



# Language Teaching Research Quarterly

2024, Vol. 44, 129–198



## Brian MacWhinney's 55 Years Research into Language Education and Psychology: A Systematic Review and Brian MacWhinney's Personal Reflection

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*Received 18 November 2024*

*Accepted 20 July 2024*

### Abstract

Ali Panahi and Hassan Mohebbi systematically reviewed Brian MacWhinney's 55 years of research and publication in language education and psychology. The study was conducted in varying sections. Section 1 illustrates a methodology for the systematic review. It presents an impressionistic framework based on which the reviewers developed some exclusion and inclusion rules. Section 2 is concerned with MacWhinney's overall achievements and contributions; all his research publications were estimated to stand at 540 items. Section 3 presents the themes (micro-themes and macro-themes) in MacWhinney's research works and presents the extracted technical jargons, terms and concepts for both language education (1548 items) and psychology (447 items). Added to this, nine meta-themes were inferred and extracted for all of his research publications. Section 4 provides a systematic review of his research works. As a result, with reference to the subjective criteria and exclusion and inclusion rules, his research works, i.e., articles, book chapters and books, were systematically reviewed. In the end, Brian MacWhinney provided his own reflection and discussion.

**Keywords:** *Brian MacWhinney, Systematic Review, Language Education, Psychology, CHILDES*

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### How to cite this article (APA 7<sup>th</sup> Edition):

MacWhinney, B., Panahi, A., & Mohebbi, H. (2024). Brian MacWhinney's 55 years research into language education and psychology: A systematic review and Brian MacWhinney's personal reflection. *Language Teaching Research Quarterly*, 44, 129-198. <https://doi.org/10.32038/ltrq.2024.44.12>

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<https://doi.org/10.32038/ltrq.2024.44.12>

## <sup>1</sup>Introduction

If the investigated areas over the course of ELT history are closely navigated, one can be potentially led to the understanding that Brian's MacWhinney's 55-year contribution, research and publications rest inevitably somewhere in the middle between psychology and language. Accordingly, the fundamental principle behind the present systematic review is that ELT is inseparable from other disciplines and requires scholars in the field not to ignore the effectiveness of this inseparability. It appears that giving researchers and educators clear and brief access to a representation of research findings revealed over the course of 55 years by Brian MacWhinney would be potentially beneficial, however demanding. That is why the current systematic review emerged. Before outlining the ins and outs of MacWhinney works, at the outset, we would like to present some key issues.

A much closer look at Brian MacWhinney's research literature, and a review of the micro-themes, macro-themes and meta-themes endorse his fair share in language education and psychology and reveal the vastness of his research scope. Approximately 55 years ago, i.e., in 1973 or so, the beginning research work of Brian MacWhinney emerged in the field of psycholinguistics and language education. The work was titled "*Glossolalic speech from a psycholinguistic perspective*" (Osser, Ostwald, MacWhinney, & Casey, 1973). Although the significance of glossolalia had already been hotly debated for decades, or even centuries (Goodman, 1964; Wolfram, 1966), Brian MacWhinney and his colleagues clarified other crucial facets of the issue and discussed glossolalia as a language-dependent psychosocial phenomenon and considered Glossolalia as a form of speech behavior. This was the beginning of a much longer journey. The reason why we first mentioned this research work is to point out that it heralds the width and depth of the investigated areas: Referring back to 55 years ago is not an easy task in terms of accessing the published works, as there existed no Google like this to record the publications. This being a guidepost for start, he proceeded with his much longer career of research areas.

One of his cogent and persuasive discussions and publications came to existence in 1991 (MacWhinney, 1991) in his reply to Woodward and Markman. In this work he did a fair share for researchers indicating that developmentalists are required to be extremely wary of theories that decouple underlying constructs from their empirical realizations. As a scholar professionally active both in psychology and language, MacWhinney could break the shackles of impressionism and personalization letting the trend of his professionalism move on the continuum of endorsed theories and scientific enterprises. This happened exclusively because he could bring about varying numbers of disciplines and subdisciplines and could effectively integrate them into his research productivity.

When computer started to play an obvious role in corpus linguistics, MacWhinney (1989d, 1992a, 1994a, 2000c, 2000d; MacWhinney & Snow, 1992) established the CHILDES corpus, serving as a computational tool for varying purposes, such analyzing talk, language disorder, and as an essential resource for modern studies in language acquisition. To illustrate its significance further, in one of the research projects titled *AphasiaBank: Data and Methods*, Macwhinney, Fromm, Holland, and Forbes (2012) emphasize the importance of the use of

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<sup>1</sup> This paper is part of a special issue (2024, 44) entitled: In Honour of Brian MacWhinney's Five-Decade Contributions to Language and Psychology Research (edited by Zhisheng (Edward) Wen and Hassan Mohebbi).

corpora, particularly in the field of child language research and indicate a decade ago, over 3500 articles have been published using CHILDES database. In the same vein, Forbes et al.'s (2012) research work titled "*AphasiaBank: a resource for clinicians*" provides a brief account of the highlighted history and role of AphasiaBank and mentions that CHILDES (Child Language Data Exchange System) is an international cooperative venture originated and directed by Brian MacWhinney. As the scholars indicate, AphasiaBank involves some 800 active users and 4000 affiliated members located in over 30 countries and aims at extending the model established by the Child Language Data Exchange System (CHILDES) for the field of child language acquisition to include the study of adult language. As a reference digital guide, MacWhinney (2014a) in a research work titled "*Challenges facing a core outcome set development for aphasia*" indicates that the AphasiaBank Project organized at <http://talkbank.org/aphasiabank> is an example of a shared database of this type. Therefore, his research areas are more extensive. For example, nearly 2 decades ago, MacWhinney, Martell et al. (2004) proposed the design of a CC system for spoken language data and presented, and published varying research work concerning collaborative commentary. More recently, MacWhinney and Fromm (2023) published a related work titled collaborative commentary for understanding communication disorders. This indicates that whatever research work he has conducted continues to appear even nowadays nonstop, the implications of which are observed in SLA.

More practically, in most of his research works, Brian MacWhinney strives to relate the findings and implications to second language acquisition. Specifically, in his research work titled "*A shared platform for studying second language acquisition*", MacWhinney (2017b) relates the findings and implications to second language acquisition and recommends data-sharing as an effective area such as first language acquisition and aphasiology. Moreover, he believes that researchers in the field can work together to construct a shared platform that combines data from spoken and written corpora, online tutors, and Web-based experimentation. This latter point is vividly portrayed in his own research works, as he has jointly contributed to a vast number of research works.

In conclusion, the vastness of his research works and the scope of his contribution in terms of quantity and quality as well as theory and practice seem unlikely to be included in this brief introduction. The study is embedded in organized procedures containing the following sections. Section 1 illustrates methodology for the systematic review. Section 2 is concerned with MacWhinney's overall achievements and contributions. Section 3 presents the themes in MacWhinney's research works and section 4 provides a systematic review of his research works.

### **Section 1. Methodology for the Systematic Review**

Panahi and Mohebbi developed a subjective framework and impressionistic criteria for the systematic review. The purpose of the framework was to offer a neat orientation to Brian MacWhinney's vast research works over his 55-year professional lifespan both qualitatively and quantitatively.

In the systematic review, which will be reported in Section 4 (Tables 7-9), we grouped in chronological order the publications located in our search. However, in the process of the current systematic review, we vividly observed that Brian MacWhinney's published research

works are too vast to be all included in the systematic review. Therefore, we developed some criteria and a framework under the general heading of “Exclusion and Inclusion Rules”, according to which we specified what to include or exclude and why. That is to say, so as not to exceed the page limit of this article, we used inclusion rules (Table 1) and exclusion rules (Table 2), based on which we removed some research works from the systematic review.

**Table 1**

*Inclusion Rules and Examples for the Systematic Review*

	Inclusion Rule	Example
1	A publication was considered to be potentially eligible for inclusion if it was relevant to <i>at least one</i> of the nine meta-themes presented in the study. (see Table 6).	MacWhinney (1975, 1977, 1983, 2004a, 2004b, 2023a)
2	The publications having somewhat similar themes and researched issues were merged and analyzed together due to time, space and manageability considerations. On these occasions, the chronological order of the intended researcher’s work was not considered. In other words, the systematic analysis was performed in a chronological order. However, in some cases, we disobeyed the rule just when the main themes of the articles published in different dates were somewhat identical and even merged the books, book chapters or journal articles.	<ul style="list-style-type: none"> <li>- MacWhinney, Osman-Sági, and Slobin (1991) was merged into MacWhinney and Osman- Sági (1991)</li> <li>- MacWhinney (1995a, 1994a, 1996b), MacWhinney and Snow (1985, 1990, 1992, 2023) and Bernstein Ratner, Rooney, &amp; MacWhinney (1996) were all reviewed together.</li> <li>- Li et al. (1992) was merged into MacWhinney et al. (1984)</li> <li>- MacWhinney’s (1992b) and MacWhinney (1997a) as book chapters were merged and analyzed as they had a lot in common in terms of themes add and content.</li> <li>- MacWhinney’s (2002a, 2002c, 2005g, 2005h, 2005j, 2008b) were all merged as they all provide an account of the competition model, new directions, and an extended formulation of the competition model.</li> </ul>
3	A research work was excluded from the study because we could not tabulate its details from our online search. However, we included it in the reference list and in Brian MacWhinney’s overall achievement.	<ul style="list-style-type: none"> <li>- Unpublished manuscript MacWhinney &amp; Bates (1994). The competition model and UG. Unpublished manuscript.</li> <li>- MacWhinney (2001a)</li> </ul>
4	The systematic review of a journal article should have been included in the Journal Analysis Table, but we included it in the book or chapter analysis section. It was due to the length of the research work, and manageability, time, and space considerations associated with the extraction of the technical terms of this work.	<ul style="list-style-type: none"> <li>- MacWhinney (1978) was analyzed in book analysis section</li> <li>- Lempert &amp; MacWhinney (1984) was analyzed in chapter analysis section.</li> <li>- Bates and MacWhinney (1988a, 1988b) both deal with functionalism from varying aspects.</li> </ul>
5	Conference proceedings were excluded from the systematic review due to time, manageability and space limitations. However, we included them in in Brian MacWhinney’s overall achievement and in meta-themes.	MacWhinney (2005d)
6	We included journal articles, books and book chapters in the systematic review. All three were viewed and reviewed in terms of research, practice, meta-themes, macro-themes, and micro-themes. Also, we extracted the technical terms of just journal articles (not those of books and book chapters) due to time, space and manageability considerations. However, assuming	<ul style="list-style-type: none"> <li>- MacWhinney (1994b)</li> <li>- MacWhinney (1995b)</li> </ul>

	that two of the book chapters contained more practical technical terms, and they were also manageable, we extracted their technical jargons, concepts and terms.	
7	A commentary on varying topics and being two pages or so long were excluded from the study, but we included this in MacWhinney's overall achievements. Also, a commentary was exceptionally analyzed, as it was supposed that it contains much richer implications. Therefore, there existed two exceptions, such as MacWhinney (1984c, 2004a) which were reviewed and listed in the reference section, too.	<ul style="list-style-type: none"> <li>- MacWhinney (1984a)</li> <li>- MacWhinney &amp; Bates (1991)</li> <li>- MacWhinney (2005e, 2005f)</li> </ul>
8	A book chapter appeared ambiguous with respect to the authors. We included it in the systematic review, but to clear up the potential ambiguity and to credit the authors of whatever kind, we detailed what we observed.	What we tabulated from his CV is "MacWhinney, B. (1994b). The dinosaurs and the ring. In R. Corrigan., S. Lima, M. Noonan (Eds.), <i>The reality of linguistic rules</i> (pp. 1-30). John Benjamins". However, on the article it appears to have been written by R. Corrigan, G. Iverson, and S. Lima. We included the first in the systematic review.
9	As regards TalkBank and the related research, we systematically reviewed some of Brian MacWhinney's research works and excluded all others due to the vastness of his research in this area, but included them all in the overall achievement and meta-themes section and would therefore like to refer the interested readers to <a href="http://talkbank.org">http://talkbank.org</a>	<p>Research works systematically reviewed were:</p> <ul style="list-style-type: none"> <li>- MacWhinney, B. (2007, 2021)</li> <li>- MacWhinney, Bird et al. (2004)</li> <li>- Bernstein Ratner &amp; MacWhinney (2019)</li> <li>- Koschmann &amp; MacWhinney (2001)</li> </ul>
10	A research work was a commentary, but due to its highly informative details, we analyzed it in the section of articles.	MacWhinney (1997b)

**Table 2**

*Exclusion Rules and Examples for the Systematic Review*

	Exclusion Rule	Example
1	A chapter was ineligible for inclusion if it was published in any book edited or co-edited by MacWhinney. It was assumed that since the book was systematically reviewed, it would be partially informative for the readers to search for their wanted content on the ground of the clues in the reviewed book. Added to this, due to the vastness of MacWhinney's research work, time and space factors as well as the manageability of the systematic review were main issues. Therefore, despite their innovativeness, differences in subject and high quality, we excluded them from the systematic review.	<ul style="list-style-type: none"> <li>- A chapter in MacWhinney (1999a) was excluded (e.g., MacWhinney, 1999b, 1999c)</li> <li>- Two chapters in MacWhinney (1987b) were excluded (MacWhinney, 1987c, Bates &amp; MacWhinney, 1987).</li> <li>- Three chapters in MacWhinney and Bates (1989) were excluded (McDonald &amp; MacWhinney, 1989; Bates &amp; MacWhinney, 1989; MacWhinney, 1989b).</li> <li>- All of the chapters, such as MacWhinney &amp; MacWhinney's (1995c) book chapters in his book titled "<i>The handbook of child language</i>" (Fletcher &amp; MacWhinney, 1995) were excluded from the systematic review, his overall achievements and reference list.</li> <li>- A book chapter in MacWhinney (2013a)</li> <li>- All book chapters in Klatzky, MacWhinney and Behrmann (2008), such as MacWhinney, (2008a) as well as the book itself were excluded from the systematic review. We could not access the book.</li> <li>- Book chapters in MacWhinney, Malchukov, &amp; Moravcsik, (2014), such as MacWhinney (2014e) were excluded from the systematic review, but the book itself was reviewed.</li> </ul>

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2	A chapter was ineligible for inclusion if it or part of it appeared in one of the research works of Brian MacWhinney. However, it was included in the reference list and also in Brian MacWhinney's overall achievement.	A portion of Bates, Thal, and Mawhinney (1991) appeared in MacWhinney and Bates (1989), so we excluded the former from the systematic review.
3	Brian MacWhinney's Research works (books, book chapters or journal articles) not tabulated from our online search were all excluded from the study. However, they were included in his overall achievements.	-
4	As regards the exclusion and inclusion rules for the extraction of the technical terms, there existed some limitations. We failed to extract the technical terms for his books, book chapters and poster publications. If performed, the number of the extracted terms would be vast enough to be accommodated in the study. Second of all, we did not extract the issues related to his research methods and approaches.	The research issues, methods and approaches, such as meta-analysis, test-res-test study, dependent variables, independent variables, correlation coefficient, specific demographics (e.g., age, education), stability metrics, etc., were excluded from the study.
5	A publication was excluded from the study if it was published in the form of a poster. Although it was innovative and informative, due to the brief nature of the poster published we were cautious not to communicate the required pedagogical implications to the readers.	Cator, Fromm, Johnson, & MacWhinney (2013) Dalton et al. (2019) Saylor et al. (2022)
6	Journal articles with no publication date or publishing company were excluded from the systematic review. Although they were not reviewed in systematic terms, they were considered in bibliographic terms as well as in terms of MacWhinney's overall achievements and meta-themes.	Fromm, D., Holland, A., Armstrong, A., Forbes, M., MacWhinney, B., Risko, A., & Mattison, N. (2011). Better but no cigar. Persons with aphasia speak about their speech.
7	(Some of the) articles with more than 9 or 10 co-authors were excluded from the systematic review due to space and manageability considerations. However, we included them in the overall achievement and meta-themes. The main reason for this was that it was required to consider space consideration so that the vastness of Brian MacWhinney's work demanded it to create internal rules and observe them.	Brassel et al. (2016) Release Collaboration (2020)
8	As regards the rules for the exclusion of technical terms, we excluded the methodological terms, concepts and jargons from the extraction section due to time, space and manageability considerations.	Since MacWhinney's research works were wide-ranging in terms of scope, quantity and quality, we failed to include the methodological concepts, notions, terms and jargons in the study. If performed, it would appear as stand-alone section next to the two meta-themes tackled.
9	Some research works (books, book chapters, or journal articles) were excluded from the study despite their innovativeness, differences in subject, and high quality, as we could not tabulate their full version from our online search. Of course, to avoid misrepresentation and faulty review, we excluded them from the systematic review, but they were included in his overall achievement and meta-themes section.	MacWhinney (1990) MacWhinney (1989c, 1989d)
10	A publication was ineligible for inclusion if it was in a foreign language that could not be understood by systematic reviewers.	MacWhinney's published books review that had been written in another language was excluded from the systematic review and from the reference list.

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11	An article was excluded from the systematic review if reviewers did not understand their implications or for other reasons. However, their technical terms were extracted and they were also considered in Brian MacWhinney's overall achievements.	Bates, McDonald et al. (1991)
12	An article was published two times or in two formats: One time as a conference proceeding in 1990, then, as a journal article in 1991. We reviewed and cited the latter. Also, a publication appeared in both a journal article and in a book chapter with different dates. We considered it in the format of journal article, but included both in the reference section.	- MacWhinney & Leinbach (1991) - MacWhinney (1995a, 1996b) as a book chapter and journal article.
13	All tributes, guest editorials, test reviews, book reviews, and other very short pieces were ineligible for inclusion.	Oxford's short contribution to a multi-authored tribute article was excluded from the systematic review and from the reference list.
14	Some of the research works we tabulated from our online search had no page number and we could not access the full version of such works. Moreover, we had access to some research works, but it was unclear where it was published. So, concerning the related cases, we had to deviate from APA style and included them in the reference list without any page number. Also, such references were found to be published in different dates. We included just the recent one.	- A look at Brian MacWhinney's book chapter titled Competition model. In S. M. Gass & A. Mackey appeared to be ambiguous in terms of the date of publication. It seemed unclear to us either it was published in 1995 or 2012. So, we ignored 1995 and considered 2012 (see MacWhinney, 2012). - MacWhinney & Chang (2019) - MacWhinney, Bird et al. (2004)
15	A research work focusing on Hungarian language acquisition was excluded from the study due to the fact that we failed to provide implications for the study.	MacWhinney (2012b)
16	We did exclude book reviews from meta-themes section.	Since it was totally deleted from the review, we did not provide any examples.
17	Publications related to book reviews and comments were excluded from the systematic review. They were only listed in Brian MacWhinney's overall achievement section. Published in well-recognized journal, the reviewed works and comments are of pedagogical implications. Due to space, time and manageability considerations, they were excluded from the systematic review.	- Published comments: MacWhinney (1991) - Reviewed books: MacWhinney (1978b)
18	Due to time considerations and pressure, we excluded the issues related to research methodology in Brian's whole works, so from the study we removed data analysis and research issues, such as ANCOVA, MANOVA, etc.	For example, the extraction of the technical terms related to the methodology section of the journal articles were ignored in the study.

