Methods in Multilingualism Research

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Abstract

This chapter presents an overview of research conducted on multilingual language acquisition (i.e., third language (L3) and additional language learning) with an emphasis on its methodological design. Early research developments in the field of multilingual language acquisition focused on the role of prior language experience on subsequent language learning with studies conducted in laboratories and in bilingual programs. Recent contributions to the field include studies that explore crosslinguistic influence (CLI) from different perspectives (e.g., universal grammar [UG], psycholinguistics, functional linguistics). Additionally, laboratory studies such as *The Latin Project* have investigated the interaction between prior linguistic knowledge and learning conditions and include cognitive variables (e.g., attentional control and working memory capacity) as possible moderating variables. Quantitative cross-sectional studies are common under these approaches, but qualitative analyses are often included to provide a larger picture of the results obtained. This is also the nature of a recent holistic approach to multilingualism (e.g., Cenoz and Gorter Mod Lang J 95(3): 339–343, 2011), which focuses on the connections among the different languages of the learner. Promising work in progress is exploring the effects of language experience on subsequent language learning with online measures of neurocognitive processing (e.g., Grey A neurocognitive investigation of bilingual advantages at additional language learning. Unpublished doctoral dissertation. Georgetown University,

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Washington, DC, 2013). Also, longitudinal studies with schooled children and college students in bilingual areas (e.g., Catalonia and Basque Country in Spain) are trying to understand how instructional conditions affect subsequent language learning and how individual differences such as motivation interact with the effects observed. The last two sections of the chapter present problems that researchers may encounter in relation to sample, constructs, measurements, and analyses in conducting research on multilingual language acquisition. The chapter concludes with suggestions for future research in this area.

Keywords

Multilingual development • Methods • Language experience • Longitudinal and cross-sectional research

Contents

Introduction

The term *Multilingualism* has often been used to define individuals or societies that rely on more than one language to communicate. In the present chapter, the term *multilingualism* refers to multilingual acquisition, that is, the acquisition of an L3 and/or any additional language (Ln). Research methods in multilingual development adopt different perspectives to address questions about acquisition processes and products, their educational and social contexts, as well as the individual variables involved.

As the field only started in the late 1980s, the methodology is innovative and highly eclectic, with designs borrowed both from linguistics and psychology by way of second language acquisition (SLA) and educational research. Quantitative, hypothesis-testing studies still outnumber qualitative or question-generating designs, although recent dynamic approaches tend to include both qualitative and quantitative data. In this regard, mixed designs combining description and interpretation with descriptive and even inferential statistics are also common. Data are collected both longitudinally and cross-sectionally, most often elicited by means of questionnaires, tests, and interviews and from large samples in tutored contexts. However, studies on experimental interventions that incorporate elicitation tasks are growing. The most popular quantitative procedures include analyses of variance (ANOVA), correlations, and regressions, but the last 5 years have seen an increase in publications that

include linear growth analysis to investigate systematic change and interindividual variability in this change.

Early Developments

Despite living in an age of migration and supranational entities, it was not until late in the twentieth century that multilingualism was recognized as the norm rather than the exception. Beginning in the 1960s, changes in general attitudes toward minorities led to greater recognition of language rights and needs of minority populations, sometimes resulting in the development of educational policies that address such rights. Increased communication between European and American researchers, as evident in, for instance, the International Conference on Third Language Acquisition and Multilingualism or the multiple publications coming from both sides of the Atlantic in professional journals and in Multilingual Matters (e.g., Cenoz and Gorter 2011; Sanz et al. 2014), is also responsible for the growing interest in multilingualism and language acquisition beyond the L2.

In the context of these shifts, a new focus on the relationship between bilingualism and cognition led to laboratory research investigating the role of prior experience on the acquisition of an L3 (McLaughlin and Nayak 1989; Nation and McLaughlin 1986; Nayak et al. 1990). Multilingual subjects (1) were found to habitually exert more effort when processing verbal stimuli, (2) were better able to shift strategies to restructure their language systems, and (3) used cognitive processing strategies that facilitated the construction of formal rules. The designs of these studies are characteristic of the cognitive framework to which they belong, in that they are experimental and compare the effects of highly controlled, computer-generated treatments on the acquisition of an artificial grammar. Conclusions are based on results from ANOVAs and post hoc analysis on accuracy and latency data.

