



17th Annual Symposium | August 12-13, 2021 | Virtual

Diagnosing Bilingual Abilities in the Domain of Literacy Skills

Yulia Edeleva, TU Braunschweig, Braunschweig, Germany

Zeynep Arslan, Friedrich Schiller University of Jena, Jena, Germany

Feroz Nuranfar, Friedrich Schiller University of Jena, Jena, Germany

Martin Neef, TU Braunschweig, Braunschweig, Germany

Gina Do Manh, Friedrich Schiller University of Jena, Jena, Germany

Abstract

Recent research on bilingualism has seen a paradigm shift from a fractional to a holistic view of bilingualism (Grosjean, 1985; Gort & Bauer, 2012) according to which all, not just multilinguals' non-primary language(s), need to be taken into account, which also brought about significant changes with regard to how a bilingual learner's linguistic abilities are conceived of (e.g., re-evaluating the appropriateness of monolingual standards). Hereby, an important claim is that all, but not only the learner's weaker languages, should be taken into account when assessing the linguistic repertoire of a multilingual speaker. Yet, this approach has not yet been sufficiently endorsed for biliteracy, while L1 literacy is claimed to be a significant predictor of literacy in an additional language (Arslan & Edeleva, 2022; Bernhardt, 2010; Kuperman et al., 2022). In our contribution, we present preliminary empirical data on two different possibilities for diagnosing multilingual abilities of adult emergent readers in the domain of literacy skills. Using common experimental procedures to investigate reading performance (e.g., visual word recognition, reading fluency) as an example, we demonstrate how they can be adapted to take account of literacy skills in German as L2 and in the respective L1 of adult emergent readers (e.g., Turkish or Farsi-Dari). Finally, we discuss the potential of combining both the languages within one task type and the utility of modern techniques such as eye tracking to determine the extent of concurrent orthographic knowledge in a bilingual's L1 during literacy-related task execution in their L2.

Keywords: adult literacy, L2 German, bilingual abilities, assessment benchmarks

Introduction

Multilingualism is a commonplace phenomenon in the present-day society. Yet, in some populations it is often restricted to oral communication while the ability to read and write in one of the languages remains rudimentary. The most well-documented explanation for the absence of the ability to read and write in one of the languages is lack of formal education or any appropriate systematic instruction (e.g., during schooling or special courses in most European countries). Additionally, the learning process itself may be constrained by specific linguistic and general cognitive abilities so that some individuals may remain functionally illiterate despite sufficient years of schooling. Numerous investigations converge on the obvious benefit of such key concurrent skills as phonological awareness (Schnitzler, 2008) or auditory processing span (Wild & Fleck, 2013) for the development of reading and writing ability both in children and in adults (Landgraf et al., 2012; Sebastián & Moretti, 2012). The development of those skills is also stipulated in respective curricula on literacy training (e.g., as one of the components of the National Reading Panel).

Bilingual Abilities and the Role of L1 Literacy

In research on multilingualism, there is a long-standing debate around measuring language abilities of bilinguals. In the course of history, this debate has grown into a paradigm shift from a fractional deficit-oriented to a holistic view of bilingualism (Treffers-Daller, 2018), which had an impact on how linguistic knowledge of bilingual speaker-hearers should be measured. Proponents of the holistic view (e.g., Grosjean, 1985; Gort & Bauer, 2012) advocate the standpoint that linguistic abilities of multilinguals should be considered in their entirety by making use of relevant information in all, but not only the learners' additional language(s). The holistic view of bilingualism challenges native speaker standards that focus on what language learners cannot achieve compared to the native speaker target. Contrary to that, it implies focusing on what makes language learning unique. Even bilinguals whose language proficiency is uneven across their languages display the well-attested unique abilities that characterize them as multilingual (e.g., translanguaging). Though detecting multilingual abilities is increasingly attracting attention on the part of researchers and assessment test developers, there have yet been only a few attempts to develop comprehensive tools for detecting and subsequently measuring them in the domain of literacy skills¹.

The role of literacy skills in the multilingual learners' first language (L1) remains controversial. In a recent large-scale study (Kuperman et al., 2022), L1 literacy has been shown to have the strongest explanatory power among various predictors of reading efficiency in L2 learners of English in different L1s. A strong correlation has also been observed between reading fluency scores in L1 and L2 for adult emergent readers with L1 Turkish and L2 German (Arslan & Edeleva, 2022). On the other hand, especially in classroom settings, hybrid spellings where two writing systems clash against each other are treated as cases of interlingual transfer. For instance, German orthography is characterised by noun capitalisation. Russian-German bilingual children who have operational knowledge of German orthographic conventions often transfer this feature onto their Cyrillic spellings (Usanova, 2016) which is classified as a misspelling. Yet, those children who have also learnt some basics of Russian orthography are less prone to overuse capitalisation in Russian. Further, the overall pattern reveals that these children are more accurate with regard to capitalisation restrictions in German, which lends support to the

¹ Yet, none of them with reference to German as an additional language.

assumption that ‘biliterate bilinguals possess above average metalinguistic awareness’ (Usanova, 2016: 171) and generally should be rewarded. Thus, the spellings that appear to be faulty at first sight might yield a consistent pattern where the knowledge of both orthographies is applied systematically if considered in its entirety.

German Assessment Metrics in the Domain of Literacy Skills

As becomes clear from the previous section, L1 literacy skills need to be taken into consideration for an accurate and wholesale understanding of a learner’s L2 performance as well as adequate classroom support. Yet, in the case of German, appropriate assessment tools are largely missing. Much of the professional discourse on literacy assessment until 2019 is framed by the results of the “Level.one” studies by Grotlüschen (2010; 2019) which served as a basis for several diagnostic tools, e.g., the *lea.Diagnostik* (Grotlüschen, 2010), *Oldenburger Diagnostikbögen* (Engel, 2016), *VHS Diagnostik* (Ossner et al., 2021). They are primarily directed at native speakers who cannot put their literacy skills to work to an extent that would fulfil societal demand in the domain of written communication. Conceptually, those tools rely on so-called alpha-levels that allow for diagnosing literacy skills on a continuum from the level of individual characters up to entire texts. In a classical picture-based spelling inventory found in *Oldenburger Diagnostik* (Engel, 2016), the participants are asked to write down the word that corresponds to the image. The scoring procedure generally allows more fine-grained assessment than a simple binary choice between correct or incorrect spellings can provide. Specifically, it offers to look at particular challenges of German orthography that serve as a decisive criterion for word selection. The mastery of these challenges is then placed on a scale from Level 1 to Level 3 (also termed *lea-levels*) that reflect natural development of literacy skills as documented in observational data of monolingual children.

