Assessment of Dyslexia in the Urdu Language

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Summary

Reading is an important skill, not only for academic achievement but also for lifelong learning and successful socio-economic participation. In contrast to speaking, reading requires explicit instruction. However, a substantial number of children experience serious problems attaining fluent reading skills despite adequate formal instruction and favourable social and learning conditions and after individual differences underlying the normal variance in reading have been accounted for. Some of these struggling children may then be suffering from dyslexia, a learning disorder that affects approximately 3 to 10% of the population worldwide (Pennington, 2012). To minimize the detrimental effects of the disorder, it is important to provide early intervention, making timely and adequate assessment indispensable.

In the general introduction (**Chapter 1**) of this thesis we established the need for a thorough assessment of reading and spelling difficulties in Urdu-speaking children. Urdu, one of the national languages in Pakistan belonging to the Indo-European family, has about 588 million speakers worldwide; for around 100 million it is their first language. Even though it is widely spoken around the world, Urdu still is an under-researched language. It is explained why and how we can adopt the dual-route model (DRM) of reading to assess Urdu reading processes and impairments. The Urdu script is cursive in nature

and is written from right to left. It has some uniquely interesting features that need to be taken into account to better understand skilled and impaired reading in Urdu. First, many letters are visually similar and can only be differentiated in terms of the presence, number and position of dots and/or strokes {e.g. ج (/d͡ʒ/) , چ (/t͡ʃ/) , ح (/h/, /ɦ/) and خ (/x/)}. Second, one sound is represented by more than one letter (e.g. /s/ س ، ص ، ث and /z/ ض ، ذ ، ز ، ظ). Third, the Urdu language has a fluctuating orthographic depth due to the inclusion and exclusion of short-vowel markers or diacritics. It has regular spelling-to-sound correspondences when fully written out with diacritics but when these are left out successful word identification happens with contextual help. And finally, in Urdu letters change shape according to their position in a word. For instance, the isolated form 'غ' (/ɣ/) can be written as غـ ,ـغـ and ـغ in initial, medial and final positions, respectively. Given these characteristics and since in Pakistan tests to diagnose reading and spelling deficits are mostly based on English tests, there is a dire need for a dedicated test battery that assesses basic literacy skills in Urdu in the early stages of reading acquisition in order to allow the timely identification and remediation of reading difficulties.

Chapter 2 covers the development and validation process of our Urdu reading/dyslexia test battery. The broad aim of this first study was to try to understand the nature of typical and impaired reading processes in Urdu. Our specific objectives were: (1) to develop a test battery to assess reading problems in Urdu; (2) to understand the deficient patterns in key reading processes by comparing young struggling readers of Urdu with typically developing peers; and (3) to test the application of the DRM to Urdu. With our tests we sought to identify reading difficulties (potentially indicative of dyslexia) in young children first learning the Urdu orthography. The choice for and content of each test is described in detail, as well as their validity and reliability, along with the results of our group comparisons (typical vs. struggling readers). Taking the DRM of reading and existing dyslexia batteries in other alphabetic languages as our lead, we designed tests to assess letter knowledge, word and pseudoword reading and spelling, and phonological abilities. These were subsequently administered to 167 typical readers (TR) and 128 struggling readers (SR) aged 7-11 years (grades 3-7; 150 boys, 145 girls) to establish their reliability and validity, to create profiles of the reading-related cognitive functions of proficient and struggling readers, and to test the applicability of the DRM. Test reliability and validity were very high. Overall, correlations of the accuracy and speed measures confirmed the test battery to have high construct validity. All TR-SR differences were significant ($\alpha = .01$) in detriment of the SR group. Effect sizes (ES) were the highest for the spelling measures ($g > 2$), followed by the reading measures, where ES for accuracy ($g > 1.50$) were higher than those for speed ($g = 1.07$ - 1.45) and ES for pseudoword reading and spelling ($g > 2.5$) higher than those for word reading and spelling ($g = 1.59$-2.37). The medium ES for rapid automatized naming (RAN) and vocabulary were lower than those for reading and spelling. Based on these results, we concluded that our DRM-based test battery was reliable and valid, and differentiated well between proficient and struggling readers, confirming that the DRM of reading was indeed also applicable to Urdu.

Certain features of Urdu, such as its dual orthography and the fact that alphabetic letters can change shape according to their position in a word (the letter-position effect),

make it an interesting language to study. In **Chapter 3** we elaborated on the dual orthography by studying the effects of inconsistencies in written and spoken Urdu resulting from the presence or absence of diacritics. Urdu orthography is transparent when written with diacritics (denoting short vowels), leading to a one-to-one letter-sound correspondence, and opaque without them, when letters correspond to more than one sound. We explored transparency and lexicality effects by comparing the reading performance (in terms of accuracy and speed) of typical and struggling Urdu readers. We tested the same sample of children (that participated in our study described in Chapter 2) on lists each containing: (1) 30 words with diacritics having one correct pronunciation, (2) the same words without diacritics having two or three correct pronunciations, (3) a list of different words without diacritics having a single correct pronunciation and (4), a list of pseudowords with diacritics having one correct pronunciation. All children read the words without diacritics better and faster than those with diacritics and words better and faster than pseudowords. Reading accuracy and speed were significantly poorer in the struggling readers, and the length of words and their frequency also affected their performance more than it did the typical readers. It was clear that both the typical and the struggling readers relied more on visual word recognition than they did on letter-to-sound conversions. We also posited that a phonological deficit appears to explain the reading-related issues in struggling readers of Urdu, which was evident from their significantly poorer and slower performance on reading/decoding tasks comprising words with diacritics and pseudowords compared to typical readers.

Chapter 4 revolves around the letter-position effect. In the study presented we sought to understand the effect of the Urdu orthography on letter-position processing in beginning readers. Being cursive in nature, an intriguing aspect of the Urdu orthography is that many letters change their shape according to the position they take in a word. Using the same groups of beginning readers that took part in our earlier investigations (Chapters 2 and 3) and hypothesizing that reading accuracy scores would be higher for words with changed-shape migrated-letter cognates as compared to when the shapes of the letters remain the same, we expected this to be true for both the typical and the struggling readers but more so for the latter group. We additionally investigated word-frequency effects and differential effects between migrations of initial and final letters compared to migrations of middle letters. Exploring how letters are processed by the orthographic visual-analysis component of the reading system that is responsible for the determination of the position of letters, we investigated whether a change in shape would facilitate or hinder the ordering of letters within Urdu words. To find out whether we would find differential letter-position effects for the typical and struggling readers, we manipulated the shape, frequency and position of letters in words such that the effects of these manipulations on letter processing could be compared for the two groups. Two lists of 25 words each in which letters varied in shape, frequency and position were presented to be read aloud. Compared to same-shape migrated-letter cognates, reading accuracy was superior for migrated-letter cognates that changed shape due to their new position, as well as for high-frequency words (having low-frequency cognates) compared to low-frequency words (having high-frequency cognates)