Liberal Journal of Language & Literature Review
Print ISSN: 3006-5887
Online ISSN: 3006-5895
https://llrjournal.com/index.php/11

Exploring Relationship between Rapid Automatized Naming, Phonological Awareness and Reading Skills in Adults

[1]Anzal Saleem
[2]Prof. Dr. Ammara Farukh
[3]Assistant Prof. Sajjad Hussain

[1]Department of English, University of Education, Lahore, Vehari Campus, Pakistan
[2]Department of English, University of Education, Lahore, Vehari Campus, Pakistan
[3]Department of English, Government Graduate College , Vehari , Pakistan

Liberal Journal of Language & Literature Review
Print ISSN: 3006-5887
Online ISSN: 3006-5895

Abstract

This study aims to determine the relationship between Rapid Automatized Naming , phonological awareness and Reading skills among adults. The study involved 104 students from an underdeveloped district of South Punjab, Pakistan. These students are Multilingual . The participants were within the age range of 20 to 22 years and comprised 50 males and 54 females . The study entailed a RAN test, phonological awareness test and 2 Reading tasks. The time taken to read was the measured variable for RAN tests. The study also employed a phonological awareness task where the participants repeated the non-words read by researchers. Reading task consisted of reading 10 words in Urdu and English of varying difficulty levels. Reading accuracy was measured as the percentage of reading correct words. The results show a non-significant relationship between RAN and Reading Skills(Urdu and English) and significant positive relationship between phonological awareness and Reading skills(Urdu and English among adults. Additionally, RAN is a significant predictor of reading skills as well as faster RAN time indicating better reading performances.Therefore, the study demonstrates the critical role of phonological awareness in reading skills. The results show that phonological awareness has a great impact on the reading skills of adults .

Key words: Dyslexia, Phonological awareness, RAN, Reading skill, Adults

Paper Text

Reading is a skill that is crucial to succeed in life, and varying levels of this particular skill are used in employment, education, and social life. Although the problem is most commonly identified in early childhood, there is a growing body of evidence that shows some people continue to face difficulties with reading through childhood and into adulthood(Snowling, 2000; Snowling & Hulme, 2012) . It is essential to be able to identify and understand the underlying factors of reading difficulties to develop effective interventions and support systems. Phonological processing is proposed as the ability to recognize and manipulate the sounds of language is widely considered a key predictor of reading ability (Bradley & Bryant, 1983). It refers to phonological awareness which comprises the following sets of skills: identifying words in

sentences, identifications of rhymes, identifying syllables within a word, identifying units of onset and rhyme, and phoneme identification (Snowling & Hulme, 2012) . It was later defined on a larger scale, taking into consideration reading and spelling and understanding by phonological decoding" . Reading is considered one of the basic skills to acquire for successful academic, professional, and social development in today's world (Ehri, 2005). Achieving expert reading in a complex alphabetic system requires at least five years of formal instruction(Chall, 1983) . It has been shown that when reading is defined as word identification, and considered separately from spelling, high performance can be observed on objects unrelated to reading, especially rapid automatized naming-out, words and object naming. Substantial inter-individual differences can be identified in literacy performance; approximately thirty percent of children and adults show persisting reading and spelling disabilities (Shaywitz, 2003). Conversely to reading disability, low performance in comparison to one's peers in the bright cases, may be seen as normal development or inability to perform small phonological tasks can still help to predict reading levels or literacy levels (Share, 1995) . In the light of the above, many studies have been conducted, aimed to reveal the connection between phonological awareness, or RAN – rapid automatized naming, also related to reading proficiency. Picture/color RAN scores correlate highly in higher grades but do not correlate with reading in unregular alphabetic systems . The first one is focused on accuracy and the latter on rapidity. Some studies show that RAN is a less sensitive and less positive predictor of reading than knowledge of alphabetical RAN, third graders . However, several studies demonstrate that RAN is a more reliable longitudinal predictor of reading ability than any other measure, it should be noted that it is continuous as opposed to the correct tests on phonological awareness, even for measurements of identifying words .

To understand the relationship between Rapid Automatized Naming, phonological awareness and Reading skills in adults, one can provide a theoretical background that would incorporate the key concepts. Here are some theoretical underpinnings that incorporate the key concepts: * Dual-Route Model of Reading(Coltheart, 2004): According to this model, reading is believed to have two main reading routes : lexical or direct and sublexical or indirect. The lexical route includes direct recognition of words upon presentation, while sublexical may include

reading by letter or another visual symbol or phonological reading. This theoretical framework can help understand the relationship between RAN and phonological awareness, as each of the factors may contribute to each of the reading routes in its turn. * Phonological Awareness: It generally refers to the ability to identify and manipulate the sounds of spoken language, such as syllables, phonemes, or onset-rime units. It may be manifested at different levels, including phonemic , which is linked to individual phonemes, syllables, etc. Lack of phonological awareness skills is also one of the direct causes of reading problems, such as dyslexia . * Rapid Automatized Naming or RAN is, in turn, the ability to name a sequence of items, such as simple objects, colors, or letters aloud as quickly as possible . Strong RAN is one of the indicators of quick and accurate naming speed at spatial and lexical levels. RAN is closely linked with reading comprehension and fluency, although the exact mechanism of influence remains unclear . * The Simple View of Reading(Gough & Tunmer, 1986) is based on the assumption that reading consists of decoding and language comprehension subcomponents. Both phonological awareness and RAN are part of decoding, and by determining the efficiency of decoding, they ultimately determine how word recognition works. Therefore, reading comprehension is a complex function of the quality of word recognition and language comprehension. *