When those diagnostic instruments are applied for multilingual readers, some of the accommodations which appear necessary for multilingual learners are not sufficiently reflected. Multilinguals who learn an additional language in adulthood come in with an already established phonological system and varying literacy skills in their first language. Therefore, language learners’ performance on the spelling test may be affected by their difficulty regarding phoneme discrimination in the target language. On the other hand, it may also be reflective of the transfer of relationships between letters and sounds in the learners’ first language (e.g., the non-realisation of vowels in Farsi-Dari writing). Metalinguistic knowledge of this kind may leave its trace resulting in faulty spellings so that superficially these individuals might be displaying poorer performance at the beginning of instruction and be perceived as poor achievers in the eyes of both the instructor and peer learners. At the same time, they might catch up and eventually progress at a quicker tempo than their peers. Thus, to develop a long-term course concept that would ensure adequate and appropriate support, all relevant information about the multilingual learners’ language abilities should be taken into account. In addition to *lea-levels*² based diagnostic tools, several other tools (Bulut et al., 2015; Markov et al., 2015; Perlmann-Balme, 2010) have been developed that place emphasis not only on technical literacy skills, but also on the learners’ achievement in formal courses, their individual biographies (e.g., their favourite books or films) as well as their communicative functioning in the written domain.

² *Lea-levels* are used by test developers for reference to construct appropriate tasks and accurately estimate the level of learners’ literacy development

Current Study

In the current contribution, we present two potential approaches to incorporating the screening for L1 literacy at the level of isolated word recognition and reading fluency. For isolated word recognition, we discuss an example of an adaptive picture selection task originally developed for children (Schneider et al., 2011) that incorporates the phonological and orthographic properties of a particular language. Further on, we will present reading protocols as a way to document multilinguals' reading ability and consider how possible misreads might be motivated and how they are reflective of the interplay between two writing systems as well as possible metalinguistic strategies. In the discussion section, we will bring together the results of the pilot study for L2 German and Turkish and Farsi-Dari as L1. Finally, we will discuss the potential of more advanced techniques such as eye tracking and how they can be informative with regard to the learners' implicit knowledge at the phono-graphemic level as well as how the integration of several languages into one paradigm may be revealing with regard to the strength of co-activation of the learner's weaker language(s) moderated by their degree of proficiency.

Isolated Word Recognition

In the Würzburg Silent Reading Screening (Würzburger Leise Leseprobe, Schneider et al., 2011) that served as a prototype for the current study design, children are asked to select one image out of four that best matches the printed word and cross it out with a pencil. A restricted amount of time is allocated to complete the task so that children are required to work through as many items as possible. The reading skill is, thus, measured through the reading speed expressed in the number of words that children could handle and through the reading precision expressed in the proportion of correct and erroneous judgements. For multilingual speakers, a separate version of such a task for different languages that takes into account their phono-graphemic properties may allow to estimate how stable phono-graphemic representations in each respective language are, that is, how quickly and robustly printed words can be identified in a crowded environment.

Materials and Method

Twenty target words were implemented as a picture matching activity. The participants saw the printed word in the middle of the screen and had to choose the matching image out of four that are presented on the visual display. The task was implemented digitally. An appropriate experimental software (e.g., Open Sesame) registered accuracy judgements and the time that the participant took to arrive at their decision.

Three competitor images were selected to generate interference with the target to be identified. One of them had an overlapping word onset with the target (e.g., *Ei* 'egg' and *Eimer* 'pail'), a second pair presented a phono-graphemic competitor (e.g., *Ei* 'egg' and *Eis* 'ice-cream'). The third competitor was a semantic competitor interfering at the level of word meaning (e.g., *Ei* 'egg' and *Huhn* 'hen'). For languages with an alphabetic writing system such as German, written characters generally correspond to individual phonological segments rather than whole words (cf. Chinese characters) or syllables (cf. Japanese). A phono-graphemic competitor in this case is a word that bears phonological and, therefore, graphemic similarity to the target. Here, graphemic similarity should be differentiated from orthographic similarity. Graphemic similarity results from a range of possible spellings which make up the 'graphemic solution space' of a language, but not a single spelling which is declared orthographically correct by the

codified norm (Neef, 2005). For instance, though German *Geld* ‘money’ is spelled with a <d> word-finally, this letter is not pronounced straightforwardly as [d] but it is devoiced to [t] due to the phonological process of final devoicing. Therefore, ‘*Gelt*’ would also be a plausible (though orthographically wrong) spelling for the phonological representation in question and, for example, a phono-graphemic competitor to *Zelt* ‘tent’. Other languages also display specific phenomena at the level of writing system that should be reasonably taken into account to construct such a task for a different language. These phenomena may be critical to determine the optimal choice of phono-graphemic competitors.