## Section 2: MacWhinney's Overall Achievements and Contributions

This section presents MacWhinney's overall achievements in Table 3, as compiled by Panahi and Mohebbi. In the systematic review, we created some subjective rules. One of the fundamental rules for the study was that we included journal articles, book chapters and books in the systematic review, but excluded from the systematic review some of his research works. The excluded research works include book reviews, conference publications and presentations, research works published in a language other than English, poster-type publications and presentations, inaccessible research works, posters, research works with no publications date, research works with no journal details (journals where they were published), research works

having more commonality with those selected for the systematic review (28 items), and published commentaries. It is worth noting that approximately all of the excluded published works were included in his overall achievements and contributions (Table 3).

**Table 3**  
*Overall Achievements and Contributions*

Type	Quantity
Total number of published research works	540
Research works included: Articles, book chapters and books	273
Research works excluded: Book reviews, conference publications and presentations, research works published in a language other than English, poster-type publications and presentations, inaccessible research works, posters, research works with no publications date, research works with no journal details (journals where they were published), research works having more commonality with those selected for the systematic review (28 items), and published commentaries.	267
Honors and research awards	176
Languages taught and published: English, Hungarian, German, French, Latin, Spanish, some Cantonese and Mandarin	8
Technical jargons, terms and concepts in psychology	447
Technical jargons, terms and concepts in language education	1548

As shown in Table 3, Brian MacWhinney's overall academic achievements and contributions stood at 540. Out of these, we excluded conference publications and presentations, book reviews, poster-type publications, inaccessible research works as well as those research works sharing commonality with other related reviewed works, and published commentaries and included in the systematic review his published articles, book chapters and books. In addition, an approximate number of technical terms and concepts in psychology and language education stood at 447 and 1548, respectively. On top of these all, the academic honors and research awards he received seem to be 176 (with reference to his CV). Among these all, he could teach and publish in 8 languages including English, Hungarian, German, French, Latin, Spanish, some Cantonese and Mandarin. A word of note regarding the implications of the technical terms and concepts is that the reasons why we extracted the technical terms are that they can help language teachers justify their practice in the classroom in both pedagogical and theoretical terms. Therefore, technical terms, as reference values, are one of the fundamental justifiers. For example, there is no balanced bilingual (Cook & Newson, 1996). The technical term 'balanced bilingual' is used when parents wrongly expect foreign language teachers to make their children (those learning English as a foreign language in a foreign context) speak English like a native speaker and be an undistinguishable member of the society. As it appears to be, it is highly unlikely in EFL context to be an exact native speaker: From our point of view, as inferred from Cook and Newson (1996), there lies degeneracy of input. Therefore, the technical issues are required for both novice and experienced researchers.

### **Section 3: Themes in MacWhinney's Research Works**

#### *A. Micro-Themes and Macro-Themes*

In bibliographic terms, we grouped his research works into varying themes: micro-themes, macro-themes and meta-themes. First, we extracted macro-themes and micro-themes (Table 4

and Table 5). At the same time we were performing the systematic review, we also identified the kind of themes relevant to every individual under-review research work.

**Table 4**

*Macro-Themes for MacWhinny's Research Works*

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<b>Macro-Themes</b>
1. Psychology
2. First language
3. Second language
4. Bilingualism
5. Trauma and brain disorder
6. Discourse issues
7. Psycholinguistics
8. Sociolinguistics
9. Skills/ subskills
10. Technology (e.g., computer)
11. Linguistics

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**Table 5**

*Micro-Themes for MacWhinny's Research Works*

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<b>Micro-Themes</b>
1. Information processing (and analysis)
2. Language emergence
3. Fossilization
4. Models (competition model, mental model, process model, etc.)
5. Connectionism
6. Simultaneous interpretation/translation
7. Talk analysis
8. Language therapy
9. Interaction
10. Theories
11. Pragmatics
12. Semantics
13. Phonology and phonetics
14. Morphology
15. Syntax – lexicon
16. Verb learning
17. Processing (sentence, word, etc.)
18. Case marking
19. Aphasia
20. Alzheimer
21. Acquisitional issues
22. Dementia
23. Neuroemergintism / neurophysiological issues
24. Feedback
25. PsyScope
26. Strategy
27. TalkBank

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Table 5 shows the micro-themes, which are wider in scope than the macro-themes. It needs to be mentioned that the micro-themes and macro-theme are reflected in the fifth and fourth columns of Tables 7-9 in the systematic section.

*B. Meta-Themes Extracted from MacWhinney’s Publications*

Due to the variety of publications and research works, themes, disciplines and subdisciplines, we were required to put Brian MacWhinney’s works in a simply understandable and neat order and considered their bibliographic basis. Therefore, after the review process was fully performed, for ease of clarification and understanding, we extracted nine meta-themes and subjectively called it meta-themes appearing as “stand-alone” words, but portraying the whole annotations and contents of a single research work. This was conducted with reference to bibliographic resources and with a view of factoring in all of his published works. We applied this to all of his research works, either included in the systematic review or excluded from the systematic review. The reason why we subjectively called it meta-themes is that the number of his research publications were immensely sizable, so we were required to use the word ‘meta-theme’ in order to organize the number of published works and areas of his research in a more sophisticated way. In total, we developed nine meta-themes serving as an umbrella term for organizing his areas of research. On some rare occasions, we failed to realize which category a specific term or concept belonged to and we impressionistically decided to include it in either one of the two themes. For example, the phrase “*initial mapping*” was difficult to decide whether it belongs to psychology or language education and research. We decided to include it in the theme of psychology. As such, every single meta-theme summarizes the title of the research work. Hence, we would like to provide an example of the way we proceeded to group and categorize all his research work into illustrated meta-themes below:

- MacWhinney, B. (2012b). Syntax
- MacWhinney, B. (2014a). Aphasia
- MacWhinney, B. (2014e). Competition model
- MacWhinney, B. (2017a). Language and psychology
- MacWhinney, B. (2017b). Language acquisition
- MacWhinney, B. (2017c). Language and psychology
- MacWhinney, B. (2006a). Emergentist
- MacWhinney, B. (2007). TalkBank
- MacWhinney, B. & Fromm, D. (2016b). CHILDES

**Table 6**  
*Meta-Themes Extracted*

Meta-themes	The Number of Research Works Published
Language and psychology	102
Syntax (and lexicon)	91
Language acquisition/learning	72
CHILDES and CLAN (Clarin)	46
Competition model (and unified model of language acquisition)	40
Others	38
AphasiaBank (aphasia issues, dementiaBank)	27
TalkBank (Phonbank, HomeBank, fluencyBank)	22
Emergentism (or emergentist)	21

As it is clear from Table 6, Brian MacWhinney’s areas of concern and investigation are wide-ranging. The fundamental issues investigated include language and psychology, syntax,

language acquisition and learning, CHILDES and CLAN (Clarin), competition model and unified model of language acquisition, AphasiaBank (aphasia issues, dementiaBank), TalkBank (Phonbank, HomeBank, fluencyBank) and Emergentism (or emergentist). Added to this, it needs to be highlighted that, due to the vastness of his research areas, we included some of his research areas under the general heading of ‘others’ which includes connectionism, translation, functionalism, task bias, cognition, pragmatics, morphology, phonology, phonetics, bilingualism, collaborative commentary, interpretation (semantics), glossolalia, feedback, corpora, discourse, lexicon, language skills, technology, social sciences and humanity, and rule instruction. Therefore, we included these all under the general heading of “*others*” in Table 6 right under meta-themes to give a more organized order to the sequence and number the meta-themes we subjectively created.

### *C. Technical Jargons, Terms and Concepts*

We established a subjective basis for the extraction of technical terms and concepts from MacWhinney’s journal articles, i.e., those journal articles we systematically review. However, we failed to extract technical jargons of his books and book chapters due to space and manageability considerations. That is to say, we extracted the technical jargons or concepts which were assumed more significant and ignored those which were deemed subjectively insignificant. Due to time, space and manageability considerations, we grouped the technical terms into two categories: technical jargons, terms and concepts in psychology and technical jargons, terms and concepts in language education. As such, the way we calculated the number of technical concepts, jargons and notions after they were extracted was much simpler: We used a comma after every independent and single technical term or concept; we included the comma in the “Find” section of Word Program in computer and the number of the technical terms appeared and were enumerated easily. To be mini-plot-tested, we also counted them one-by-one. It is worth noting that we admit we failed to fully acknowledge what Brian MacWhinney has contributed to the field in both qualitative and quantitative terms, as space considerations and the vastness of his research works prevented us from undertaking a full-fledged systematic review. Therefore, as it was mentioned already, we created inclusion and exclusion rules in order to depict more visibly the contribution he has made to the field. We removed from analysis the appreciation notes, acknowledgement, edited special issues, edited articles, edited journals. Also, from MacWhinney’s works, we removed aside those works which were merely syntactic, such as case markers. The main reason for this is that we are interested in ELT, applied linguistics, and psychology-relevant issues.

## **Technical Jargons, Terms and Concepts**

### *1. Psychology: Technical Jargons, Terms and Concepts*

Psychopathology, genetic psychology, psychology laboratory, signal waveform, pathology, nonsensical behavior, aphasia, aphasics, Broca's aphasia, Broca's aphasics, Wernicke's aphasia, Wernicke's aphasics, aphasic discourse, dementia, Alzheimer's disease pathology, Psychiatry, agrammatic aphasics, posterior aphasics, anterior aphasics, apraxia of speech, dysarthria, apraxia of speech, dyslexia, frontal–temporoparietal neural substrates, Newell's general cognitive model, cognitive growth, cognitive development, theory of embodied cognition,

theory of grounded cognition, neurophysiology, cognitive neuroscience, cognitive linguistics, rote-memorization, amplitude changes, pulse-frequency rate, self-control, psychosocial phenomenon, transcendental states of consciousness, clinical standpoint, clinical practice, information processing (model), formation-theory view of sentence processing, emotive sound making, acquisitional process, working memory, premotor working memory, schema-based memory, implicit memory, verbal memory span, phonological rehearsal, phonological rehearsal loop, comparative process, sound-meaning association, emotional disability, cognitive disability, cognitive apparatus, initial validation of the stimuli, word processing, sentence processing, computational processing, parallel distributed processing, cognition, explorations in the microstructure of cognition, simulation, back propagation, back propagation algorithm, nodes, patterns of activation, input units, output units, output phonetic processing, phonetic processing, phonological processing, paradigm extraction, interactive graphic system, conceptual building blocks of experimental design, psychology experiment, groups components of a psychology experiment, blocks components of a psychology experiment, trials components of a psychology experiment, factors components of a psychology experiment, graphic environment, laboratory microcomputer, psyScope, pyscript, acuity experiment, size factor, position attribute, stimulus attribute, declarative language, intertrial interval, precompile mode, pre-reviewing and prechecking trials, randomization, data output, subject input, built-in facility, timing, customizing pyscope, customizing the interface, scripting language, processing load, cognitive structures, cognitive reality, psycholinguistic theory, interactive activation networks, language therapy, specific language impairment, predictive processing, native processing, nonnative processing, Anticipatory processing, expectation-driven processing mechanisms, eye-tracking, electrophysiology, L1 processing, L2 processing, incremental processing, cognitive impairment, micro-linguistic impairments, trauma, traumatic brain injury, participation restrictions, social isolation, reduced quality of life, cognitive-communication deficit, macrostructural analysis, superstructural analysis, diagnosis of cognitive-communication disorder, speech-language pathology, dysarthria, diagnosis of impairment, Aphasia, aphasia assessment, aphasia rehabilitation, international classification of disability and health model, leadership team, executive leadership, perceptual magnet effect, perceptual contrasts, initial mapping, fast mapping, initial mapping process, complex relational concepts, auditory contrasts, auditory impairment, neural network modeling, self-organizing networks, self-organizing framework, auditory map, concept map, articulatory maps, serial order mechanism, conceptual coding, active processing, sentence processing, meaning as imitative construction, representation, sensori-motor stage, sensorimotor cognition, sensori-motor causal perspective, perceptual factors, relational factors, sensori-motor schema for causation, attentional saliency, lexical markings, deixis, anaphora, ego-perspective ' to problem-solving, empathy, mental picking-up, mental model, sentence memory, naturalistic sentence processing, verbal planning, verbal planning time, closeness-to-ego principle, reaction time, non-autonomy of components, competition situations, conspiracy principle, conspiracy of weak vectors, convergence principle, memory for conversation, recognition memory, subjects' electrodermal response, subject's phasic electrodermal response (EDR), locus coeruleus, direct mapping, multiplicity of form-function mappings, two-level mapping, function-function mapping, form-form mapping, processing limitations, language impairments, lexical impairment, grammatical impairment, cognitive processing, cognitive

content, general psycholinguistic model, focus maintenance, bilingual aphasia test, syndrome-specific problems, aphasic patients, fluent aphasic subjects, non-fluent aphasic subjects, Boston diagnostic aphasia examination, Aachen aphasia test, paraphasia, syndrome-specific symptom patterns, inhibition, induction, facilitation, failure to parse, error-tracking, view of Broca's as agrammatic, view of Wernicke's as paragrammatic, aphasia battery, prototypic Broca, behavioral plasticity, neural plasticity, cognitive neurobiology, cognitive psychology, experimental psychology, STEP (System for the Teaching of Experimental Psychology), aphasic syndromes, closed-class impairment, neural specialization, selective apraxia of phonation, idiosyncratic symptoms, base rate performance, underlying shape of the distribution, strong agrammatism, functional neural circuits, local processing, neural connectivity, integrative circuits, masking process, local memory, temporal lobe, attentional processing, motor processing, dorsolateral prefrontal cortex, posterior cortex, immediate serial recall, short-term recall primacy, short-term recall recency, shadowing, simultaneous translation, speech monitoring, and utterance formulation, top-down inferential processes, higher-level integrative processes, auditory noise, auditory-verbal short term memory, auditory rehearsal process, short-term memory, articulatory control process, articulatory rehearsal, general processing capacity, auditory imagery, imagery strategy, auditory image, functional neuroimaging, information processing psychology, analogistic processing, lexical activation, self-organizing, catastrophic interference, fossilization, plasticity, pattern-based mode of activation, phonological receptors, conceptual receptors, motor activators, syntactic connections, cohort inhibitors, cohort formation, archisegmental representation, phonological memory, focal lesion, non-verbal intelligence, developmental plasticity, verbal short-term memory, self-organizing neural network, feed-forward neural networks, self-organizing maps, semantic map, phonological map, associative links, biological implausibility, psychological implausibility, parsing process, automatic parsing, morphological tagger, neuron, neuronal plasticity, neuronal processing, event-related brain potentials, electroencephalographic record, implicit processing, explicit processing, syntactic anomaly sensitivity, contralateral hemisphere, domain-general cognitive mechanisms, neuronal landscape, physiological landscape, theory of mappings, theory of code activation, coactivation process, AphasiaBank, conflict resolution, retrieval ability, from-meaning mapping, , selective attention, back-propagation algorithm, E-prime system, B/C Power Lab, ERTS, MacLaboratory, MEL, MacProbe, MindLab, MPS, Psych-Scope, SuperLab, psychology software tools, absolute threshold measurement, adaptation-level theory, Weber's law, Müller-Lyer illusion, Ponzo illusion, McCollough effect, McGurk effect, perceptual magnet effect, graphic user interface, mnemonic ability, visuo-spatial short-term memory, central executive, storage system, irrelevant speech effect, word length effect, chunking effects, concurrent articulation effect, backward priming effect, avalanche node, competitive queueing model (CQ model), serial order learning, input phonology, output phonology, neurophysiology, neuroanatomy, neuropsychology, neuroimaging, visual-spatial manipulation task, mental rotation of alphanumeric stimuli, auditory sentence comprehension task, mental rotation task, left hemisphere activation, right hemisphere activation, left hemisphere stroke, right hemisphere stroke, lateralization, auditory rehearsal skills, quick processing, quick activation, automatic processing, automatic activation, orthographic processing, parvocellular system, remedial intervention, early focal brain lesions, cognitive crowding, late rigidity, contralateral

recruitment, local recruitment, white matter commitment, connecting wires, psychometric profiling, maximally parsimonious discrimination, Stroop interference, staged processing, cascaded Processing, cascaded articulation, theories of information processing, parallel planning of speech, incremental planning of speech, semantic priming, functional magnetic resonance imaging, periventricular hemorrhages, neurocognitive networks, dorsolateral prefrontal cortex, pediatric brain lesions, enactive imagery, depictive imagery, egocentric frames, allocentric frames, geocentric frames, prefrontal cortex, medial structures, embodied cognition, ventral visual processing stream, dorsal visual stream, skateboarder perspective, depictive mental model, enactive mental model, direct experience subsystem, deictic spatio-temporal reference frames, fragmentary mental models, embodied situational model, unified embodied situation model, temporal lag, temporal Perspective, corollary discharge, reafference, low-level attentional processes, high-level attentional processes, multifocality of representations, multifocal chains, mimetic symbols, expressive sighs, muscle control, attentional movement, iteration, goal direction, processing model, unilateral brain injury, prelinguistic injury, prelinguistic left-hemisphere, prelinguistic right-hemisphere damage, anticonvulsant medication, domain-general cognitive skills, auditory word recognition, visual word recognition, inhibitory control model of bilingual performance, inhibitory control mechanism, priming interference effect, social neuroscience, neuroinformatics, attrition, attritional processing, stuttering, autism spectrum disorder, right hemisphere damage, poststroke aphasia