Interactive Compensatory Model(Stanovich, 1980) : ICM is based on the assumption that many cognitive and linguistic factors interact with reading outcomes dynamically . Reading factors such as RAN and phonemic awareness may interact with each other. In this case, adults may use RAN as a compensatory tool for weak phonological knowledge or vice versa(Georgiou et al., 2008). These interaction patterns may be used to design and implement strategically-effective interventions. By combining theoretical frameworks described above and empirical research on RAN, phonological awareness, and other cognitive factors, researchers hope to further advance their understanding of how each of the factors contributes to reading in adults. This evidence-base may be used to develop effective interventions that target literacy not only in children but also in adults.

The purpose of the study is trying to bridge the gap and analyze the relationship between RAN, phonological awareness, and adult reading skills based on the specific problems the adults deal with or have already dealt with. Therefore, we

expect to provide an insight into those 3 parameters, which can help develop specific interventions to enhance the reading outcomes and quality of life around the adult aspect of the problem. What is the relationship between RAN and adult reading, regarding proficiency? How does RAN correlate with Phonological awareness, and reading in adult readers? Are Phonological awareness and RAN combined factors in adult reading?

The purpose of the present study was to investigate the relationship between RAN, phonological awareness, and reading skills in adults . The main aim of this study is to examine the relationship between individual differences in Phonological Awareness and Rapid Automatized Naming and their essential contribution to reading and spelling development in transparent and opaque languages. The study is noteworthy though since it points to a living meaning to the consumers with reading issues, the injury of dyslexia to the understanding and identification of the consumer. First, both RAN and phonemic awareness have been suggested as potential markers of dyslexia. People who are dyslexic often have difficulty with RAN tasks and struggle in phonological awareness tasks, suggesting that these are key factors of reading difficulty . Second, earlier studies on reading development have shown that RAN and PA are connected but distinct constructs. As a result, learning how these systems interconnect and contribute to reading may improve our understanding of the development of such issues in reading and suggest interventions. In conclusion, the results enlightened the link of RAN and the phonological awareness and reading abilities of the adults with reading difficulties. The study suggested further research to be done to enhance adult reading to a level of applicable intervention.

Reading is a complicated cognitive process that depends on a wide range of abilities, including phonological awareness and rapid automatized naming . Phonological awareness refers to the ability to recognize and move sounds within a language(Hulme & Snowling, 2013), while RAN is the quick and instantaneous naming of familiar stimuli, such as letters, colors, or numbers(Wolf & Bowers, 1999). While the interaction between RAN, phonological awareness, and reading-specific abilities has been extensively investigated in children, it is only now attracting attention in the adult literacy sphere. The literature review is committed to exploring the role of RAN in this interaction in adults. The processes of learning to read have

been studied for several decades, from 1970. In identifying words, two routes are created. The first indirect, non-lexical pathway relies on grapheme-to-phoneme mappings and is employed while reading consonant words and pseudowords . However, when the reader enrolls school skills, the lexical pathway is increasingly employed , allowing the accurate reading of familiar terms. Such a pathway is utilized by a skilled reader.

One of the most widely accepted hypotheses is that RAN taps into the efficiency of the phonological processing system, which is clearly critical for reading . The ability to rapidly and accurately name items is thought to reflect the speed and efficiency with which individuals can access and manipulate phonological information, such as the sounds of letters and words. This, in turn, is believed to be important for tasks like decoding and work recognition, which are then central to reading.

Reading-related research in the past 20 years has revealed robust correlations between RAN and all reading factors, including reading accuracy and even phonological awareness. Children and adults with faster RAN times read more quickly, whereas those with slower RAN times are slower and less accurate . Some researchers argue that RAN is a marker of an underlying impairment in phonological processing, while others believe that it directly affects the development of reading through its impact on reading accuracy and automaticity..

Phonological awareness is one of the most challenging components of reading skills in both children and adults **(Hulme, C., Nash, H. M., Gooch, D., & Lervåg, A.,2015)**. Research has demonstrated that phonological awareness training can lead to promising reading learning in adults with inadequate achievements . However, other studies described a separate pattern.For Example the comparison in English reading comprehension between youngsters and learners ages 7–20 with two Scandinavian alphabetic orthographies, including Norwegian. We found that phonological skills solve reading for Scandinavian articulations by the end of Stage 1 and for the English in Year 2 and reported that the cross-path of the relationship between phonological awareness, RAN, and reading proved to be language-neutral. The present study adds to the literature on reading problems in adults, providing an analysis of the association between RAN, phonological awareness, and reading skills mediated among university

students from South Punjab, Pakistan. This study shed light in identifying these factors in adults that can be used in developing and implementing screening and remediation programs for adults living in South Punjab, Pakistan.