From a Chomskyan approach, but also process oriented in nature, Klein's investigation (1995) of the acquisition of the preposition-stranding parameter by English as a second language (ESL) learners shows that multilinguals and monolinguals produce the same type of errors, but multilinguals learn faster because they more efficiently identify the key verbs that trigger the parameter. This result indicates that prior language experience promotes noticing of key elements in the input.

The establishment of immersion programs in Canada and later in Europe led to another series of product-oriented studies. This work aimed to provide insight into appropriate timing and procedures for the incorporation of foreign languages (L3s) into bilingual curricula, to properly document the development of different types of immersion programs, and to investigate the underlying psychosocial variables involved. Cenoz and Valencia's (1994) comparison of English proficiency among students instructed in the minority (Basque) or majority language (Spanish) yielded evidence in favor of bilingualism and bilingual education as

contributors to L3 learning, independent of cognitive, sociostructural, sociopsychological, and educational variables, as well as independent of the first language (L1). Sanz (2000) compared L3 (English) acquisition of bilingual Catalan/Spanish in a Catalan immersion program with monolinguals from a Spanish region with parallel results. In turn, Swain et al. (1990) investigated the effect of L1 literacy on L3 (French) learning in Toronto and found that knowledge of a heritage language had little facilitative effect on L3 acquisition without L1 literacy. Their conclusions supported Cummins' (1981) linguistic interdependence hypothesis, according to which children learn to use language as a symbolic system while acquiring literacy skills in their first language. As a result, learners are able to generalize linguistic information in a way that can be transferred to subsequent language learning contexts. However, counterevidence for this relationship also exists. Wagner et al.'s (1989) study of Berber and Arab children in Morocco concluded that L1 literacy is not necessary to achieve native-like literacy norms in Arabic or French.

A possible explanation for the seemingly contradicting effects is the status of the languages involved; indeed, socioeducational variables are likely an important component of L3 acquisition. For this reason, more research within different sociolinguistic contexts is important (e.g., Lambert 1981). One challenge in making cross context comparisons, however, is the striking methodological differences across multilingualism research. For instance, Wagner et al. (1989) conducted a 6-year longitudinal study examining primary school literacy in three languages, whereas others (e.g., Cenoz and Valencia 1994; Sanz 2000; Swain et al. 1990) used cross-sectional designs with a focus on general linguistic ability and included older participants. Despite their differences, these designs are characterized by their product-oriented nature, including large sample sizes; complex batteries of attitudinal, motivational, and background questionnaires; nonlanguage-based IQ tests; attention to language knowledge and use patterns; and a preference for correlations and regressions. Importantly, they overcome the methodological limitations that plagued research prior to the 1960s, when socioeconomic status, intelligence, and bilingualism were usually confounded.

A decade ago, Multilingual Matters press published several volumes that provided an overview of the sociolinguistic, psycholinguistic, and educational aspects of L3 learning (e.g., Cenoz et al. 2001a; Mayo and Lecumberri 2003). Cenoz et al. (2001a) published a collection of empirical studies on crosslinguistic influence (CLI), which explored the role of psycholinguistic factors such as linguistic distance, competence, age of acquisition, recency, amount of formal instruction and frequency, and contextual use of the languages involved. Mayo and Lecumberri (2003) presented empirical studies on the age factor, a line of research that was followed by the Grup de Recerca en Adquisició de Llengües (GRAL, http://www.ubgral.com/) at the University of Barcelona and the Research in English and Applied Linguistics (REAL) Group in the University of the Basque Country. The longitudinal studies conducted by these two research groups revealed that an earlier age of first exposure to a third language does not result in higher performance as older learners may benefit from cognitive maturation. The authors of these studies also

believe the quality of language instruction to be responsible for the lack of advantage for early exposure.