For instance, Turkish is a language with a relatively transparent alphabetic writing system. There is almost one-to-one correspondence between alphabetic characters and individual sounds, which holds both for reading and spelling (Czevriye et al., 2020). Thus, in contrast to German there are very few cases in Turkish where alphabetic characters display more complex correspondence rules than the ones with one-to-one letter-to-sound mapping (e.g., in Turkish the letter <ğ> is sometimes pronounced as a consonant but sometimes it is mute). Additionally, Turkish is characterised by so-called vowel harmony. The vowel in the suffix should align with the vowel in the preceding syllable of the stem. Practically, this results in a direct match between the suffix vowel and the last vowel of the stem (Gürsov, 2010). Another important characteristic of Turkish is extensive agglutination. Where additional lexical and grammatical meanings are expressed by separate words in English or German, word roots are extended by respective suffixes in Turkish (Mavis & Balo, 2020). Morphological markers in Turkish are less plurifunctional than in German or English. In German, the inflectional ending *-t* in a word like *singt* ‘(he/ she/ it) sings’ comprises information with regard to person (3rd person), number (singular) and tense (present). In Turkish, such individual meanings may each receive a separate morphological marker. Thus, the words tend to be longer. This can be demonstrated by the following question: *temizlikçilerden misin? //temzik.cleanliness çiler.cleaning personnel.plural den.one of misin.are you// ‘Are you one of the cleaning workers?’* Elaborate affixation is also a very productive word formation strategy. A great number of words rely on a restricted number of stems while new meanings are expressed by affixation. This poses an additional challenge to search for competitors that are phono-graphemically similar, but at the same time semantically unrelated (i.e., not derived from the same root). For example, *uçurtma* ‘kite’ is not the most suitable competitor for the target *uçak* ‘airplane’. Instead, the homophonous and semantically more distal *uç* ‘top’ was used.

Participants

The task was administered to five adult emergent readers with L1 Turkish and/or Kurdish (four females; mean age = 50.8). Their participation was voluntary. Prior to the investigation, all of them provided their informed written consent to participate in the study and were surveyed for demographics.

Results

Response proportions for the target and each of the competitors were calculated for isolated word recognition in German and in Turkish (cf. Figure 1). Additionally, we calculated the participants’ mean reaction times³ in milliseconds for the Turkish and the German tasks separately.

³ The time that elapsed from the presentation of the stimulus till the participant’s response.

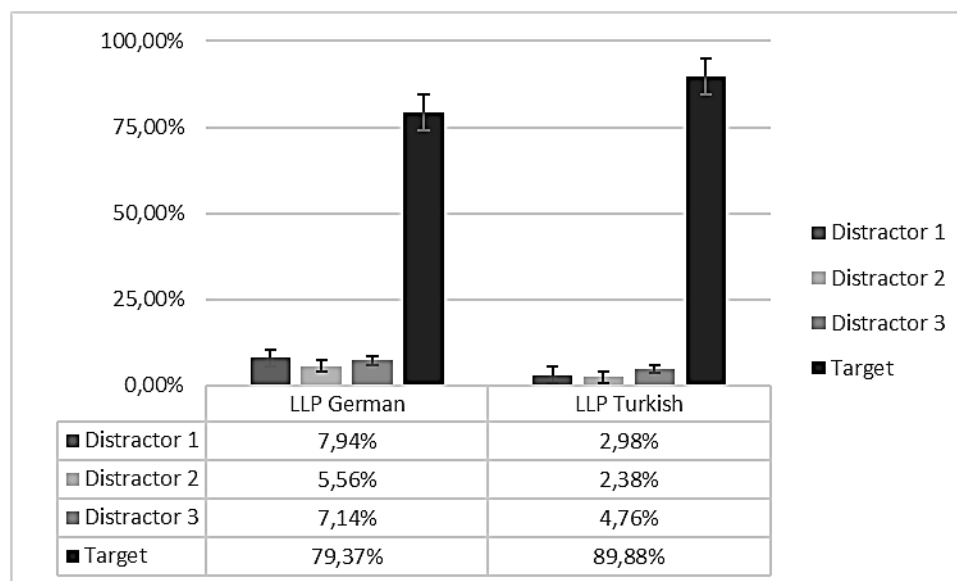


Figure 1. Mean accuracy scores on the isolated word recognition task in L1 Turkish and L2 German. Distractor 1 signifies the phono-graphemic competitor; Distractor 2 – the competitor with the overlapping word onset; Distractor 3 – the semantic competitor.

Though highly skilful in visual word recognition in both the languages, the learners were generally less accurate on the items of German than on the items in their respective first language (cf. Figure 1). They also took about 500 milliseconds longer to select the target in L2 German compared to the targets in their L1. The distribution of errors reveals that the interference from the phono-graphemic competitor is more pronounced for German as L2 than for the respective L1. It is indicative of the fact that phono-orthographic representations for L2 lexical items are generally less stable and might get overridden in competition with phono-orthographic neighbours.

Reading protocols: Parallel texts for measuring reading fluency in L1 and L2

Though the reading speed and the reading precision at the level of isolated words appear to be a robust measure of the reading skill, words are rarely read or written in isolation in everyday life. The use of written language typically takes place at the level of phrases, sentences or even whole texts, because the goal of reading and writing is the generation of meaning (Edeleva et al., 2022). Reading fluency in L1 and L2 appears informative for an integrated investigation of partial abilities, ranging from word-level decoding accuracy to reading speed and prosodic reading at the sentence and text level as well as the degree of their automaticity. Taken together, those subskills enable reading for meaning construction (cf. Rosebrock & Nix, 2017). On the one hand, an oral reading fluency task allows for quantitatively assessing the average reading rate which is necessary for successful reading comprehension. On the other hand, a qualitative examination allows to describe the pattern of linguistic features that is characteristic of a multilingual speaker depending on their constellation of languages and the properties of writing systems as well as the learners' degree of literacy in each respective language.

Materials and Method

We compiled three texts for each respective language using the procedure proposed in Liversedge et al. (2016). Three source texts on a variety of topics (home schooling, Olympic games, measles vaccine) were selected from the German-speaking website *Nachrichtenleicht* which publishes the news in accessible language for people with reduced literacy skills. German source texts were translated into Arabic, Turkish and Farsi-Dari using an automated translation tool. Once the text versions in Arabic, Turkish and Farsi-Dari were edited for grammar and vocabulary inconsistencies, they were translated back into German. Any sentences that did not translate directly were edited both in the German source text and in the respective target language. The process was repeated until the translations were stable, i.e. backtranslations did not impair sentence meaning or grammar. In this way, the texts were consistent across languages in terms of linguistic structure and word choice, but not oversimplified.