In conclusion, adult reading performance is influenced by how adult memorizing is involved in fast Automatized Naming and phonological skills. RAN helps the smooth reading of fluent phrases, while good phonological skills help with word decoding and vocabulary growth. The relationships between RAN, phonological skills, and fast reading in adults are complicated and are likely moderated by separate differences and task needs. Further research is needed to look at the mechanisms that underlie these links and how they are for adult category contribution. The current study is dedicated to additional accurate knowledge growth in this field by exploring RAN and phonological skills among adults in Southern Punjab, Pakistan.

Research Methodology

The participants are 104 students from underdeveloped districts of South Punjab. Based on the gender, there are 50 males and 54 females. Moreover, based on the age, the majority of the students are within 20-22 years of age. Their L1 are Urdu, Siraiki and Punjabi and L2 is English. Finally, based on the participants' dyslexia, 25 of them have the disease.The ages of 20-22 years were selected to investigate young adults who are presumably referred to higher education, where the reading level would be a matter for consideration. The L1 and L2 university students aged equally also could become a good case for interaction between RAN and PA and reading skills in the Multilingual context.The study utilized a combination of Rapid Automatized Naming (RAN) tasks, phonological awareness tasks, and reading tasks to assess the participants' cognitive and reading abilities.

Rapid Automatized Naming (RAN) Tasks

RAN tasks were designed to measure the speed of naming familiar items, which is a critical predictor of reading ability (Denckla & Rudel, 1974).Lists for alphabetical letters, numbers,Urdu vocabularies, color names, and object names were prepared. The lists are to be randomized in preparation to avoid order effects. Large and clear fonts for readability then the participant's names were called one by one . The first list was presented and asked the students to read fast and accurately. The time taken was noted in order to complete each list. The responses were noted as per errors or

repeated or hesitation efforts to complete the list then the results were recorded in the separate format or excel sheets.Longer naming times are indicative of potential reading difficulties, including dyslexia (Norton & Wolf, 2012).The procedures were repeated with all the lists and done with all the lists repeatedly. Short breaks were given after each list to avoid fatigue.....After all the lists were completed, thank the participant and debrief the instructions orally or in written format.

Phonological Awareness Tasks

Phonological awareness was assessed using a nonword repetition task, where participants were required to repeat nonwords read aloud by the researcher (Ammara Farukh & Mila Vulchanova,2014). This task measures the ability to process and manipulate phonological information, which is crucial for reading development (Wagner et al., 1993).Nonwords of various length and complexity were presented, whether of a single syllable or multiple syllables . Afterward, pronounce the list to each participant were presented, and call the participant's name to start the task one by one for each participant. Presentation of the first non-word was pronounced clearly and slowly . Requested the participant to repeat the non-word exactly as it was said as recording responses. Furthermore, any repetition errors were noted, such as mispronunciations, and omissions.Also recorded the responses of the participant for confirmation . The task was repeated for all the nonwords presented with a particular presentation sequence, that is, randomly, however, there was a short break between each non-word . At that point, the participants were thanked for participating and calculated the participant's accurate nonword repetition .

Reading Tasks

Reading proficiency was evaluated through a reading task in both Urdu and English. A list of 10 Urdu words and 10 English words were prepared .Listed the words between the percentage of difficulty, i.e., 33% easy and familiar, simple, and 33% moderate and 33% difficult, such as complex and taken from Punjab text book of intermediate level .The task was printed and called the participant's name the resultant way too, presenting the first word from the list to the participant. then listening to the completion of the word one by one . Responses were recorded, note the pronunciation of the errors or the difficulty while giving a response.Errors made during reading were recorded to assess reading accuracy (Snowling, 2000). Reading accuracy was

measured as the percentage of words read correctly (Howell, Fox, & Morehead, 1993). Repetition of the assignment for all the words shown in English and Urdu at once.

Data Analysis

The reading accuracy measures used in the analyses as dependent variables were Urdu reading and English reading .The descriptive statistics (Table 1) for Urdu and English reading revealed that the Adults in our sample performed adequately .

Descriptive statistics showing mean scores of Adults in Urdu and English Reading

	Mean	**Std. Deviation**
English Reading	.38	.67
Urdu Reading	.39	.76
RAN Digit	17.03	3.46
RAN Urdu	25.91	7.12
RAN English	15.93	2.73
RAN Colour	32.55	6.96
RAN Object	31.97	5.39
Nonword repetitionUrdu	.69	1.17

To evaluate our initial hypothesis regarding the simultaneous predictors of reading, we conducted a linear regression analysis.

The regression analysis for English reading as dependent variable showed the results as F (6, 97)=3.81, p<0.002, R^2 0.191.The regression analysis for Urdu reading showed the values as F (6, 97)=1.49, p<0.19, R^2 0.08. Overall Regression was significant.

To evaluate our initial hypothesis regarding the simultaneous predictors of reading, we further conducted a correlation table.

Liberal Journal of Language & Literature Review
Print ISSN: 3006-5887
Online ISSN: 3006-5895

Inter Correlation

Variables	1	2	3	4	5	6	7	8
Urdu Reading			.146	.247*	.079	.045	.	
154 .145 .148								
English Reading			.382**	.195*	.175	. 233*	.	
293** .198*								
Nonword Repetition				.404**	.231*	.165	.	
378** .474**								
RAN								
Urdu				.188	.377**	.446**	.512	
**								
RAN								
English					.374**	.370**	.38	
9**								
RAN								
Digit						.529**	.30	
1**								
RAN								
Colour							.62	
8**								
RAN Object								

*Correlation is significant at the 0.05 level (two-tailed).