## 2. *Language (Education): Technical Jargons, Terms and Concepts*

MacWhinney-Leinbach model for English, language learning, syntax, semantics, syntactic, syntactic processing, phonology, morphology, formulaic, vowels, consonants, psycholinguistics, sociolinguistics, linguistic creativity, semantic components, intonation, pitch rate, glossolalic speech, MacWhinney's psycholinguistic model, informal interview, formal interview, natural language, international phonetic alphabet, phonetic transcription, generative grammar, utterance, sentence, glossic words, Glossolalia, glossolalic phonation, glossolalic grammars, recurring partials, phonological strings, formulaic glossalia, innovative glossalia, linguistic styles, pseudo-linguistic styles, pseudo-phonetic features, phrase structure, formulas, innovative glossolalic sequences, expressive language, repetition, pause, turn-internal pauses, reduplication, triplication, rhyming, alliteration, syllable, enclosing syllables, babbling, markedness, unmarkedness, parameters, threshold of onset, phonation, glottal stops, medial consonants, medial clusters, consonant clusters, nonsemanticity, nonsemantic speech, morphological formation, word formation, rules, analogy, analogic formation, rule-operation, inflection, verb middle inflection, verb final inflection, reversive verbs, generalization, over-generalization, generative-transformational aspect, transformational grammar, morphological learning, morphological boundary, lexeme, lexical information, syntactic information, lexical encoding, morphological context, process model, amalgams, phonetic simplification, semantic levels, semantic complexity, analogical formation, fundamental frequency, allomorphs, plural allomorphs, allomorphic pair, primitive tendency, voice assimilation, denominator plural, prefix, suffix, suffix superimposition, plural suffix, progressive assimilation, final vowel lengthening, internal vowel deletion, vowel shortening, inflectional morphology, segment, suprasegment, input amalgams, phonological rules, bound rules, free variation of allomorph,

disambiguation of the features, unification of allomorphs, suffix-initial vowel deletion, v-insertion, warm-up period, pitch, rhyme, morpheme, unified plural morpheme, rounding harmony, fronting harmony, tape-recording, video-tape recording, child language data exchange system, coding convections, language production, wireless microphones, using directional microphones, recording technology, sampling strategies, non-intrusive recording methods, and detailed systems for coding, coding schemes, analytic techniques, hand-written transcripts, typewritten transcripts, transcription methodology, and cross-investigator reliability, microcomputer software, microcomputer word-processing systems, standard data-processing techniques, transcript data exchange system, automation of coding, automation of analysis, data-processing hardware, data-processing software, tense, aspect, data collection process, data transcription process, data coding process, data analysis process, semantic categories, agent, patient, instrument, transferred object, created entity, removed object, location, realized adjective, action, pragmatics, pragmatic categories, pragmatics aspect of notion, pragmatic aspect of comment, semantic coding scheme, interactional features, individual differences, imitation, acquisition, language acquisition, language acquisition theory, and second language acquisition theory, parental speech acts, CALARSP system for data, PEPPER system for data, DBMS systems for data, datatrieve system for data, RS-I system data, INGRES system data, child language development, informal speech, formal speech, line headers for data, unmarked utterance, declarative utterance, dialectal variation, stylistic variation, colloquialism, word stress, contrastive stress, time marking, ergative marking, morphemic semantics, cross-linguistic study, morpho-phonological comment, oblique, compound, contraction, metathesization, ellipsis, dummy morpheme, empty morpheme, structural coding, subject, object, topic, comment, coordinate clause, subordinate clause, foregrounded clause, backgrounded clause, appositive, prosody, paralinguistics, paralinguistic criteria, alternative transcription, situational contextual coding, interactional qualifiers, response, imitations, affirmative answer, negative answer, answer to yes-no question, answer to wh-question, completion, request for repetition, compliance, denial, refusal, noncompliance, question command, request, invitation, prompt, suggestion, repetition, expansion, elaboration, break-down, rephrasing, gesture, proxemics, free translation, errors, incorrect morpheme order, agreement error, affix semantic extension, stem semantic extension, blend, malapropism, secondary stem overgeneralization, primary stem overgeneralization, consonant assimilation error, harmony error, selection error, sandhi error, tone error, allomorphy, allomorphy errors, allomorphic resolution, segmentation error, superfluity, contradiction, redundancy, grammatical redundancy, over-analysis, neologism, anticipation, perseveration, exchange, omission, stranding, hesitations, retraced false start, word repetition, syllable repetition, drawling, consonant repetition, filled pausing, incompletions, systematic analysis of language transcripts, Oxford Concordance Programs, computational formalism, corpus-driven computational modeling, connectionist algorithm, connectionist model, connectionist approach, neural modeling, generative grammarians, three-dimensional word-class, syntactic cues, phonological cues, morphological cues, lexical semantic cues, word order cues, and intonational cues, converging cues, competing cues, systematic interactions between cues, cue prepotency effects, cue availability, accusative, accusative marking, nominative, Instrumental, Comitative, dative, genitive prepositions, subject-verb agreement, word order, word agreement, free parameters, phonological representation, orthographic representations,

pseudo-homophone, phonological activation, phonological pattern generator, word recognition, phonological recoding, naming task, naming accuracy, feedback, corrective feedback, negative feedback, feedback loop, universal grammar (UG), conservatism, item-based learning, item-based constructions, indirect negative evidence, competition, cue construction, emergentist theory, emergentist model, grammatical competition, competition model, unified competition model, functionalist model, the poverty of the linguistic input, poverty of stimulus, input degeneracy, input gain, logical problem of language acquisition, Plato's Problem, Chomsky's Problem, Gold's Problem, Baker's Paradox, negative evidence, positive evidence, species-specific innate hypotheses, congenital specialization for language, innate knowledge, learnability theory, generativist analyses of learnability, finite-state grammar, non-finite grammar, phrase-structure grammar, error-free learning, the empty category principle, structural dependency, the binding conditions, subjacency, negative polarity items, that-trace deletion, c-command, nominal compound formation, control, auxiliary phrase ordering, non-parameterized features, parameterized features, theory of barriers, the repositioning of the auxiliary, embedded relative clauses, item-based auxiliary frames, structural compositionality, compositional production, conjugation, complex-NP constraint, low-error constructions, stative progressives, binding theory, binding conditions, innateness of the binding conditions, medial arguments, theory of parameter setting, marked parameter, unmarked parameter, parallel approach to learnability, optimality theory, optimality theory phonology, optimality theory syntax, revised end-state criterion, end-state grammar, item-based finite-state grammar, subset principle, topicalization, wh-movement patterns, recovery mechanisms, morphological competition, lexical competition, syntactic frame competition, formalizing competition, modelling competition, Kohonen's self-organizing feature map model, developmental sentence scoring, morpho-syntactical measure, morpho-syntactic development, language assessment, morpho-syntax, communicative development inventories, grammatical acquisition process, elliptical null-argument language, argument structure, grammatical complexity, index of productive syntax, elicitation, acquisitional timing, copula, mean length of utterance, case marking, pronominal case, mono-transitive constructions, ditransitive constructions, monolingual processing, head-final languages, canonical condition, scrambled condition, accusative condition, recipient, theme, distractor, computerized language analysis, proposition density, computerized propositional idea density rater program, discourse tasks, communicative adequacy, communicative competence, communicative dynamism, communicative context, automated approaches, Automated analyses, nonautomated approaches, oral-language sampling, type-token ratio, T-unit, micro-linguistic analysis, macro-linguistic analysis, narrative discourse, picture description task, discourse assessment tasks, discourse function, discourse strategies, conversations, monologic genres, Monologic tasks, concurrent visual-auditory tasks, semi-spontaneous tasks, task switching, task-switching paradigm, mixed-task, single-task, Simon tasks, anti-saccade tasks, stop-signal tasks, flanker tasks, change card sort task, communication assessment, spoken discourse, aphasia spoken discourse, extended discourse, microstructural information, and macrostructural information, lexical-semantic structure, cohesion, coherence, connected speech samples, single picture description, picture sequence description, procedural description, interviews, story recall, story retell, picture description, filmstrip narration, personal narratives, systematic analysis of language transcripts, monolingual, bilingual,

emergence of language, models of emergence of language, Chomsky's Universal Grammar, principles and parameters model of language structure, parameter-setting, cognitive module, species-specific communication, inductive approach, deductive approach, nativist approach, genetically-wired modules, neural network modelling, dynamic systems theory, perceptual contrasts, species-specific language gift, language-specific prosodic patterns, trochaic bias as a pattern of sound leaning, audition, inferior parietal, superior temporal, articulation, motor cortex, lexical principles, child-based agenda, child-based meaning, decontextualization, core-periphery model of lexical structure, vocabulary spurt, vocabulary size, vocabulary depth, connectionism, self-organizing connectionist model, lexical feature map model, articulatory gestures, articulatory sequences, output phonology, phonological output, speech output planning mechanisms, operating principle, output, input, input units, output units, input levels, immediate serial recall, serial ordering mechanisms, interference effects, rehearsal, cryptotype, cryptotypic meanings, mini-cryptotypes, Rosch's theory of prototypes, fuzzy categories, inflectional marking, dual-route models, U-shaped learning, two-process connectionist approach, episodic support, initial state, internal state, current state, , agglutination, vowel harmony, morphological analysis, neologisms, acquisition of the first inflections, morphophonemics, diary data, diary observation, stressed syllable, morpheme segmentation, denominator strategy, morphological segmentation, word segmentation, segmentation error, under-extraction, over-extraction, over-analysis, under-analysis, suffix reduplication, suffix redundancy, contradiction, semantic under-analysis, semantic over-analysis, verb-complement agreement, processing universal, universal mechanism, morphophonemic errors, phonemic restoration effect, flexional suffixes, formative suffixes, neologisms, child neologisms, accusative pronouns, Possessive personal pronouns, general denominative, de-adverbial, deverbative, semantic-pragmatic factors, locative, locative deictics, Indefinite suffixes, definite suffixes, dative, suffix assimilation, metathesis, Prefix ordering, segmentation, bound morpheme order errors, semantic information, syntactic information, intonational information, Object agreement, subject agreement, double agreement, agreement marking, Intransitive verbs, transitive verbs, quantifier agreement, auto-tutorial Instruction, A-T instruction, A-T teaching/learning, A-T method, evaluations of auto-tutorial teaching, A-T course structures, video auto-tutorial (video-AT) method of instruction, visuals, printed materials, instructional methods, The American College Test (ACT), unit-mastery grading, individualization, individualized program, perspective hypothesis, perspective taking, ratings approach, elicited production approach, problem-solving approach, verification approach, comprehension approach, recall approach, starting point in production, starting point in comprehension, sentence perspective, intonational stress, contrastive focus, curricular validity, self-report information, frequent testing, advance organizer, mathemagenic devices, interactional content, low interactional content, high interactional content, ecological validity, macrorhythms, procedural semantics, semantic network systems, pragmatic theory of reference, hesitation phenomena, sentential devices, givenness and newness, pronominalization, pronominal referents, emphatic stress, cleft construction, indefinite article, definite article, initialization, extra-grammatical knowledge, semantic strategies, syntactic strategies, pragmatic strategies, competence-to-perform, message processing, syntactic processing, Core grammar rules, penumbral grammar rules, Grammatical processing, semi-grammatical processing, semi-grammar, functional grammar, functionalism, topicalization, coalition of function, topic-agent,

coalitions of surface forms, breakdown of coalition, unity of the surface subject coalition, Vector weighting, conventionalization, optional rules, obligatory rules, form/function mappings, direct mapping, animacy, animacy hierarchy, noun animacy, unnatural situations, prototypic input, best input, qualitative shifts from one strategy to another, quantitative shifts from one strategy to another, plausibility of their combinations, sentence interpretation, induced introspection procedure, non-canonical orders, plausibility of certain lexical combinations, propositional information, pragmatic information, interaction, face-to-face interaction, high interaction statements, low interaction statements, hesitation placement, lexical choice, intonation contour, paralinguistic markers, constituent ordering, social interaction, social intercourse, universal operating principles, a miniature linguistic system, linguistic naturalness, linguistic referentiality, language acquisition device (LAD), continuous morphemes, discontinuous morphemes, pseudomarked forms, unmarked forms, consistent forms, inconsistent forms, referential content of the items, error assimilation, errors as auto-input, free-speech corpus, learner's own productive formations as inputs, baby errors, similar errors, formal overgeneralizations, substitutions, functional substitutions, omissions, Incorrect word order, morpheme placement, performance, competence, performance grammar, communicative function, cue strength, cue validity, cue utility, conflict validity, conflict reliability, device validity, device availability, cue applicability, cue reliability, computational simulation, language typology, topological cues, local cues, medium cue, local processing of grammatical cues, topological processing of grammatical cues, deletion, non-addition (haplology), haplology, stem-end haplology, suppletion, accidental repetition, repetition through reduplication, morph repetition, activation theory, morphophonology, mental lexicon, affix-checking, avoidance (blocking of derivation), schema, false derivational, affix haplology, stem boundary plus clitic, stem boundary plus derivational affix, prefixal inflection after clitic, suffixal inflection before clitic, Inflectional plus derivational suffix, free grammatical morpheme plus clitic, clitic-raising rule, locative clitic, stem-end repetition, circumlocution, ambimorphemic, tolerance of repetition, stem-end duplications, repeated morph constraint, over-marking, under-marking, analytic bead-stringing' model, analytic 'bead-stringing view, shwa-insert affixes, zero morphological marking, acceptance of partial regularity, over-regularization, syllabic allomorph, back-formation, dialectic model, competition system, category-sensitive affix-checker, holistic template-matching, linguistic metatheory, output constraint, extra-syllabic consonants, CV phonology, shwa insertion rule, shwa deletion rule, inflectional processing, temporarily extra-syllabic consonants, permanently extra-syllabic consonants, CV-tier for motor programming, permanently extra-syllabic segments, temporarily extra-syllabic segments, nonsyllabic allomorph, extra-grammatical knowledge, parsing strategy, chunking (analysis), inflectional cues, lexical semantics, animacy manipulation, Child Language Data Exchange System (CHILDES), CHILDES database of transcripts, CLAN programs for analyzing CHAT files, CHILDES system, non-computerized analyses, computerized analyses, English glosses, morphemic coding, syntactically-coded corpus, non-continuous interactions, continuous interactions, lingua franca, a single-character phonemic transcription system, MS-DOS, UNIX, VMS, XENIX, , phonological detectability, cross-linguistic data, cognitive development, minimalist model, ongoing updating, competition-type models, cue competition, information-integration approach, integrated model, principle of detectability, principle of segmentability, visual-auditory cross-modal processing, form-

oriented inflectional errors, form-oriented errors, function-oriented errors, no-marking errors, pseudo-indefinites, low-frequency allomorph, high-frequency allomorph, lexical storage, high-frequency lexical items, low-frequency lexical items, irregular inflected forms, regular inflected forms, morphological accommodation, lexical representations, phonological representations, open-class lexical items, phonological error, transfer, positive transfer, negative transfer, formal level, functional level, co-occurrence, non-prototypical situations, universal built-in prepotency, grammar as anti-nativist, grammar as anti-linguistic, symbolic relation, indexical relations, sign-referent relations, meaning driven analysis, distributional analysis, innateness, domain-specificity, indirectly innate, linguistic Darwinism, Eastern European functionalism, , British functionalism, generative semantics, cognitive grammar, construction grammar, role and reference grammar, role identification, restrictive relative clauses, processing of relative clauses, subject-modifying relatives, object-modifying relatives, sentential relatives, subject-extracting relatives, object-extracting relatives, extraposed relative clauses, non-extraposed relative clauses, parallel function, adjacency strategy, perspective maintenance, accessibility, conjoined clause, clausal unity, fragment construction, morphological marking, self-embeddings, right embeddings, left embeddings, multiple center-embeddings, configurational analyses, enactment technique, fragment construction determinant, clausal unity determinant, crosslinguistic assessment, crosslinguistic comparisons, orthographical depth hypothesis, cyrillic graphemic system, lexical plausibility factors, foreign language acquisition, duration of exposure, amount of exposure, time on task, transfer effect, proficiency test, achievement test, orthography, standard lexical decision task, lexical decision vocabulary test, multiple-choice test, test-taking strategies, familiarity/meaningfulness values, Balota's and Chumbley's model, explicit lexical access stage, postlexical decision stage, Seidenberg and McClelland's interactive activation model, pseudoderivatives, grammatical competence, grammatical impairment, theory agrammatism, given-new task, universal pragmatic tendencies, lexical expletives, dummy subject, discourse context, lexicalization, pragmatic coding, probe task, nonreferent probe, referent probe, non-pronoun sentences, non-pronoun baseline, alternative probe word baseline, pre-pronoun baseline, pre-anaphor control, cross-modal probe response task, reaction time, reaction time method, reaction time analysis, premature reaction time, ambiguous reference conditions, anaphoric reference, anaphoric relations, poverty of the stimulus, uniqueness principle, principle of contrast, pidgin, creole, CHIP framework, automatic coding, conversational interaction, nature/nurture, facilitative input, nativist position, cognitive facilitator, CLAN data analysis, operant conditioning, non-finite-state languages, no-negative-evidence hypothesis, communicative facilitator, levels of learning, learning-on-error mechanism, feature frequency model, agglutinating language, sublativ, superessive, inessive, ablative, language-specific content, language-specific prediction, Cross-linguistic variation, Performance deficits, language-specific knowledge, selective vulnerability of morphology, closed-Class theory of agrammatism, diagnostic category, information value, processing speed, closed-class theory, grammatical morphology, activation pattern, receptive dissociation, expressive dissociation, data-limited processes, resource-limited processes, semantic relatedness, priming effects, maximum likelihood procedure, nine-parameter approach, single-case approach, multiplicative formulae, additive formulae, access model, loss model, verb learning model, verb-driven processing, back-propagation algorithm, homonymy, cue-based connectionist models,

perceptron convergence procedure, u-shaped learning problem, The R&M model, Stemberger's model, auto-segmental phonology, algalgal model, brag-grab problem, lexical identity, convergence problem, crypto-rule problem, slit-silt" problem, early noise problem, phonological regularities problem, input representation, input corpus, zero-marking verbs, homophony problem, regular pattern problem, direct access problem, compounds, derivational status, symbolic model, Semantic grounding, covering meaning, enclosing meaning, surface-attaching meaning, computational lexicography, Whorfian hypothesis, crosslinguistic psycholinguistic analysis, Defense Language Aptitude Battery or DLAB, skill analysis, language reversals, learner reversals, stage reversals, skill reversals, higher-level strategic processes, phonemic recoding, graphemic visualization, translational equivalents, vocal tract models, monitoring or error-checking, auto-support strategies, auto-support mechanisms, input maximization, articulatory control, orthographic learning, phoneme-grapheme correspondence, mapping simplicity, mapping similarity, computational models, receptive phonology, contrastive analysis, match-to-sample test of prosodic contrasts, match-to-sample test of segmental contrasts, same-different tests of prosodic contrasts, same-different tests of segmental contrasts, syllable shadowing, EFL/ ESL, verbal rehearsal, articulatory rehearsal, articulatory loop, auditory loop, articulatory loop model, closed loop, cognate mapping, analogic mapping, semantic transparency, semantic overlap, lexical learning, lexical decision task, verbal learning technique, paired-associate learning, marking complexity, class membership complexity, conceptual complexity, category membership, superordinate, Chomskyan parameter-setting theory, Local marking, nonlocal marking, conservatism, anaphor resolution, immediate pronoun resolution, implicit verb causality, cross-modal probe, causal conjunction, probe recognition methodology, cross-modal technique, unimodal technique, cross-modal probe resolution paradigm, probe reaction time, stimulus-experiencer verbs, experiencer-stimulus verbs, semi-morphological marker, concurrent articulation, phonological loop, phonological store, phonological production planning, articulation-based process, irrelevant speech effect, word length effect, phonological similarity effect, visual presentation, non-articulatory task, finger-tapping, auditory resources, dual-task difficulty, auditory interference, articulatory resources, external auditory interference, internal bone conduction, scalability, generativity, crispness, hand-wiring , gradation, leakage, constrain symbol passing, lexical categories, cognitive models, symbolic dinosaurs, Lamb's stratificational grammar, Markov Model, Constraint models, G-B theory, hand-wired systems, LISP-based production system architecture, AI programs, critical periods, critical period hypothesis, modularity, statistically-oriented models, polysemy, valence bridges, garden-path sentence, learning curve, the power law of practice, time-on-task effect, foreign language tutoring systems, learning strategies, scaffolding, non-word repetition, word density, semantic similarity, Rumelhart and McClelland's pioneering model of the English past tense acquisition, phenomenon of catastrophic interference, naming deficit, auto-association task, semantic-to-phonological association links, plasticity-stability dilemma, DevLex model, WCD-based meanings, WordNet-based meanings, age-of-acquisition effects, Word co-occurrence detector, conversation analysis, classroom discourse, legal oral argumentation, I XML schema, linguistic consortium, TalkBank, clinical Bank, TalkBank data-sharing model, fluency Bank, SLABank, BilingBank, ClassBank, RHDBank, (right-hemisphere bank), dementiabank, conversation analysis bank, CABank, CABank, SCOTUS, SamtaleBank, code-switching corpora, data-

