. (2021) discussed the participatory paradigm, and Farsani et al. (2021) explored the postmodern paradigm. As the field of AL continues to evolve, it is important to recognize and explore the limitations of traditional research paradigms such as positivism and post-positivism and to embrace a more diverse range of philosophical perspectives and approaches to research that can better capture the complexity and diversity of language use and education in the real world.

In addition, some AL scholars have examined research paradigms from the standpoint of thinking schools (Kumaravadivelu 2006; Vygotsky 1978), theories (Holliday and Macdonald 2020; Zuengler and Miller 2006), and ontology (Corson, and David 1997). Hashemi (2019) highlighted several philosophical perspectives appropriate to AL research, including critical realism, dialectic stance, dialectical pluralism, critical dialectical pluralism, transformative paradigm, and performative

paradigm. These philosophical perspectives align with the argument made by Creswell and David Creswell (2018), who argued for the need to adopt a mixed-methods approach that combines quantitative and qualitative research methods to gain a more comprehensive understanding of the complex issues in AL research.

The evolution of HSS concepts has unavoidably influenced the research of AL. Similar to the debate between quantitative and qualitative research in HSS, which focuses on the evolution of three research methods: quantitative research, qualitative research, and mixed-methods research (MMR), the debate surrounding paradigms in AL research focuses primarily on the quantitative and qualitative paradigms (Bryman 1984, 2006; Hashemi 2019; Lapid 1989; Larsen-Freeman 2007). In the 1980s, AL research transitioned from the conventional speculative research paradigm to the empirical research paradigm due to the infiltration of the natural science research model into the field (Gao et al. 2001). When positivism collapsed in HSS research in the mid-1990s, AL research turned to qualitative research, focusing mostly on qualitative data, and was dominated by interpretive methodologies and critical theories (Risager 2011; Torabi 2011). With the strong support of post-positivism in the HSS in the early twenty-first century, post-positivism also emerged in AL. Some scholars believe that post-positivism has become an alternative paradigm to positivism, advocating the use of MMR and that post-positivism has become a new paradigm that provides AL with rich research paths (Jacobs and Farrell 2001; Weideman 2013a). In recent years, AL scholars have been looking for ways to integrate paradigms for conducting MMR studies (Farsani and Babaii 2020; Farsani et al. 2021; Riazi 2016a, 2016b; Riazi et al. 2020).

Pennycook (2018) suggests that there has been a paradigm shift in AL due to its growing relationship with other disciplines, such as natural sciences. However, some researchers argue there is no shift to post-positivism in AL. For instance, Yüce et al. (2014) examined the research paradigms and designs of doctoral theses conducted in AL in Turkey since 2000 and analyzed how the paradigm shift affected AL. The research revealed that experimental and descriptive research designs remained the most prevalent in doctoral dissertations and that post-positivism did not emerge as the dominant paradigm. In Teaching English as a Foreign Language (TEFL) research, studies by Farsani and Babaii (2020) suggest that most research continues to use traditional paradigms and designs, with a focus on quantitative methods, but there is a growing trend toward the use of MMR and recognition of the value of qualitative methods. Overall, it appears that the debate around research paradigms and designs in AL research continues, with some arguing for a paradigm shift towards post-positivism and others maintaining that traditional research paradigms and designs still have value in these fields.

In addition, it has been found that AL researchers and researchers in other HSS disciplines lack a consistent philosophical dimension to define research paradigms (Benton and Craib 2011; Berkovich 2018; Christopher 2017). In research practice, the majority of researchers, such as those discussed by Hashemi (2019), concentrate on methodological orientations, which entails integrating qualitative and quantitative research approaches, but few openly state the philosophical basis of their research (Gorard et al. 2004; Hashemi 2019). For instance, Gorard et al. (2004)

discovered that the majority of researchers reported employing some quantitative approaches, but the “quantitative” abilities were weak, and the quality of educational research was generally poor. This suggests a need for AL researchers to pay closer attention to both the philosophical underpinnings and the purpose of their research when considering the use of MMR approaches, as highlighted by recent studies in the field, such as those by Farsani and Babaii (2020) and Farsani et al. (2021).

Early on, Corson (1997) observed that it appeared that AL was emerging and operating without a cohesive or consistent governing paradigm. Pederson (2006) also noted that researchers in the field of second and foreign language teaching, a subfield of AL, lacked the appropriate paradigm criticism awareness and were unable to comprehend the context of discipline development and the internal structure and development rules of the discipline. In numerous AL journal articles, just “methods” and methodology are discussed; ontology and epistemology are ignored (Carter and Little 2007). Ortega (2012) contends that SLA, another branch of AL, has witnessed a variety of epistemological perspectives, but many scholars fail to critically assess paradigmatic assumptions, views, methodologies, and categories, impeding the advancement of AL. Given the interdisciplinary nature of AL, it may not be easy to develop a consensus on fundamental terms such as knowledge or practice, as noted by Wagner (2019). This highlights the need for continued discourse and reflection on the philosophical foundations of AL research.

Consequently, it has been argued that AL research has failed to engage in substantive ontological and epistemological arguments over research paradigms (Hashemi 2019). This has led to AL scholars placing themselves in the area according to their research strands, such as applied linguists, sociolinguists, (applied) cognitive linguists, psycholinguists, neurolinguists, etc. These terms are intrinsically imprecise because of their vast character, which transcends mere academic fields (McKinley 2019).

## 2 Bibliometric Studies in AL

Over the past two decades, there have been substantial changes in AL research. According to Lei and Liu (2019a), who conducted the first bibliometric analysis of 2005–2016 research trends in AL, certain topics, such as the effects of socioeconomic class and multilingualism, have gained more interest, while some linguistic topics have decreased. The study, which aimed to identify popular topics and changes in research trends in AL over time, also found an increase in new theories and a shift in publication rates in different countries. These findings provide deeper insights into language learning and communication and suggest a need for further investigation. In addition, Lin and Lei (2020) also examined the research on bilingualism or multilingualism conducted over the past two decades and discovered that there had been a change in AL toward the study of bilingualism and multilingualism from multilingual perspectives.

Using bibliometrics methods, AL researchers have attempted to examine AL paradigms in terms of research methodology. Meihami (2020) and Amini Farsani

et al. (2021) did two similar studies on the approach for AL research. Meihami (2020) examined 3491 publications published by seven main AL journals between 1980 and 2019, whereas Amini Farsani et al. (2021) conducted a study aimed at exploring the role of bibliometrics, notably citation and collaboration, analyzing 3992 articles published by 18 leading AL journals between 2009 and 2018. Both surveys revealed that quantitative research methods were the most prevalent. In addition, Meihami (2020) stated that from 1980 to 2000, quantitative research methods were favored by AL researchers; however, from 2001 to 2019, qualitative research methods became increasingly popular.

In addition, other bibliometric analyses have been conducted in AL, but they have primarily focused on a subfield of AL, such as vocabulary research (Meara 2020), translation studies (Dong and Chen 2015a), blended language learning (Li 2022), L2 pronunciation (Demir and Kartal 2022), writing (Crosthwaite et al. 2022; Sun and Lan 2021), publication fields of specific AL journals. In addition to these bibliometric studies, there is a lack of research on AL paradigms or paradigm evolution. In the context of this chapter, paradigm refers to the fundamental assumptions, concepts, values, and practices that shape AL research. In this chapter, the paradigms of positivism, critical theory, interpretivism, and post-positivism will be used to analyze the AL research paradigms and their evolution over time. For details on the paradigms, please see the section “Classification of Paradigms”.

In summary, AL research has experienced major changes since 1990, as new journals have been founded, research has expanded at unprecedented rates, and calls for AL bibliometrics research have intensified (Plonsky 2015; Plonsky et al. 2020). A great deal of conceptual discussions have also raised awareness of the need for a deeper understanding of AL paradigms, making this an exciting time for the AL research community and an opportunity to theoretically advance the discipline (McKinley 2019). However, prior discussions of paradigms and paradigm development within the area of AL have resulted in divergent perspectives, and studies of AL paradigms have uncovered a certain vagueness about them within the research conducted in this area. Therefore, the study presented in this chapter seeks to analyze the paradigms in AL that underpin major research areas and explore their connections to the wider field of HSS. The primary research questions of this investigation include:

1. How have the major areas of AL research developed since their inception?
2. What are the fundamental paradigms that inform the major research areas in the AL field?

This chapter presents a rare empirical study that has utilized bibliometric and data mining methods to examine the advancements in the AL paradigms. It differs from prior bibliometric studies of AL in that it concentrates on paradigms as opposed to research topics, methodologies, and trends, providing further insights.

The remainder of the chapter is structured to fulfill the stated objective. First, we provide the classification of key paradigms, which is commonly used nowadays to refer to a collection of fundamental beliefs underlying HSS research (Crotty 1998; Denzin and Lincoln 2000; Guba and Lincoln 1994). Following an explanation of our research methodologies and procedures, we analyze and discuss the outcomes of the

research. We also consider the implications of using scientometrics and data mining techniques. Finally, we provide concluding thoughts and recommendations for further research.

### **3 Classification of Paradigms**

#### **3.1 *Positivism***

Positivism is a paradigm of social research methods that dates back to Bacon's empiricism philosophy and Newton's Galilean natural scientific methods (Guba and Lincoln 1994). It is based on the ontology of naïve realism, which holds that reality is absolute, external to the observer, and driven by natural laws (Haack 2003). Quantitative research, adopted by positivism, follows a deductive analysis path (Bergman 2016). It starts from a conceptual model based on theories or early research results and proposes hypotheses about the relationship and conditions of variables, which are then operationalized, quantified, and experimented on (Guba and Lincoln 1994; Kincaid 1996). This linear process, along with the use of value-free methods such as random sampling, statistical processing, and questionnaire development, aims to ensure the objectivity and universality of the conclusions (Bergman 2016; Haack 2003). The goal is to predict, control, objectively describe, and rationally explain behavior, phenomena, or causal relationships (Guba and Lincoln 1994; Kincaid 1996).

#### **3.2 *Critical Theory***

The term Critical Theory is linked to the Frankfurt School of the 1930s (Kellner and Gennaro 2022). Max Horkheimer and Theodor Adorno of the Frankfurt School articulated an attempt to link philosophical critique and political interpretation through the thought of Marx (Felluga 2015). The critical theory focuses on the upper structure of society, studying the role of ideology and seeking practical solutions to create a more humane society (Bohman 2021). Habermas and McCarthy (1984) argued that there are three types of knowledge interests: the interest in instrumental purpose, the interest in practice, and the interest in liberation.