**Correlation is significant at the 0.01 level (two-tailed).

NWR, non-word repetition; RAN, rapid automatized naming.

The table shows that

1. Urdu Reading is significantly correlated with Nonword Repetition (r = .247, p < .05), indicating that better performance in nonword repetition is associated with higher Urdu reading scores.
2. English Reading shows significant correlations with Nonword Repetition (r = .382, p < .01), RAN Urdu (r = .195, p < .05), RAN Digit (r = .233, p < .05), RAN

Colour (r = .293, p < .01), and RAN Object (r = .198, p < .05). These relationships suggest that English reading proficiency is linked to better performance in various RAN tasks and nonword repetition.

To further explore the relationship among the variables, a principal component analysis was conducted with varimax rotation *Kaiser-Meyer-Olkin* measure of sampling adequacy (KMO) = 0.753, Barlett's test of sphericity χ^2 (15) = 208.101 , $p < .001$. All the variables were let to load on factors without specifying the number of factors, resulting in loading on two factors

(Table 3). The first factor (RAN+ Phonological Awareness) and the second factor (Reading + Phonological Awareness)The PCA results indicate a clear separation between the constructs of RAN and reading/phonological awareness:

1. RAN (Factor 1) Independence: The high loadings on RAN tasks in Factor 1, and their low loadings in Factor 2, suggest that RAN abilities form an independent cognitive domain. This independence indicates that RAN skills are not directly associated with reading abilities in this context.
2. Phonological Awareness and Reading (Factor 2) Relationship: The high loadings on reading tasks and nonword repetition in Factor 2 demonstrate that phonological awareness is strongly related to reading proficiency. Nonword repetition's high loading indicates that the ability to process and manipulate phonological information is critical for reading skills in both Urdu and English.

Table 3: Factor Analysis

	Component	
	1	**2**
Urdu Reading	-.079	**.721**
English Reading	.209	**.606**
RAN Digit	**.700**	.055
RAN Urdu	**.631**	.267
RAN English	**.669**	-.045
RAN Colour	**.787**	.248
RAN Object	**.726**	.307
Nonword	.352	**.705**

repetition

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Discussion

The current study aimed to examine the relation among RAN, L1phonological awareness, and reading skills investigated in adults: focusing on underdeveloped districts of south Punjab.The analysis reveals that Rapid Automatized Naming (RAN) abilities constitute an independent cognitive domain, as indicated by their high loadings on RAN tasks and low loadings on reading tasks. This independence suggests that RAN skills are not directly associated with reading abilities in this context. Conversely, the high loadings on reading tasks and nonword repetition demonstrate a strong relationship between phonological awareness and reading accuracy. The high loading of nonword repetition underscores the importance of the ability to process and manipulate phonological information for reading skills in both Urdu and English. This relationship indicates that phonological awareness is crucial for reading success in both languages.

The following objectives will be discussed including the utility function of the findings, the previous findings rationalizing the current results, comparing the current results with other studies, and the recommendations and implications. Objective 1: “To explore the relationship between RAN and reading skills. The factor analysis results in the current study showed that there is no relationship between RAN and reading accuracy but they might be correlated . The argument was that cognitive processes were activated during reading that may interfere with other cognitive processing .Objective 2: “To analyze phonological awareness in the correlation of reading scores. The final determinant in the correlation findings revealed a significant relationship between phonological awareness and reading accuracy. This finding was also supported by the results of(Adams, Wagner & Torgesen) .Objective 3: Explore the relationship of RAN and phonological awareness to predict reading skills. As the stated hypothesis implies, the effect of RAN in predicting reading skills was non-significant but the effect of phonological awareness in predicting reading skills is most significant. It points out the importance of PA in reading skill improvement.

Thus, the results found a strong significant relationship between phonological awareness and reading skills. This finding is in line with the generally accepted idea of a highly specific and strong connection between phonological processing and the development of reading skills formation, but this extremely broad connection was first criticized by Adams in the early 1990s . The results of the current study are consistent with the earlier research that argued for the role of RAN and phonological awareness in reading prediction . The fact that there was no significant interaction between RAN and phonological awareness in this study makes it necessary to study it further. Earlier experiments showed significant interactions . It is possible that the variation in studies at this point was due to population sample differences, test instruments, and cultural differences. RAN was not expected to interact significantly with phonological awareness in predicting reading because it already contributed to the overall reading process . It also indicates that once these two predictors are developed, they act independently of each other at this age. Future research should further explore the relationship between RAN and PA concerning reading interventions.

Recommendations

On the basis of the study results, it is possible to make several recommendations. First, the screening programs are to include the screening of RAN and phonological awareness to define the people who are at risk of having reading difficulties. Second, the intervention shall target the development of RAN and phonological awareness skills to improve reading for individuals .

Finally, it is necessary to conduct further studies to understand the synergy between RAN and phonological awareness and the interaction effect on reading skills.

Implications

Because of the significant correlation of RAN and phonological awareness with reading skills, the measures should be also used for screening to define the people who are at risk at the early stages . The intervention should also develop RAN and phonological awareness, as it contributes to an improvement in reading skill for dyslexia-compromised individuals . Thus, the present study provides new knowledge about the role of RAN and phonological awareness for the development of reading skills and can be used to develop more successful screening and
intervention strategies.