sharing ethics, Truscott's and Sharwood Smith's APT model, Chomsky's theory of Principles and Parameters, Hebbian Learning (comprehension or production), lexically-based transfer, phonological transfer, syntactic annotations, automatic syntactic annotations, sentence annotations, grammatical relations, initial grammatical relations, deep grammatical relations, actual grammatical relations, surface grammatical relations, dependency structures, dependency-based scheme, constituent structures, content words, function words, lexical functional grammar, inter-annotator agreement, definiteness agreement, dependent-head links, rule-based approaches, data-driven approaches, error-driven transformation based learning, word skipping, tree-node insertion, verbal input, syntactically parsed utterances, semantically parsed utterances, automatic syntactic parsing, tagging, data-mining, content analysis, treebanks, statistical disambiguation models, Eve corpus, grammar-driven robust parsing, statistical disambiguation. Grammar-driven parsers, rule-based parser, context-free rule, statistical disambiguation module, transcribed spontaneous speech, agenda-driven bottom-up chart parser, bottom-up parsers, pseudo-context sensitive, onomatopoeia, newspaper-style text, lexical ambiguity, task-specific grammar, corpus-based techniques, grammar coverage, grammar ambiguity, competing modules, early simultaneous bilinguals, late bilinguals, topography-preserving feature map, MacArthur-Bates Communicative Development Inventory, emergentist approach, competition construct, parasitism construct, resonance construct, entrenchment construct, hard-wired modules, grammaticality judgement task, automatic response, nonreflective response, implicit responses, implicit knowledge, explicit knowledge , cross language mismatches, Interactive activation models, word-pseudoword pairs, bilingual mental lexicon, shared model, distributed model, asymmetrical model, shared meanings, separate meanings, separate storage model, word-type effects, concept mediation model, association model, revised hierarchical model, associative priming effects, emergence of linguistic forms, phylogenetic emergence, epigenetic emergence, developmental emergence, processing emergence, social emergence, interactional emergence, diachronic emergence, homeorhesis, homeorhetic process, loose coupling, error propagation, social landscape, linguistic diversity, dialect diversity, initial lexical mapping, auditory map, spatial deixis, extraposition, anaphora, passivization, relativization, phylogeny, ontogeny, acquisition and learning distinction, auditory arena, lexical arena, morphosyntactic arena, interpretive arena, arena of message formulation, arena of expressive lexicalization, arena of sentence planning, arena of articulatory planning, inter-language phenomena, core-periphery distinction, generative theory, cognitive linguistics, computational linguistics, neurolinguistics, emergentist thinking, developmental timescales, interactional timescales, source-filter model of speech production, bilingual input, theory of pivot grammar, agent-based modeling, complexity theory, voice recognition, prosodic analysis, anthropology, ethology, microanalysis of videos, gesture, proxemics, props, prosodies, microgenetic studies, dynamic modeling, TalkBank Browser, indeterminacy in transcription, tedium in transcription, lack of standards in transcription, collaborative commentary, field linguistics, cultural anthropology, Human-computer interaction, cue word frequency, target word frequency, word-frequency, word-length effects, translation ambiguity, interlanguage, imageability, concreteness, dynamic Self-Organization, DevLex-II model, DevLex model, social-communicative awakening, auto-association model, cross-situational learning, type-token, input-output exemplars, output sequence map, input phonology map, input-driven self-organization, MacArthur-Bates

communicative development Inventory, homographs, homophones, binary representation, real-value representation, lesion method, associative learning, dual-code theory, picture superiority effect, general capacity theory, serial position effects, readiness potential, problem-based learning, paired associates, paired-associate learning, interference tasks, concurrent articulation, imaging technology, sentence processing strategy, expressive–receptive language impairments, specific language impairments, comprehension strategies, test of receptive grammar, pseudo-homophone, visual word recognition, grapheme-phoneme correspondences, rapid temporal perception, phoneme segmentation, phoneme deletion, phoneme blending, self-teaching device, stimuli individuation, temporal ordering of stimuli, reading impairment, reading disorders, self-paced reading, phonological priming, incrementalist approach, output phonological buffer, lexicalization process, phonological encoding, picture-word interference task, Stroop-like interference effect, interfering stimulus, repetition primes, just-in-time incremental processing strategy, Phonological priming effects, identity priming effects, lexical competition effects, standardized test, language sparing, auditory detection task, task-dependence, speech error, stimulus–onset asynchrony, cognition–action relationship, initial phoneme criterion of response initiation, whole-word criterion of response initiation, noncanonical views of stimuli, time deixis, space deixis, transitivity system, partial independence, accusative-nominative languages, relativization, co-reference, c-command, theory of government and binding, binding theory, clitic assimilation, syntactic ambiguity, interpersonal frames, social frames, social scenarios, observational learning, implicit causality, stimulus-experiencer, classical theory of rhetoric, situation models, prelinguistic period, co-occurrence learning, semantic vectors, NTL framework, PatPho, PatPho representations, PatPho program, phonological learning model, binary codes, hierarchical cluster analysis, representational scheme, teaching practice, developmental norms, non-engaging lessons, Peabody picture vocabulary test, receptive vocabulary, word-reading skills, medium of instruction policy, continuous cognitive decline, English–French immersion, between-language switching, within-language register switching, operations–word task, bilingual lexical processing, semantic competitor priming, within-language priming, cross-language facilitation effect, tonal language, perceptual input stimulus, visual pitch contours, traditional computer interface, pinyin spelling, high-level tonal, rising tonal value, low-falling-rising tonal value, high-falling tonal value, mid-flat value, componential feature of training, dual-modality feature of training, inclusionary feature of task training, full-form retrieval, full-form chunks, metalinguistic feedback, analogical feedback, L1 hybrid models, dual-route model, retention, narrative comprehension, narrative production, collaboratory workspaces, Lardiere’s feature reassembly, core set standard, core outcome set, Bayesian optimization, prototypicality, diversity, bootstrapping, multilingual competition, analytic forms, combinatorial forms, synthetic form, rote form, minimization, formulation, early differentiation, Genetic variation, epigenetic variation, language sparing, vulnerability of timing, articulatory challenges, individual variation, simple input, input variability, degenerate input, universal phonology, mutual exclusivity, back propagation, s event-related potential, near-infrared spectroscopy, preferential looking, eye-tracking, home-bank, cloze test, translation test, schematic diagram feedback, metalinguistic rule feedback, incrementalism, neuroemergentism, articulatory phonology, child language, child phonology, bilingualism, and

at-home daylong recordings, computerized language analysis, gesture–speech integration, communication commentary, The PhonBank project,

#### **Section 4: The Systematic Review**

Now we present three highly substantive tables of the systematic review associated with journal articles, book chapters and books. The tables (Tables 7- 9) contain 5 columns: type of research work containing the authors and date of publication, research which summarizes the main content of the investigated work, practice portraying the implication and application of the research work, and macro-themes and micro-themes. As noted, in the systematic review, all three tables contain a qualitative analysis which is concerned with research and practice or an abstract and implication. We now turn to the results of the systematic review below.

**Table 7***Analysis of Articles*

Articles	Research	Practice	Macro-Themes	Micro-Themes
Osser, Ostwald, MacWhinney, & Casey (1973)	The article investigates glossolalia from psycholinguistic perspectives, and examines acoustic patterns on the basis of four speakers: Three of the four speakers had higher vowel-to-consonant ratios than are found in English speech.	The study has implications for the linguists and researchers. They can discover and explore varying representations of glossic behavior as a ground for a typology of speech behaviors.	8, 9	12, 13, 14, 15, 16
MacWhinney (1975)	The article investigates the role of rote-memorization, analogic formation and rule-operation in the production of plurals by Hungarian children: The effect of rote-memorization was seen to be more than that of analogic formation.	The study has potential implications for researchers and linguists as well as language teachers. They can use the strategies suggested for morphology and word formation: This can contribute to both education and research.	1, 2, 3, 7	4, 14, 21
MacWhinney (1976a)	The study reviews an array of data on the acquisition of Hungarian morphology and syntax and examines topics such as morphological analysis, neologisms, acquisition of the first inflections, morpheme order, word order and agreement.	One of the main implications is for researchers; they need to further investigate case markers which can probably be associated with verbs in pre-lexical structure and they also need to investigate the factors governing pragmatic ordering.	1, 2, 11	11, 12, 13, 14, 15, 16, 18
Fisher & MacWhinney (1976)	The study provides two brief reviews including an impressionistic evaluation of Autotutorial (A-T) teaching in the California and a paper by Mintzes reviewing 20 studies. Therefore, it examines A-T as an effective method of instruction.	One of the implications is that A-T method can be applied to other subject areas, so teachers need to perform needs analysis in applying A-T instruction and evaluation.	1, 2, 9, 10	21, 25
Fisher, Guenther et al. (1977)	The paper presents the results of the evaluation of a video-autotutorial (video-AT) method of instruction employed in teaching an introductory genetics course with use of a comparative gain in knowledge of the subject as measured through objective tests of achievement.	There exist varying potential implications in the study for teachers. For example, they need to value video-autotutorial (video-AT) method as an important method of instruction, and also consider frequent testing and individualized programs needed for students' progress.	2, 3, 9, 10	9, 21

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Keenan, MacWhinney & Mayhew (1977)	The study examines the difference between sentence processing in the context of natural communication and in laboratory experiments: A dramatic difference in memorability between statements classified as high and low interactional content is observed.	Researchers need to consider the relative significance of various factors required for controlling the interactional context, such as the degree of previous involvement with the speaker, the amount of active participation and the formal identity of speech acts, etc.	2, 3, 6, 7, 8	1, 9, 11,
MacWhinney & Osser (1977)	The study investigates the role of communicative explicitness, sex, and social class upon children's utilization of a wide variety of hesitation phenomena. It was found that hesitations served 3 major functions: preplanning, co-planning, and avoidance of superfluous verbalization.	The study has varying implications. It motivates interested researchers to investigate a huge variety of hesitation phenomena as used in different communicative situations.	1, 2, 3	1, 9, 11
MacWhinney (1977)	The article draws on a number of linguistic and psycholinguistic studies and examines perspective as the starting point of the sentence. It also explores the way sentence processing depends upon the active construction of a perspective, i.e., a speaker's or a listener's active involvement in a sentence.	The study has implications for researchers; it facilitates further investigation into the relation between the abstract, but highly motoric imagery of the perspective hypothesis and the abstract mental code proposed by Clark and others which demands further clarification.	1, 11	1, 12, 14, 15
MacWhinney, & Bates (1978)	The study examines a set of devices in functionalist theory including ellipsis, pronominalization, emphatic stress, the indefinite article, the definite article, and initialization: The results showed that increased givenness was marked most clearly by increased ellipsis and the use of the indefinite article.	The general implication is that researchers need to consider that there is a fair degree of consistency in the functional determination of the use of the sentential devices across both languages and ages.	1	15
MacWhinney et al. (1982)	The study aims to determine whether the difference in memorability between high and low-interaction sentences was in fact due to the interactional content of the sentences or whether it was due to some other property of the test sentences: The difference did not vary as a function of involvement in the conversations.	In terms of memory, there exist implications for language teachers and learners; teachers can provide language learners with chances and properties associated with interactional content and involvement: The more they involve learners in the interactional content, the more conversational they can possibly be.	1, 2, 3	9

Bates et al. (1982)	The study examines functional constraints on sentence processing in the light of the competition model and a functionalist approach to grammar in a principled way: The results from different performance domains can be unified within a single, coherent performance grammar.	The study can potentially have multiple implications. It initiates linguists and researchers into carrying out some production and acceptability judgment studies using the competition or convergence approach adopted in the article.	1, 11	1, 4
MacWhinney (1983)	This study examined four universal operating principles for first language acquisition and the applicability of these principles to second-language acquisition: The four principles functioned significantly in the learning of the system by 5- to 7-year-olds, but not by adults.	Teachers for young learners can use playful techniques, such as games, families of animals, hotels, etc., to maximize the referential richness of the communicative context in which the miniature linguistic system is acquired.	2, 3, 11	9, 11, 21
Butler Platt & MacWhinney (1983)	This article tests the hypothesis that a lot of grammatical errors observed during the course of language development can serve as 'auto-input' leading to the acquisition of new expressive forms. The results support the findings that errors can serve as auto-input and affect language learners' competence and performance positively.	The study is rich with pedagogical implications. One main implication is that teaching oneself is an important way of learning so that large segments of the language proficiency of adults and children derive from auto-instruction. This means that they can teach themselves both their own errors, and their own correct productions.	1, 2, 3, 9	7, 9, 21
Bates et al. (1984)	This article compares sentence interpretation in American and Italian children aged 2-5. Italians relied primarily on semantic cues, whereas American children relied on word order. In general, the data did not support claims regarding the existence of universal hypotheses about language structure.	There are psychologically inspiring implications for researchers; they are required to further investigate the fact that whether it is true children first tend to rely on pragmatic and semantic strategies, whereas, later on, they rely primarily on word order to determine the basic grammatical relations.	2, 3, 6, 9	9, 11, 12, 13, 15, 21
MacWhinney et al. (1984)	Linguistic and psycholinguistic accounts concerning the study of English may prove unreliable guides to sentence processing in even closely related languages, such as German and Italian with reference to word order, agreement, animacy, and stress. A related work by Li et al. (1992) in Chinese context is suggested for further study.	The study has multiple implications. One of the implications is for teachers of German and Italian. They need to focus on stress which plays a role in terms of complex interactions with word order and agreement.	2, 3, 7, 11	9, 14, 15

Menn & MacWhinney (1984)	The study examines repeated morph constraint. It presents a psycholinguistic processing model driven from language acquisition, draws on activation theory and affords a unification of the linguistic data while allowing for their variety.	The main implications of the study are that there exist no strong universal constraints against morph repetition. Therefore, linguists and researchers should consider parameters in addition to universal principles.	11	15, 18, 21
Stemberger & MacWhinney (1984)	The study investigates the role of extra-syllabic consonants in CV phonology: If a rule of shwa insertion or shwa deletion is considered, the errors can only be accounted for by assuming that temporarily extra-syllabic consonants exist and that permanently extra-syllabic consonants are not pronounceable.	The study has implications for researchers in the field of syntax and linguistics. They can further investigate the issues with reference to somewhat similar features with other languages.	11	13, 14, 15
MacWhinney, Pléh & Bates (1985)	The article investigates three experiments on sentence understanding by Hungarian preschool children with use of competition model. Experiments 2 and 3 supported the ecological validity of the experimental method. Closely related to case marking, articles by Kempe and MacWhinney (1998) and Mitsugi and Macwhinney (2016) are more informative.	The study has implications for further research, as researchers can investigate the question whether it is possible to provide a full account of sentence processing based upon the competition between a set of cues.	1, 2, 3, 11	1, 4, 10, 12, 13, 14, 15, 16, 17, 18
Stemberger & MacWhinney (1986a)	The article examines speech errors as a way of understanding key features of cognitive processing and focuses on form-oriented errors in production tasks, and the failure to add an inflection. It indicates that language processing is sensitive to the form of the output. It provides support for an interactive activation view of cognitive processing.	The study has implications for researchers and linguists. It can motivate the researchers and linguists to more specifically deal with the details of the workings of inflectional rules and further explore how speakers process unintended words that are similar in form to the intended word.	11	1, 4, 13, 14, 15, 16, 17, 18
Stemberger & MacWhinney (1986b)	This article examines the ways in which speakers store regularly inflected forms and focuses on the use of these forms in production. So, the study raises two questions: First, are inflected forms such as “walked” stored in the lexicon? Second, do	The study has varying implications. Since children can potentially store their own errors, for example, ‘ated’, as new lexical items, teachers should raise their consciousness of this issue and avoid the potential fossilization.	2, 3, 11	13, 14, 15, 16, 21

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MacWhinney (1987a)	<p>speakers analyze such forms into their component morphemes?</p> <p>The article brings together a set of papers devoted to the experimental study of sentence processing by bilinguals in their second language. It shows the usefulness of viewing sentence processing in terms of cues whose strengths and interrelations vary as a result of learning and processing. The result is that learners transfer their L1 sentence processing strategies onto sentence processing in L2.</p>	<p>One of the main pedagogical implications of the study is that researchers can potentially investigate the Competition Model as a useful tool for research in second language acquisition. If researchers bring to the forefront the pedagogical implications of the findings from the model, they can help teachers have a realistic picture of the second language learner.</p>	2, 3, 4	1, 4, 6, 13, 14, 15, 16, 17, 18, 21
MacWhinney & Pléh (1988)	<p>The study reports on possible determinants associated with the processing of relative clauses. It examines the grammatical role of the head, the shape of surface order configurations, the occurrence of interruptions of the main clause, the importance of perspective maintenance, the conflict between focusing on the relative clause and focusing on the main clause, morphological cues, and object/subject-modifying relatives.</p>	<p>The study has implications for syntacticians who conduct research into the processing of relative clauses in Hungarian. It can help teachers realize the differences between the processing demands of relative clauses in Hungarian and provide numerous tasks for lowering down the cognitive demands related to processing the clauses and facilitate their application in communicative context.</p>	11	1, 14, 15, 16, 17
MacWhinney & Leinbach, Taraban, R., & McDonald, (1989)	<p>The study examines the development of a computational model of the acquisition of the gender, number, and case paradigm for the German definite article with use of the computational formalism, i.e., connectionist algorithm. The models are compared. Also, closely connected to the study, research works by MacWhinney, (2010b) and Macwhinney and Li (2008) provide an informative background to computational model.</p>	<p>The study has implications for German language researchers; it can help them understand German-related data on the acquisition of definite article in German and provide communicative tasks which can facilitate the production and use of definitive articles for interactional purposes.</p>	1, 2	1, 4, 5, 13, 14, 15, 17