Studies have highlighted the role of Critical Theory in language education and linguistics research (Flowerdew 2013; Fairclough 2000; Ledin and Machin 2019; Pennycook 2001; Rogers 2008; Weiss and Wodak 2007). Recent studies have demonstrated its value in language teaching, exploring ways to promote social change and challenging power structures (Pennycook 2018). A number of studies have explored the use of critical approaches in language education (Kubota and Austin 2007; Leeman 2014; Pennycook 1999). Critical theory has become an important paradigm in HSS and language education research.

### 3.3 *Interpretivism*

Interpretivism is an alternative paradigm of contemporary society that adheres to a subjectivist epistemology (Denzin and Lincoln 2005). It opposes positivism and accepts the involvement of personal opinion in research. This school of social sciences includes constructivism, hermeneutics, phenomenology and symbolic interactionism, with qualitative research commonly used (Leavy 2014). Habermas and McCarthy (1984) suggested that all research should be based on understanding and interpreting the meanings individuals attach to their experiences. Guba and Lincoln (2005) argued for constructivist qualitative research, and Schwandt (1990) suggested hermeneutics to uncover underlying meanings. Interpretivism focuses on understanding and meaningful interpretation rather than explanatory proof, emphasizing personal reflection (Hiller 2016). It also believes reality is localized, multiple and constructed by individuals or societies, and acknowledges the impact of the past on meaning construction (Chipindi et al. 2020). Interpretivism and constructivism are often grouped because they share similar views on the subjective nature of knowledge and the importance of understanding the perspectives of individuals and groups. Both reject the idea of a single objective reality and emphasize that knowledge is socially constructed through people's interactions and experiences (Guba and Lincoln 2005).

### 3.4 *Post-Positivism*

Post-positivism is a theoretical pluralism that balances the methods of positivism and interpretivism (Lather 2004). It emphasizes the use of MMR by combining quantitative and qualitative methods to investigate both objective and subjective phenomena (Fischer 1998; Phillips and Burbules 2000; Wildemuth 1993). Historical comparison, philosophy, and phenomenology analysis are also included (Fischer 1998). Post-positivism recognizes that absolute truths are not attainable and instead seeks to explore phenomena as much as possible, advocating for MMR (Guba and Lincoln 1994; Phillips and Burbules 2000; Wildemuth 1993). Although some scholars argue that pragmatism is the best paradigm for MMR (Giddings 2006; Morgan 2007, 2014; Richards 2009), post-positivism has been found to be suitable for MMR in various disciplines, including AL (Creswell et al. 2018; Johnson and Onwuegbuzie 2004). This is evidenced by the successful adoption of mixed methods using post-positivist epistemology in some AL studies (Riazi 2016a; Tabari and Ivey 2015). Furthermore, there are voices that pragmatism is not the philosophical foundation of MMR (Denscombe 2008). Thus, in this chapter, we consider pragmatism as a research orientation parallel to quantitative and qualitative research orientations rather than a philosophical foundation, as advocated by many scholars (Creswell et al. 2018; Onwuegbuzie et al. 2009; Symonds and Gorard 2010; Teddlie and Tashakkori 2012). In this sense, we include pragmatism in the post-positivist paradigm rather



than categorizing it as a separate pragmatism paradigm, and we view the empirical-postpositivist research paradigm as based on quantitative research methods and mixed research methods, while the constructivist-interpretive research paradigm is based on qualitative research methods. This fourfold classification also allows us to compare our research results with those of other HSS paradigms.

## **4 Methods**

### ***4.1 Data Source***

A search conducted on 2022.5.29 included 25 AL journals, based on the publication titles used by Lei and Liu (2019b) and Ahmed et al. (2021) included in the Web of Science Categories of “Language & Linguistics” and “Linguistics”. However, some titles were excluded due to their absence in the “Language & Linguistics” or “Linguistics” categories, such as Recall, Language Policy, and Language Assessment Quarterly. Additionally, review articles, book chapters, proceedings, and retracted publications were excluded from the study. A total of 23,790 records were retrieved from the Web of Science databases of these journals, which included all articles published since the establishment of each journal with full bibliographic information (see Table 1).

### ***4.2 Bibliometrics Analysis and Mapping of AL Studies***

Bibliometrics, scientometrics, and informetrics are data analysis methods used to study research areas through science communication and information, such as publications, references, and citations (Sooryamoorthy 2021). Bibliometrics focuses on publication patterns, citation networks, and co-authorship patterns, while scientometrics analyzes scientific output, such as articles, journals, and institutions (Glänzel and Schubert 2003). In this research, document co-citation analysis was used to identify the scientific communities in a discipline, which involves analyzing how often two documents are cited together (Small 1973). By using statistical techniques like factor analysis, cluster analysis, and multidimensional scaling, important authors and documents can be classified according to their “distance” in the discipline.

Mapping is an analysis technique used to answer questions related to the major research areas, connections between those areas, and the transition of a research field over time (Chen 2017). In order to conduct this rigorous scientific exercise, appropriate scientometric tools are necessary. Two of the most commonly used software tools are VOSViewer and CiteSpace (both freeware) (Dong and Chen 2015b; Chen 2018). A co-citation analysis was conducted in this study to investigate the major research areas in the AL field and the development of the areas chronologically,

**Table 1** Publications and articles of dataset

Publication	No. of articles
Lingua	2551
Modern Language Journal	2140
Foreign Language Annals	2081
TESOL Quarterly	1644
System	1378
Canadian modern Language Review	1293
Applied Psycholinguistics	1248
Language Learning	1238
Applied Linguistics	960
International Journal of Bilingual Education and Bilingualism	931
Bilingualism Language and Cognition	863
IRAL	822
Language Teaching Research	711
International Journal of Bilingualism	641
Computer Assisted Language Learning	632
World Englishes	551
ELT Journal	522
English for Specific Purposes	494
Studies in Second Language Acquisition	491
Journal of English for Academic Purposes	474
Cognitive Linguistics	462
Language and Education	462
English Today	429
Journal of Language Identity And Education	418
Journal of Second Language Writing	354

using CiteSpace, a software package able to detect, analyze, and visualize trends in the scientific literature (Chen 2006).

### 4.3 *Detection of Paradigms*

#### 4.3.1 **Topic Modelling Based on Dictionary**

Co-word analysis has been used in this research to map the structure and dynamics of scientific research, assuming that articles using the same term are related on a cognitive level. The network of co-occurrences between different words, extracted from a set of publications, allows a quantitative study of the structure of the publication contents (Tijssen and van Raan 1989). This study used clustering, which is also commonly used by other bibliometric studies.

Although the above-mentioned bibliometric analysis software packages can perform unsupervised research area detection using co-word analysis, our research

adopted a different approach for detecting paradigms. We created our dictionary and used content analysis on the records' abstracts to detect paradigms through topic modelling. However, paradigms are not usually emphasized or even rarely mentioned in the abstract, and content analysis typically only analyzes keywords to identify the research topic (Bryman 2006; Gorard et al. 2004; Crotty 1998). To overcome this limitation and uncover both the explicitly stated and implicitly underlying paradigms in the abstracts, we also utilized topic modelling, which takes into account both manifest and latent dimensions. According to Li and Lei (2021), topic modelling has established itself as an important technique in not only natural and formal sciences but also social sciences. Latent Dirichlet Allocation (LDA), social networks and text analysis are among the topics that are gaining increasing popularity, while certain models (e.g., Probabilistic Latent Semantic Analysis (PLSA)) and applications (e.g., topic detection) are losing their appeal over time (Li and Lei 2021). The specific steps to create a dictionary are as follows.

### **4.3.2 Dictionary**

Content analysis is a research method that involves classifying many words contained in a piece of text into content categories of interest. This requires the development of a coding scheme, a system for classifying text to achieve the objectives of a particular study (Krippendorff 2004). For this research, the content categories were defined as the four paradigms described in the preceding section. The goal was to create a set of reliable and valid indicators of the expression of these four broad categories of paradigms. To do this, the descriptions of paradigms in 79 works (Appendix 1) were coded using QDA Miner (Provalis Research 2020), a qualitative analysis software package.

This study employed a two-step process (Krippendorff 2004) to ensure the accuracy of the dictionaries. First, a keyword-in-context (KWIC) list of words and phrases was generated. Then, a manual examination of thousands of words and phrases was conducted to ensure that the words and phrases funneled into each paradigmatic category truly represented the corresponding paradigm. Ambiguous or incorrect words and phrases were removed from the dictionaries. It is believed that the categories into which each code funneled were able to fully capture the corresponding paradigm in question.

## ***4.4 Identification of Paradigms and Cross-Paradigmatic Comparison of AL Research Areas***

We used the dictionary built above to categorize the paradigms of all members of the research area clusters generated from our co-citation analysis. Records that were not included in the major research area clusters after the co-citation analysis were labeled

as ‘none’. Wordstat (Provalis Research 2020) was used to cross-tabulate and plot all 23,790 records by research areas and paradigmatic categories.

### 5 Results

This section focuses on two to three areas that fit our research questions: (1) major AL areas and their development, and (2) the cross-paradigmatic comparison of the areas.

#### 5.1 Major Research Areas in AL

We obtained the major research areas of AL by running CiteSpace, and the cluster visualization view and timeline view of AL research areas are shown in Figs. 1 and 2.

Table 2 presents 12 of the 35 main AL research areas visualized by Citespace based on the clustering labels and the contents of the nodes. For example, Cluster 0, which has 80 pivotal works and a silhouette value of 0.963, is labeled as “second language” by the LLR algorithm, and the mean publication year of the citing articles in this cluster is 1982.