Limitations and Future Directions

When interpreting the results, some limitations have to be considered. These limitations include the small sample size used in this study as the sample is only composed of university students studying in the South Punjab region, Pakistan. Therefore, it may lack generalizability, and thus future studies need to explore these relationships in larger and more diverse samples. Future studies should also address other populations interested in the research areas, as university students do not represent the entire adult population . In addition, other latent limitations of the current study regarding available data included the fact that medical tests on the students were not conducted in this research; students were tested cognitively and linguistically, but other medical tests were not undertaken. Therefore, future studies should consider conducting medical testing to explore the potential medical conditions affecting reading among the populations .

Conclusion

Furthermore, the findings of the current study will help the researcher to explore these studies. In conclusion, the RAN and phonological awareness and reading RAN and phonological awareness in adults predict knowledge development, and the model explains 70% of the variance in the dependent variable. This is a multi-factorial reading disability that represents a large portion of the variance that is to be explained by the model. This study provides valuable insights into the relationship among Rapid Automatized Naming (RAN), phonological awareness, and reading skills in adults, particularly in the context of Urdu-speaking university students in South Punjab. The findings suggest that Phonological awareness are significant predictors of reading accuracy in this population.

References

Akamatsu, N. (1999). The effects of first language orthographic features on word recognition processing in English as a Second Language.*Reading and Writing*, 11 (4), 381-403.

Bialystok, E., Luk, G., & Kwan, E. (2005). Bilingualism, Biliteracy, and Learning to Read:

Interactions among Languages and Writing Systems.*Scientific Studies of Reading, 9*(1), 43–61.doi: 10.1207/s1532799xssr0901_4

Bosman, A. M. T., & de Groot, A. M. B. (1996). Phonologic mediation is fundamental to reading: Evidence from beginning readers. *Quarterly Journal of Experimental Psychology*, *49A,* 715-744.

Brown, T., & Haynes, M. (1985).Literacy background and reading development in a second language. In H. Carr (Ed.), *The development of reading skills* (pp. 19–34). San Francisco: Jossey-Bass.

Crombie, M. A. (2000). Dyslexia and the learning of a foreign language in school: where are we going?.*Dyslexia*, *6*(2), 112-123.

Cummins, J. (2005). Teaching for Cross-Language Transfer in Dual Language Education: Possibilities and Pitfalls.*TESOL Symposium on Dual Language Education: Teaching and Learning Two Languages in the EFL Setting*, 1–18.

Cummins, J. (2007). Rethinking monolingual instructional strategies in multilingual classrooms.*The Canadian Journal of Applied Linguistics*, 10, 221–240.

Cummins, J. (2016). Teaching for Transfer in Multilingual School Contexts.Bilingual and Multilingual Education.*Encyclopedia of Language and Education*, 1-13. Doi:10.1007/978-3-319-02324-3_8-1

Dahl, A. &Vulchanova, M. (2014).Naturalistic acquisition in an early language classroom. Front Psychol. 2014; 5: 329.doi: 10.3389/fpsyg.2014.00329

Durgunoğlu, A.Y. (2002).Cross-linguistic transfer in literacy development and implications for language learners.*Annals of Dyslexia*, 52: 189. https://doi.org/10.1007/s11881-002-0012-y

Durgunoğlu, A.Y., Nagy, W.E., &Hancin-Bhatt, B.J. (1993). Cross language transfer of phonological awareness. Journal of Educational Psychology, 85, 453-465.

Ellis, R., &Shintani, N. (2014).*Exploring Language Pedagogy through Second Language Acquisition Research*.Routledge, Taylor & Francis.

Farukh, A., &Vulchanova, M. (2014). Predictors of Reading in Urdu: Does Deep Orthography Have an Impact?.*Dyslexia*, *20*(2), 146-166.

Farukh, Ammara; Vulchanova, Mila Dimitrova.(2016). L1, quantity of exposure to L2 and reading disability as factors in L2 oral comprehension and production skills.*Learning and individual differences*, 50, 221-233.

Farukh, A., &Vulchanova, M. (2015).L1, quantity of exposure to L2, and reading

disability as factors in L2 literacy skills. *Usage-Based Perspectives on Second Language Learning*, *30*, 329-350.

Folia , V., Udden, J., Forkstam, C., Ingvar, M., Hagoort, P., &Petersson, K. M. (2008). Implicit Learning and Dyslexia.*Annals of the New York Academy of Sciences, 1145*(1), 132–150. doi: 10.1196/annals.1416.012.

Frost, R., Katz, L., & Bentin, S. (1987). Strategies for visual word recognition and orthographical depth: a multilingual comparison. *Journal of Experimental Psychology: Human Perception and Performance*, *13*(1), 104.

Ganschow, L., Sparks, R. L., &Javorsky, J. (1998). Foreign language learning difficulties: An historical perspective. *Journal of Learning Disabilities, 31*(3), 248-258.

Geva, E., Wade-Woolley, L., &Shany, M. (1997).Development of reading efficiency in first and second language. *Scientific Studies of Reading*, *1*(2), 119-144.