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Wulfeck et al. (1989)	The study examines how the forms of reference are used by aphasic patients influenced by universal pragmatic principles, syndrome-specific symptom patterns and language-specific constraints. Pragmatics of reference was observed in both Broca's and Wernicke's aphasics. Concerning aphasia issues, Fromm et al. (2022) is more informative, too.	There exist implications for researchers. For example, the issues of lexical and grammatical impairment can provide further evidence and strong motivation for researchers to investigate the finding that knowledge is preserved in aphasia.	1, 2, 3, 5, 6, 7, 8, 11	1, 8, 10, 11, 12, 14, 15, 19,
Bohannon, MacWhinney, & Snow (1990)	The article sheds light on three main themes: learnability proof and innateness of language, innate restraints and language learning, and feedback.	EFL teachers are required to take into account the key role of corrective feedback, as this can lead to a highly effective outcome of learning.	1, 2, 9	9, 10, 21, 24
MacDonald & MacWhinney (1990)	Two cross-modal experiments investigated changes in activation levels for pronominal referents and non-referents. In both experiments, responses to probes corresponding to non-referents were slower in the presence of an unambiguous pronoun compared to the no-pronoun condition. The results in brief indicate that pronouns inhibit non-referents.	The implication can be for researchers. They can further investigate the discourse shifts associated with pronominal reference, and the sensitivity of probe response tasks in varying contexts.	6, 11	10, 11, 12, 14, 15
Sokolov & MacWhinney (1990)	The study examines CHIP as a computer program for the automatic coding and analysis of parent-child conversational interaction. It used three longitudinal corpora from CHILDES: The results indicated a high degree of contingency between parental and child language for different word classes across a large span of development.	One of the main implications is for researchers. They can replicate the study or reanalyze the data for other related purposes. Also, they can do further research into conversational interactions between parents and their children maintained across word classes.	1, 2, 3, 8, 10	6, 7, 9, 24
MacWhinney & Leinbach (1991)	The study examines a series of 13 problems raised by the verb learning model. As a result, connectionist models are considered extremely useful ways of justifying the learning of inflectional systems.	There exist varying implications for researchers and linguists. They can study the article and enjoy the applicability of connectionist models to language processing or learning.	1, 2, 3, 11	4, 5, 13, 14, 1516, 17, 18
Bates, Wulfeck & MacWhinney (1991)	The study examines cross-linguistic research in aphasia and reviews issues such as cross-linguistic variation, performance deficits, selective vulnerability of morphology,	The study has implications for linguists and researchers as it can provide a brief review of fundamental issues associated with cross-linguistic method. Also, it broadens their understanding of	1, 5, 9, 11	1, 4, 8, 10, 12, 14, 15, 19,

	<p>patient group similarities and differences, similarity of lexical and grammatical symptoms, competition Model and cross language contrast. In this connection, research works by Guan et al. (2022), Fromm, Holland et al.'s (2011) and Holland, Fromm et al. (2017) are equally insightful.</p>	<p>language-specific and universal symptom patterns in aphasia and offers a promise for the future of aphasiology.</p>		
<p>MacWhinney, &amp; Osman-Sági (1991)</p>	<p>The study uses the picture description task and examines the use of inflectional markings in Broca's and Wernicke's aphasic speakers of Hungarian. It focused on subject, direct object, indirect object, and locative nominal arguments. And pictured a group of individuals whose grammatical abilities are damaged and noisy, but still largely functional. Closely related to the theme of the study is a research work conducted by MacWhinney, Osman-Sági, and Slobin (1991) which is suggested for further study.</p>	<p>The study has implications for linguists and teachers of Hungarian. In instructional terms, it can help them comprehend how to deal with teaching the rich inflectional marking available in agglutinative languages like Hungarian.</p>	<p>11,5</p>	<p>13, 14, 15,18, 19</p>
<p>McDonald &amp; MacWhinney (1991)</p>	<p>The study examines levels of learning with respect to concept formation and language acquisition and within the framework of the Competition Model. This paper extends the domain of the model to the nonlinguistic realm by examining the acquisition of categories in a concept learning task.</p>	<p>There are implications for teachers: They are required to realize that not all errors are soon detected and removed. When errors persist, teachers can help learners accommodate and restructure the errors with reference to their schemata.</p>	<p>1, 2, 3, 11</p>	<p>4, 21</p>
<p>Cohen et al. (1993)</p>	<p>The study examines PsyScope as an integrated environment for designing and running psychology experiments on Macintosh computers; it provides an example of how a simple experiment can be constructed within its graphic environment.</p>	<p>The study has implications for psychology students and researchers in the field of psychology and allows novice and experienced psychologists alike to design and implement psychology experiments without any need for programming.</p>	<p>1</p>	<p>1, 25</p>
<p>Li, Bates &amp; MacWhinney (1993)</p>	<p>The study examines how Chinese speakers use varying cues (e.g., semantic cues, syntactic cues, and semi-morphological cues which all work together) to interpret sentences and offer an interactive model which indicates how cues converge and compete to specify the timing and outcome</p>	<p>The study has implications for syntacticians and linguists. The study can raise their awareness to numerous techniques and help them understand that reaction time method is effective for sentence interpretation, so it can be further investigated.</p>	<p>1, 2, 3, 11</p>	<p>1, 4, 6, 7, 9, 12, 13, 14, 15, 16, 17, 18</p>

	of sentence processing. Also, another informative work by Gao et al. (2022) is recommend which deals with the acquisition of Chinese verb separation by adult L2 learners.			
Gupta & MacWhinney (1994)	The study examined a series of experiments associated with the effect of concurrent articulation on immediate serial recall which serves as a basis for the development of articulatory loop model.	One of the main implications of the study is that there exist some inadequacies in working memory model, thus further research is required to detect the inadequacies.	1, 2, 3, 11	1, 4, 6, 15, 23
McDonald & MacWhinney (1995)	The article examines time course of the use of implicit verb causality and gender agreement information which helps determine the antecedent of a pronominal pronoun; it used a cross-modal probe paradigm and presented a model of anaphor.	Reading the article can be beneficial for researchers. Since the study offers a model of anaphor resolution which can be used as a source of thought and investigation, studying the content of the study can be though-provocative for the researchers.	11	1, 4, 12, 13, 14, 15, 16, 17
Kempe & MacWhinney (1996)	Focusing more on lexical sensitivity, the experiment aimed at establishing a native speaker baseline for both languages and examined whether the selected word material yielded similar results in terms of word frequency effects, error rates and the size of the lexicality.	The study has implications for researchers and teachers; researchers can further research lexical processing in children, and aphasics as a topic in its own right. Teachers should design and develop related tasks for learners and assist them to be more strategic in performing a task.	1, 2, 3, 5, 11	1, 4, 10, 14, 15, 17, 19, 26
Li & MacWhinney, (1996)	This study evaluates the semantic basis for the overgeneralization in language acquisition with a main focus on three simulations. In the first two simulations, the network was unable to recover from overgeneralizations, despite repeated training, but in simulation 3, the network could recover from overgeneralizations with a number of words.	The study can help educators and researchers well-realize the role of the plasticity and stability of network learning in the network's ability to recover from overgeneralizations.	1, 2, 3, 11	4, 12, 13, 14, 15, 16, 17

MacWhinney (1996a)	The article investigates the ways in which target language structures (e.g., orthography, phonology, lexicon, morphology and syntax) interact with individual differences in language learners and reviews psychological and neurology evidence which points toward a wide variety of individual differences in language learning mechanisms.	The study has implications for teachers in the classroom context. They need to realize the profiles of individual differences and value the specific types of styles and preferred kinds of strategies triggered to the individuals. Also, studying the content of the study can help learners improve functional language learning skills.	1, 2, 3, 7, 8, 9, 11	9,13, 14, 15, 21
Gupta & MacWhinney (1997)	The study examines human vocabulary acquisition processes and verbal short-term memory abilities with use of behavioral evidence and using the computational models and the way vocabulary acquisition and verbal short-term memory might be related. Concerning receptive vocabulary, Shing, Perry et al.'s (2012) work is equally more informative.	The study has implications for researchers and educators, as it offers an integrated model or a conceptual framework which identifies factors which relate verbal short-term memory and vocabulary acquisition and solves problems regarding vocabulary acquisition, and verbal short-term memory.	1, 2, 3, 9	4, 15, 21, 26
Macwhinney, Cohen & Provost (1997)	The study surveys PsyScope as a system for building behavioral experiments on the Apple Macintosh computer using a graphic user interface requiring no computer programming. It supports a wide variety of experimental designs, multimedia formats, and stimulus control.	The study provides researchers with additional user control over psychophysical properties of the screen display currently addressed by systems such as Morphonome.	10, 11	25
MacWhinney, & Pléh (1997)	This study used two dependent variables—choice and reaction time and examined the processing of five major types of cues including subject–verb agreement-marking, object–verb agreement-marking, case-marking, animacy and word order. In syntactic terms, other works by MacWhinney and Osmán-Sági (1997), Yoshimura and MacWhineny (2011), Presson et al. (2012), Presson, Sagarra et al. (2013), Andreu et al. (2012) and Walter and MacWhinney (2015) are highly informative.	The implications of the study can help syntacticians to realize that, in Hungarian language, there exist clear limits to the morphosyntax of language, as the morphosyntax of Hungarian language is not always fully functionally determined.	11	1, 4, 14,15, 16, 17, 18
MacWhinney, (1998a)	The study surveys the nature, varying stages, syntactic and semantic factors and numerous models associated with language, indicating	The main implication is that the article can help the readers to realize the way neural network models contribute to our growing understanding of varying	1, 2, 11	1, 2, 4, 5, 12, 13, 14, 15, 17, 21

	that the successful learning of human language is a tightly copyrighted component of our basic human nature, as all of the main social accomplishments of human culture depend on language use.	aspects of language development, such as auditory, articulatory, lexical, inflectional, and syntactic development.		
Booth, Perfetti & MacWhinney (1999)	The study suggests that children make quick, automatic, and general use of both orthographic and phonological information to recognize written words. One of the results is that older and good readers use phonological and orthographic information sooner and more effectively compared with younger and poor readers.	Teachers can use both phonological and orthographic representations for improving the reading skills of their learners. Also, researchers need to realize that there exists no absolute measure and instrument for children's knowledge of orthographic forms and their naming ability, so researchers should consider the results of such findings with caution.	2, 3, 9	13, 17
Booth, Perfetti, et al. (2000)	The study administered a battery of orthographic and phonological tasks, a rapid auditory task, and a rapid visual task to adults and children with reading impairment. As a result, adults displayed a strong relation between rapid auditory ability and both orthographic and phonological processing.	The study can help educators understand that children and adults with deficits in phonological and rapid auditory ability would potentially benefit from an extensive intervention program, as they can design the relevant task and trigger it to the needs of the adult or younger learners.	1, 2, 3, 9, 11	1, 13, 14, 15, 17
Evans & MacWhinney (1999)	The article investigates the sentence comprehension strategies used by children with expressive (E) and expressive-receptive (ER) specific language impairments (SLI) within a language processing framework. As a result, children with E-SLI and ER-SLI differed from each other in the comprehension strategies they employed.	The study can potentially help researchers realize that in contexts where processing demands are low, children with expressive specific language impairments may appear unimpaired. Scholars can design tasks which are more demanding to see what happens with much large sample size.	1, 2, 3, 5, 9, 11	15, 21, 26
Booth et al. (1999)	The study used whole brain FMRI imaging and three cognitive tasks including auditory sentence comprehension, verb generation to line drawings, and mental rotation of alphanumeric stimuli and examined patterns of brain activation: significant bilateral activation was observed in all three cognitive tasks.	The study has implications for researchers. They can replicate the study on children with a left-hemisphere stroke as well as right-hemisphere stroke.	1, 5, 10	1, 19, 22

Booth, MacWhinney et al. (2000)	The article investigated the development of neurocognitive networks in two cognitive paradigms. One of the results was that healthy children and adults activated similar neurocognitive networks, but there were developmental differences in the distribution of activity across these networks.	The study has implications for researchers and educational psychologists. They can replicate the study in other settings in the light of global findings without any regards to generalization.	1, 2, 3, 5, 7, 11	1, 17, 23
Brooks, & MacWhinney, (2000)	The study used two experiments to examine phonological priming in children and adults, using a cross-modal picture-word interference task: Priming effects reach a peak during a time when articulatory information is internalized in the output phonological buffer. Closely connected to this, Brooks et al.'s (2015) work is also informative.	The study can help teachers use visual input for engaging learners in phonological tasks. Also, it can help them teach phonology-related tasks more effectively.	1, 2, 3, 11	13, 14, 15
Kello, Plaut & MacWhinney (2000)	The study investigated the online relationship between the central processes of speech production and overt articulation with use of two experiments manipulating the timing of Stroop interference in color naming. Depending on task demands, naming behavior can shift between exhibiting a staged or cascaded mode of processing.	The study has implications for educators. They need to help their learners understand how to exert strategic control and realize effectively the link between cognition and action and the way related cognition triggers the related action.	1, 2, 3, 9, 10	1, 4, 9, 17, 21
MacWhinney, Feldman et al. (2000)	The article examines online measures of basic language skills in children with early focal brain lesions. These results advocate a model in which damage to the complex functional circuits gives rise to only minor deficits in process efficiency because of the plasticity of developmental processes.	The content of the article supports and recommends the use of online measures of basic language skills and considers them much more effective than and much better than standardized measures. Thus, researchers can replicate the study in other local setting.	1, 2, 3, 5, 7, 9, 10	4, 8, 9, 22
MacWhinney (2000)	This paper examines the effects of perspective-taking on the processing of sentences and grammar. The perspective hypothesis is on the claim that language allows us to shift perspective on varying cognitive levels.	The study is beneficial for language teachers. It can potentially awaken the imagination of the listener leading to successful sharing of ideas, impressions, attitudes, and narratives.	1, 2, 3, 6, 7, 8, 9, 11	1, 10, 11, 12, 16, 17, 21

Koschmann, & MacWhinney (2001)	The study investigates a new initiative in medical education research, documenting the range of practices used in various implementations of problem-based learning. Medical educators use the tradition commonly employed in linguistics and communication studies of creating shared data corpora.	The study is potentially informative for researchers, as it can enable them to conduct contrastive studies of numerous aspects of problem-based learning associated with varying local contexts.	10, 11	27
MacWhinney, James et al. (2001)	The study examines system for the teaching of experimental psychology, the goal of which is to provide instructional materials facilitating the use of E-Prime in various learning contexts and to construct a Web-based resource for a wide range of instructional materials.	The study has implications for researchers; it can help them provide input to the development of system for the teaching of experimental psychology and the selection of materials for the experiment database.	1, 10	1, 10, 17, 25
Feldman, MacWhinney, & Sacco (2002)	This study examined how children use word order and animacy cues to determine the agent of the action in an on-line sentence-comprehension task.	It can possibly motivate scholars to replicate the study with a much larger group of children in varying settings and on children with both right-hemisphere and left-hemisphere lesions.	1, 2, 3, 5, 11	15, 16, 17, 19
Li & MacWhinney, (2002)	The study introduces a phonological pattern generator (PatPho) and aims at providing an accurate representation system for the phonology of English words and a computational tool (PatPho) that facilitates the generation of phonological patterns. In this connection, Rose and MacWhinney's (2014) research work concerning software-assisted methods for the study of phonology and phonological development is informative.	The study raises the awareness of researchers in syntactic field to the fact that the learning of linguistic structure in neural network models depends heavily on accurate encoding of the statistical regularities implicit in the phonological properties of words.	11	4, 13, 14, 15
Gupta et al. (2003)	The study examines eleven children with early focal lesions compared to 70 age-matched controls to assess their performance in repeating non-words, in learning new words, and in immediate serial recall: All proved to be relatively demanding tasks.	There are possible implications for researchers. It motivates them to further investigate the fact that those abilities remaining more impaired are those which are either more demanding, or less amenable to neural reorganization, or both.	1, 2, 3, 5	13, 21

MacWhinney (2004a)	The commentary explores Truscott's and Sharwood Smith's APT model for SLA; they indicate how SLA can occur without any learning depending only on the tuning of innate principles. While Brian MacWhinney finds some interesting features in their model, he criticizes some other characteristics and claims of their perspectives.	There exist potential implications for teachers. They need to consider motivational and environmental features of SLA process. Therefore, they are required to fully comprehend that no one is perfect, as there is evidence that even advanced learners have problems learning to place the adverb before the verb.	2, 3, 11	4, 12, 13, 14, 15, 16, 21
Sagae et al. (2004a)	The study describes an annotation scheme for syntactic information in the CHILDES database containing transcribed dialogs between parents and children. The scheme is based on grammatical relations composed of billexical dependencies.	The study can benefit the researchers and syntacticians, as it briefly and informatively addresses the needs of the child language acquisition community and provides data for researchers to replicate the study in varying settings with numerous related areas.	11	7, 9, 15,16
Sagae et al. (2004b)	The study examines parsed corpora of child language input data and attempts to automate this process with use of a system that combined the morphological tagger, a rule-based parser, and statistical disambiguation techniques. The resultant system obtained nearly 80% correct parses for the sentences spoken to children.	The study can inspire researchers to investigate the effectiveness of the proposed techniques on other corpora in the CHILDES database and facilitates the construction of a particular processing sequence that minimizes problems caused by the coverage/ambiguity trade-off in parser design.	1, 2, 3, 11	4, 6, 14, 15, 26
Li, Farkas & MacWhinney (2004)	The article investigates a self-organizing neural network model (a growing semantic map and a growing phonological map) of early lexical development called DevLex. The study portrays a dynamically changing linguistic environment in language learning.	The study has implications for researchers, as it provides impetus for researchers to further investigate a number of fundamental phenomena associated with early lexical acquisition by children.	1, 2, 3	4, 5, 12, 13, 21, 23
MacWhinney, (2004b)	The article examines a logical problem associated with language acquisition theory, according to which the input to the learner is too inconsistent and incomplete to determine the acquisition of grammar. Therefore, it elaborates on alternatives such as conservatism, item-based learning, indirect negative evidence, competition, cue construction, and monitoring.	Researchers need to consider that the logical problem provides guidelines for child language research. However, it cannot serve as a deterministic guide for research, so researchers need to take caution in generalizing the related findings. The main implication indicates that just one solution is not sufficient; they need to consider varying solutions altogether.	2, 3, 7	1,4,5,10,12, 13, 14, 15, 21