Major Contributions

In the last 10 years, the number of publications on multilingual development has continued to grow. The International Association of Multilingualism and the abovementioned International Conference on Third Language Acquisition and Multilingualism have provided a platform for the distribution of research carried out under different approaches. Although Multilingual Matters, supported by the association, is still the most important press for volumes on multilingualism research (e.g., De Angelis and Dewaele 2011), other presses such as John Benjamins (e.g., Cabrelli Amaro et al. 2012) or Springer (e.g., Gabrys-Barker 2012) have also published volumes on L3 and multilingual language acquisition. The following section presents a brief summary of these volumes. Methodological details – including sample, languages, materials, analysis, and conclusions – are provided in Table 1. Overall, it seems that although most research still adopts either a qualitative or a quantitative approach, more studies are including both types of analyses as a way to account for the complex nature of language development in multilinguals. In terms of sample, as in earlier research, college and high school students are the most represented populations, although the presence of older adults and senior citizens in a few of these studies reveals a growing trend. Finally, the majority of studies reported in these volumes are conducted in bilingual countries where English is the most popular foreign language. For that reason, it is understandable that English appears as the most frequent L2 or L3. Spanish and German follow English and seem to have a similar presence. Interestingly, these volumes include languages as disparate as Cantonese, Polish, Tuvan, or Georgian, which were not present in traditional L3 research.

The volume edited by De Angelis and Dewaele (2011) (code 1 in Table 1) includes seven studies devoted mainly to CLI in relation to, among other factors, affordances, backward transfer, *L2 status factor* (Bardel and Falk 2007), or the role of metalinguistic awareness in multilingual acquisition. The study of the intricacies of previous language experience on L3 phonology is becoming a promising line of research as revealed by its presence not only in this volume but also in Cabrelli Amaro et al. (2012) (code 2 in Table 1). Both studies find that the L1 seems to have a prevailing influence on L3 phonology.

Pragmatics is another emergent field in the study of multilingual acquisition. Gabrys-Barker's (2012) (code 3 in Table 1) edited volume reports on two studies in this area that reveal a positive CLI among the languages involved. Other works of Cabrelli Amaro et al. (2012) and Gabrys-Barker (2012) include empirical studies conducted under a UG approach and test the models developed to explain CLI. Besides *the L2 status factor*, the models tested are the *cumulative enhancement model* (CEM), first proposed by Flynn et al. (2004), the *typological primacy model* (TPM) (Rothman 2011), or the *full transfer/full access hypothesis* (Schwartz and

Table 1 Overview of studies in (1) De Angelis and Dewaele (2011), (2) Cabrelli Amaro et al. (2012), and (3) Gabrys-Barker (2012)

Study	Goal	Sample	Languages involved	Tests/materials	Analysis	Conclusions
Angelovska and Hahn (3)	To investigate negative transfer (L2 to L3) at various L3 proficiency levels	$N = 13$ (aged 20–25)	Different L1s	Oxford Quick Placement Test	*Qualitative*: Percentage of L2-negative transfer instances (overall and per L3 level) and description of type of instances transferred Contrastive analyses of languages involved	Support for *L2 status factor*
			German (L2)	Free written production text		Transfer of L2 syntactical properties that do not exist in the L1
			English (L3)			
Berkes and Flynn (2)	To test the CEM and to investigate the effect of the last learned L2 on L3 complementizer phrase development	$N = 78$ (college and high school students)	Hungarian (L1)	Michigan test	*Quantitative*: Three-way ANOVA, paired samples *t*-test, and correlations	Support for the CEM
			German (L1/L2)	Elicited imitation task on the production of English relative clauses		Increased facilitation in subsequent acquisition with each new language learned
			English (L2/L3)			Development of syntactic knowledge that cannot be explained as transfer from the last language learned
Berkes and Flynn (3)	To investigate what CEM predicts when language proficiency is controlled	$N = 72$ (high school students)	Hungarian (L1)	Michigan test	*Quantitative*: Three-way ANCOVA	New syntactic knowledge acquired as adult "rearranges the UG-guided language development"
			German (L2)	Elicited imitation task on the production of English relative clauses		
			English (L2/L3)			