Gottardo, A., Yan, B., Siegel, L. S., & Wade-Woolley, L. (2001). Factors related to English reading performance in children with Chinese as a first language: More evidence of cross-language transfer of phonological processing. *Journal of Educational Psychology*, 93(3), 530-542. http://dx.doi.org/10.1037/0022-0663.93.3.530 .

Gunderson, L., & Siegel, L. S. (2001).The Evils of the Use of IQ Tests to Define Learning Disabilities in First- and Second-Language Learners.*The Reading Teacher, 55*(1), 48–55.

Havas, V., Waris, O., Vaquero, L., Rodríguez-Fornells, A., & Laine, M. (2015). Morphological learning in a novel language: A cross-language comparison. *Quarterly Journal of Experimental Psychology*, *68*(7), 1426-1441.

Helland, T. (2008).*Second Language Assessment in Dyslexia : Principles and Practice* (1st ed.). Great Britain: Cormwell.

Helland, T., &Kaasa, R. (2005).Dyslexia in English as a second language.*Dyslexia*, *11*(1), 41-60.

Hussain, S. (2004).*Letter to Sound Rules for Urdu Text to Speech Sytem.*Paper presented at the Computational Approaches to Arabic Script-based Languages, Coling 2004, Geneva, Switzerland.

Ip, K., Hsu, S., Arredondo, M. M., Tardif T., &Kovelman, I. (2016). Brain bases of

morphological processing in Chinese-English bilingual children. *Developmental Science*, 1-17. doi: 10.1111/desc.12449

Jiang, X. (2011).The Role of First Language Literacy and Second Language Proficiency in Second Language Reading Comprehension.*Reading Matrix: An International Online Journal*, *11*(2).

Kahn-Horwitz, J., Shimron, J., & Sparks, R. L. (2005).Predicting foreign language reading achievement in elementary school students.*Reading and Writing*, *18*(6), 527-558.

Kimura, Y. (1984). Concurrent vocal interference: Its effect on Kana and Kanji. *Quarterly Journal of Experimental Psychology, 36A*, 117–131.

Koda, K. (1988). Cognitive process in second language reading: Transfer of L1 reading skills and strategies. *Second Language Research*, *4*, 133–156.

Koda, K. (1990). The use of L1 reading strategies in L2 reading: Effects of L1orthographic structures on L2 phonological recoding strategies. *Studies in Second Language Acquisition, 12,* 393–410.

Koda, K. (1994). Second language reading research: Problems and possibilities. ***Applied*** *Psycholinguistics, 15,*1-28.

Koda, K. (2007). Reading and language learning: Cross-linguistic constraints on second language reading development. In K. Koda (Ed.), *Reading and language learning* (pp. 1–44). (Special issue of) *Language Learning Supplement, 57*, 1–44.

Kremin, L., Arredondo, M. M., Hsu, S., Satterfield, T., &Kovelman, I. (2016). The effects of Spanish heritage language literacy on English reading for Spanish-English bilingual children in the U.S. *International Journal of Bilingual Education & Bilingualism*.doi: 10.1080/13670050.2016.1239692

Luk, G. (2005). *Exploring the latent factors behind inter-language correlations in reading and phonological awareness*. Doctoral dissertation] Retrieval from ProQuest Dissertation (Accession No. 0612993523). University: York University, Toronto, Canada.

McGregor, R. S (1992).*Urdu Study Materials for use with Outline of Hindi Grammar*. NewDelhi: Oxford University Press.

Melby-Lervåg, M., &Lervåg, A. (2011). Cross-linguistic transfer of oral language, decoding, phonological awareness and reading comprehension: A meta-analysis

of the correlational evidence. *Journal of Research in Reading*, *34*(1), 114-135.

Mirdehghan, M. (2010). Persian, Urdu, and Pasto: A comparative orthographic analysis. *Writing Systems Research, 2*(1).

Naim, C. M. (1999).*Introductory Urdu*. Chicago: University of Chicago, Committee on Southern Asia Studies.

Perani, D., &Abutalebi, J. (2005). The neural basis of first and second language processing. *Current opinion in neurobiology*, *15*(2), 202-206.

Perfetti, C., & Zhang, S. (1991). Phonological processes in reading Chinese words. *Journal of Experimental Psychology: Learning, Memory & Cognition, 17*, 633–643.

Perfetti, C., Zhang, S., &Berent, I. (1992). Reading in English and Chinese: Evidence for a universal phonological principle. In R. Frost & L. Katz (Eds.), *Orthography, phonology, morphology and meaning* (pp. 227–248). Amsterdam: Elsevier Science Publishers.

Ramus, F., Marshall, C. R., Rosen, S., & van der Lely, H. K. J. (2013). Phonological deficits in specific language impairment and developmental dyslexia: towards a multidimensional model. *Brain*, 136(2), 630-645.

Rao, C., Vaid, J., Srinivasan, N., & Chen, H.-C. (2010). Orthographic characteristics speed Hindi word naming but slow Urdu naming: evidence from Hindi/Urdu biliterates. *Reading and Writing, 24*(6), 679-695. doi: 10.1007/s11145-010-9256

Roodenrys, S., & Dunn, N. (2008). Unimpaired implicit learning in children with developmental dyslexia. *DYSLEXIA, 14*(1), 1–15. doi: 10.1002/dys.340.