Hernandez & MacWhinney (2005)	The study examines the emergence of competing modules in bilingualism and deals with varying related issues such as early simultaneous bilinguals, late bilinguals, resonance within emerging modules, DevLex model, and neurolinguistic and emergentist issues. For further elaboration on emergentist approach, MacWhinney's (2006a, 2019d, 2023b) other research works are informative.	One of the inferred implications is that in addition to hard-wired modules, the process and product of language acquisition are nurture-driven rather than born. Therefore, teachers should take the environmental and motivational issues into account.	1, 2, 3, 4,7	2, 4, 5, 6, 21
Dong et al. (2005)	This paper proposes a distributed, asymmetrical model for the bilingual mental lexicon with use of two experiments: Experiment one used the classical priming paradigm with specific methodological innovations. Experiment two examined the details of meaning separation.	Educators can use the contents of the article and help bilinguals realize the significance of integrating conceptual differences and representations into translation equivalents. At the same time, they should inform the bilinguals that they should maintain their L1 conceptual system.	1, 2, 3, 4, 11	1, 4, 6, 11, 12, 13, 14, 15, 16, 17, 21
MacWhinney (2002a, 2002c, 2005g, 2005h, 2005j, 2008b, 2018); Zhang & MacWhinney (2023a, 2023b); Li & MacWhinney (2013); MacWhinney, & Bates (1994)	The studies detail the competition model, some new directions, and an extended formulation of the competition model called the unified competition model which accounts for a much wider range of issues in L1 and L2; the related issues such as arenas, mappings, chunking, storage, codes, support, codes, cues, transfer, age-related effects, and resonance are detailed.	The studies provide us with a high-level road map of a very large territory that can potentially lead to the understanding that there are varying interactive and resonant factors involved in language development rather than just one fixed single factor.	1, 2, 3, 4	1, 4, 5, 9, 10, 21, 26
Tokowicz & MacWhinney, (2005)	The article investigates the contributions of explicit and implicit processes during second language sentence comprehension with use of event-related brain potentials and L2 grammaticality judgment task.	The study can contribute to the development of adequate tools to isolate problem areas in L2 learning that could inform L2 teaching techniques and it also helps teachers to identify what students know, what they should know and what they do not know.	2, 3, 11	1, 4, 15, 16, 17, 21, 24

MacWhinney (2005b)	The study examines issues on linguistic forms which are shaped by forces operating on varying time scales and attempts to comprehend the challenge that how forces mesh together to determine the emergence of linguistic form.	The study can have potential implications for syntacticians, as it can help them note the systemic interactions in varying aspects of language development and language processing.	11	2
MacWhinney (2006b, 2007)	The studies investigate TalkBank which seeks to harness the new information technology to study the great complexities of human talk and details TalkBank research issues, methods, tools and circles. Moreover, Ratner and MacWhinney's (2019), Liu et al.'s (2023) and Zhang and MacWhinney's (2023a) research works are recommended for further study.	The study has implications for educators, as it can help them engage in the multidisciplinary study of human communication and build a new system giving rise to a qualitative improvement in research on communicative interactions.	1, 2, 3, 4, 6, 10	8, 27
Li, Zhao, & MacWhinney (2007)	The article presents a self-organizing neural network model, the input of which is sampled from actual parent-child interactions. It accounts for developmental patterns, such as vocabulary spurt, word-length, word-frequency effects, individual differences in lexical development, and word learning after early brain injury.	Since the study proposes a new computational account of the vocabulary spurt, it can be potentially informative to teachers: After reading the article, teachers will be more capable to raise learners' awareness to the ins and outs of vocabulary development.	1-7, 11	1-15, 23
Prior, MacWhinney, & Kroll (2007)	The study presents a set of translation norms for English and Spanish words in accord with a single written translation for each word presented to bilinguals. Closely connected to this, Prior et al's (2011, 2013) works on translation ambiguity are more detailed and informative.	The effective norms introduced in the study can help bilinguals identify lexical variables that impact on the outcome of translation and help them realize the types of translations they prefer when given the choice.	2, 3, 4	6
Wong & MacWhinney, (2009)	The article investigates the substantial role of phonological instruction in early second language English learning. It reviews and explores the issue that younger learners seem to have a greater facility with sound learning and older learners or adults can efficiently acquire grammar and vocabulary.	The study has implications for teachers and program managers. It can help them notice articulatory skills for younger learners and that the teaching of articulation should not be reduced to non-engaging lessons characterized as a drill or a skill.	2,3, 9	13, 21

Mitsugi & MacWhinney (2010)	This study used self-paced reading to investigate the processing of Japanese ditransitive scrambling by native speakers and L2 learners of Japanese. Relevant to sentence scoring in Japanese context, Miyata et al.'s (2013) work is equally insightful.	The study has implications for researchers, as it can further test the hypothesis that there are no significant differences in reading times among word-order types.	2, 3, 11	1, 17, 18, 21
Prior & MacWhinney (2010)	The article investigated lifelong bilingualism and enhanced efficiency in the light of a task-switching paradigm. The advantages of bilinguals extend beyond inhibition of competing responses, and includes flexible mental shifting as well.	The study can motivate researchers to further investigate the cognitive consequences of lifelong bilingualism through variations in executive function.	2, 3, 47	21
Yoshimura & MacWhinney (2010)	This study examined adult English native speakers' processing of sentences and a conflict between pronominal case marking and word order is observed.	The article has implications for the study of second language acquisition, as it helps educators understand various patterns in second language learning of English pronominal marking.	1, 2, 11	4, 6, 17, 15, 21
Andreu, Sanz-Torrent, et al. (2011)	The article examines narrative production and comprehension in children with specific language impairment (SLI) with use of an eye-tracking experiment intended to report on online narrative comprehension and production in Catalan- and Spanish-speaking children with SLI. Closely connected to this, Andreu e al.'s (2011, 2013) formulation of argument structure in SLI is highly informative.	The study has implication for educators as they can consider the kinds of semantic and syntactic errors associated with retelling and also, scholars can further investigate children's information processing capacity and working memory limitations.	1, 2, 3, 5, 11	1, 15, 17, 19, 21
Liu, Wang, et al. (2011)	The study examines learning a tonal language by attending to the tone in a vivo experiment using three learning conditions. Some results were observed, such as more error reduction in the Contour + Pinyin condition.	The study has potential implications for students of Chinese as a second or foreign language, as it can help them understand the features of the Chinese tone system and use the required techniques and strategies.	2, 3, 9, 11	13, 15, 17
Hong & MacWhinney (2011)	The study reports three studies of bilingual lexical processing, learning experience and working memory in the light of the semantic competitor priming method. In the end, it presented findings in relation to cross-language priming.	The study has implications for educators. They are required to notice individual differences in vocabulary development and help their learners boost vocabulary-learning strategies required for both vocabulary size and vocabulary depth.	1, 2, 3, 4	21

Miyata, et al. (2013)	This paper examines the development and use of the developmental sentence scoring for Japanese as a new morpho-syntactical measure for Japanese: the developmental sentence scoring for Japanese is a helpful and valuable device, more particularly for the language acquisition research.	One of the main implications of the study, among many, is that the researchers doing research into the developmental sentence scoring for Japanese need to consider that it should be used with samples larger than 50 sentences.	1, 9	7, 14, 15
Presson et al. (2013)	The article trained learners of Spanish in a task requiring the production of regular and sub-regular verbs, for forms of sub-regular verbs with and without a transformation related to dual-route model and hybrid models.	The study has implications for educators in Spain context. It can help them understand that learners can be in need of deliberate production practice with difficult patterns, without which they may not potentially achieve full mastery of the various regular, sub-regular, and irregular patterns and verbs.	2, 3, 11	4, 15, 16, 21, 24
Arbib et al. (2014)	The study examines the challenges of action and language mechanisms in the brain. Overall, it provides a novel perspective on neuroinformatics and integrates the development of databases for encoding neurocomputational models and empirical data serving systems and cognitive neuroscience.	One of the implications of the study is that scholars can be encouraged to share their data with others concerning action and language mechanisms in the brain.	1, 2, 3	4, 23
MacWhinney (2014a)	The study examines a core set standard for evaluating the outcomes of treatments for aphasia. It represents varying challenges and dangers associated with a core outcome set that is responsive to conflicting goals and offers more significant guidelines.	There are varying implications implicit in the study. For example, the study can motivate the related agencies and organizations to emphasize and invest in international standardization efforts for dealing with challenges relevant to medicine, education, and technology.	1, 2, 3, 5	19, 21
Mitsugi & MacWhinney, (2015)	This study expands predictive processing to L2 learners of Japanese and compares sentences under three word-order conditions: canonical, scrambled, and accusative. The results underscore the efficiency of morphosyntactic information in processing Japanese.	One of the potential implications of the present study is for researchers; they need to investigate predictive processing with L2 learners at varying proficiency level; this will help teachers realize the fact that L2 learners fail to make full use of case markers predictively.	1, 3	1, 14, 15, 17, 18

Fromm et al. (2016)	The article uses much larger sample size, procedural discourse and personal narratives and investigates proposition density and aphasia and subtypes of aphasia with individuals. Closely connected to this, MacWhinney, Fromm, Holland, et al. (2010), MacWhinney, and Fromm (2016a), MacWhinney, Fromm, et al. (2011) MacWhinney, Fromm, Holland, et al. (2012), Dalton, Stark et al. (2022) and Fornes et al. (2012) are informative.	Researchers need to realize that access to automated analysis tools and the large AphasiaBank database can help further research into proposition density and its link to other aphasia measures.	1, 5, 6	19, 20, 22
Fromm, Greenhouse et al. (2016)	This study investigates the way proposition density can differentiate between persons with aphasia and individuals in a control group. Also, it examines subtypes of aphasia with reference to personal narratives and procedural discourse resulted from large sample size.	The study can be effective for neurologists, linguists and psycholinguists working in the field of aphasia. It can help them realize that proposition density is sensitive to aphasia type and differentiates individuals with Broca's aphasia from the other groups.	1, 2, 3, 5,6, 7, 8, 11	8, 15,19, 21, 23
Tsvetkov et al. (2016)	The study examines Bayesian optimization to learn curricula modeled by a linear ranking function for word representation. The study indicates that the curriculum improves performance on a variety of downstream tasks.	The study has varying implications. For example, educators can study the article and note the issue of choosing the order of learning, i.e., curriculum learning and reformulate and reframe it in a way that they can trigger the curriculum and the related tasks to the needs of learners.	1, 2,3, 11	1, 17, 21
VanDam et al. (2016)	The study examines HomeBank as an online database of daylong audio recorded in naturalistic environments. It is a repository for raw audio files and is an open repository for processing and analysis tools for HomeBank or similar data sets.	There exist varying implications in the article. For example, it can make primary data available to researchers, especially those in child development, linguistics, and audio engineering.	1, 2, 3, 10	7, 13, 14, 15, 21
Williams et al. (2016)	The study investigates a multidisciplinary aphasia dataset of individual patient data for the rehabilitation and recovery of people with aphasia after stroke.	The study motivates scholars and psychologists, and psycholinguists to examines issues related to aphasia and stroke in varying local contexts with much larger sample size.	1, 5, 6	19

MacWhinney (2017a)	The study summarizes crucial issues related to the dialog between emergentist and nativist approaches, and the related problems, language attrition and competition model. Other articles refreshing a shared platform in SLA (MacWhinney, 2017b, 2017c) are also more informative.	The study can be beneficial to educators, as it can help them realize the key issues related to the way children and adults learn a language; it helps them justify language attrition and guides the learners through learning process.	1, 2, 3, 7, 8	2, 4, 21
MacWhinney (2019b)	The study reviews the issue that nature is replete with emergent processes so that all structures in the natural world emerge from the force of constraints on different levels. The study surveys the mechanisms that determine the shape of the emergent patterns.	It can help educators to realize that varying forms of natural languages are in the service of communicative functions. Therefore, whatever theory is coined should be connected to practice.	1, 2, 3, 5, 11	1, 2, 4, 23
MacWhinney (2019c)	The study reviews the TalkBank system providing online multimedia data for 14 types of spoken-language data, such as language in aphasia, child language, stuttering, child phonology, autism spectrum disorder, etc. Also, those more interested in the issues related to dementia, Liang et al.'s (2022) and Zhu et al.'s (2023) research works are more informative.	The study has implications for researchers and educators. It helps them get familiar with data analysis methods with reference to TalkBank and it contributes to language therapy, clinical diagnosis, and second language teaching.	1, 2, 3, 5, 6, 10	1, 4, 7, 8, 19, 22, 27
Fromm, MacWhinney & Thompson (2020)	The current article seeks to implement a new, single, composite computerized language analysis command for the full set of 51 northwestern narrative language analysis codes and evaluates its reliability for coding aphasic language samples. In the same vein, MacWhinney, Roberts et al.'s (2020) and Yang et al.'s (2022) research work on computerized language analysis–index of productive syntax is more informative to reflect over.	The study can motivate scholars and educators to replicate the study and examine analysis of spontaneous speech samples for determining patterns of language production in people with aphasia in their own local context.	1, 2, 3, 5, 10	7, 19, 27
Power et al. (2020)	The study examines the pattern and nature of narrative discourse impairment in people with severe traumatic brain injury (TBI) during early recovery and describes the communication abilities of a group of individuals with severe TBI. The patterns	The study has implications for psychologists, researchers and educators. The performance of people with severe traumatic brain injury can change according to the nature of task and context; realizing this can help educators to reconceptualize cognitive-communication disorder in classroom context.	1, 5, 6	8, 19

	and change in narrative discourse behaviors following severe TBI are highly individualized. Closely connected to this, research works by Brassel et al. (2016), Stubbs et al. (2018), Togher et al. (2023), Power et al. (2020), and Minga et al. (2021) are informative.			
Minga et al. (2020)	This study examines the impact of right-hemisphere brain damage (RHD) on pragmatic aspects of communication and tests the hypothesis that adults with RHD differ from neurologically healthy adults in the types of questions asked during a structured task. In this connection, Minga et al.'s (2022) work is also more insightful.	Educators can benefit from the study and enjoy ways of asking varying types of questions as a significant part of pragmatic communication. Scholars can be also encouraged to replicate the current findings.	1, 2, 3, 5, 11	1, 9, 11, 15, 16, 21
Fromm, Katta et al. (2021)	The study is concerned with the creation and evaluation of an automated program to score the results of the quantitative production analysis, an approach for measuring structural and morphological characteristics of connected speech.	The study has implications for application in clinical settings as a tool for assessment, treatment planning, and treatment outcome measurement.	1, 2, 3, 11	1, 7, 17
Luz et al. (2021)	The study examines Alzheimer's disease classification for distinguishing individuals with Alzheimer's disease from healthy controls, and cognitive test score regression to infer the patient's Mini Mental Status Examination score.	The study can serve as a basis for understanding the reasons for Alzheimer's disease and the prevention of Alzheimer's disease progression. Also, it can serve the purpose of further research into the related fields.	1, 5	20
Release Collaborators (2021)	The study described recovery of overall-language-ability, auditory comprehension, naming, and functional-communication across participants' age, sex, and aphasia chronicity in a large, multilingual, international aphasia dataset.	Scholars can replicate the study and examine the extent to which earlier intervention for post-stroke maximizes language recovery across a range of language domains.	1, 2, 3, 5	8, 19
Stark, Dutta et al. (2021)	The article examines the development and structure of a working group and addresses major gaps in the spoken discourse aphasia literature, including a lack of standardization in methodology, analysis, and reporting, as well as nominal data regarding the	The study has varying implications. Researchers can help improve the state of research in spoken discourse in aphasia and facilitate the application of research in aphasia that goes beyond the single-word and sentence levels of processing.	1, 2, 3, 5, 6, 7, 9	7, 19

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	psychometric properties of spoken discourse outcomes.			
MacWhinney (1994a, 1995a, 1996b, 2000c, 2000d, 2014c); MacWhinney & Fromm (2016b); MacWhinney & Snow (1985, 1990, 1992, 1994, 2023); MacWhinney & Wagner, 2010); Bernstein Ratner, Rooney, & MacWhinney (1996); Yao et al. (2022)	The articles deal with an international system for exchanging and analyzing child language transcript data, the formation and nature of Child Language Data Exchange System (CHILDES), CHILDES tools for clinical analysis, and the types of computer programs. CHILDES contains three major tools for child language research: the CHILDES database of transcripts, the CHAT system for data transcription/coding and the CLAN programs for analyzing CHAT files. Some of the references listed here (e.g., Sagae, MacWhinney et al., 2004a) deal with CHILDES and linguistics-related issues such as syntactic annotations, child-parent dialog and CHILDES.	The process of collecting, transcribing, and analyzing naturalistic data is extremely time-consuming and often quite unreliable. The study facilitates the sharing of transcript data, automates the process of data analysis and increases the reliability of transcription. The CHILDES can also facilitate the comparison of experimentally generated data with spontaneous data and help the children attain their full potential.	2,3,6, 9, 10	1, 7, 9, 11, 12, 17
	The article examines gesture–speech integration among adolescents who are deaf or hard of hearing and those with typical hearing. The results of the study revealed stronger gesture–speech integration effects among deaf or hard of hearing participants than hearing participants.	The study can potentially motivate researchers to investigate the impact of gesture on communication and language processing.	1, 2, 3	1, 8, 9
Ratner & MacWhinney (2023)	The article investigates a free software system (Computerized Language Analysis [CLAN]) that can enable fast, thorough, and informative language sample analysis. To this end, methods for eliciting, transcribing, analyzing, and interpreting language samples are described and a diagnostic report is generated.	The study can have potential benefits for researchers in the field as it provides an introduction to the use of free CLAN software and can help researchers address specific aspects of grammatical structure.	1, 2, 3, 5, 10	7, 9,19, 21, 27

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**Table 8**  
*Analysis of the Book Chapters*