Bono (1)	To investigate the role of native and nonnative languages (proximity, proficiency, L2 status, etc.) and the role of metalinguistic awareness in the L3 learning process	$N = 42$ (college students)	French (L1) English (L2) Different L3s and L4s	Forty-eight 30 min recordings of uncontrolled speech production	*Qualitative*: Classification of language switches according to functional typology and description of metalinguistic sequences	Support for *L2 status factor* Evidence of higher levels of metalinguistic awareness in multilinguals
Cheung, Matthews, and Tsang (1)	To investigate the role of backward language transfer (L3 to L2) in the acquisition of the present perfect past simple contrast in L2 English	$N = 37$ (college students)	Cantonese (L1) English (L2) German (L3)	Writing task Acceptability judgment task	*Qualitative*: Frequency and percentages of nontarget use *Quantitative*: Independent samples *t*-test	Support for backward transfer
Dewaele (2)	To investigate the role of individual differences in self-perceived proficiency (SPP) in multilinguals	$N = 122$ (aged 15–65)	Spanish (L1/L2) Galician (L1/L2) English (L3/L4) French (L3/L4) Different Lns	Questionnaire	*Quantitative*: Several statistical tests (Mann-Whitney, correlations, etc.)	SPP was found to be linked to different variables (e.g., age of onset, language attitudes) for most languages (not for Spanish)
Elordi (3)	To investigate how CLI affects learning of the French and Spanish subjunctive when mood can alternate without ungrammaticality	$N = 101$ (adults)	French (L1/L2) Spanish (L1/L2/L3) English (L1)	Scenario selection task	*Quantitative*: ANOVAs	Multilingual learners outperformed monolinguals Positive CLI from L2 to L3 (stronger) and from L3 to L2

(*continued*)

Table 1 (continued)

Study	Goal	Sample	Languages involved	Tests/materials	Analysis	Conclusions
Karpava, Grohmann, and Fokianos (3)	To investigate different areas of Greek (L2/L3) acquisition in the domain of aspectual marking in embedded clauses	$N = 132$ (adults and children)	Georgian (L1)	Two-task test	*Qualitative*: Comparison among groups of percentages of nontarget production	Support for *full transfer/full access hypothesis*
			Russian (L1/L2)	Forced-choice task		L2 learners can reach native-like attainment, though there is L1 interference at the initial stage of L2 acquisition
			Greek (L2/L3)	Elicited production task	*Quantitative*: Analyses of deviance and multiple comparison analyses for origin and age levels	
Kresić and Gulan (3)	To investigate the role of interlingual identifications, learner's psychotypology, and learner's proficiency with respect to modal particles/modal elements	$N = 148$ (college students)	Croatian (L1)	*Four tasks:* Mapping of equivalents, filling in gaps, translations, and assessment of similarities	*Quantitative*: T-tests for independent and dependent samples Correlations	Interlingual identifications are facilitative of multilingual language learning
			English (L2/L3)			
			German (L2/L3)			
Kulundary and Gabriele (2)	To investigate the role of L2 syntactic development in L3 acquisition (comprehension of coordinate and relative clauses)	$N = 152$ (high school and college students)	Russian (L1/L2)	Michigan Listening Comprehension Test	*Quantitative*: One-way ANOVA and repeated-measures ANOVA	Better performance in L2 Russian led to better performance on L3 English coordinate clauses, but not on relative clauses
			Tuvan (L1)	Two comprehension tests		
			English (L2/L3)			

Jaensch (2)	To test the CEM, *L2 status factor*, and TPM theories while investigating the effect of the L1 and of general L2 proficiency on L3 German gender assignment, gender concord on articles and adjectives, and definiteness on articles	$N = 26$ (aged 15–32)	Japanese (L1) Spanish (L1)	Gender assignment task	*Quantitative*: Non-parametric tests	Positive effect of L2 proficiency on L3 development
			English (L2)	Definiteness and gender concord on articles task		Results provide support for the *L2 status factor* and the TPM (although not on gender assignment to novel Ns)
			German (L3)	Gender concord on articles task		
Lindqvist (2)	To investigate word choices in native speakers and two levels of nonnative speakers of French (low-intermediate and advanced) and if there is CLI between languages	$N = 29$ (PhD and secondary school students)	Swedish (L1)	Retelling of two short video films	*Qualitative*: Description of word choices used by native and nonnative	Advanced learners preferred more general words than native speakers
			English (L2)			Advanced learners have more meaning-based CLI; low-intermediate learners have more formal CLI
			German (L2/Ln)			
			Italian (L2/Ln)			
			Spanish (L2/Ln)			
			Russian (L2/Ln)			
			Latin (L2/Ln)			
			French (L3/Ln)			

(*continued*)

Table 1 (continued)