Table 3 shows the pivotal works (most cited works) within each cluster. For example, Cluster 0 includes 1122 citing articles. The major citing article of the cluster is WR, ACTON (1983.0) 2nd language interpersonal-communication – paradigm and praxis. LANGUAGE LEARNING, V33, P23. The most cited works

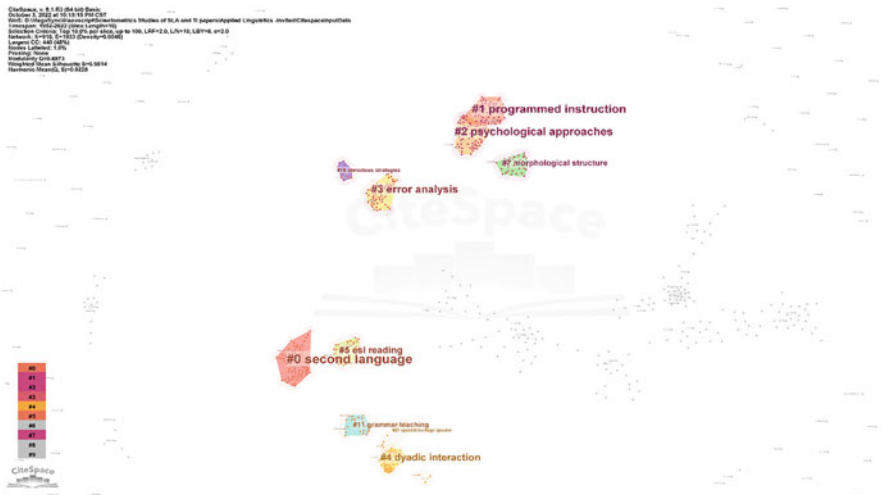


Fig. 1 The co-citation clustering map. (Based on the Title Terms LLR Algorithm)

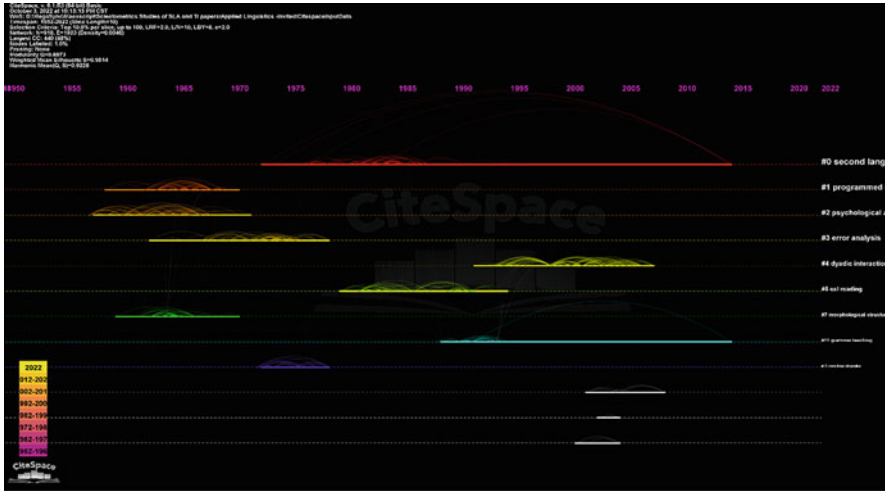


Fig. 2 A timeline map of the co-citation clustering

Table 2 Summary of the largest 12 clusters

Cluster-ID	Size	Silhouette	Label (LLR)	Average Year
0	80	0.963	Second language (1202.45, 1.0E-4)	1982
1	67	0.967	Programmed instruction (699.56, 1.0E-4)	1965
2	60	0.958	Psychological approaches (429.96, 1.0E-4)	1963
3	57	0.966	Error analysis (1033.08, 1.0E-4)	1972
4	48	0.921	Dyadic interaction (1530, 1.0E-4)	1998
5	43	0.979	ESL reading (1564.34, 1.0E-4)	1985
7	32	0.95	Morphological structure (237.02, 1.0E-4)	1964
11	24	0.969	Grammar teaching (746.74, 1.0E-4)	1992
16	14	0.982	Conscious strategies (440.73, 1.0E-4)	1974
21	8	1	Spanish heritage speaker (475.57, 1.0E-4)	2004
29	4	0.995	Corrective feedback (628.76, 1.0E-4)	2003
35	3	1	Task accomplishment (294.55, 1.0E-4)	2001

in this cluster are (the number prior to the works refers to the number of times being cited):

- 220 Halliday MICHAELAK, 2014, COHESION ENGLISH, V0, P0
- 116 Krashen S, 1982, PRINCIPLES PRACTICE, V0, P0
- 101 Krashen SD, 1981, 2ND LANGUAGE ACQUISI, V0, P0

According to the information provided in the visual diagrams (Figs. 1 and 2), this paper analyzes the development and evolution of various research areas in AL over the past 50 years from four different periods.

**Table 3** Information of the most cited works within each cluster

Cluster	3 most cited works	Major citing article	Total citing articles
0	220 Halliday MICHAELAK, 2014, COHESION ENGLISH, V0, P0 116 Krashen S, 1982, PRINCIPLES PRACTICE, V0, P0 101 Krashen SD, 1981, 2ND LANGUAGE ACQUISI, V0, P0	WR, ACTON (1983.0) 2nd language interpersonal-communication – paradigm and praxis. LANGUAGE LEARNING, V33, P23.	1122
1	55 Chomsky NOAM, 1968, SOUND PATTERN ENGLIS, V0, P0 18 King RD, 1969, HISTORICAL LINGUISTICS, V0, P0 18 Rivers WM, 1964, PSYCHOLOGIST FOREIGN, V0, P0	LA, JAKOBOVITS (1969) Research findings and foreign language requirements in colleges and universities. FOREIGN LANGUAGE ANNALS	215
2	63 Chomsky N, 1965, ASPECTS THEORY SYNTA, V0, P0 15 Jakobovits LA, 1970, FOREIGN LANGUAGE LEA, V0, P0 15 Katz JJ, 1964, INTEGRATED THEORY LI, V0, P0	JW, OLLER (1969.0) Conceptual restrictions on English – psycholinguistic study. LINGUA, V23, P24.	177
3	59 Selinker L, 1972, IRAL-INT REV APPL LI, V10, P209 32 Brown R, 1973, 1 LANGUAGE, V0, P0 30 Bailey N, 1974, LANG LEARN, V24, P235	J, CHUN (1980) A survey of research in 2nd language acquisition. MODERN LANGUAGE JOURNAL, V64, P10.	306
4	52 Norris JM, 2000, LANG LEARN, V50, P417 48 Skehan P, 1998, COGNITIVE APPROACH L, V0, P0 45 Schmidt RW, 2001, COGNITION 2 LANGUAGE, V0, P3	ROD, ELLIS (2006) Reexamining the role of recasts in second language acquisition. STUDIES IN SECOND LANGUAGE ACQUISITION, V28, P26.	443
5	68 Omaggio AC, 1986, TEACHING LANGUAGE CO, V0, P0 52 Oxford RL, 1990, LANGUAGE LEARNING ST, V0, P0 41 Gardner R, 1985, SOCIAL PSYCHOL 2ND L, V0, P0	RM, DEKEYSER (1993) The effect of error correction on l2 grammar knowledge and oral proficiency. MODERN LANGUAGE JOURNAL, V77, P14.	435

(continued)

**Table 3** (continued)

Cluster	3 most cited works	Major citing article	Total citing articles
7	21 Lyons J, 1968, INTRO THEORETICAL LI, V0, P0 12 Fillmore CJ, 1968, CASE, V0, P0 8 Halliday MAK, 1961, WORD, V17, P241	SC, DIK (1967) Some critical remarks on the treatment of morphological structure in transformational generative grammar. LINGUA, V18, P32.	435
11	50 Chaudron C, 1988, 2ND LANGUAGE CLASSRO, V0, P0 34 Phillipson ROBERT, 1992, LINGUISTIC IMPERIALI, V0, P0 27 Peirce BN, 1995, TESOL QUART, V29, P9	RP, LEOW (1998) The effects of amount and type of exposure on adult learners' 12 development in SLA. MODERN LANGUAGE JOURNAL, V82, P20.	267
16	38 Gardner RC, 1972, ATTITUDES MOTIVATION, V0, P0 21 Krashen SD, 1976, TESOL QUART, V10, P157 14 Brown HD, 1973, LANG LEARN, V23, P231	E, BIALYSTOK (1978) Variables of classroom achievement in 2nd language-learning. MODERN LANGUAGE JOURNAL, V62, P10.	98
21	31 Ellis R, 2005, STUD SECOND LANG ACQ, V27, P141. 30 Montrul S, 2004, BILING-LANG COGN, V7, P125 30 Dekeyser R, 2003, HDB 2 LAN	SILVINA, MONTRUL (2009) Reexamining the fundamental difference hypothesis, what can early bilinguals tell us? STUDIES IN SECOND LANGUAGE ACQUISITION, V31, P33.	150
29	37 Chandler J, 2003, J SECOND LANG WRIT, V12, P267. 35 Ferris DR, 2003, RESPONSE STUDENT WRI, V0, P0 34 Ferris DR, 2004, J SECOND LANG WRIT, V13, P49.	NIGEL, Harwood et al. (2009) Proofreading in a UK university: proofreaders' beliefs, practices, and experiences. JOURNAL OF SECOND LANGUAGE WRITING, V18, P25.	69
35	26 Ohta AS, 2001, 2 LANGUAGE ACQUISITION, V0, P0 23 Markee N, 2000, CONVERSATION ANAL, V0, P0 21 Markee N, 2004, MOD LANG J, V88, P491.	L, MONDADA (2005) Second language acquisition as situated practice: task accomplishment in the French second language classroom. CANADIAN MODERN LANGUAGE REVIEW-, V61, P30	49

In the period 1955–1970, AL research focused on several key areas represented as clusters 1, 2, 3, and 7. The major research in Cluster 1 centers around foreign language requirements in colleges and universities and their relationship to research findings. Chomsky and Halle (1968) look at the theoretical foundations of phonology, King (1969) examines the history of language and its evolution, and Rivers (1964) looks at the psychological factors that affect foreign language learning. Cluster 2 focuses on the study of language and its acquisition, with Oller and Dennis Sales (1969) examining the limitations and restrictions of conceptual knowledge in language acquisition and Chomsky (1965) looking at the theoretical foundations of aspects and the relationship to the study of language. Jakobovits (1970) and Katz (1964) also focus on the process of language acquisition and the role of different factors in this process. In Cluster 3, the major research centers around the field of second language acquisition (SLA), with Chun (1980) providing an overview of the state of research in SLA at the time and Selinker (1972) examining the concept of interlanguage. Brown (1973) and Bailey et al. (1974) also focus on the process of language acquisition and the different factors that influence it. Cluster 7 emerged during this period, with Lyons (1968) providing an overview of the field of theoretical linguistics and its relationship to the study of language, and Fillmore (1968) and Halliday (1961) examining the morphological structure of language and the different elements that make up a word.

In the period of 1970-late 1980s, SLA represented by cluster 3 continued as a major research area while clusters 0 and 16 emerged as new major research areas. Cluster 0 focuses on the study of language, interpersonal communication, and language acquisition, with Acton (1983) examining the relationship between language and communication and the implications of this relationship for language learning. Halliday and Hasan (2014) examine the ways in which language is used to create cohesion and coherence in written and spoken discourse, and Krashen (1981, 1982) focuses on the process of language acquisition and the role of input and affective factors in this process. Cluster 16 emerged during this period, with a focus on variables that affect classroom achievement in second language learning. Bialystok and Fröhlich (1978) examine these variables. Gardner and Lambert (1972) look at the role of attitudes and motivation in second language acquisition. Krashen (1976) examines the role of input and affective factors in second language acquisition. Brown (1973) looks at the process of language acquisition and the factors that influence it.