Participants

The oral reading task was performed by the same group of adult emergent readers with Turkish (or Kurdish) as described in the previous section and an additional group of learners with Farsi-Dari as L1. The rationale behind including Farsi-Dari readers was the difference in the script. In contrast to Turkish, Farsi-Dari uses the Arabic script where only long vowels are represented in spelling while short vowels are realized with the help of diacritics, though the use of diacritics is register-specific. Additionally, two control groups (experienced native readers in L1 Turkish and L1 Farsi-Dari and readers in L2 German who had diverse L1 backgrounds, but were highly skilled in reading their L1) contributed their data that served as a baseline to estimate the reading fluency of adult emergent readers. All the subjects provided their informed written consent to participate in the study and to be audio-recorded during the session. Their participation was voluntary.

Results

To have written notations of the audio-recordings, we compiled reading protocols for each participant and text. The protocols were produced by a pre-trained coder as to the pre-defined guidelines. Orthographic notations in the reading protocols were selected with the basic idea in mind that they should be easy to read for a broad audience. Phonological notations were provided where necessary. Individual reading protocols were provided along with the original texts so that deviations from the target form (either as misread words or as a language-specific deviation in pronunciation) can be easily identified. Additionally, each single deviation was highlighted in bold.

Reading Fluency

For each participant, the numeric reading fluency score in words read correctly per minute (wcpm) was computed. This estimate relies both on the reading speed and the reading accuracy (Rasinski, 2004; 2012). For raw reading fluency scores, we subtracted the number of misread words from the total number of words that the participants read in one minute. In the next step, we computed relative reading fluency scores by relating raw reading fluency scores to the control scores of experienced adult readers in Farsi-Dari and Turkish. We utilised the equation suggested in Kornev and Ishimova (2010) $CoRR = 100 + ((M-m)/m)*50$, where M is the raw reading fluency score of a particular experimental subject, m is the mean number of words in the same text read correctly within one minute in a control group (Kornev and

Ishimova, 2010; Dorofeeva et al., 2019). Similarly, raw reading scores for L2 German were related to the reading scores of a control group of three literate non-native speakers with various linguistics backgrounds (Russian, Arabic).

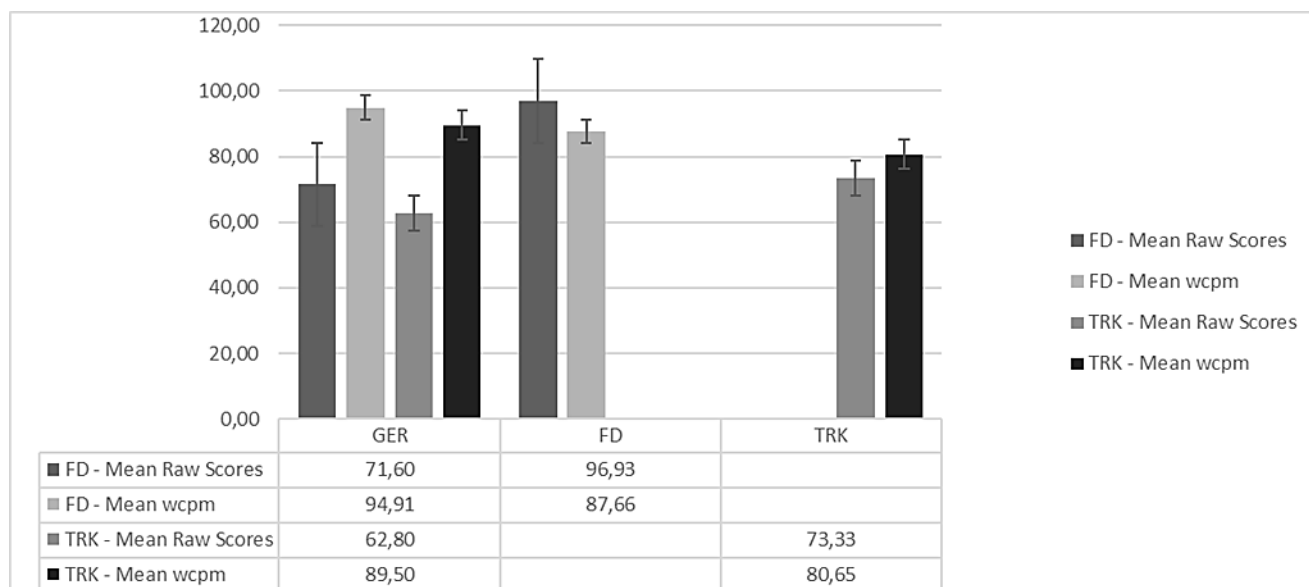


Figure 2. Mean reading fluency scores of low-literate learners in L1 Turkish (TRK), L1 Farsi-Dari (FD) and L2 German (GER). ‘Mean raw scores’ designate mean number of words read correctly in one minute. ‘Mean wcpm’ designate raw scores relativised against the baseline derived from the reading scores in a control group.

Figure 2 reveals that L1 Turkish readers displayed poorer reading performance than L1 Farsi-Dari readers in their L1. Yet, once raw reading scores are related to the baseline of highly literate Turkish and Farsi-Dari readers, they are negatively adjusted for Farsi-Dari low-literates, but positively adjusted for Turkish low-literates. Obviously, the texts that we selected generally appeared more challenging to L1 Turkish speakers compared to the Farsi-Dari group. Alternatively, it might be conditioned by the fact that the Farsi-Dari control group displayed better literacy skills than the Turkish control group, so that it would be advisable to also use control groups that are matched by the level of literacy skills to make valid judgements. Further, the learners’ average raw reading scores were generally lower for L2 German (62.8 for L1 Turkish readers and 71.60 for L1 Farsi-Dari readers) compared to their reading performance in L1 Turkish (73.33) or L1 Farsi-Dari (96.93). Once the scores are relativised against the baseline of L2 learners who are experienced readers in their L1, the values were upgraded to the benefit of the adult emergent readers (94.91 for L1 Farsi-Dari readers and 89.50 for L1 Turkish readers). Therefore, the baseline that the reading performance in L2 is related to might deliver a more equitable measurement of reading fluency.