Study	Goal	Sample	Languages involved	Tests/materials	Analysis	Conclusions
Odlin (3)	To investigate acquisition of zero prepositions and articles in L2 and L3	$N = 210$ (aged 11–16)	Finish (L1) Swedish (L1/L2) English (L2/L3)	Writing piece (film retell)	*Qualitative*: Total occurrence of articles and prepositions in writing of each participant *Quantitative*: Summary of group tendencies (quantitative statistical tables provided in Odlin 2012)	Learners with Swedish language experience performed better on English prepositions but similarly on L3 articles
Otwinowska-Kasztelanic (1)	To investigate the link between affordances available to language learners and their awareness of crosslinguistic lexical similarities	$N = 512$ (aged 19–35)	Polish (L1) English (L2) Different L3s and L4s	Questionnaire	*Qualitative*: Percentages and description of comments *Quantitative*: Correlations and chi-square tests	Multilingual learners have more affordances (perceived opportunities for action) than bilinguals
Pinto and Carvalhosa (3)	Investigate the role of CLI in L3 production	$N = 37$ (college students)	Serbian (L1) Different L2s Portuguese (L3)	Dictation task	*Qualitative*: Number and examples of nonproduced words, spelling errors, and CLIs	Influence of languages typologically closer to the L3

Safont-Jordà (3)	To explore the role of the L1, L2, and L3 on pragmatic development in request modification items in a case study	A 2-year-old child	Catalan (L1) Spanish (L2) English (L3)	Audio and video recordings of mother-child interaction during a year	*Qualitative*: Instances of the child's production (request modifiers)	The three languages interact and modify one another
					Quantitative: Wilcoxon signed-rank test and Friedman test	Evidence of identification of early pragmatic differentiation
Sanchez (1)	To explore if the *L2 status factor* affects transfer more than typological distance during ab initio English (L4) learning	$N = 154$ children (aged 8.9–10.9)	Spanish (L1/L2) Catalan (L1/L2) German (L3) English (L4)	Story telling task (*The Dog Story*)	*Qualitative*: Description of data	Support for the role of all nonnative languages on L4 irrespective of typology
					Quantitative: Pearson correlations on internal consistency	
Tymczyńska (3)	To investigate the impact of conference interpretation training and practice on the strength of interlingual lexical links in the mental lexicons of trilinguals	$N = 26$ (average age 35.4)	Polish (L1) English (L2) German (L3)	Translation judgment test	*Quantitative*: Paired samples t-tests, multivariate tests, and ANOVAs	Expertise in conference interpretation associated with better accuracy and ability to process semantic information, but not with faster lexical retrieval in translation tasks

(*continued*)

Table 1 (continued)

Study	Goal	Sample	Languages involved	Tests/materials	Analysis	Conclusions
Wlosowicz (3)	Three studies on the role of CLI at the grammatical level in reception and production of L3	$N = 152$ (study 1)	Different L1s, L2s, and L3s (Polish, English, French, German, and Portuguese)	Translation of tests from L3 into L1 while thinking aloud (study one)	*Qualitative*: Description of examples and percentages of responses attributable to different sources	Transfer to the L3 occurs from the L1 and the L2
		$N = 21$ (study 2)				Frequent L3-internal errors (e.g., overgeneralizations)
		$N =$ (study 3) (adults)		L3 grammaticality judgment and error correction sentence test (study two)		
				Translation sentence test from L1 and L2 into L3 (study 3)		
Wrembel (2)	To investigate L1- or L2-accented speech in learners' L3 and its relationship to L3 proficiency level	$N = 11$ (college students)	Polish (L1)	Read on your own task	*Quantitative*: Statistical procedures (t-tests, ANOVAs) established relationships between proficiency level and accent ratings from 20 judges	Prevailing influence of the L1 on L3 phonology irrespective of L3 level
			French (L2)	Spontaneous speech task		
			English (L3)			
Wunder (1)	Role of CLI on L3 phonology	$N = 8$ (adults)	German (L1)	Two read-on-your own tasks	*Qualitative*: Recordings analyzed with Praat for *voice onset time* (VOT) (means and percentages)	Stronger role of the L1 (over the L2) on the amount of L3 aspiration
			English (L2)	Praat (Boersma and Weenink 2015)		
			Spanish (L3)			

Sprouse 1996). Overall, these studies revealed mixed results for the CEM and gave an important role to the L2 when learning an L3.