In the period of 1990–2005, while the study of language, interpersonal communication, and language acquisition (represented in Cluster 0) remained a key research interest, clusters 4, 5, 11, 21, 29, and 35 represent the various new research areas that emerged in this period. Cluster 4 centers around the role of recasts in second language acquisition, as highlighted by Ellis and Sheen (2006) in their examination of the role of recasts and the need for further research in this area. Norris and Ortega (2000) also examine the role of input and output in language acquisition. Skehan (1998) looks at the cognitive processes involved in second language acquisition. Schmid (2001) examines the role of cognitive factors in second language acquisition. Cluster 5 focuses on the effect of error-correction on second language grammar



knowledge and oral proficiency as highlighted by DeKeyser (1993) in his examination of the effect of error-correction, Omaggio (1986) looks at the methods and techniques of teaching language in context, Oxford (1990) examines the strategies used by language learners to acquire a second language, and Gardner (1985) looks at the role of social factors in second language acquisition. Research in Cluster 11 mainly examines the relationship between language and communication, the role of context in language use (Leow 1998), the importance of cohesion in written and spoken discourse, and the process of language acquisition (Chaudron 1988), and the role of input and affective factors in this process (Peirce 1995). The research in Cluster 21 focuses on the fundamental difference hypothesis (FDH) and the study of early bilingualism. The research in this cluster suggests that the FDH is not supported by the evidence from the study of early bilinguals and that other factors may be more important in bilingualism. Montrul (2009) challenges the FDH's claim that early bilinguals have a fundamentally different cognitive and linguistic system compared to late bilinguals.

Other notable works in this cluster, such as Ellis (2005), Montrul (2004), and DeKeyser (2003), also provide evidence against the FDH and explore other factors that may play a role in bilingualism, such as explicit instruction and implicit learning, and age. The major research area represented by Cluster 29 focuses on the beliefs, practices, and experiences of proofreaders in UK universities, as represented by Harwood et al. (2009). Other important works include Chandler (2003) and Ferris (2003, 2004). Cluster 35 focuses on second language acquisition as situated practice, as represented by Mondada and Doehler (2005), with relevant and notable works including Ohta (2001), Markee (2000), and Markee and Kasper (2004), which also examine the importance of context, input, and interaction in language learning, and use of conversation analysis in understanding language use and social interaction.

In the period of 2005–2015, it seems that AL research continued to focus on several key areas represented in Clusters 0, 4, 11, and 21. However, they all came to an end in around 2015. As this study only plotted the 12 most influential AL research areas, research areas that are less prominent than the top 12 during this period are not shown in Figs. 1 and 2, indicating that the potential new and influential AL research areas are yet to form.

In fact, with continuous expansion and diversity, some key research areas that emerged after 2015 include the use of technology in language learning (Farr and Murray 2016; Shannon and Chapelle 2017), the study of multilingualism (Martin-Jones and Martin 2017; Gorter and Cenoz 2017), the use of corpus-based methods (Un-udom and Un-udom 2020; Yin and Li 2021; Szmrecsanyi and Rosseel 2020), the study of language assessment (Giraldo 2018; Glenn Fulcher 2021), the use of discourse analysis (Slembrouck 2019; Zotzmann and O'Regan 2016), and the study of language and identity (Zotzmann and O'Regan 2016; McEntee-Atalianis 2019; Zenker 2018; Pérez-Milans 2016). The research areas in the field of AL continue to evolve and expand, reflecting the dynamic and multifaceted nature of the field.

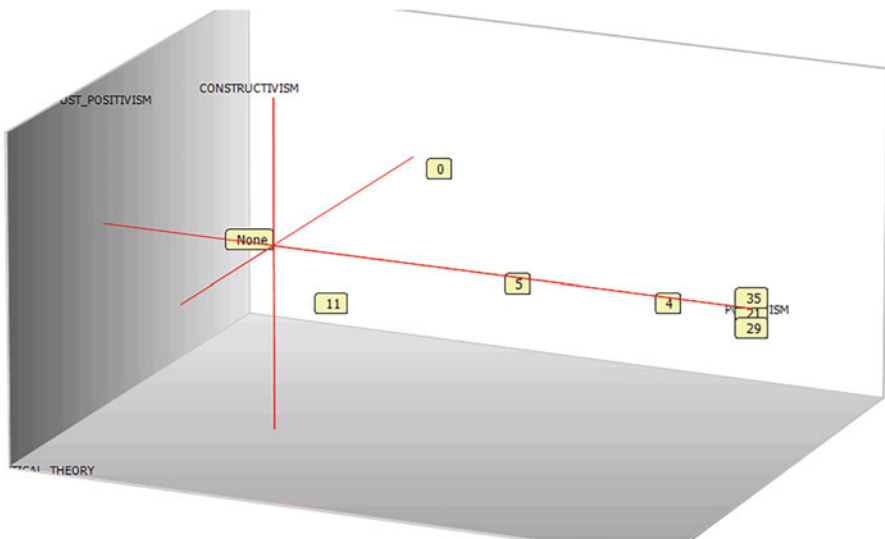
It's worth noting that the clusters in each period are not mutually exclusive, and there may be some overlap between them (as shown in Fig. 2). Additionally, it's

important to keep in mind that the works cited in each cluster are not exhaustive, and there are likely many other important works and research areas within each cluster. Furthermore, the clusters identified and the periods assigned to them are based on the information provided in the question and may not fully capture all the nuances and complexities of the field of language research.

## 5.2 Cross-Paradigmatic Content Analysis of the Themes

We classified all documents into 12 major clusters and determined the paradigm of each cluster according to a dictionary. The results, shown in Fig. 3, reveal that the positivist paradigm is the most dominant across major research areas. Clusters 1, 2, 3, 4, 5, 7, 16, 21, 29, and 35 all fall under this paradigm. As shown in Fig. 2, Clusters 1, 2, 3, 7, and 16 were major research areas before 1980, while clusters 4 and 5 were dominant between 1980 and 2005. Clusters 11, 21, 29, and 35 were the main research areas from 2005 to 2015. Our findings indicate that positivism dominated the early period of AL research (1955–1970), with four major research areas falling under this paradigm. Positivism slightly decreased during 1975–1990, with only one major research area (cluster 5) having a clear positivist character. However, it returned to dominance between 1990 and 2015, with five major research areas (clusters 4, 5, 21, 29, 35) showing characteristics of positivism.

Figure 3 also shows that cluster 0, which has the largest timespan in Fig. 2, is far away from any paradigm, indicating that this main research area, which focuses on the study of language, interpersonal communication, and language acquisition, is



**Fig. 3** Cross-tabulation of clusters and paradigmatic categories

difficult to fit into any of the four paradigms. The “none” cluster, with the largest members, is furthest from positivism, and the distances between it and post-positivism, constructivism, and critical theory are about the same, showing that most of the paradigms or methods of AL research in this cluster do not have the characteristics of positivism, but prefer post-positivism, constructivism, and critical theory and other paradigms. However, the “none” cluster is at the origin of the 3-D coordinate system of Fig. 3, which also indicates that the vast majority of AL studies included in the cluster may not have a clear paradigm tendency.

Cluster 5, one of the major research areas of AL from 1990 to 2005, is not far from the positivist paradigm, but there is a clear tendency to depart from it. This cluster centers around the effect of error correction on second language grammar knowledge and oral proficiency and is more in line with the general understanding that error analysis, proficiency tests and other measurements are carried out with a positivist approach. Cluster 11 is a major AL research area spanning 25 years from 1990 to 2015. It also seems to detach from the positivist paradigm, with weak Critical theory characteristics. As Cluster 11 centers around factors that impact second language acquisition, including the factor of language policies on second language development (Phillipson 1992), it is understandable that such social issues are addressed with the critical theory approach.

## 6 Discussions and Implications

To address RQ 1, our results show that AL has evolved over time, with key areas of focus shifting from foreign language requirements and psychological factors in language learning in the 1955–1970s to interpersonal communication and language acquisition in the 1970s and 1980s and then to technology, individual learner differences, and language and culture in the 1990s–2005. After 2015, research in AL continued to expand and diversify with a focus on technology, multilingualism, corpus-based methods, language assessment, discourse analysis, and language and identity. Importantly, our research results align with those of Lei and Liu (2019a) and Lin and Lei (2020), who also found that popular topics during the 2005–2016 period included the impacts of socioeconomic class, ideology, and globalization on language use and identity, the development and use of English as a Lingua Franca, the practice and effects of multilingualism, and corpus-based investigations of field-specific discourse and literacy practices.

One key difference between our results and those of Lei and Liu (2019a) and Lin and Lei (2020) is that our results focus on the evolution of research areas over a longer period, while the other researchers focus on specific periods. Additionally, while our results indicate a shift towards technology and multilingualism in recent years, Lei and Liu (2019a) and Lin and Lei (2020) focus on specific popular research topics within these areas. Another difference is that our research results also indicate that after 2015, AL research continued to expand and diversify, while Lei and Liu (2019a) and Lin and Lei (2020) did not mention this.

Addressing RQ 2, our results show that the dominant paradigm in AL research from 1955–2015 was positivism, with four major research areas falling under this paradigm in the early period of 1950–1970 and five major research areas showing positivist characteristics between 1990–2015. However, the longest and major research area in AL, focusing on language, interpersonal communication, and language acquisition (Cluster 0), does not fit into a clear paradigm. Two other major research areas from 1990–2015 show a departure from positivism, with one focusing on measurements and the other showing weak characteristics of critical theory.

Our results suggest that four paradigms tend to be coexistent in AL research, indicating that they appear to compete with rather than replace one another. This finding is in line with other researchers' views, which suggest that in HSS, as in any subject, paradigms mean answers to three philosophical questions, namely, ontology, epistemology, and methodology (Guba and Lincoln 1994; Creswell et al. 2018; Bettis and Gregson 2001). Our findings also support the view that although HSS fields lack a unified paradigm in general, it does not mean that there is no paradigm (Holliday and Macdonald 2020) and that, in fact, new and old, and different paradigms (or schools) can coexist in mutual competition (Laudan 1996; Giddens 1986).

Our results indicate that the dominant paradigm in AL research from 1955–2015 was positivism, with four major research areas falling under this paradigm in the early period and five major research areas showing positivist characteristics between 1990–2015. This is similar to Meihami (2020) and Amini Farsani et al. (2021), who found that the most prevalent research approach in AL was quantitative. However, it should be noted that our results also indicate that the longest and major AL research area of language, interpersonal communication, and language acquisition does not fit into a clear paradigm. Our results also indicate that two major research areas from 1990 to 2015 tend to depart from the positivist paradigm, with one of them showing weak characteristics of critical theory. In contrast, Meihami (2020) and Farsani et al. (2021) did not specifically analyze research paradigms but rather the methodological orientations used in AL. Therefore, while there is some overlap in terms of the use of quantitative methods in positivist research and the field of AL more broadly, our results also highlight a more nuanced picture of the paradigms used in the field over time.