Book Chapters	Research	Practice	Macro-Themes	Micro-Themes
Bates & MacWhinney (1981)	The chapter explores varying issues on second language acquisition, performance grammar, competition model, functional perspectives, pragmatic and semantic issues, cross-linguistic experiments, production and comprehension experiments and processing strategies related to grammar acquisition.	One of the potential implications is for teachers and researchers. Teachers can use the content of the chapter and help learners understand the significance of strategy use in grammar acquisition. Also, it can serve as a basis for researchers to further investigate performance grammar.	1, 2, 9	1, 4, 11, 12, 15, 17
Bates & MacWhinney, (1979, 1982)	The studies review the details of main themes such as linguistic and psycholinguistic theories, diachronic relation between syntax and topic-comment functions, formalist-functionalist controversy, perspective/salience and the device of initialization in adult English, topicality and syntactic devices, syntax and pragmatic functions, competition model, criterial attribute model, and prototype models and theories.	The study has numerous implications. Researchers and syntacticians can potentially enjoy the considerable evidence proposed for functionalistic approaches, as these approaches can serve the purpose of the acquisition and use of grammar.	2, 3, 7, 11	4, 15, 21
MacWhinney (1982)	The present chapter extends the computational model of the acquisition of morphophonology presented to the acquisition of word-order patterns. Also, it explores six alternative strategies in word-order processing: rote, analogy, predispositions, bound patterns, free patterns, and class-bound patterns.	One of the potential implications of the study is for researchers. They are required to go beyond the analogy and begin to conduct research into the fundamental patterns that govern the acquisition of cognitive systems.	2, 3, 11	1, 4, 11, 12, 13, 14, 15, 17, 21, 26
Bates, MacWhinney & Smith (1983)	The study presents main issues on functionalism and discusses varying themes, such as nativist position, autonomy, anomalist approach, biological feasibility of modern-day analogism (i.e., functionalism), communicative and non-linguistic issues, learnability theory, ecology of grammar, linguistic Darwinism, formal causality and emergent form, vestigial learning, and automatic and controlled processing. Concerning functionalism, Bates, McNew et al. (1982) is more informative, too.	The study has multiple implications for educators, researchers and linguists: They need to study the content of article for the purpose of broadening their views of the main issues in syntax and pragmatics and apply their findings to their research and instruction context.	1, 2, 3, 11	1, 2, 4, 10, 11, 12, 15, 21
Lempert & MacWhinney (1984)	The study reports on the outcomes of three experiments associated with a sentence form. It identifies whether acquisition of word order relations for this form would be affected by pragmatic ordering principles and whether referent animacy would be included in children's rules for word order: pragmatic factors appeared to play a critical role in the acquisition of word-order knowledge.	Educators need to note that children's acquisition of a form can be affected and controlled by appropriate contextual manipulations and linguistic and nonlinguistic variables. Therefore, they are required to consider teaching and helping learners develop syntax in the light of context.	1, 2, 11	11, 15, 21

MacWhinney (1984b)	This chapter deals with specific devices from the point-sharing system. It lists and explores 12 major devices from the point-sharing system including definite article, indefinite article, pronominalization, ellipsis, relativization, stress, initialization, preverbal positioning, subject-verb agreement, verb selection, case marking, and particles.	There exist potential implications in the study, as it can be informative to teachers to help learners acquire the various point-sharing devices and their polysemes; it will help organize learners' understanding of the devices for a successful communication which will give rise to new ideas.	1, 2, 3, 11	1, 9, 15, 21
MacWhinney (1984c)	The study examines varying numbers of categories and subcategories resulting from numerous sources, such as children's cognitive processing of direct perceptual interactions with the world, and their social interaction with their parents and peers.	The categories can help teachers realize how to help young learners develop the range and level of their words with use of categorization principles and the concrete items around them.	1, 2, 3, 8, 11	1, 2, 9, 11, 12, 15, 21
MacWhinney & Anderson (1986)	This chapter offers a model of language use and acquisition which provides a reasonable account of the fundamental principles underpinning language acquisition. It covers five main themes including general architecture, lexical activation, syntactic processing, monitoring, and acquisition and then summarizes nine acquisitional strategies.	The nine acquisitional strategies which the study outlines and summarize can be potentially informative to teachers, educators, researchers and course designers and can be also used as a part of syllabus or part of an instructional course.	2, 3, 9, 11	4, 9, 11, 12, 15, 21
Keenan & MacWhinney (1987)	The chapter mainly outlines the possible analysis of the component processes in comprehension and production. It reveals the way this framework can be potently used to distinguish between numerous types of comprehension and production tasks.	The chapter can help teachers understand the relation between production and comprehension and the related tasks. This can be practically effective in providing language learners with required input for the purpose of developing their spoken proficiency.	1, 2, 3, 7, 8, 9	1, 9, 15, 21
Stemberger & MacWhinney (1988)	Lexical items are a fundamental part of a speaker's knowledge of language, but it is not clear what (inflectional) items should be listed and stored in the lexicon and that whether they should be stored or not and how. The present chapter examines these issues from a psycholinguistic perspective.	The study has implications for language teachers. It helps them decide what high-frequency and low-frequency words to include in the lexical syllabus of the course they teach.	2, 3, 7, 11	14, 15, 21
Bates & MacWhinney (1988a)	The study compares and contrasts the principles of Straw Man Functionalism summarized in six beliefs. Overall, it brings the findings of language acquisition in children and language processing in adults within a framework for the study of linguistic performance called the Competition Model, a model inspired by functionalism. Regarding what functionalism is, Bates and MacWhinney (1988b) is highly informative.	The study provides a clear position for linguists regarding the definition, application and research into the concept "functionalism". It helps understand and clarify the extent to which nature and nurture play a role in language acquisition.	2, 3, 9, 11	4, 15, 21
MacWhinney (1989a)	The chapter is mainly concerned with competition model. It first reviews the shift from Classical Theory to Prototype Theory and presents an approach to categorization theories. In fact, it first deals with how competition provides a way of understanding the semantic	There exist varying implications: knowledge of competition and categorization theory can help teachers and researchers understand the crucial aspects of language learning, language	1, 2, 3, 7, 8, 9, 11	1, 2, 11, 12, 15, 21

	ranges of words, then it discusses the acquisition of basic word meaning by children; next, it indicates how words take on various polysemic and extended meanings. Regarding the Competition Model, Li and MacWhinney's (2013) and MacWhinney's (2022a) book chapters are informative.	extension, and language change and the way polysemy can allow learners to use language creatively and dynamically.		
Taraban, McDonald & MacWhinney (1989)	The study examines a connectionist model and explores the mechanisms underlying the learning of grammar by children. It therefore investigates cue learning and cue competition, paradigm formation, learning in a connectionist architecture, and simulation issues. Similar to the main theme of the study, MacWhinney (1993) is also informative.	The coding of the semantic features and sampling in this study are incomplete and insufficient. Therefore, researchers can replicate the study and conduct some research on a somewhat similar issues tackled in the study.	1, 2, 3, 11	4,5,6,10, 13, 14, 15, 16, 21
Klahr & MacWhinney (1997)	The chapter provides a short historical account and overview of the emergence of computational approaches to cognitive development, lays out three classes of computational models and details two types of computational models: production systems and connectionist systems.	Language teachers can use the new tools for computational modeling and broaden their understanding of cognitive development and help their learners develop cognitive techniques and strategies for learning.	1, 2, 3, 7	1, 4, 5
MacWhinney (1992b, 1997a)	The chapters deal with nativist approach, empiricist approach and competition model. They indicate that L1 acquisition and L2 learning are driven by the competition model. The model is characterized by lexical functionalism, connectionism, input-driven learning and capacity limitations in terms of short-term memory.	Reading these two chapters can provide an informative background for language teachers and researchers and help them adopt a balanced position between nativism and empiricism. The competition model can help them adopt this position.	1, 2, 3, 7	1, 4, 5, 21
MacWhinney (1992c)	The study explores the application of the Competition Model to the study of second language acquisition and distinguishes between transfer from L1 and direct learning of L2. The model predicts certain typical varieties of transfer during the process of phonological, syntactic, and lexical learning. In this connection, syntactic transfer in English-speaking Spanish learners by Morett and MacWhinney (2013) is also informative.	The study has implications for teachers and researchers. Teachers are required to realize the way transfer can negatively affect their learner's learning outcome if feedback is not appropriately performed. Also, researchers can further investigate the construct of transfer.	1, 2, 13,7, 11	3, 4, 11, 12, 13, 15, 18, 21, 26
MacWhinney (1994b)	The study charts out a path that helps escape from the dangers of hand-wired complexity, and reviews cognitive models based on rules and symbols. It offers a connectionist networks extension of the competition model which relies on lexical item and lexical categories as ways of managing processing and learning.	The study has implications for linguists and researchers. They need to mind that there exists a danger in insufficient clarity and evidence. Whatever they research should be on the basis of multiple evidence in order to be justifying.	1, 2, 3, 11	1, 2, 3, 4, 5, 10, 12, 13, 14, 15, 16, 17
MacWhinney (1995b)	The study focuses on the design of foreign language tutoring systems within the framework of varying lessons from experimental and cognitive psychology, developmental psycholinguistics and SLA research. It pinpoints the significance of error diagnosis, feedback, transfer, time on task, context, communication, and learning strategies.	The study provides a reasonable and practical guidepost for educators and teachers in classroom context. They are encouraged to study SLA research findings and justify their real teaching activities in the class.	1, 2, 3, 7, 8, 10	4, 5, 9, 10, 11, 21, 24, 26

MacWhinney, (1998b)	The study examines a consistent framework and methodology for elicitation, recording, transcription, and analysis of data, i.e., the CHILDES (Child Language Data Exchange System) Project and also deals with the development of research methodology from the pre-computer period into the current period of connectivity and exploratory reality. The effectiveness of technology is represented in MacWhinney's (2022b) two-page elaboration on the future of digital language learning.	One of the potential implications of the study is motivational. It can inspire researchers in the field to replicate the study and further investigate language disorder in the light of the CHILDES. Also, it can provide neuro-linguists a rich source of information about how language is processed in the brain.	1, 2, 3, 5, 7	1, 4, 8, 19, 21, 23
MacWhinney (2000a)	The chapter surveys issues related to a rigid set of social conventions or rules which affect the linguistic behavior of the members of the society: These conventions make a contribution to the mutual understating and communication of the members of the society.	The study has implications for sociolinguists and classroom teachers, as they need to analyze the social rules and conventions and raise the communicators' awareness of the nature and significance of social rules in their effective communication.	8, 11	9
MacWhinney, (2001c)	The study reviews and surveys a general framework for language learning in the light of a three-way interaction between the input, the learner, and the context. It also explores other fundamental issues such as roles of transfer, automatization, plasticity, commitment and parasitism in the learning of L2.	The study can help language teachers to realize the significance of auto-support compensating for the adult learner's loss of neuronal plasticity and social support. Also, it can help them move beyond a uniform structure in which interaction is controlled by the instructor.	1, 2, 3, 7	1, 4, 9, 21
Sasaki & MacWhinney (2006)	The chapter deals with the Competition Model. The model seeks to integrate the traditions of L1 acquisition, L2 acquisition, and adult processing research without relying on the principles from Universal Grammar. Then, it reviews some of the major findings of research it has inspired with a focus on sentence comprehension in Japanese and Korean. For further reflection, MacWhinney's (1997c) further investigation into simultaneous interpretation in the light of the competition model is more informative.	The chapter can help teachers clarify the main issues on human language and bring to the forefront the clear perspectives on L1 and L2: This can in turn help learners to realize their preferred style and strategies for learning.	1, 2, 3	1, 2, 9, 10, 21
MacWhinney (2002d, 2005i, 2008c)	The chapters present a fairly detailed account of gradual emergence of and cognitive precursors to language with reference to the advantages, and neural modifications of bipedalism, social Cohesion, mimesis, systematization, and the related issues such as cultural evolution, social-developmental consequences, and disorders of Communication. Closely related to emergentist accounts, MacWhinney (2001b, 2002b) and Caldwell-Harris and MacWhinney 's (2023) works are informative.	The studies can be of potential implication for researchers and those interested in the emergence of language. So, it can broaden their horizon of the ins and outs of the processes and varying periods during which numerous factors led to the emergence of language. Also, it can help them widen their knowledge of varying cognitive precursors to language.	1, 3, 9, 11	2, 21
MacWhinney (2003a)	The study examines language acquisition with reference to issues such as network model of language acquisition, Chomsky's perspectives,	The study can help researchers how to develop techniques for learning a vast number of words	1, 2, 3, 4, 7, 9, 11	4, 5, 9, 21, 26

	and five main related challenges such as dual route, lexical learning, syntax, neuronal realism and embodiment.	for meeting multiple purposes and further examine the way lexical items can be stored in the brain.		
MacWhinney (2003b)	Due to the significance of language development and that children need to know language for multiple purposes, the chapter examines technical issues in language study, theoretical and empirical review of the language literature, developmental stability of language, and factors that affect the development of language.	The implication of the study is for educators, as they can read the chapter and well-realize the close relationship between knowing a language and children's overall well-being. This will encourage them to help children understand the value of language use for varying communicative objectives.	2, 3, 4, 8	9, 21
MacWhinney (2005a)	The chapter examined a set of hypotheses regarding the age of acquisition and fossilization. The hypotheses include lateralization, neural commitment, parameter-setting hypothesis, metabolic, reproductive fitness, aging, fragile rule, starting small, entrenchment and balance hypotheses.	One of the significant implications of the study is for educators; they are required to realize that it is the age of arrival, rather than length of residence, which can predict the extent of achievement of nativelike proficiency in L2.	1, 2, 3, 7, 8	3, 26
MacWhinney (2005c)	The chapter examines an approach called perspective hypothesis which builds on recent advances in cognitive linguistics, embodied cognition, cognitive neuroscience, anthropology, and developmental psychology. It indicates that perspective taking is at the center of language structure and higher-level cognition.	The study helps educators understand the linkage between the brain, society and language and can possibly broaden their horizon of the fact that communication is viewed as a social interaction that activates mental processes of perspective taking.	1, 2, 3, 7, 8	8, 9
MacWhinney (2009)	The chapter surveys recursion as an emergent property of a set of adaptations that involve six processing systems and explores subsystems such as audition, articulation, lexicon, syntax, storage, and mental models. Out of the interplay of all six of these systems, linguistic complexity arises. As a result, an account of neurolinguistic processing is provided.	The implication of the study is that for producing complex syntax, in both educational and research terms, researchers and teachers should note that the subsystems work together and are integrated and in interaction with each other rather than separated.	1,11	1, 2, 10, 15, 17
Wintner et al. (2009)	The study models the development of language by a series of formal grammars and examines the linguistic capacity of children at the very early stages of mastering language. In terms of the innate, language-specific mechanisms, the approach provides a testbed for evaluating theories of language acquisition.	The study can help researchers examine the sequence of grammars adequately covering the first stages of the emergence of syntax in the language of one child.	1, 2, 3, 11	2, 15, 17, 21
MacWhinney (2010a)	The study reviews the tale of two competing paradigms: Universal Grammar and emergentism. These two paradigms take different positions on these eight core issues in the field. In this connection, a chapter by MacWhinney (2014d) dealing with second language acquisition and the competition mode is highly informative.	Although short, the chapter can have implications for researchers, language teachers, graduates, and post-graduates: It can provide an informative coverage of the main issues regarding UG and emergentism as well as the eight core issues.	1, 2, 3, 7,11	2, 4, 10

MacWhinney (2011)	The study investigates corpus linguistics. It is concerned with developing easily used methods for each of the examined analytic methods and emphasizes constructing a unified database for language studies and related sciences.	The study has theoretical implications for teachers and researchers, as it can widen the horizon of educators to corpus analysis and corpus linguistics.	2, 3, 6, 10, 11	7, 21
Presson & MacWhinney (2011)	The study examines the competition model and language disorders and contrasts disordered language processing with normal language processing. Considering the properties of language acquisition, the chapter helps understand the dynamics of communication disorders and the challenges associated with language disorder.	The study can be beneficial for teachers, researchers and psychologists doing research into language disorder, as it can help explain behavioral and neural patterns of language disorders.	1, 2, 3, 5	1, 2, 19, 21, 23
MackWhinne, Fromm et al. (2012)	The chapter examines AphasiaBank, electronic corpora and the use of computerized data base, i.e., corpora, which are accessed over the internet and then analyzed for content, function and language. It details issues such as protocol standardization, GEM, lexical and morphological coding, MORtable, lexical frequency analysis, COMBO, and error analysis.	The study is effective for scholars interested in research into CHILDES database and CHILDES issues as an international cooperative venture.	2,3,6, 9, 10	1, 7, 9, 11, 17
Presson, Davy et al. (2013)	The chapter is concerned with improvements in computer technology, recommends the integration of web-based language learning into classroom and focuses more on experimental computer-assisted language learning (eCALL) methods which can make student learning more efficient.	The study has more practical implications for classroom teachers: They can integrate technological and digital tools into the classroom teaching and provide deeper support for second language learning.	2, 3, 10	21
MacWhinney (2014b)	The current chapter presents an account of first language acquisition based on the child's learning of item-based patterns, which involve grammatical dependencies between a lexical predicate (such as more) and its arguments (such as milk) to form a new cluster (such as more milk).	The study can be of use for language teachers, as it can help children use inductive operations to acquire these patterns. Researchers can also use the presented framework to construct computational simulations of children's syntactic development.	2, 3, 11	15, 21
MacWhinney (2015)	The study reviews key issues on psycholinguistics and examines six core areas including spoken word recognition, message construction, sentence production, sentence comprehension, crosslinguistic comparisons and neurolinguistics.	The study can help language teachers to realize how to help their language learners to use varying techniques in a dynamic way to process and learn language skills and subskills.	1, 2, 3, 5,7, 9, 11	1, 10, 11, 21, 23
MacWhinney (2015b)	The chapter examines multidimensional SLA, and explains the linkages between theory and practice. To this end, it accounts for second language learning as a multidimensional emergent process in the light of the principles of competition, hierarchical structure, and timeframes. Regarding language and psychology, MacWhinney's (2015b) research work concerning psycholinguistics and the related issues is suggested for further study.	The study provides an efficient background for educators more interested in creating a connection between theory and practice; the chapter, in fact, helps them consider multidimensional view of second language acquisition in the classroom context.	1, 2,3	2, 4, 21

MacWhinney (2017d)	The study explores the role of entrenchment in second language learning. It accounts for how language learning success declines with age. It reviews the findings from the critical period concept, and neural network models and finally resolves the paradox in the light of the Unified Competition Model.	The study has implications for language educators and language learning counselors. They can review varying models and help learners with the process of language learning and with age-sensitive factors.	1, 2, 3, 11	4, 10, 21
Walter & MacWhinney (2018)	The study explores language processing, focuses on predictive capabilities in anticipating words, and examines the predictability of separable verb prefixes in German. The results are compared to statistics drawn from a corpus associated with German speakers' accurate prediction of sentence-final prefixes.	The study has a number of possible implications for researchers and educators. It can broaden their horizon of the way to use corpora for the creation and assessment of language testing procedures.	1, 2, 3, 6, 7, 8, 11	1, 13-17
Wong et al. (2018)	The article investigates the effects of teaching English prepositions using competition model and schematic diagrams inspired by cognitive linguistics in a computer-based tutorial system. Results showed that instruction was effective in all three feedback groups, as measured by a cloze test and a translation test.	The study has implications for educators and scholars. They can use and investigate the three types of feedback including schematic diagram feedback, metalinguistic rule feedback, and correctness feedback in varying contexts.	1, 2, 3, 10, 11	4, 13-15, 21, 14
Zhao & MacWhinney, (2018)	The study investigates the instructed learning of the English article system by L2 learners using a theoretical framework related to the competition model for analyzing the cues to article usage and for designing effective computer-based article instruction.	There are implications for educators in terms of both theory and pedagogy. The article can help them realize the value of explicit instruction in its own place and use the type of feedback learners need for improving their accuracy problems.	1, 2, 3, 11	4, 15, 21, 24
MacWhinney (2019a)	This chapter deals with the Competition Model and the way it can help us understand language attrition. It elaborates on four puzzles arising from empirical studies of language attrition: Puzzle 1: Permastore, Puzzle 2: Variation across levels, Puzzle 3: Childhood forgetting and Puzzle 4: Catastrophic interference. It then offers solutions to these puzzles. For further reading on competition model, MacWhinney's (2012a) work is also informative.	Studying the chapter can lead every individual teacher or educator to the understanding that language is a dynamic and emergent system based on a complex variety of inputs, systems and sub-systems. To solve the problems with language learning and loss, (the combination of) all of the related processes should be taken into account.	1, 2, 3, 9, 11	1, 2, 3, 421
Bernstein Ratner & MacWhinney (2019)	The belief is that a network of linked linguistic open data can contribute to the study of language structure, usage, processing, and acquisition. The study is hence concerned with TalkBank system which has its origins in 1985 with the Child Language Data Exchange System (CHILDES) functioning successfully and used for data analysis purposes.	The study helps researchers understand TalkBank system, gain automatic access to large corpora that can be automatically analyzed and compute a wide variety of measures such as MLU, IPSyn, DSS, TTR, and many others.	1, 2, 3, 10	1, 27
MacWhinney & Chang (2019);	The studies examine connectionism and language learning with the main themes including symbols and connections, grand pretensions, modest reality, lexical items, homophony, compounds, derivational	The studies can potentially help teachers realize that input to the presented model contains a corpus of syntactic frames,	1, 2, 3, 11	4, 10, 11, 12, 13, 14, 15, 17, 21