As reflected in the volumes above, the study of CLI continues to grow in different contexts and with different populations with results that point toward complexity and multidirectionality. Many of the studies reviewed in these volumes adopt a UG approach, but recent accounts have also used other frameworks such as the *competition model* (CM) (MacWhinney and Bates 1989) to explore CLI. Specifically, Sanz et al. (2014) examined the role of L1 (English) and L2 (Japanese and Spanish) in ab initio development of L3 (Latin) morphosyntax. Their results indicate that during the first stages of L3 language processing, L1 plays a larger role and that higher levels of L2 are needed for integrated patterns of L1 and L2 cues to emerge.

Sanz et al. (2014) is one of many studies coming out of *The Latin Project*, a research program that investigates the interaction between language experience and input varying in degrees of explicitness, and includes cognitive variables such as aptitude as possible moderating variables. The target is the use of word order, case, and number morphology in the assignment of semantic functions (or who does what to whom) in L3 Latin by native speakers of different L1s (English, Spanish, Chinese) and L2s (English, Spanish, Japanese, Arabic). The project contributes to the growing line of research suggesting that prior linguistic experience provides bilinguals with cognitive abilities that facilitate additional language learning.

The different conditions in *The Latin Project* vary in their degree of complexity depending on the amount of metalinguistic information provided as it looks for a possible interaction between bilingualism and task conditions (e.g., Bialystok 2001). Departing from previous studies that compared monolinguals with bi-/multilinguals, *The Latin Project* delves into the role of prior experience on additional language learning by including bilinguals with different degrees of proficiency in their non-primary languages. Stafford et al. (2010) compared early and late bilinguals through exposure to a highly explicit condition – a treatment consisting of a grammar lesson and task-essential practice with metalinguistic feedback. While the groups performed similarly on the immediate posttests, late bilinguals were better at retaining what they had learned 3 weeks after the treatment. *The Latin Project* has also incorporated an often underrepresented population (e.g., adults who were older than 65 years old) in multilingual acquisition research. Cox and Sanz (2015) investigated the effects of explicit instruction and practice in two groups of late English/Spanish bilinguals aged over 65 years old and aged between 19 and 27. The results revealed that younger bilinguals benefit more than older adults from explicit instruction alone and maintain this advantage in interpretation tasks after practice. Importantly, the young adults' advantage was not maintained 3 weeks after the treatment. The studies in The Latin Project rely on ANOVAs, ANCOVAs, and linear growth analyses to analyze accuracy and latency data elicited by means of aural and written interpretation tasks, grammaticality judgment tasks, and production tasks. The studies are entirely computer delivered, thanks to a software application that combines Flash and ColdFusion tools; the application can be accessed online and delivers all audiovisual materials, collects all data, and stores it facilitating password-protected access to the procedures and the database.

A different paradigm is advocated by scholars such as Cenoz and Gorter (2011), who have proposed a holistic approach to second (and additional) language learning to better account for the complex nature of the language acquisition process. This approach stems from recent dynamic approaches to second (and additional) language acquisition such as the *dynamic systems theory* (De Bot et al. 2007) and explores the connections and interactions of the different languages of the learner as well as the way in which these languages support each other. An example of a study conducted within this approach is the case study by Safont-Jordà (see Table 1). Cenoz and Gorter (2011) also used this approach to compare writing samples of bilingual (L1/L2 Spanish/L1/L2 Basque) teenagers with English as L3. Correlations were obtained for each pair of languages for most of the dimensions evaluated (content, structure, vocabulary, grammar, and mechanics). Additionally, their quantitative and qualitative analyses looked at scores in each of the languages separately and at instances of transfer. The results revealed multidirectional crosslinguistic influence and nonlanguage differences in general writing strategies.

Work in Progress

New investigations are implementing online measures of neurocognitive processing as potential tools to understand the way previous language experience influences additional language learning. This approach (i.e., electrophysiology) records electrical voltage potentials produced by cellular activity, which can later be analyzed and can yield patterns of data called event-related potentials (ERPs). These ERPs provide information on timing and nature of processing (see Morgan-Short 2014, for more information on language acquisition ERP research). Grey's (2013) recent dissertation is the first study to compare bilinguals and monolinguals using models and tools from neurocognition. The study compared early balanced Mandarin-English bilinguals to monolinguals learning a Romance language-like (Brocanto2). Participants were exposed to an instructed (with metalinguistic information and meaningful examples) or uninstructed (with meaningful examples and no metalinguistic information) condition at two different points (low and high experience). Grey's behavioral (accuracy) results did not show marked differences between bilinguals and monolinguals; however, ERP data revealed differential reliance on neurocognitive mechanisms at different points in the learning curve for bilinguals and monolinguals.