Our findings show that certain main research areas of AL do not align with any paradigm, with the “none” cluster showing a preference for post-positivism, constructivism, and critical theory, yet lacking a clear tendency. Additionally, major research areas of AL from 1990 to 2005 and 1990 to 2015 also tend to diverge from the positivist paradigm. This supports the viewpoint that the supposed shift to post-positivism in AL is not accurate (Yüce et al. 2014). Yüce et al. (2014) specifically demonstrate that experimental and descriptive research designs are still prevalent, indicating that the dominant paradigm in AL research is positivism, with other paradigms barely present. Our finding that there are paradigms present in AL research and that there has been a slight shift in paradigms contradicts the claims that there is no paradigm or paradigm shift in AL research (Corson 1997). This may

alleviate concerns raised by some researchers about a lack of paradigm awareness in AL research (Benton and Craib 2011; Berkovich 2018; Christopher 2017).

Our results, which show that the majority of studies in the “none” cluster are furthest from positivism, should not be interpreted as evidence that AL research has abandoned positivism in favor of interpretivism and critical theory paradigms, as claimed by some researchers (Torabi 2011; Risager 2011; Weideman 2013a; Jacobs and Farrell 2001). This may be due to a lack of mention of the research paradigm or a lack of clear description of the research method in the studies analyzed. Pederson (2006), Corson (1997), and Ortega (2012) have all argued that many AL researchers focus too heavily on the methodological aspects of their research rather than its philosophical foundations. As a result, it is not easy for readers to identify research paradigms due to a lack of critical analysis of paradigmatic assumptions by the researchers. Additionally, as this study only analyzed abstracts, which are often limited in word count, it is possible that the text describing research paradigms was not captured.

## 7 Implications for Scientometric Studies

In this research, scientometric methods were employed to identify research areas and trends in AL. The most used scientometric methods for identifying research areas and trends are co-word clustering and co-citation clustering. Citespace was used due to its specialized ability to analyze bibliographic information and its co-citation function to identify the major research areas of AL with more precise results than those of co-word clustering. Several methodological advantages of our scientometric review over a conventional review can be argued.

Firstly, co-word clustering is a common clustering analysis available in most scientometric software packages. However, due to the limited number of words in the abstract, some paradigmatic related words may appear less frequently than other academic terms or professional terms and thus cannot be presented with significance. Furthermore, researchers may not describe paradigms clearly or not describe them at all, which could potentially affect the identification results if co-word clustering is used. Therefore, our research employed data mining methods to establish a dictionary model (Four paradigms model) with the extensive discussion of paradigms in existing literature as the data. As far as we know, none of the existing bibliometric studies in AL research has used similar methods, and this is the contribution of our research to scientometrics, i.e., bibliometric data can be combined with content analysis to achieve a greater effect.

Our study used a dictionary model to classify 23,790 datasets, cross-tabulating the research area variable (cluster membership) and the paradigmatic variable (category of paradigms) to produce a 3-D projection map. This is the first time such a map has been created in AL, thus providing new insights into AL research. Furthermore, bibliometric software can usually be used to cross the identified research areas with temporal variables or geographic coordinate variables to generate

timeline projection maps or geographic distribution maps of research areas; however, they are generally unable to generate such cross-tabulations without the use of custom codes written by researchers. Our study reveals the potential for further exploration of research areas and paradigmatic transformation.

## 8 Implications for AL Studies

Our analysis indicates that while there has been some paradigmatic change in the AL research community since the 1950s, this change has not significantly manifested itself in research papers. This may be due to a variety of factors, such as the persistence of disciplinary traditions or the difficulty in operationalizing new paradigms in research practice, highlighting the need to explore these factors and their implications for the AL field. Our analysis also shows that in most AL research areas, positivism maintains its prevailing, dominant position. This could have implications with respect to pluralists and general researchers. As Riazi (2016a) asserted, one way to address this issue is to consider a research problem from two theoretical underpinnings. If the AL field were to become a pluralist discipline (Weideman 2013b), the long-term advocacy for pluralism would need continuous and stronger endeavors. The empirical evidence shown in this study suggests that while there are signs of the emergence of post-positivist, constructivism or critical theory in AL research, their influences are still rather insignificant, particularly given that researchers are often vague about their paradigmatic positions (Bryman 2006; Hashemi 2019). Therefore, when reporting their research, researchers should consider the paradigmatic dimensions and philosophical positions of their research and choose a research design that aligns with their research questions and goals. Although movements away from a positivist paradigm in the AL community since 1990 might include the rise of critical theory, which emphasizes the role of power and ideology in language use, or the increased focus on the social and cultural contexts of language learning and use in sociocultural theory, these movements have not yet significantly displaced the positivist paradigm in the AL field, highlighting the need for ongoing effort towards pluralism. To ensure a long-lasting influence, pluralist researchers will need a stronger commitment and continuous effort.

The findings of our study suggest that it is crucial for researchers to carefully consider their paradigmatic dimensions and philosophical positions of ontology, epistemology, and methodology when reporting their research specifically, for quantitative researchers interested in exploring post-positivist paradigm issues, MMR, which leans towards quantitative methods, maybe a better research design. This is a serious consideration, as the choice of research design can impact the outcome and interpretation of the research findings. Furthermore, it is important to note that MMR can be particularly valuable for critical research and innovative perspectives. Therefore, this issue warrants further attention and consideration in the field of AL research.

## 8.1 *Limitations*

This study focuses on identifying the paradigms that are prevalent in AL. However, several limitations should be noted to avoid potential misinterpretations. Firstly, as we used quantitative methods, the data used for this study is based on a sample of 23,790 AL papers collected from the Web of Science database, including numerous references cited in these papers. We used co-citation clustering to identify important research areas within AL. It should be noted that papers that are grouped in the same cluster are largely determined by the references cited by the authors of the papers.

In addition, it is important to note that while this study analyzed 12 major clusters within AL, these clusters represent only a small portion of the 23,790 AL papers included in the study. The papers that did not belong to these clusters were classified as “none cluster.” This clustering method may have caused bias in the results as the text used for analysis was limited to the 12 research areas identified. Therefore, it is possible that the true evolution of AL research paradigms may not be fully reflected in our findings as the abstracts of the papers used in the study may not provide enough information to draw definitive conclusions about the paradigms used in the research. Future research using co-word clustering may reveal a greater diversity of AL paradigms, but it is also important to consider that co-word clustering is still subject to bias due to the subjective nature of abstract and keyword writing.

Furthermore, our dictionary also has some impact on the research results. Because there are relatively few philosophical discussions in AL, the related texts used to establish the dictionary model are all from the philosophical discussions of some other fields, such as education and social science. If the philosophical discussions of the field of AL increase in the future, extracting keywords from these discussions to make a dictionary model may obtain more accurate results.

Lastly, our classification of paradigms is based on Guba and Lincoln’s (1994) category; as other scholars point out, there is no unified classification method for paradigms in AL. Different researchers may use different paradigm classification methods. Therefore, we can only say that our research results reflect the development and evolution of paradigms in AL using this paradigm classification method.

## 9 **Conclusions**

This study has provided a comprehensive overview of the development of major AL research areas over the past six decades. It reveals that the dominant paradigm in AL is positivism, characterized using empirical methods such as quantitative, qualitative, and MMR. Although the presence of the remaining three paradigms in AL research is weak, they have been identified as coexisting in the field. This finding highlights the ongoing paradigm war in the AL community and supports the argument in the literature that various paradigms coexist and compete with one another in scientific research (Riazi 2016a). Further research should investigate the

implications of this paradigmatic competition and coexistence in AL research and explore the potential benefits of a more pluralistic approach.

The use of a dictionary model to classify 23,790 pieces of data has provided new insights into AL research. This is the first time a data mining method has been combined with bibliometric methods in AL, contributing to scientometrics. The study highlights that postmodernism, which originated in Western humanism and Anglo-American scientism in the 1970s, has had a significant influence on AL research. This influence has led to the evolution of paradigms in the field, providing a new perspective and direction for its advancement. The findings of this study underline the importance of understanding the paradigms that inform AL research, as well as the need for further research to explore their implications for the field.

In conclusion, this chapter highlights the dominance of the positivist paradigm in AL research and the coexistence of other paradigms. Researchers can benefit from a deeper understanding of these paradigms, leading to more effective research designs and clearer reporting of results. The coexistence of multiple paradigms emphasizes the importance of open-mindedness and flexibility in approaching research questions and interpreting findings. As the field of AL continues to evolve, embracing a diversity of perspectives and approaches will be critical for a stronger and more cohesive research community.

## Appendices

### *Appendix 1 Coded Works on Paradigms*

Aliyu-2015
Allwright 2005 – Developing Principles for
Barnes 1969 – Paradigms-scientific and social
Bednarek 2006 – Epistemological positioning
Bhavnan-2014
Brown 1982 – Paradigms and revolutions
Butler 1978 – Epistemology in the language
Case 1998 – Changing Views of Knowledge
Clarke, Losoff et al. 1984 – Linguistic relativity
Cleland-2015
Corson, David 1997 – Critical Realism
Creswell 2018 – Designing and Conducting
Creswell 2018-Philosophical foundations
Crotty 1998
Denzin & Lincoln 2005 – Introduction
Deumert 2003 – Bringing speakers back in
Dewaele 2005 – Investigating the Psychological
Dieronitou 2014 – The ontological and epistemological foundations

(continued)



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Dryzek 2012 – Paradigms and discourses

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Fazliogullar 2012 – Scientific research

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Fishman 1984 – Epistemology

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Gert 2001 – Hobbes on language

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Gontier, van Bendegem et al. (Ed.) 2006

---

Gray-Doing research

---

Gregg 1987 – Communication epistemology

---

Guba & Lincoln 1994

---

Guba Lincoln 2000

---

Guba-1990

---

Hinkel, E.\_2016 -Int

---

Jalali, Ghadiri et al. 2021 – Epistemic Features

---

Kern, Schultz 2005 – Beyond Orality

---

Kubota 2020 – Confronting Epistemological

---

Lather-2004

---

Lillis, Scott 1997 – Defining academic literacies

---

Luck, Jackson et al. 2006 – Case study

---

Madiill–2000

---

Magnan 2005 – From the Editor

---

Maingard 1999 – Evolutionary epistemology

---

McDonagh 1976 – Attitude changes and  
Morato – 2019

---

Morgan-1980

---

Mori 1999 – Epistemological Beliefs

---

Orman 2016 – Paradigm as a central

---

Ortega 2005 – For What and for Whom

---

Ortega 2005 – Methodology

---

Ortega 2012 – Epistemological diversity

---

Ortega 2018 – Ontologies of language

---

Pascal – 2016

---

Pederson 2006 – Epistemologies and research

---

Pennycook 2018 – Transdisciplinarity in Applied

---

Peterson, L 1981 – Historical self-understanding

---

Rancourt 1983 – Epistemology

---

Reagan 1999 – Constructivist Epistemology and

---

Riazi 2016 – Innovative mixed-methods research

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Riazi, Candlin 2014 – Mixed-methods research