Reading Accuracy. Regarding reading accuracy, the reading protocols were used to detect and note all the deviations that might be critical in terms of meaning differentiation. Deviant stress patterns as well as unconventional intonation were disregarded as long as the word that the participants pronounced remained understandable.

To classify the systematic deviations that we observed in the learner varieties (either in L1 or in L2), we relied on the types of relationships between letters and phonological units as described in Neef (2005) and Neef and Balestra (2011) who distinguish four types of correspondence rules. The simplest types are unambiguous context-free correspondence rules. An example is the letter <q>, which (with minor restrictions) always corresponds to [k]. If the phonological equivalent is known to the L2-reader, such characters should not cause major problems. Turkish seems to have almost only this type of correspondence rules. A second type of rules is underdetermined correspondence rules, which are typical of the German writing system. For example, the letter <o> corresponds to either tense [o] or lax [ɔ]. In some words, specific markings fix the correspondence to a single option. In *Sohn* ‘son’, there is a silent <h> (a lengthening marker) indicating that the preceding vowel is a tense vowel, while in *offen* ‘open’, the reduplicated consonant letter (a sharpening marker) indicates that the preceding vowel is a lax vowel. In other cases, however, there is no graphic marker, so a spelling such as *Ton* ‘tone’ is underdetermined in terms of the vowel quality and, thus, a potential problem.

Another fairly large group of characters displays the type of inherently ordered correspondence rules. Again, such a character has at least two options for corresponding phonological elements, but the phonological structure of German makes it clear which one to choose. Typical cases are letters for voiced obstruents such as <d>. This letter corresponds to [d] when the phonology allows it, otherwise to [t]. An example is *Bad* ‘bath’ [bat], which shows the phonological rule of final devoicing. Voiced obstruents are not allowed syllable-finally in the phonology of German. Finally, there are letters that show specific correspondences only in certain graphemic contexts, such as the letter <u>, which corresponds to the consonant [v] when preceded by the letter <q> and to vowels otherwise. Other complexities of the German writing system concern letters that are more or less specific to this writing system, namely <ß> (always corresponding to [s]) and the umlaut letters <ä, ö, ü>, which correspond to front vowels. In addition, the German writing system has a number of ‘fixed letter combinations’ that behave like single letters in that they have their own correspondence rules. Examples include <sch>, which corresponds to [ʃ], and <ch>, which corresponds to either [ç] or [x] (with phonological conditioning).

A typical deviation of L1-Turkish learners of German is that they constantly pronounce <ch> as [x] (e.g. the pronoun *sich* [ziç] as [zix]), which can be regarded as a deviation on the graphemic level. As mentioned, this fixed letter combination has an underdetermined correspondence rule and corresponds either to [ç] or to [x]. However, both sounds are non-existent in Turkish (Zimmer and Orgun 1999), therefore, the correspondence rule <ch> to [x] is not further specified. For participants with L1 Kurdish as a subgroup of L1 Turkish participants, we could observe that they regularly pronounced the letter <ğ> as [x] instead of [ɣ] in Turkish texts, presumably because the latter sound does not exist in Kurdish (cf. an example from a reading protocol below; the first highlighted deviation is a case of freely inserted additional material).

<i>Turkish original version</i>	<i>Output of the participant (L1 Kurdish)</i>
Berlin'deki birçok insan bu yıl kızamığa yakalandı.	Berlin'deki birçok insan ve isan bu yıl kızamı [x] a yakalandı.

In Farsi-Dari which possesses the sound [x] but not the sound [ç], the correspondence rule for the digraph <ch> is more elaborated. In the word *Nachrichten* pronounced by the participants as

Nachrichten, the first instance of <ch> was realised correctly while the second was exchanged into [ʃ]. The latter indicates that the learners are aware of two possible realisations of <ch>. For the Turkish group, we also observed deviations in the pronunciation of the letters <z> and <v> in the German texts for which we assume different explanations. All these letters exist in the Turkish alphabet. However, the letter <z> was not pronounced correctly by the Turkish speakers because the affricate [ts] does not exist in Turkish (here, <z> regularly corresponds with [z]). A typical case is *Zahl* being pronounced as *Tahl*. Moreover, the letter <v> is problematic due to its underdetermined character in German. We find that the Turkish participants preferred a constant articulation of this letter, leading to a misreading of the preposition *vom* [fɔm] as [vɔm]. For Farsi-Dari, a noteworthy case was the realisation of the letter <s> which has an inherently ordered correspondence rule in German, with [z], [s] and [ʃ] (in this order) being its possible pronunciations. Since the phonology of Farsi-Dari lacks the phoneme [z], it is not a surprise that participants pronounced <s> as [s] in contexts where [z] would have been appropriate like in *Sonne* pronounced as [sɔnə] instead of [zɔnə].

Another interesting case are umlaut letters. Umlaut letters <ü> and <ö> are familiar to the Turkish spelling system. German additionally has the letter <ä>. Therefore, it is not surprising that in several cases the Turkish participants misread <ä> as <a> like in *wäre* read as *ware*. We also observed cases where <ü> is misread as <u>, e.g., in *Schüler* ‘pupil’ pronounced as *Schuler* (a non-existing word) and *größte* misread as *großte*. That means that the same letters were differently recognized in L1 and L2 and a separate strategy was utilised for their realisation in L2 German. A similar pattern was observed in Farsi-Dari where umlaut letters do not exist at all (cf. Amirpour 1989). The respective letters <ä, ö, ü> were pronounced as the related letters <a, o, u>, leading to deviations like in *mussen* instead of *müssen* and *großte* instead of *größte*. Since consonant clusters are typical for German, but not for Turkish or Farsi-Dari, it is likely that L2 learners develop specific simplification or modification strategies to adjust those sound combinations to L1 phonotactics. We find cases like the following in the reading protocols obtained in the current study where the sequence of the three consonants [ʃtr] is resolved by the insertion of a vowel:

<i>German original version</i>	<i>Output of the participant (L1 Turkish)</i>
Streit über Impfungen	[ʃ]itreit über Impfungen

The learners with L1 Farsi-Dari showed a different strategy to overcome difficulties regarding consonant clusters in syllable onsets. They inserted the vowel [e] at the very beginning of a word like in *Estreit* instead of *Streit*.