The GRAL group continues to conduct longitudinal studies on the role of age, input, and aptitude as predictors of L3 (English) proficiency by Catalan/Spanish bilinguals. This group has investigated L2 and L3 development in study abroad (SA) contexts with children, adolescents, and adults in quantitative projects that compare short-term SA (2/3 months or 3 weeks) with immersion English as a foreign language (EFL) courses at home. Their findings reveal that after 3 months in a SA context, learners outperform those at home regardless of age. Additionally, comparable performance between SA and EFL groups was found for the 3-week period,

although the SA learners had an advantage in one of the areas investigated (formulaic sequences and lexical complexity).

Study (or stay) abroad and language acquisition is also one of the main foci of the SALA project (at Universitat Pompeu Fabra in Barcelona and Universitat de les Illes Balears in Palma de Mallorca, http://www.upf.edu/allencam/en/research_projects/sala.html), with comparable work on the effects of different learning contexts (SA and formal instruction, FI) on the development of English as an L3 by Catalan/Spanish bilingual college students (Pérez Vidal 2014). The project is quantitative and longitudinal and investigates the interaction between context of acquisition and individual differences. Data is rich: immediate and retention gains in L3 oral comprehension and production, grammatical abilities, phonological perception and written production. In line with some of the findings of the GRAL group, the results point toward a positive effect of SA not only in oral but also in written abilities. Phonological development, on the contrary, does not seem to be affected by SA. This research group has expanded its scope of investigation in the COLE project by including teenagers and both quantitative and qualitative data to compare FI with *content and language integrated learning* (CLIL) in English, which has resulted in a compilation of studies that have appeared in a volume edited by Juan-Garau and Salazar-Noguera (2015). Similar research is being conducted in another bilingual area in Spain by the Language and Speech Laboratory (LASLAB) at the University of the Basque Country, including longitudinal studies comparing English as a foreign language (EFL) versus CLIL in an attempt to find effective ways to develop L3 English communicative competence in school contexts. In particular, this team has conducted research on the acquisition of L3 English from a generative perspective with a focus on morphosyntactic development. Cognitive and psycopedagogic approaches are also adopted to incorporate the study of individual differences (e.g., motivation) and how they influence the effect of instructional contexts on L3 development. Work completed links CLIL with higher motivation and more positive language outcomes.

To conclude, in the last 10 years, the field has started to incorporate different contexts (e.g., SA, CLIL) in an attempt to understand how external conditions interact with individual differences and bilingualism to explain L3 development. These studies are often longitudinal and collect qualitative and/or quantitative data. In addition, laboratory studies continue to provide more information on the actual processes involved in multilingual acquisition by manipulating external conditions and collecting data with different techniques, including those borrowed from neurocognition.

Problems and Difficulties

Multilingual language acquisition is complex and its investigation requires sophisticated designs. The challenges are many, stemming from four basic components of the design: sample, constructs, measurements, and analyses.

In order to answer some of the questions, especially those that require multifactorial, correlational types of analyses, researchers need to identify large, homogeneous samples. This is no easy task because such participants are not always available or willing. For example, schooled children and college students are usually available to researchers. However, other populations such as older adults are not so easy to reach.

In addition, institutional review boards make it difficult to include certain items in questionnaires or certain conditions in the design, citing the potential for lawsuits concerning discrimination based on gender, race, or place of origin, all of which provides another reason to explain the limits in the proportion of minorities in samples. Finally, obtaining a homogeneous sample, especially in terms of proficiency, frequency of use, and age of acquisition of the languages involved is a major achievement in and of itself.

Most constructs, including motivation, aptitude, and awareness, are elusive, difficult to define, operationalize, and measure. It is often necessary to reformulate the tests and recode and revise the procedures after a discussion among raters to avoid inter-rater reliability problems. The inclusion of certain procedures, for example, requiring learners to think aloud while completing a treatment in order to measure awareness, might turn against the researcher by altering the very same processes under investigation (reactivity) (e.g., Sanz et al. 2009).