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Rothman 2008 – Poverty-of-the-Stimulus and

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Schwandt 1990 – Paths to inquiry

---

Schwartz 1986 – The epistemological status of

---

Scotland 2012 – Exploring the Philosophical

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Shah, Al-Bargi 2013 – Research Paradigms

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Shin 2006 – Rethinking TESOL

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Slevitch-2011

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Spada 2005 – Conditions and Challenges

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(continued)

Spencer-2014
Staller –2013
Strong – 1976
Tang 2011 – Foundational paradigms of
Thomas, Suleiman 2019 – Thomas Kuhn’s
Thorne 2005 – Epistemology
Toohey 2019 – The Onto-Epistemologies of
Torabi 2011 – Philosophy of Research in
Tresch 2001 – On going native
Tsai 2006 – On the Epistemology of Language
Tuli-2011
Wagner 2019 – Towards an Epistemology of
Watson-Gegeo 2004 – Mind, Language
Wierzbicka 1994 – Semantics and epistemology
Yearley 1988 – Argumentation
Younas, Parsons 2019 – Implications for

## References

- Acton, William R. 1983. Second language interpersonal communication: Paradigm and praxis. *Language Learning* 33 (5): 193–215.
- Ahmed, Fasih, Murtaza Ashiq, Shafiq Rehman, Shakil Ahmad, and Shaista Rashid. 2021. Mapping the intellectual structure of linguistics research over 101 years (1919–2020). *Library Philosophy and Practice*: 1, 5089–28.
- Bailey, Nathalie, Carolyn Madden, and Stephen Krashen. 1974. Is there a “natural sequence” in adult second language learning? *Language Learning* 24 (2): 235–243. <https://doi.org/10.1111/j.1467-1770.1974.tb00505.x>.
- Benton, Ted, and Ian Craib. 2011. *Philosophy of social science: The philosophical foundations of social thought*. 2nd ed. Palgrave.
- Bergman, Mats. 2016. Positivism. In *The international encyclopedia of communication theory and philosophy*, ed. Klaus Bruhn Jensen, Robert T. Craig, Jefferson D. Pooley, and Eric W. Rothenbuhler, 1–5. Wiley.
- Berkovich, Izhak. 2018. Beyond qualitative/quantitative structuralism: The positivist qualitative research and the paradigmatic disclaimer. *Quality & Quantity* 52 (5): 2063–2077.
- Bettis, Pamela J., and James A. Gregson. 2001. The why of research: Paradigmatic and pragmatic considerations. In *Research pathways: Writing professional papers, theses, and dissertations in workforce education*, ed. Edgar I Farmer and Jay W. Rojewski, 1–21. University Press of America.
- Bialystok, Ellen, and Maria Fröhlich. 1978. Variables of classroom achievement in second language learning. *The Modern Language Journal* 62 (7): 327–336. <https://doi.org/10.1111/j.1540-4781.1978.tb02403.x>.
- Bohman, James. Critical Theory, 2021. <https://plato.stanford.edu/archives/spr2021/entries/critical-theory/>.
- Brown, Roger. 1973. *A first language: The early stages*. Harvard University Press.
- Brown, James Dean. 2014. *Mixed methods research for TESOL*. Edinburgh University Press.

- Bryman, Alan. 1984. The debate about quantitative and qualitative research in built environment: A question of method or epistemology? *The British Journal of Sociology* 35 (1): 75–92.
- . 2006. Paradigm peace and the implications for quality. *International Journal of Social Research Methodology* 9 (2): 111–126.
- Carter, Stacy M., and Miles Little. 2007. Justifying knowledge, justifying method, taking action: Epistemologies, methodologies, and methods in qualitative research. *Qualitative Health Research* 17 (10): 1316–1328.
- Case, Robbie. 1998. Changing views of knowledge and their impact on educational research and practice. In *The handbook of education and human development*, ed. David R. Olson and Nancy Torrance, 73–95. Blackwell.
- Chadha, Gita, and Renny Thomas. 2022. Methodological diversity: Seeking disciplinary narrations. In *Mapping scientific method: Disciplinary narrations*, ed. Gita Chadha and Renny Thomas, 1–38. Routledge India.
- Chandler, Jean. 2003. The efficacy of various kinds of error feedback for improvement in the accuracy and fluency of L2 student writing. *Journal of Second Language Writing* 12 (3): 267–296. [https://doi.org/10.1016/S1060-3743\(03\)00038-9](https://doi.org/10.1016/S1060-3743(03)00038-9).
- Chaudron, Craig. 1988. *Second language classrooms: Research on teaching and learning*. Cambridge University Press.
- Chen, Chaomei. 2006. CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. *Journal of the American Society for Information Science and Technology* 57 (3): 359–377.
- . 2017. Science mapping: A systematic review of the literature. *Journal of Data and Information Science* 2 (2): 1–40.
- Chen, Meng-Lin. 2018. A data-driven critical review of second language acquisition in the past 30 years. *Publications* 6 (3): 1–29.
- Chipindi, Ferdinand Mwaka, Janet Serenje-Chipindi, and Harrison Daka. 2020. An analysis of epistemological considerations in educational research. *Journal of Lexicography and Terminology* 4 (2): 105–118.
- Chomsky, Noam. 1965. *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
- Chomsky, Noam, and Morris Halle. 1968. *The sound pattern of english*. Harper & Row.
- Christopher, Justin. 2017. *Testimony in narrative educational research*. PhD. Iowa City: The University of Iowa.
- Chun, Judith. 1980. A survey of research in second language acquisition. *The Modern Language Journal* 64 (3): 287–296. <https://doi.org/10.1111/j.1540-4781.1980.tb05194.x>.
- Clarivate. 2022. *Web of science core collection: search tips*. <https://clarivate.libguides.com/woscc/searchtips>. Accessed 16 Nov 2022.
- Corson, David. 1997. Critical realism: An emancipatory philosophy for applied linguistics? *Applied Linguistics* 18 (2): 166–188.
- Creswell, John W., and J. David Creswell. 2018. *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage.
- Creswell, John W., L. Vicki, and Plano Clark. 2018. *Designing and conducting mixed methods research*. Sage.
- Crosthwaite, Peter, Sulistya Ningrum, and Icy Lee. 2022. Research trends in L2 written corrective feedback: A bibliometric analysis of three decades of Scopus-indexed research on L2 WCF. *Journal of Second Language Writing* 58: 100934.
- Crotty, Michael. 1998. The foundations of social research meaning and perspective in the research process. Sage.
- DeKeyser, Robert. 1993. The effect of error correction on L2 grammar knowledge and oral proficiency. *The Modern Language Journal* 77 (4): 501–514. <https://doi.org/10.1111/j.1540-4781.1993.tb01999.x>.
- . 2003. Implicit and explicit learning. In *The handbook of second language acquisition*, ed. Catherine J. Doughty and Michael H. Long, 313–348. Blackwell.

- Demir, Yusuf, and Galip Kartal. 2022. Mapping research on L2 pronunciation: A bibliometric analysis. *Studies in Second Language Acquisition* 44 (5): 1211–1239.
- Denscombe, Martyn. 2008. Communities of practice: A research paradigm for the mixed methods approach. *Journal of Mixed Methods Research* 2 (3): 270–283.
- Denzin, Norman K., and Yvonna S. Lincoln. 2000. *Handbook of qualitative research*. 2nd ed. Sage.
- . 2005. Introduction: The discipline and practice of qualitative research. In *The sage handbook of qualitative research*, ed. Norman K. Denzin and Yvonna S. Lincoln, 1–32. Sage.
- Dong, Dahui, and Meng-Lin Chen. 2015a. A bibliometric analysis of translation studies between 1999 and 2014. *Compilation & Translation Review* 8 (1): 41–82.
- . 2015b. Publication trends and co-citation mapping of translation studies between 2000 and 2015. *Scientometrics* 105 (2): 1111–1128. <https://doi.org/10.1007/s11192-015-1769-1>.
- Ellis, Rod. 2005. Measuring implicit and explicit knowledge of a second language: A psychometric study. *Studies in Second Language Acquisition* 27 (2): 141–172. <https://doi.org/10.1017/s0272263105050096>.
- Ellis, Rod, and Younghee Sheen. 2006. Reexamining the role of recasts in second language acquisition. *Studies in Second Language Acquisition* 28 (4): 575–600. <https://doi.org/10.1017/s027226310606027x>.
- Ellis, Rod, and Natsuko Shintani. 2014. *Exploring language pedagogy through second language acquisition research*. Routledge.
- Fairclough, Norman. 2000. Language and neo-liberalism. *Discourse & Society* 11 (2): 147–148. <https://doi.org/10.1177/0957926500011002001>.
- Farr, Fiona, and Liam Murray. 2016. *The Routledge handbook of language learning and technology*. Routledge.
- Farsani, Mohammad Amini, and Esmat Babaii. 2020. Applied linguistics research in three decades: A methodological synthesis of graduate theses in an EFL context. *Quality & Quantity* 54 (4): 1257–1283. <https://doi.org/10.1007/s11135-020-00984-w>.
- Farsani, Mohammad Amini, Hamid R. Jamali, Maryam Beikmohammadi, Babak Daneshvar Ghorbani, and Ladan Soleimani. 2021. Methodological orientations, academic citations, and scientific collaboration in applied linguistics: What do research synthesis and bibliometrics indicate? *System* 100: 102547.
- Felluga, Dino Franco. 2015. *Critical theory: The key concepts*. Routledge.
- Ferris, Dana. 2003. *Response to student writing: Implications for second language students*. Routledge.
- . 2004. The “grammar correction” debate in L2 writing: Where are we, and where do we go from here? (and what do we do in the meantime . . .?). *Journal of Second Language Writing* 13 (1): 49–62. <https://doi.org/10.1016/j.jslw.2004.04.005>.
- Fillmore, Charles. 1968. The case for case. In *Universals in linguistic theory*, ed. Emmon Bach and Robert Harms, 1–89. Holt.
- Fischer, Frank. 1998. Beyond empiricism: Policy inquiry in post positivist perspective. *Policy Studies Journal* 26 (1): 129–146.
- Flowerdew, John. 2013. *Discourse in English language education*. Routledge.
- Fulcher, Glenn. 2021. Language assessment literacy in a learning-oriented assessment framework. In *Learning-oriented language assessment: Putting theory into practice*, ed. Atta Gebril, 34–48. Routledge.
- Gadamer, Hans-Georg. 2013. *Truth and method*. Bloomsbury.
- Gao, Yihong, Lichun Li, and Jun Lü. 2001. Trends in research methods in applied linguistics: China and the west. *English for Specific Purposes* 20 (1): 1–14.
- Gardner, Robert C. 1985. *Social psychology and second language learning: The role of attitudes and motivation*. Edward Arnold.
- Gardner, Robert C., and Wallace E. Lambert. 1972. *Attitudes and motivation in second-language learning*. Newbury House.
- Giddens, Anthony. 1986. *Sociology: A brief but critical introduction*. London: Palgrave.