The last case to mention here is the obvious influence of the L1 in the reading products of German in that German words that share morphemes with the respective Turkish words were read partly or completely in Turkish. Examples are the geographic name *Japan* which is written the same in both languages. Our participants tended to mispronounce this in the Turkish way as [tʃapɔn] instead of [japɔn]. The L1 influence is also evident in the word *olympiyat* with Turkish morphology instead of the German word *olympischen*.

Discussion

In the current contribution, we discussed two potential approaches to take account of L1 literacy skills in multilingual learners. For isolated word recognition, we considered language-

specific properties that one needs to be mindful of when selecting competitor images for the target. For reading fluency, we developed parallel texts in L2 German and the respective L1s of the learners. We compiled reading protocols that allowed an insight into the deviations that systematically occurred in the learner varieties. Finally, we also showcased the role of multilingual control group scores as a benchmark for the assessment of reading fluency in adult emergent L2 readers. Our results generally capture the difference in the participants' performance in L1 compared to L2, between two different L1 groups (Turkish vs. Farsi-Dari), or between the relativised and the raw reading fluency scores. Still, both the tasks that we used were originally developed to suit the cognitive demands of children. Since adults typically possess well-developed cognitive functions (Trueswell et al., 1999), pure deterministic response measures (e.g., accuracy scores) might not be sensitive enough to pick up delayed or multiple lexical activation when an adult participant is required to choose the target item among several competitors in case of isolated word recognition.

A more ecological way to gain an insight into the learners' implicit phono-graphemic knowledge is through the inspection of their eye movements while they are engaging with the task. Since the classical study of Altmann and Kamide (1999), eye movements have been repeatedly shown to be modulated by linguistic input and are, thus, sensitive to linguistic processing. In the picture selection activity as mentioned above, eye movements may be informative with regard to the extent to which intended competitors interfere with the target as well as how word recognition takes place with emergent adult readers. It would be intuitive to suggest that initial distribution of looks between the target and the competitor with the same onset would indicate that the printed word is not processed as a whole at once, but incrementally, which is in line with existing models of bilingual word recognition (Dijkstra & Van Heuven, 2002). Incremental word decoding may gradually transition into the ability to recognize the printed word as a whole. Especially at initial stages of reading development, graphemic representation may not be stable enough which will bring about the interference from possible phono-graphemic neighbours. The more automatised low-level recognition processes are, the more resources are freed up for higher level processes such as the access to word semantics (LaBerge & Samuels, 1974; Geva & Weiner, 2015; Rosebrock & Nix, 2017; Hayes, 2012). In accordance with this, ultimate and timely allocation of looks towards the semantic competitor would indicate that lexical access has taken place appropriately.

Respective research studies also demonstrate that an overlap in the phonological form of the words between the languages of a multilingual speaker may lead to between-language activation of lexical items in the language which is not actively involved in the accomplishment of the task, which may be considered another specific realisation of multilingualism. Marian and Spivey (2003) investigated Russian-speaking university students who have been living in the US for at least seven years at the point of investigation and, thus, displayed a high level of proficiency both in English and in Russian. They presented the participants with four objects. Besides the target 'shark', there were two competitors that overlap with the target in word onset either in English 'shovel' or in Russian *sharik* 'balloon'. Eye movements were recorded while the participants were inspecting the visual scene to reach out for the target object. Though the experiment was run entirely in English and Russian was not involved in the task, the participants allocated approximately equal proportions of looks towards the within- and the between-language competitor during the search phase. As such, this finding lends support to the idea that bilingual lexical access is non-selective. Yet, concurrent co-activation of lexical items that overlap in phonological form across languages may be modulated by the learners' proficiency in

the respective language. The authors tentatively hypothesise that the lower the learners' proficiency, the weaker the link between the lexical item and the concept behind it in the weaker language and, therefore, the lower the degree of between-language co-activation. Since such a paradigm appears susceptible to linguistic abilities in both the learners' languages, a version of the task with printed rather than spoken words might be co-revealing with regard to the learners' basic literacy skills in both the languages (cf. Freeman & Marian, 2021 for a recent study with balanced bilinguals). The better literacy skills in either language are developed, the stronger the activation effect will be. Obviously, the strength of parallel co-activation will bear an influence of other factors, such as the difference in script type (Liversedge et al., 2016), transparency of orthography (Katz & Frost, 1992; Ktori & Pitchford, 2008) as well as word frequency (Brysaert et al., 2018), which have an attested effect on reading efficiency.

Conclusion

For multilingual learners, literacy acquisition is a process involving more than one language and, therefore, more than one writing system, which requires a systematic account of bilingual abilities in the domain of literacy skills. As we have seen in the current contribution, adaptations of common experimental tasks related to visual word recognition and reading fluency might be potentially informative with regard to such bilingual phenomena as, for example, instances of cross-linguistic influence. They may also reveal common strategies that bilinguals develop to negotiate the regularities of the writing system of their less dominant language. Finally, L2 learners' degree of literacy in their respective languages is concomitant with the strength of interference from within-language phono-graphemic competitors and co-activation of between-language ones during isolated word recognition. Using skilled L2 readers as a reference point might yield more adequate estimation of reading fluency in adult emergent L2 readers. Considerations of this type are becoming increasingly important for an integrated approach to testing and assessment as well as curriculum and course design for literacy instruction in multilingual classrooms.