In addition, the construct Ln *proficiency* is especially problematic both because it assumes a standard variety and because it includes a multiplicity of elements (e.g., oral and written productive and receptive skills). Furthermore, multilinguals' Ln proficiency is often measured with tests that are designed for monolinguals, which are not sufficiently fine grained to evaluate highly skilled multilinguals. Other studies measure proficiency with self-rated questionnaires without considering that learners' ratings may be influenced by different factors (e.g., attitude toward the language).

Naturally, because constructs are hard to define, measurements also suffer. A classic example is the Modern Language Aptitude Test (MLAT), a measure of aptitude to learn nonnative languages. Aptitude is actually a macroconcept made up of four smaller constructs (phonetic coding ability, rote learning ability, grammatical sensibility, and inductive language learning). Due to its multicomponential nature, any results associated with higher or lower aptitude do not actually inform us about the specific microconstruct which ultimately accounts for the results. New aptitude tests such as the LLAMA Language Aptitude Test (Meara 2005) or the Cognitive Ability for Novelty in Acquisition of Language – Foreign (CANAL-F) Grigorenko et al. (2000) incorporate measures of constructs that have not been considered in the MLAT (e.g., working memory, attentional processing). Additionally, recent reevaluations of the construct recognize the role of affective factors (strategy use and motivation) as mediating factors on the role of aptitude on language learning (Winke 2013).

Regressions and correlations are frequent procedures in quantitative studies because Ln acquisition and use is multifactorial and demands an interactive approach, which leads to several problems. First, it demands large samples. Also,

while these analyses clearly establish relationships among the factors, the direction of the relationship is left to interpretation. Moreover, a relationship does not imply cause and effect. Finally, the variety of methods implemented and the lack of replication are a challenge for any scholar trying to draw general conclusions for the research (Sanz 1997).

Future Directions

Multilingual language acquisition is a relatively new field that will no doubt grow in breadth and depth as it strives to isolate the internal and external variables involved in Ln learning and to account for their multiple interactions. Methods will expand to include research on the acquisition of non-primary languages in formal contexts, case studies, and laboratory research as scholars continue to borrow and refine methods from linguistics, sociology, and psychology and to create their own.

Qualitative and question-generating case studies will continue to grow, as they are necessary in a young field in which homogeneity in the sample is extremely difficult to achieve. An advantage of case studies is that they allow the learner's voice to be heard. To include the learners' reactions is a growing trend in language research in general, including laboratory research, resulting in mixed designs that combine highly controlled procedures with debriefing questionnaires and stimulated recalls, for example. As a result, a combination of micro-, macro-, and learner-centered designs will develop.

Future research will also need to continue developing research designs that account for the complex nature of multilingual acquisition. It is important to include measures and analysis that incorporate the variability and dynamics of the learner's languages (Herdina and Jessner 2002). An example is the study of motivation in language acquisition, which in the last decade has looked into the motivation process and its dynamic interaction with different internal and external factors. Many studies under this sociodynamic approach are conducted qualitatively with interviews (e.g., Ushioda 2001) and provide information on how motivation changes depending on the outcomes achieved. Research also needs to continue exploring whether language experience has an effect on language aptitude (e.g., Thompson 2013). Longitudinal studies with learners at different points in their language development should provide more evidence of the dynamic nature of both motivation and aptitude and of their role in subsequent language learning.

Finally, laboratory research within the cognitive framework will continue to increasingly implement computers in the design as more and larger laboratories become available, research institutions hire technicians, and software becomes more affordable. Computers allow for highly controlled treatments and data gathering procedures. Moreover, they allow researchers to track learners' performance, manipulate the amount and type of input presented, and even individually adapt it based on performance. They also facilitate the inclusion of reaction time – not just accuracy – data in the design, expanding our view of learners' performance. Theoretical developments in neurolinguistics, closely tied to advances in neuroimaging techniques,

although still in its infancy in multilingual acquisition research, will certainly continue to grow. This new line of research will contribute to our knowledge of internal factors, including individual differences, and their interaction with external factors, which is necessary to explain such a complex phenomenon as multilingual acquisition.

Cross-References

- ▶ Research Perspectives on Bilingualism and Bilingual Education
- ▶ Researching the Continua of Biliteracy
- ▶ Second Language Acquisition Research Methods

Related Articles in the Encyclopedia of Language and Education

Diana Schwinge: Biliteracy and Multiliteracy in Bilingual Education. In Volume: Bilingual Education

James Cummins: Teaching for Transfer in Multilingual School Contexts. In Volume: Bilingual Education

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