- Giddings, Lynne S. 2006. Mixed-methods research. *Journal of Research in Nursing* 11 (3): 195–203.
- Giraldo, Frank. 2018. Language assessment literacy: Implications for language teachers. *Profile: Issues in teachers' Professional Development* 20 (1): 179–195. <https://doi.org/10.15446/profile.v20n1.62089>.
- Glänzel, Wolfgang, and András Schubert. 2003. A new classification scheme of science fields and subfields designed for scientometric evaluation purposes. *Scientometrics* 56 (3): 357–367. <https://doi.org/10.1023/a:1022378804087>.
- Gorard, Stephen, Katie Rushforth, and Chris Taylor. 2004. Is there a shortage of quantitative work in education research? *Oxford Review of Education* 30 (3): 371–395. <https://doi.org/10.1080/0305498042000260494>.
- Gorter, Durk, and Jasone Cenoz. 2017. Linguistic landscape and multilingualism. In *Language awareness and multilingualism*, ed. Jasone Cenoz, 3rd ed., 233–245. Springer.
- Guba, Egon G., and Yvonna S. Lincoln. 1994. Competing paradigms in qualitative research. In *Handbook of qualitative research*, ed. Norman K. Denzin and Yvonna S. Lincoln, 105–117. Sage.
- . 2005. Paradigmatic controversies, contradictions, and emerging confluences. In *The sage handbook of qualitative research*, ed. Norman K. Denzin and Yvonna S. Lincoln, 191–216. Sage.
- Haack, Susan. 2003. *Defending science—Within Reason: between scientism and cynicism*. Prometheus Books.
- Habermas, Jürgen, and Thomas McCarthy. 1984. *The theory of communicative action*. Beacon Press.
- Halliday, Michael A.K. 1961. Categories of the theory of grammar. *Word* 17 (2): 241–292. <https://doi.org/10.1080/00437956.1961.11659756>.
- Halliday, Michael A.K., and Ruqaiya Hasan. 2014. *Cohesion in English*. Routledge.
- Harwood, Nigel, Liz Austin, and Rowena Macaulay. 2009. Proofreading in a UK University: Proofreaders' beliefs, practices, and experiences. *Journal of Second Language Writing* 18 (3): 166–190. <https://doi.org/10.1016/j.jslw.2009.05.002>.
- Hashemi, Mohammad R. 2019. Expanding the scope of mixed methods research in applied linguistics. In *The Routledge handbook of research methods in applied linguistics*, ed. Jim McKinley and Heath Rose, 39–51. Routledge.
- Hiller, James. 2016. Epistemological foundations of objectivist and Interpretivist research. In *Music therapy research*, ed. Barbara L. Wheeler and Kathleen M. Murphy, 99–127. Barcelona Publishers.
- Holliday, Adrian, and Malcolm N. Macdonald. 2020. Researching the intercultural: Intersubjectivity and the problem with post-positivism. *Applied Linguistics* 41 (5): 621–639.
- Jacobs, George M., and Thomas S.C. Farrell. 2001. Paradigm shift: Understanding and implementing change in second language education. *Teaching English as a Second or Foreign Language* 5 (1): 1–17.
- Jakobovits, Leon A. 1970. *Foreign language learning; a psycholinguistic analysis of the issues*. Newbury House.
- Johnson, R. Burke, and Anthony J. Onwuegbuzie. 2004. Mixed methods research: A research paradigm whose time has come. *Educational Researcher* 33 (7): 14–26. <https://doi.org/10.3102/0013189X033007014>.
- Kaplan, Robert B., and Richard B. Baldauf. 1997. *Language planning from practice to theory*. Multilingual Matters.
- Katz, Jerrold J. 1964. *An Integrated theory of linguistic descriptions*. MIT Press.
- Kellner, Douglas, and Steve Gennaro. 2022. Critical theory and the transformation of education in the new millennium. In *The Palgrave handbook on critical theories of education*, ed. Ali A. Abdi and Greg William Misiaszek, 21–45. Palgrave.
- Kincaid, Harold. 1996. *Philosophical foundations of the social sciences: Analyzing controversies in social research*. Cambridge University Press.

- King, Robert Desmond. 1969. *Historical linguistics and generative grammar*. Prentice-Hall.
- Krashen, Stephen. 1976. Formal and informal linguistic environments in language acquisition and language learning. *TESOL Quarterly* 10 (2): 157–168. <https://doi.org/10.2307/3585637>.
- . 1981. *Second language acquisition and second language learning*. Pergamon.
- . 1982. *Principles and practice in second language acquisition*. Pergamon.
- Krippendorff, Klaus. 2004. *Content analysis: An introduction to its methodology*. Thousand Sage.
- Kubota, Ryuko, and Theresa Austin. 2007. Critical approaches to world language education in the United States: An introduction. *Critical Inquiry in Language Studies* 4 (2–3): 73–83.
- Kuhn, Thomas S. 1962. *The structure of scientific revolutions*. The University of Chicago Press.
- Kumaravadivelu, Baskaran. 2006. *Understanding language teaching: From method to Postmethod*. Lawrence Erlbaum.
- Lapid, Yosef. 1989. The third debate: On the prospects of international theory in a post-positivist era. *International Studies Quarterly* 33 (3): 235–254.
- Larsen-Freeman, Diane. 2007. Reflecting on the cognitive–social debate in second language acquisition. *The Modern Language Journal* 91: 773–787.
- Lather, Patti A. 2004. Critical inquiry in qualitative research: Feminist and poststructural perspectives: Science “after truth”. In *Foundations for research methods of inquiry in education and the social sciences*, ed. Kathleen de Marrais and Stephen D. Lapan, 203–215. Lawrence Erlbaum.
- Laudan, Larry. 1996. *Beyond positivism and relativism: Theory, method, and evidence*. Westview Press.
- Leavy, Patricia. 2014. Introduction. In *The Oxford handbook of qualitative research*, ed. Patricia Leavy, 1–16. Oxford University Press.
- Ledin, Per, and David Machin. 2019. Doing critical discourse studies with multimodality: From metafunctions to materiality. *Critical Discourse Studies* 16 (5): 497–513. <https://doi.org/10.1080/17405904.2018.1468789>.
- Leeman, Jennifer. 2014. Critical approaches to teaching Spanish as a local/foreign language. In *The Routledge handbook of Hispanic applied linguistics*, 291–308. Routledge.
- Lei, Lei, and Dilin Liu. 2019a. Research trends in applied linguistics from 2005 to 2016: A bibliometric analysis and its implications. *Applied Linguistics* 40 (3): 540–561.
- . 2019b. The research trends and contributions of system’s publications over the past four decades (1973–2017): A bibliometric analysis. *System* 80: 1–13. <https://doi.org/10.1016/j.system.2018.10.003>.
- Leow, Ronald. 1998. The effects of amount and type of exposure on adult learners’ L2 development in SLA. *The Modern Language Journal* 82 (1): 49–68. <https://doi.org/10.1111/j.1540-4781.1998.tb02593.x>.
- Li, Rui. 2022. Research trends of blended language learning: A bibliometric synthesis of SSCI-indexed journal articles during 2000–2019. *ReCALL* 34 (3): 309–326.
- Li, Xin, and Lei Lei. 2021. A bibliometric analysis of topic modelling studies (2000–2017). *Journal of Information Science* 47 (2): 1–15.
- Lian, Andrew, and Roland Sussex. 2018. Toward a critical epistemology for learning languages and cultures in twenty-first century Asia. In *Intercultural communication in Asia: Education, language and values*, ed. Andy Curtis and Roland Sussex, 37–54. Springer.
- Lin, Zhong, and Lei Lei. 2020. The research trends of multilingualism in applied linguistics and education (2000–2019): A bibliometric analysis. *Sustainability* 12. <https://doi.org/10.3390/su12156058>.
- Lyons, John. 1968. *Introduction to theoretical linguistics*. Cambridge University Press.
- Marcuse, Herbert. 1964. *One dimensional man*. Beacon Press.
- Markee, Numa. 2000. *Conversation analysis*. Taylor & Francis.
- Markee, Numa, and Gabriele Kasper. 2004. Classroom talks: An introduction. *The Modern Language Journal* 88 (4): 491–500. <https://doi.org/10.1111/j.0026-7902.2004.t01-14.x>.
- Martin-Jones, Marilyn, and Deirdre Martin. 2017. *Researching multilingualism: Critical and ethnographic perspectives*. London/New York: Routledge.