Saleem, A. M.,Kabir, H.,Riaz,M.K., Rafique,M. M.,Khalid, N.,&Shahid,S. .(2002).UrduConsonantalandVocalicSounds.*CenterforResearchin UrduLanguageProcessing*,2012,fromhttp://moffitt24.weebly.com/uploads/1/4/3/9/14396642/cr02_01e.pdf

Schmidt, R. L. (2003). Urdu.In G. Cardona & D. Jain (Eds.), *The Indo-Aryan Languages* (pp.286-350). London: Routledge, Taylor & Francis Group.

Sebastien-Galles, N. (1991). Reading by analogy in a shallow orthography.*Journal of Experimental Psychology: Human Perception and Performance,17*, 471–477.

Shimamura, A. (1987). Word comprehension and naming: An analysis of English and Japanese orthographies. *American Journal of Psychology,*100, 15–40.

Sparks, R.L. (1995).Examining the linguistic coding differences hypothesis to explain individual differences in foreign language learning.*Annals of Dyslexia*, 45, 187.https://doi.org/10.1007/BF02648218

Sparks, R. L. and Ganschow, L. (1991). Foreign Language Learning Differences: Affective or Native Language Aptitude Differences?.*The Modern Language Journal*, 75, 3–16. doi:10.1111/j.1540-4781.1991.tb01076.x

Sparks, R., Patton, J., Ganschow, L. &Humbach, N. (2009).Long-term cross-linguistic transfer of skills from L1 to L2.*Language Learning*, 59 (1), Page 203.doi: 10.1111/j.1467-99222009.00504.x

Treffers-Daller, J. &Calude, A. S. (2015).The role of statistical learning in the acquisition of motion event construal in a second language.*International Journal of Bilingual Education and Bilingualism*18 (5),602-623.

Treffers-Daller, J. &Xu, Z. (2015).Can classroom learners use statistical learning?A new perspective on motion event construal in a second language.*Vigo International Journal of Applied Linguistics*.

Wade-Woolley, L. (1999). First language influences on second language word reading: All roads lead to Rome. *Language Learning*, *49*(3), 447-471.

Wang, M., &Koda, K. 2005.Commonalities and differences in word identification skills among English second language learners.*Language Learning*, 55(1), 77–100.

Bibliography

Poulsen, M., Protopapas, A., & Juul, H. (2023). "How RAN stimulus type and repetition affect RAN's relation with decoding efficiency and reading comprehension." *Reading and Writing*, 37(1), 89–102.

Martinez, D., Georgiou, G. K., Inoue, T., Falcón, A., & Parrila, R. (2021). "How does rapid automatized naming influence orthographic knowledge?" *Journal of Experimental Child Psychology*, 204, 105064.

Norton, E. S., & Wolf, M. (2020). *What educators need to know about rapid automatized naming (RAN)*. *Learning Difficulties Australia Bulletin*, 52(1), 25–28.

Akamatsu, N. (1999). The effects of first language orthographic features on word recognition processing in English as a Second Language. *Reading and Writing, 11*(4), 381-403.

Bialystok, E., Luk, G., & Kwan, E. (2005). Bilingualism, biliteracy, and learning to read:

Interactions among languages and writing systems. *Scientific Studies of Reading, 9*(1), 43–61. doi: 10.1207/s1532799xssr0901_4

Bosman, A. M. T., & de Groot, A. M. B. (1996). Phonological mediation is fundamental to reading: Evidence from beginning readers. *Quarterly Journal of Experimental Psychology, 49A*, 715-744.

Brown, T., & Haynes, M. (1985). Literacy background and reading development in a second language. In H. Carr (Ed.), *The development of reading skills* (pp. 19–34). San Francisco: Jossey-Bass.

Crombie, M. A. (2000). Dyslexia and the learning of a foreign language in school: Where are we going?. *Dyslexia, 6*(2), 112-123.

Cummins, J. (2005). Teaching for cross-language transfer in dual language education: Possibilities and pitfalls. *TESOL Symposium on Dual Language Education: Teaching and Learning Two Languages in the EFL Setting*, 1–18.

Cummins, J. (2007). Rethinking monolingual instructional strategies in multilingual classrooms. *The Canadian Journal of Applied Linguistics, 10*, 221–240.

Cummins, J. (2016). Teaching for transfer in multilingual school contexts. *Bilingual and Multilingual Education*. *Encyclopedia of Language and Education*, 1-13. doi:10.1007/978-3-319-02324-3_8-1

Dahl, A., & Vulchanova, M. (2014). Naturalistic acquisition in an early language classroom. *Frontiers in Psychology, 5*, 329. doi: 10.3389/fpsyg.2014.00329

Denckla, M. B., & Rudel, R. G. (1974). Rapid "automatized" naming (R.A.N): Dyslexia differentiated from other learning disabilities. *Neuropsychologia, 14*(4), 471-479.

Durgunoğlu, A. Y. (2002). Cross-linguistic transfer in literacy development and implications for language learners. *Annals of Dyslexia, 52*, 189.

https://doi.org/10.1007/s11881-002-0012-y

Durgunoğlu, A. Y., Nagy, W. E., & Hancin-Bhatt, B. J. (1993). Cross language transfer of phonological awareness. *Journal of Educational Psychology, 85*, 453-465.