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Macwhinney, (2000f)	status, and early irregulars. Then, they offer a solution to the lexical learning problem with a view of lexicalist connectionism, maps for retrieval, lexical representation, inflectional morphology, the logical problem, masking mechanism and processing, and a modification system.	phonological association, semantic constructs and pragmatic representations and that all of these constructs are interdependent and intertwined. When they put them in operational definition, the inseparability of the construct is visible.		
MacWhinney (2021)	This chapter surveys TalkBank which provides data during spoken language interactions and attempts to meet individual researchers' needs and their research communities. Also, concerning TalkBank, a research work by MacWhinney, Bird et al. (2004) is informative.	The study can help researchers understand TalkBank and CLAN and accurately perform error analysis developed based on experience in coding errors in aphasia and child language learning.	1, 2, 3, 5, 10	7, 9,19, 21, 27
MacWhinney (2022c)	The study explores the psycholinguistic aspects of second language processing and learning in the light of examining the issues of the trade-off and interaction between implicit and explicit processing and learning, the role of working memory, and processes of proceduralization.	The study can be highly beneficial for teachers and help them understand L2 learning as an emergent process with limitation associated with social inputs, linguistic levels, neuronal support, language competition, neuronal support, and social inputs.	1, 2, 3	2, 21

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**Table 9**  
*Analysis of the Books*

Books	Main Tenet	Implications	Subdiscipline(s)	Domain(s)
MacWhinney (1978a)	The study presents a model detailing the ways in which children in varying language communities acquire the morphophonological structure of their languages. In this model, the processes of combination, rote, and analogy are integrated into a single processing goal stack.	The implications can help educators realize that learning is a cyclical process which leads to application, application leads to correction, and ultimately, correction leads to renewed acquisition: This can help educators get engaged in needs-analysis approach and develop needs-based syllabus and materials.	1, 2, 11	10, 11, 12, 13, 14, 15, 16
MacWhinney (1987b)	The book contains 13 chapters and discusses main themes such as the principles of contrast, SLA theory and machine learning, simplicity and generality of rules in language acquisition, novel word learning and phonology, competition model, variation, and language learning, acquisition of implicit arguments, parsability and learnability, bootstrapping problems in SLA, and a commentary on mechanisms of SLA.	The book is of varying pedagogical applications and implications. Professors can use it as part of course syllabus and materials developers can use it as a key materials-development basis for producing coursebooks.	1, 2, 3, 11	1, 4, 10, 11, 12, 13, 15, 21
MacWhinney & Bates (1989)	This volume is a collection of articles representing the state of the art in the competition model. It deals with the issues that crystalize the real-world and linguistic knowledge required for comprehending and generating sentences, and the related psychological processes and cognitive principles within the framework of the competition model and functionalism.	The book can be used as an effective source of input for educators and researchers; it can potentially engage them in understanding the details of the competition model, functionalism, cue-driven learning, sentence processing and language acquisition principles and processes which can lead to varying implicit and explicit justification of educational agendas.	1, 2, 3, 11	1, 2, 9, 10, 15, 17, 21
Fletcher & MacWhinney (1995)	The book contains 25 chapters on language development issues and reflects the up-to-date complete sourcebook on all aspects of child language development, such as phonetics, phonology, grammar, lexical development, connectionism and government-binding theory.	Studying the present book can help researchers and educators gain profound knowledge of the significance of input, social factors and cognition to language development. Also, it can be potentially used as a part of course syllabus.	1, 2, 3, 7, 8, 11	1, 4-18, 21

MacWhinney (1999a)	This book presents an emergentist account of language acquisition. It introduces varying approaches and theories and examines the aspects of language such as auditory representations, phonological and articulatory processes, lexical semantics, ambiguity processing, grammaticality judgment, and sentence comprehension.	The book has implications for professors, professionals and researchers. The professors and professionals can use it as a coursebook and as a part of course syllabus. By the same token, researchers can use it as a basis for research in the field of child language acquisition.	1, 2, 7, 9	2, 4, 10, 12, 13, 15, 21
MacWhinney & O'Grady (2015)	The book covers the latest integrated theory, and empirical, and methodological issues for understanding human language. In general, it focuses on the ways in which the learning, processing, and structure of language emerge from a competing set of cognitive, communicative, and biological constraints.	The book can be used by graduates and postgraduates as a more comprehensive source providing effective background for further research and practice in the field of language emergence.	1, 2, 3, 11	2, 4, 5, 10
MacWhinney (1992a, 2000b, 2023a)	The studies deal with CHILDES project which comprises computational tools offering data on second-language learning, adult conversational interactions, and child language acquisition. It contains three parts: The CHAT (Codes for the Human Analysis of Transcripts), the CLAN (Computerized Language Analysis) package of programs, and the CHILDES database (both English speakers' data and non-English data).	The implications of the studies are implicit in understanding the fact that the availability of CHILDES has revolutionized research on language data. Therefore, the books can enable researchers to establish a database, automate the process of data analysis, increase the reliability of transcriptions and share transcript data.	1, 2, 3, 10	1, 7, 21
MacWhinney, Malchukov, & Moravcsik, (2014)	The book is concerned with conflicting factors shaping the content and form of grammatical rules in language usage. The chapters analyze grammar and usage in L1 and L2 and the incentives associated with historical change.	The book will be of interest to linguists, graduates, undergraduates and postgraduates more interested in psycholinguistics, historical linguistics, philosophy of language, and language acquisition.	1, 2,3, 7, 8, 11	1-21

## **Discussion and Reflection (Brian MacWhinney)**

Ali and Hassan have provided a remarkably well-organized and comprehensive review of my work. To round this out, they have asked me to add some further discussion and I am very happy to do that. Given the inclusion of this systematic review in LTRQ, it seems that the most helpful form of this discussion would be to highlight those aspects of my work that have the greatest relevance to language teaching research. Toward that end, I can list the following 11 contributions.

### **1. The Classic Competition Model**

Beginning in 1978, Elizabeth Bates and I worked on the construction of a crosslinguistic model of language learning and sentence processing. Empirical work on this model has continued to the present day, including data from child and adult speakers of 20 languages and resulting in over 120 publications. Most of these studies focus on ways in which listeners and speakers use grammatical cues such as word order, case-marking, stress, or honorifics to mark grammatical roles such as agent and patient. Other studies look at cues to co-reference such as pronoun gender or verb causality. Methods have included eye-movement tracking, EEG, fMRI, object manipulation, picture choice, picture description, and cross-modal matching. The core finding of this research is that, for both first and second language learners, cue validity, as measured in corpus analysis, is the principle and final determinant of cue strength and usage. During early stages of learning, the transfer of strong cues from L1 will impact L2 production and comprehension. However, over time the strengthening of L2 cues weakens the effects of transfer. This basic finding seems obvious, but working out the details of how this work has involved studies and measures in many of the following 10 contributions.

### **2. Item-Based Patterns**

In 1974, I spent a year in Budapest studying how Hungarian children learn their grammar. Based on this data and ideas from Martin Braine, I developed a model of grammatical learning as based on item-based patterns (IBPs). For example, a child who knows the word *cookie* could hear the phrase *more cookie* and realize that the combination refers to getting more of something they want. They would establish an IBP for the word *more* which would then generalize to *more milk*, *more blankets*, and even *more hugs*. Next, the child would compare IBPs for words such as *more*, *this*, or *nice* to form the modifier class as a generalization. There is evidence that second language learners go through a similar process, although it is speeded by the ability to match up with similar structures from L1. It is also promoted by language teaching methods such as pattern drills and build-ups.

IBP theory also links up closely to grammatical dependency models of language structure that are now in the mainstream for computational linguists working on NLP (natural language processing), including recent work on large language models (LLMs) like BERT or ChatGPT, as further discussed in contribution #9 below.

### **3. E-CALL**

Between 2004 and 2014, NSF provided funding for the Pittsburgh Science of Learning Center that included support for studies of language learning. We used this support to create several online language learning tutors and tests that are openly available at <https://sla.talkbank.org>.

The online tutors include the Pinyin Tutor, the Jyutping Tutor, the English Preposition Tutor, the English Articles Tutor, the German Grammar Tutor, the Spanish Verb Tutor, the Wikipedia German Article Tutor, the VR Tutor, and the CapVid Captioned Video Tutor. There are also resources for designing “Language in the Wild” experiences such as a tour of Pittsburgh or reading of a dimsum menu.

For each of these tutors, patterns of student usage on the web are stored in a structured database that can then be analyzed to discover learning challenges and patterns. In tutors such as the Pinyin Tutor, this data can be used by the program to customize the course of learning for each student to avoid repetition of easy items and to focus on problem areas. This training follows rules for graduated interval recall, as computed by a model for each student (Pavlik, Bolster, Wu, Koedinger, & MacWhinney, 2008). The tutors can also be configured to run online experimental comparisons between different learning conditions, using within-subject designs. The addition of this feature led us to characterize this work as *e-CALL* or experimentalized computer assisted language learning.

Often these experimental comparisons contrasted explicit rule feedback, basic correctness feedback, and no feedback during training and testing. Across studies, we showed that both explicit rule feedback and correctness feedback are initially equally effective. However, after a delay of two to three weeks, rule feedback is better retained and more effective. These tutors also use score icons and other “gamification” methods to bolster a sense of **mastery** of a given target language structure.

#### **4. A Shared Platform**

In 2017, based on the wide usage and extensive findings from our e-CALL tutors, I proposed the construction of a shared platform for research on second language learning (MacWhinney, 2017b). By configuring methods for online delivery and experimental control, researchers and instructors could work together to improve language teaching pedagogy and theory. Sites such as IRIS at [iris-database.org](http://iris-database.org) illustrate the range of methods that could be implemented. Paul Cobb’s Compleat Lexical Tutor at <https://lextutor.ca> shows how well these methods can be implemented on the web. Adding the ability to harvest and share the data from such efforts across learners and learner types internationally would be a great boon for language teaching and learning theory. However, organizing such an effort would require major grant support, and granting agencies currently believe that the promulgation of commercial efforts such as DuoLingo or Rosetta Stone make it unnecessary to fund alternative platforms, even though commercial platforms are not designed to further the analytic study of language learning.

#### **5. TBLT, CALF, CLAN, and ASR**

The study of task-based language teaching (TBLT) (Wen & Ahmadian, 2019) has highlighted the measurement of the four learning dimensions of complexity, accuracy, lexical richness, and fluency which are summarized in the abbreviation CALF. The assumptions and methods of TBLT are highly compatible with the findings and formulations of the Competition Model, as discussed in detail in MacWhinney (MacWhinney, 2019e). Moreover, as Lambert (Lambert, 2019) has shown, the CLAN programs used in the TalkBank system can be used to compute each of these dimensions from transcribed corpora. Using our Batchalign2 program (Liu, MacWhinney, Fromm, & Lanzi, 2023) at <https://github.com/talkbank>, audio recordings in up

to 70 languages can be transcribed automatically in the CHAT format required for analysis by CLAN and inclusion in TalkBank. Batchalign2 can also apply automatic morphosyntactic tagging for grammatical dependency relations based on the Universal Dependencies (UD) framework from <https://universaldependencies.org> in ways that are very compatible with the IBP framework mentioned in #2. At that point, one can measure grammatical complexity based on the dependency structure. Lexical richness can be computed in CLAN using either the vocD measure (Malvern, Richards, Chipere, & Purán, 2004) or MATTR (Covington & McFall, 2010). Based on the accurate time alignment produced by Batchalign2, fluency can be measured using CLAN's FLUCALC program. Computation of accuracy is more complicated, but we are working on the use of AI (Artificial Intelligence) methods to tackle this fourth dimension of CALF analysis.

## **6. Age Effects and Emergentism**

Although the Classic Competition Model explained many important patterns in first and second language learning, it was not able to account for four aspects of second language learning. First, it ignored the role of social forces on second language learning and input to the learner. Second, it provided little detail on the ways in which the brain supports language learning. Third, it failed to explain ways in which fluency, complexity, and accuracy compete in learners' productions. Fourth, it failed to fully address the evidence pointing to a role for a set of sensitive or critical periods (Werker & Hensch, 2014) putatively blocking nativelike attainment of a second language.

To deal more effectively with these issues, it was necessary to broaden the scope of the Competition Model to include findings from additional research programs. This extended version of the model now formulates language learning as an emergent process, based on evidence from across the sciences that structures emerge across multiple levels because of competing constraints. The emphasis on emergentism is in accord with the dynamic systems approaches articulated by Ellis et al. (2015), Larsen-Freeman (2020), and others. For the level of articulatory phonology, many of these constraints come directly from neural, motor, and physical structures. For other levels, constraints come from memory and processing systems, along with a range of social forces. Applying this analysis to understand age effects in second language acquisition, Caldwell-Harris and MacWhinney (2023) were able to construct an emergentist alternative to the theory of a Critical Period for L2 acquisition. This analysis in terms of levels, constraints, and social inputs has wide-ranging relevance to approaches to language teaching, suggesting that with the proper support mechanisms second language learning can become markedly more effective.

## **7. TalkBank and ClassBank**

Online tutors, captioned video, and immersion experiences provide excellent avenues for second language learning. However, teacher support through classroom or hybrid instruction can serve to bind these experiences together. Unfortunately, there is almost no publicly available data on actual teaching in second language classrooms. This contrasts markedly with the richer tradition of the study of classroom discourse in other subjects. Within the framework of the TalkBank project, the ClassBank system at <https://class.talkbank.org> provides direct access to a large database of classroom interactions through the custom-made TalkBank

Browser. The TB Browser relies on the fact that the video media is time linked to the transcript so that each utterance can be highlighted as the corresponding interaction plays in the video window. This allows users to study interactions and teaching methods directly. This ability further supports a system called Collaborative Commentary which allows users to comment and code specific utterances or strings of utterances while watching interactions online. For example, the collection of 50 videotaped interactions from K-11 classrooms contributed by the APT (Academically Productive Talk) study group can be coded using the LIDO system (Al-Adeimi & O'Connor, 2021), and agreements on each code can be measured to evaluate the overall validity of the analysis system. This same method can also be applied for training language teachers and can be used by language learners seeking to understand the pragmatics of native language interactions.

## **8. SLABank**

SLABank is a further resource within TalkBank. It includes transcripts linked to audio from studies of second language learning of Czech, English, French, Hungarian, Icelandic, Italian, Mandarin, and Spanish. Of particular interest are large learner corpora from projects such as LANGSNAP, SPLLOC, and Nebrija, along with the classic ESF multilingual corpus. Unlike other systems which provide access primarily to student writing, all SLABank data derive from oral production and most of the corpora are linked to the audio. Because all the corpora are in CHAT format, it is possible to analyze SLABank data through many of the CLAN programs.

## **9. CHILDES**

The largest databank within TalkBank is CHILDES (CHILd Language Data Exchange System) which has been providing access to child language data since 1984. The corpora in CHILDES provide information on language learning from 42 languages across the full age range of the first six years of life. Recently, we have begun intense elaboration of the data to allow crosslinguistic analyses across lexical, phonological, morphological, syntactic, and conversational structures. Using the Universal Dependencies framework mentioned in #5 above, we have tagged the data from 27 languages for part-of-speech, grammatical/semantic features, and grammatical dependency relations. In addition, the complete compatibility of the Phon and CLAN programs allows us to provide accurate IPA codes for many of the transcripts. Using these additional coding tiers, we are now able to examine crosslinguistic differences in the acquisition and usage of a wide variety of language patterns. In the future, we hope to be able to apply similar methods to SLABank data.

## **10. BilingBank**

BilingBank represents the fourth case of TalkBank data that are relevant to language teaching. The interactions in BilingBank focus on adult multilingual speakers engaged in code-switching. Three corpora of particular interest are the Eppler corpus of Jewish children who fled to London during the Nazi occupation of Vienna, the Miami corpus of Spanish-English code-switching in Miami and the Bangor corpus of switching between Welsh and English. To facilitate analyses of these corpora, we have developed a method of utterance-level and word-level tagging based on the idea that there is usually a matrix language (Myers-Scotton, 1997) for an utterance which is then shifted at certain points to the other language. Study of

BilingBank materials can illuminate language teaching in terms of sociolinguistic perspectives, as well as ways of thinking about comparisons between interlanguaging and code-switching. It can also be used to elaborate our understanding of language attrition.

## 11. Perspective and Mental Models

Underlying my interests in language structure is a certain curiosity regarding the ways in which we go from the acoustic signal to mental models in comprehension and how we convert mental models to spoken forms in production. For each of these processes, the least well understood dimension of processing is the part that involves mental model construction and usage. The theory of Cognitive Grammar provides schematic ways of thinking about mental models, but that theory has failed to incorporate newer evidence from neurolinguistics about embodied and dynamic cognition. As early as 1977 (MacWhinney, 1977), I suggested that, on both the utterance and discourse level, it is the agential human perspective that serves as the primary organizer of mental models and utterances and that the function of grammatical devices is to track shifts of perspective across the three dimensions of actors, space/time, and reference.

I hope that this summary of contributions illustrates the relevance of these tools and findings to second language teaching. Although learning to use these tools, concepts, and data requires a commitment of time and effort, it could help researchers and instructors develop a fuller view of how people learn languages and how to measure and promote that development. To that end, interested readers can find the original papers involved in the construction of each of these contributions at <https://psyling.talkbank.org/guides> .

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## Acknowledgements

Not applicable.

## Funding

Not applicable.

## Ethics Declarations

## Competing Interests

No, there are no conflicting interests.

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