- Masterman, Margaret. 1970. The nature of a paradigm. In *Criticism and the growth of knowledge*, ed. Imre Lakatos and Alan Musgrave, 59–89. Cambridge University Press.
- Maxwell, Joseph A. 2013. *Qualitative research design: An interactive approach*. Sage.
- McEntee-Atalianis, Lisa. 2019. *Identity in applied linguistics research*. Bloomsbury.
- McKinley, Jim. 2019. Theorizing research methods in the ‘Golden age’ of applied linguistics research. In *The Routledge handbook of research methods in applied linguistics*, ed. Jim McKinley and Heath Rose, 1–12. Routledge.
- McKinley, Jim, and Heath Rose, eds. 2019. *The Routledge handbook of research methods in applied linguistics*. Routledge.
- Meara, Paul. 2020. The emergence of a first paradigm in vocabulary research: The Bibliometrics of system. *Vocabulary Learning and Instruction* 9 (1): 1–32.
- Meihami, Hussein. 2020. Research methodology and orientation of papers published from 1980 to 2019 in applied linguistics journals. *Issues in Language Teaching* 9 (2): 59–88.
- Mondada, Lorenza, and Simona Doehler. 2005. Second language acquisition as situated practice: Task accomplishment in the French second language classroom. *The Canadian Modern Language Review* 61 (4): 461–490.
- Montrul, Silvina. 2004. Subject and object expression in Spanish heritage speakers: A case of morphosyntactic convergence. *Bilingualism: Language and Cognition* 7 (2): 125–142. <https://doi.org/10.1017/S1366728904001464>.
- . 2009. Reexamining the fundamental difference hypothesis: What can early bilinguals tell us? *Studies in Second Language Acquisition* 31 (2): 225–257.
- Morgan, David L. 2014. Pragmatism as a paradigm for social research. *Qualitative Inquiry* 20 (8): 1045–1053.
- . 2007. Paradigms lost and pragmatism regained. *Journal of Mixed Methods Research* 1 (1): 48–76.
- Norris, John M., and Lourdes Ortega. 2000. Effectiveness of L2 instruction: A research synthesis and quantitative meta-analysis. *Language Learning* 50 (3): 417–528. <https://doi.org/10.1111/0023-8333.00136>.
- Ohta, Amy Snyder. 2001. *Second language acquisition processes in the classroom: Learning Japanese*. Lawrence Erlbaum.
- Oller, John W., and B. Dennis Sales. 1969. Conceptual restrictions on English: A psycholinguistic study. *Lingua* 23: 209–232.
- Omaggio, Alice. 1986. *Teaching language in context: Proficiency-oriented instruction*. Heinle and Heinle.
- Onwuegbuzie, Anthony J., R. Burke Johnson, and Kathleen Mt Collins. 2009. Call for mixed analysis: A philosophical framework for combining qualitative and quantitative approaches. *International Journal of Multiple Research Approaches* 3 (2): 114–139.
- Ortega, Lourdes. 2012. Epistemological diversity and moral ends of research in instructed SLA. *Language Teaching Research* 16 (2): 206–226.
- Oxford, Rebecca L. 1990. *Language learning strategies: What every teacher should know*. Newbury House.
- Pederson, Rod. 2006. Epistemologies and research paradigms in applied linguistics: 10 years of published research. *English Teaching* 62 (1): 171–197.
- Peirce, Bonny Norton. 1995. Social identity, investment, and language learning. *TESOL Quarterly* 29 (1): 9–31. <https://doi.org/10.2307/3587803>.
- Pennycook, Alastair. 1999. Introduction: Critical approaches to TESOL. *TESOL Quarterly* 33, np. 3 329–348. doi: <https://doi.org/10.2307/3587668>.
- . 2001. *Critical applied linguistics: A critical introduction*. Taylor & Francis.
- . 2018. Transdisciplinarity in applied linguistics. *AILA Review* 31 (1): 113–134.
- Pérez-Milans, Miguel. 2016. Language and identity in linguistic ethnography. In *The Routledge handbook of language and identity*, ed. Siân Preece, 83–97. London: Routledge.
- Phillips, Denis C., and Nicholas C. Burbules. 2000. *Postpositivism and educational research*. Rowman & Littlefield.

- Phillipson, Robert. 1992. *Linguistic imperialism*. Oxford University Press.
- Plonsky, Luke. 2013. Study quality in SLA: An assessment of designs, analyses, and reporting practices in quantitative L2 research. *Study Quality in SLA* 35 (4): 655–687.
- . 2015. *Advancing quantitative methods in second language research*. Routledge.
- . 2017. Quantitative research methods. In *The Routledge handbook of instructed second language acquisition*, ed. Shawn Loewen and Masatoshi Sato, 505–521. Routledge.
- Plonsky, Luke, Emma Marsden, Dustin Crowther, Susan M. Gass, and Patti Spinner. 2020. A methodological synthesis and meta-analysis of judgment tasks in second language research. *Second Language Research* 36 (4): 583–621.
- Popper, Karl Raimund. 1959. *The logic of scientific discovery*. Routledge.
- Provalis Research. 2020. *Prosuite*. Provalis Research.
- Riazi, A. Mehdi. 2016a. Innovative mixed-methods research: Moving beyond design technicalities to epistemological and methodological realizations. *Applied Linguistics* 37 (1): 33–49.
- . 2016b. *The Routledge encyclopedia of research methods in applied linguistics: Quantitative, qualitative, and mixed-methods research*. Routledge.
- Riazi, A. Mehdi, Hessameddin Ghanbar, and Ismaeil Fazel. 2020. The contexts, theoretical and methodological orientation of EAP research: Evidence from empirical articles published in the journal of English for academic purposes. *Journal of English for Academic Purposes* 48: 100925. <https://doi.org/10.1016/j.jeap.2020.100925>.
- Richards, Keith. 2009. Trends in qualitative research in language teaching since 2000. *Language Teaching* 42 (2): 147–180.
- Risager, Karen. 2011. The cultural dimensions of language teaching and learning. *Language Teaching* 44 (4): 485–499. <https://doi.org/10.1017/S0261444811000280>.
- Rivers, Wilga M. 1964. *The psychologist and the foreign-language teacher*. University of Chicago Press.
- Rogers, Rebecca. 2008. Critical discourse analysis in education. In *Encyclopedia of language and education*, ed. Nancy H. Hornberger, 810–825. Springer.
- Schmid, Richard. 2001. Attention. In *Cognition and second language instruction*, ed. Peter Robinson, 3–32. Cambridge University Press.
- Schwandt, Thomas R. 1990. Paths to inquiry in the social disciplines: Scientific, constructivist, and critical theory methodologies. In *The paradigm dialog*, ed. Egon G. Guba, 258–276. Sage.
- Selinker, Larry. 1972. Interlanguage. *International Review of Applied Linguistics in Language Teaching* 10: 209–232. <https://doi.org/10.1515/iral.1972.10.1-4.209>.
- Shannon, Sauro, and Carol Chapelle, eds. 2017. *The handbook of technology and second language teaching and learning*. Wiley Blackwell.
- Skehan, Peter. 1998. *A cognitive approach to language learning*. Oxford University Press.
- Slembrouck, Stef. 2019. Discourse analysis. In *The Routledge handbook of linguistic ethnography*, ed. Karin Tusting, 28–39. Routledge.
- Small, Henry. 1973. Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for Information Science* 24 (4): 265–269. <https://doi.org/10.1002/asi.4630240406>.
- Sooryamoorthy, Radhamany. 2021. *Scientometrics for the humanities and social sciences*. Routledge.
- Sun, Yachao, and Ge Lan. 2021. Research trends in ‘trans-’ studies on writing: A bibliometric analysis. *System* 103: 102640. <https://doi.org/10.1016/j.system.2021.102640>.
- Symonds, Jennifer E., and Stephen Gorard. 2010. Death of mixed methods? Or the rebirth of research as a craft. *Evaluation & Research in Education* 23 (2): 121–136. <https://doi.org/10.1080/09500790.2010.483514>.
- Szmrecsanyi, Benedikt, and Laura Rosseel. 2020. English corpus linguistics. In *The handbook of English linguistics*, ed. Bas Aarts and April McMahon, 29–44. Wiley.
- Tabari, Mahmoud Abdi, and Toni A. Ivey. 2015. Cognitive task complexity effects on L2 writing performance: An application of mixed-methods approaches. *Latin American Journal of Content & Language Integrated Learning* 8 (1): 55–65. <https://doi.org/10.5294/5279>.



- Teddlie, Charles, and Abbas Tashakkori. 2012. Common “Core” characteristics of mixed methods research. *American Behavioral Scientist* 56 (6): 774–788.
- Tijssen, Robert, and Anthony van Raan. 1989. Mapping co-word structures: A comparison of multidimensional scaling and leximappe. *Scientometrics* 15 (3–4): 283–295. <https://doi.org/10.1007/bf02017203>.
- Torabi, Mohammad Ali. 2011. Philosophy of research in applied linguistics. *The Journal of Applied Linguistics* 4 (2): 196–213.
- Un-udom, Suwitchan, and Nathaya Un-udom. 2020. A corpus-based study on the use of reporting verbs in applied linguistics articles. *English Language Teaching* 13 (4): 162–169.
- Vygotsky, Lev. 1978. *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Wagner, Johannes. 2019. Towards an epistemology of second language learning in the wild. In *Conversation analytic research on learning-in-action*, ed. John Hellermann, Søren W. Eskildsen, Simona Pekarek Doehler, and Arja Piirainen-Marsh, 251–271. Springer.
- Wallerstein, Immanuel. 1996. The inter-state structure of the modern world-system. In *International theory*, ed. Steve Smith, Ken Booth, and Marysia Zalewski, 87–107. Cambridge University Press.
- Weideman, Albert. 2013a. Applied linguistics beyond postmodernism. *Acta Academica* 45 (4): 236–255.
- . 2013b. Positivism and postpositivism. In *The encyclopedia of applied linguistics*, ed. Carol Chapelle, 1–7. Wiley Blackwell.
- Weiss, Gilbert, and Ruth Wodak. 2007. Introduction: Theory, interdisciplinarity and critical discourse analysis. In *Critical discourse analysis*, ed. Gilbert Weiss, 1–34. Palgrave.
- Wexler, Philip. 1995. After postmodernism: A new age social theory in education. In *After postmodernism: Education, politics and identity*, ed. Richard Smith and Philip Wexler, 41–62. Routledge.
- Wildemuth, Barbara M. 1993. Post-positivist research: Two examples of methodological pluralism. *The Library Quarterly* 63 (4): 450–468. <https://doi.org/10.1086/602621>.
- Yanow, Dvora, and Peregrine Schwartz-Shea. 2015. *Interpretation and method: Empirical research methods and the interpretive turn*. Routledge.
- Yin, Xiaoyi, and Shuangling Li. 2021. Lexical bundles as an Intradisciplinary and interdisciplinary mark: A corpus-based study of research articles from business, biology, and applied linguistics. *Applied Corpus Linguistics* 1 (1): 100006. <https://doi.org/10.1016/j.acorp.2021.100006>.
- Yüce, Kemal, Mustafa Yunus Eryaman, Abdullah Şahin, and Ömer Koçer. 2014. Paradigm shift in social sciences and qualitative research in applied linguistics in Turkey. *Education and Science* 39 (171): 1–2.
- Zenker, Olaf. 2018. *Language and identity*. Wiley.
- Zotzmann, Karin, and John P. O’Regan. 2016. Critical discourse analysis and identity. In *The Routledge handbook of language and identity*, ed. Siân Preece, 113–127. Routledge.
- Zuengler, Jane, and Elizabeth R. Miller. 2006. Cognitive and sociocultural perspectives: Two parallel SLA worlds? *TESOL Quarterly* 40 (1): 35–58. <https://doi.org/10.2307/40264510>.

**Dr Dahui Dong** is a professor at the Department of Translation and Interpretation Studies, Chang Jung Christian University, Tainan City, Taiwan. His research interests include cognitive translation studies, corpus translation studies, and translation into the second language. His publications appear in various journals including *Scientometrics*, *Translator* and *Interpreter Trainer*, and *Lingua Posnaniensis*

**Ms. Ming Yuan Dong** is a student at the Department of German, Tamkang University, Taipei City, Taiwan. Her research interests include German linguistics, psychology, and bibliometric research. She has been enthusiastically involved in research projects funded by the Ministry of Science and Technology