Acknowledgement

The isolated word recognition task and texts for the oral reading fluency task for L2 German as well as for L1 Turkish and L1 Farsi-Dari were developed within the project on the evaluation of literacy skills of learners attending L2 German courses with literacy instruction (ELIKASA⁴) funded by the German Ministry of Education and Research (Grant Number W146500) which is being carried out from 2020 till 2023 at the University of Jena by the authors and directed by Prof. Dr. Christine Czinglar.

⁴ <https://www.dafdz.uni-jena.de/elikasa>

References

- Altmann, G.T.M., & Kamide, Y. (1999). Incremental interpretation at verbs: restricting the domain of subsequent reference. *Cognition*, 73, 247 – 264.
[https://doi.org/10.1016/s00100277\(99\)00059-1](https://doi.org/10.1016/s00100277(99)00059-1)
- Amirpur, M. (1989). *Zielsprache Deutsch. Eine kontrastive Analyse Deutsch/ Persisch.// German as a Target Language. A contrastive analysis German/Persian*. Available online at: <http://spektrum.irankultur.com/wp-content/uploads/2013/04/Zielsprache-Deutsch.-Eine-kontrastive-Analyse-Persisch-Deutsch.pdf>. Retrieved: 14.10.2021.
- Arslan, Z., & Edeleva, Y. (2022). Reading fluency as a resource for L2 writing competence in adult low-literate migrants. Talk presented at the 18th Annual LESLLA Symposium (Arizona, USA), 19.10.2022.
- Bernhardt, E.B. (2010). *Understanding Advanced Second-Language Reading*. New York, NY: Routledge.
- Bulut, N., & Linnemann, M. (2015). AdISLA – Adaptives Instrument zur Sprachdiagnostik von Lernenden in Alphabetisierungskursen.//AdISLA – An Adaptive Instrument for Linguistic Diagnosis of Learners in Literacy Courses. In: Deutscher Volkshochschul-Verband e.V. (Eds.). Projekt ‘Rahmencurriculum und Kurskonzept für die abschlussorientierte Grundbildung’//*Project ‘Framework Curriculum and Syllabus towards Certified Basic Education’*, (pp.23–32). Bonn: Deutscher Volkshochschul-Verband.
- Brysbaert, M., Mander, P., & Keuleers, E. (2018). The word frequency effect in word processing: An updated review. *Current Directions in Psychological Science*, 27 (1), 45-50. <https://doi.org/10.1177/0963721417727521>
- Cevriye E., Akoğlu, G., Akçamuş, M. Ç. Ö., Demir, E., Tülü, B.K., & Kudret, Z.B. (2020). Longitudinal Results on Phonological Awareness and Reading Performance of Turkish-Speaking Children by Socioeconomic Status. *Education and Science* tedmem: Early Release, 1-20. <https://doi.org/10.15390/EB.2020.8991>
- Dijkstra, T., & Van Heuven, W. J. B. (2002). The architecture of the bilingual word recognition system: From identification to decision. *Bilingualism: Language and Cognition*, 5, 175-197. <https://doi.org/10.1017/S1366728902003012>
- Dorofeeva, S., Reshetnikova, V., Serebryakova, M., Goranskaya, G., Akhutina, T., & Dragoy, O. (2019). Assessing the Validity of the Standardized Assessment of Reading Skills in Russian and Verifying the Relevance of Available Normative Data. *The Russian Journal of Cognitive Science*, 6 (1), 4 – 24.
- Edeleva, J., Do Manh, G., Förster, F., & Czinglar, Ch. (2022). Basale literale Kompetenzen bei erwachsenen Migrant*innen mit Deutsch als Zweitsprache erforschen: Forschungsmethoden und Forschungsdesiderate im Überblick.//Researching basic literacy skills in adult migrants with German as a Second Language: An Overview over research methods and open issues. In: B. Marschke (Ed). *Handbuch für kontrastive Alphabetisierung.//Handbook of contrastive literacy instruction* (pp. 265-283). Berlin: Erich Schimdt Verlag.
- Engel, N. (2016). *Oldenburger Diagnostikbögen. Erläuterungen und Kopiervorlagen*. Online-Version, 2. Fassung. // *Oldenburg Diagnostic Sheets. Guidelines and Mastercopies*. Online version. 2nd ed. Oldenburg: Volkshochschule Oldenburg e.V., Regionales Grundbildungszentrum (RGZ).