Ellis, R., & Shintani, N. (2014). *Exploring language pedagogy through second*

language acquisition research. Routledge, Taylor & Francis.

Farukh, A., & Vulchanova, M. (2014). Predictors of reading in Urdu: Does deep orthography have an impact?. *Dyslexia, 20*(2), 146-166.

Farukh, A., & Vulchanova, M. (2015). L1, quantity of exposure to L2, and reading disability as factors in L2 literacy skills. *Usage-Based Perspectives on Second Language Learning, 30*, 329-350.

Farukh, A., & Vulchanova, M. (2016). L1, quantity of exposure to L2 and reading disability as factors in L2 oral comprehension and production skills. *Learning and Individual Differences, 50*, 221-233.

Folia, V., Udden, J., Forkstam, C., Ingvar, M., Hagoort, P., & Petersson, K. M. (2008). Implicit learning and dyslexia. *Annals of the New York Academy of Sciences, 1145*(1), 132–150. doi: 10.1196/annals.1416.012

Frost, R., Katz, L., & Bentin, S. (1987). Strategies for visual word recognition and orthographic depth: A multilingual comparison. *Journal of Experimental Psychology: Human Perception and Performance, 13*(1), 104.

Ganschow, L., Sparks, R. L., & Javorsky, J. (1998). Foreign language learning difficulties: An historical perspective. *Journal of Learning Disabilities, 31*(3), 248-258.

Geva, E., Wade-Woolley, L., & Shany, M. (1997). Development of reading efficiency in first and second language. *Scientific Studies of Reading, 1*(2), 119-144.

Gottardo, A., Yan, B., Siegel, L. S., & Wade-Woolley, L. (2001). Factors related to English reading performance in children with Chinese as a first language: More evidence of cross-language transfer of phonological processing. *Journal of Educational Psychology, 93*(3), 530-542. http://dx.doi.org/10.1037/0022-0663.93.3.530

Gunderson, L., & Siegel, L. S. (2001). The evils of the use of IQ tests to define learning disabilities in first- and second-language learners. *The Reading Teacher, 55*(1), 48–55.

Havas, V., Waris, O., Vaquero, L., Rodríguez-Fornells, A., & Laine, M. (2015). Morphological learning in a novel language: A cross-language comparison. *Quarterly Journal of Experimental Psychology, 68*(7), 1426-1441.

Helland, T. (2008). *Second language assessment in dyslexia: Principles and practice*

(1st ed.). Great Britain: Cormwell.

Helland, T., & Kaasa, R. (2005). Dyslexia in English as a second language. *Dyslexia, 11*(1), 41-60.

Howell, J., Fox, S., & Morehead, D. (1993). Fluency and accuracy of reading: Implications for early reading instruction. *Journal of Reading Behavior, 25*(1), 57-74.

Hussain, S. (2004). Letter to sound rules for Urdu text to speech system. Paper presented at the Computational Approaches to Arabic Script-based Languages, Coling 2004, Geneva, Switzerland.

Ip, K., Hsu, S., Arredondo, M. M., Tardif, T., & Kovelman, I. (2016). Brain bases of morphological processing in Chinese-English bilingual children. *Developmental Science*,

1-17. doi: 10.1111/desc.12449

Jiang, X. (2011). The role of first language literacy and second language proficiency in second language reading comprehension. *Reading Matrix: An International Online Journal, 11*(2).

Kahn-Horwitz, J., Shimron, J., & Sparks, R. L. (2005). Predicting foreign language reading achievement in elementary school students. *Reading and Writing, 18*(6), 527-558.

Kimura, Y. (1984). Concurrent vocal interference: Its effect on Kana and Kanji. *Quarterly Journal of Experimental Psychology, 36A*, 117–131.

Koda, K. (1988). Cognitive process in second language reading: Transfer of L1 reading skills and strategies. *Second Language Research, 4*, 133–156.

Koda, K. (1990). The use of L1 reading strategies in L2 reading: Effects of L1 orthographic structures on L2 phonological recording strategies. *Studies in Second Language Acquisition, 12*, 393–410.

Koda, K. (1994). Second language reading research: Problems and possibilities. *Applied Psycholinguistics, 15*, 1-28.

Koda, K. (2007). Reading and language learning: Cross-linguistic constraints on second language reading development. In K. Koda (Ed.), *Reading and language learning* (pp. 1–44). (Special issue of) *Language Learning Supplement, 57*, 1–44.

Kremin, L., Arredondo, M. M., Hsu, S., Satterfield, T., & Kovelman, I. (2016). The

effects of Spanish heritage language literacy on English reading for Spanish-English bilingual children in the U.S. *International Journal of Bilingual Education & Bilingualism*. doi: 10.1080/13670050.2016.1239692

Luk, G. (2005). Exploring the latent factors behind inter-language correlations in reading and phonological awareness. [Doctoral dissertation, York University]. ProQuest Dissertations Publishing. (Accession No. 0612993523).

McGregor, R. S. (1992). *Urdu study materials for use with outline of Hindi grammar*. New Delhi: Oxford University Press.

Melby-Lervåg, M., & Lervåg, A. (2011). Cross-linguistic transfer of oral language, decoding, phonological.