- Freeman, M.R., & Marian, V. (2021). Visual word recognition in bilinguals. Eye-tracking evidence impacts access of L1 phonotactics. *Studies in Second Language Acquisition*, 44 (3), 759-787. <https://doi.org/10.1017/S027226312100053X>
- Geva, E., & Weiner, J. (2015). *Psychological assessment of culturally and linguistically diverse children: A practitioner's guide*. Berlin, Heidelberg: Springer Publishing Company.
- Gort, M., & Bauer, E.B. (2012). Holistic approaches to bilingual/biliteracy development, instruction, and research. In: E.B. Bauer, & M. Gort (Eds.). *Exploring young learners' use of their linguistic resources*. New York, NY: Routledge.
- Grosjean, F. (1985). The bilingual as a competent but specific speaker-hearer. *Journal of Multilingual and Multicultural Development*, 6 (6), 467-477. <https://doi.org/10.1080/01434632.1985.9994221>
- Grotlüschen, A. (Ed.) (2010). *lea. – Literalitätswicklung von Arbeitskräften. Diagnose//lea – The development of literacy skills in workers. A diagnosis*. Münster, Waxmann.
- Grotlüschen, A., Buddeburg, K., Dutz, G., Heilmann, L., & Stammer, Ch. (2019). *LEO 2018 – Leben mit geringer Literalität//LEO 2018 – Living with restricted literacy*. Bielefeld: wbv Media.
- Gürsoy, E. (2010). Sprachbeschreibung Türkisch. *proDaZ Deutsch als Zweitsprache in allen Fächern//Linguistic Description of Turkish. proDaZ German as a Foreign Language across Subjects*. University of Duisburg.
- Hayes, J.R. (2012). Modeling and Remodeling Writing. *Written Communication*, 29(3), 389-388. <https://doi.org/10.1177/0741088312451260>
- Katz, L. & Frost, R. (1992). The reading process is different for different orthographies: The orthographic depth hypothesis. In R. Frost, & L. Katz (Eds.), *Orthography, phonology, morphology, and meaning* (pp. 67–84). North-Holland.
- Kornev, A. N. & Ishimova, O.A. (2010). *Metodika diagnostiki dislexii u detej// An approach to diagnosing dyslexia in children*. St. Petersburg, Russia: Politechnicheski Universitet.
- Ktori, M. & Pitchford, N.J. (2008). Effect of orthographic transparency on letter position encoding: A comparison of Greek and English monoscriptal and biscriptal readers. *Language & Cognitive Processes*, 23, 258-281. <https://doi.org/10.1080/01690960701536797>
- Kuperman, V., Siegelman, N., Schroeder, S., Acartürk, C., Alexeeva, S., Amenta, S., . . . Usal, K. (2022). Text reading in English as a second language: Evidence from the Multilingual Eye-Movements Corpus. *Studies in Second Language Acquisition*, 1-35. <https://doi.org/10.1017/S0272263121000954>
- LaBerge, D. & Samuels, S.J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology*, 6 (1), 293-323. [https://doi.org/10.1016/0010-0285\(74\)90015-2](https://doi.org/10.1016/0010-0285(74)90015-2)
- Landgraf, S., Beyer, R., Hild, I., Schneider, N., Horn, E., Schaadt, G., Foth, M., Pannekamp, A. & van der Meer, E. (2012). Impact of phonological processing skills on written language acquisition in illiterate adults. *Developmental cognitive neuroscience*. 2 Suppl 1, 129-38. <https://doi.org/10.1016/j.dcn.2011.11.006>
- Liversedge, S. P., Drieghe, D., Li, X., Yan, G., Bai, X. & Hyönä, J. (2016). Universality in eye movements and reading: A trilingual investigation. *Cognition*, 147, 1–20. <https://doi.org/10.1016/j.cognition.2015.10.013>

- Marian, V. & Spivey, M. (2003). Bilingual and monolingual processing of competing lexical items. *Applied Psycholinguistics*, 24, 173-193.
<https://doi.org/10.1017/S0142716403000092>
- Markov, S., Scheithauer, Ch., & Schramm, K. (2015). *Lernberatung für Teilnehmende in DaZ-Alphabetisierungskursen. Handreichung für Lernberatende und Lehrkräfte.//Learning Guidance for Learners in GFL-Courses with Literacy Instruction. Handbook for Training Consultants and Course Instructors*. Münster, New York: Waxmann.
- Maviş, İ, Tunçer, A.M. & Balo, S.S. (2020). *The Adaptation of MAIN to Turkish*. Anadolu: Anadolu University Press.
- Neef, M. (2005). *Die Graphematik des Deutschen*. Tübingen: Niemeyer.
- Neef, M. & Balestra, M. (2011). Measuring graphematic transparency: German and Italian compared. *Written Language & Literacy*, 14 (1), 109-142.
<https://doi.org/10.1075/wll.14.1.06nee>
- Ossner, J., Rosebrock, C., & Scherf, D., (2021) *Alpha-Kurzdiagnostik. DVV Rahmencurriculum Schreiben und Lesen.// Alpha-Brief Diagnostics. DVV Framework Curriculum Reading and Writing*. Bonn: Köllen-Druck Verlag.
- Perlmann-Balme, M. (2010). *Diagnose & Einstufung: Der Alpha-Baustein im Einstufungssystem in die Integrationskurse in Deutschland.//Diagnosing and Placement: The Literacy Component in the Placement System into Integration Courses in Germany*. Goethe-Institut.
- Rahbari, N., Se'ne'chal, M. & Arab-Moghaddam, N. (2006). *The role of orthographic and phonological processing skills in the reading and spelling of monolingual Persian children*. Springer Science+Business media B.V.
- Rasinski, T. (2004). *Creating Fluent Readers. A growing body of evidence points to reading fluency as an important factor in student reading success*. Educational Leadership. Association for Supervision and Curriculum Development. March. Available online at: https://lrl.appstate.edu/reading_resources/RASINSKI_04.pdf Retrieved: 03.07.2021
- Rasinski, T. (2012). Why Reading Fluency Should be Hot. *The Reading Teacher*, 65. Available online at: <https://ila.onlinelibrary.wiley.com/doi/epdf/10.1002/TRTR.01077> Retrieved: 03.07.2021, <https://doi.org/10.1002/TRTR.01077>
- Rosebrock, C. & Nix, D. (2017). *Grundlagen der Lesedidaktik und der systematischen schulischen Leseförderung//Basics of the Pedagogy of Reading Pedagogy and Systematic Reading Instruction at School*. Baltmannsweiler: Schneider Verlag Hohengehren.
- Schneider, W., Blanke, I., Faust, V. & Küspert, P. (2011). *WLLP-R Würzburger Leise-Leseprobe-Revision. Ein Gruppentest für die Grundschule.//WLLP-R Würzburg Silent Reading Screening. A group test for primary school*. Göttingen: Hogrefe.
- Schnitzler, C. D. (2008). *Phonologische Bewusstheit und Schriftspracherwerb.//Phonological Awareness and Literacy Acquisition*. Stuttgart u.a.: Thieme.
- Sebastián, C. & Moretti, R. (2012). Profiles of cognitive precursors to reading acquisition. Contributions to a developmental perspective of adult literacy. *Learning and Individual Differences* 22 (5), 585-596. <https://doi.org/10.1016/j.lindif.2012.02.005>
- Treffers-Daller, J. (2018). The measurement of bilingual abilities: central challenges. In: De Houwer, A. & L. Ortega (eds.) *The Cambridge Handbook of Bilingualism*. Cambridge: Cambridge University Press, 289-306. <https://doi.org/10.1017/9781316831922.016>

- Trueswell, J. C., Sekerina, I., Hill, N.M. & Logrip, M.L. (1999). The kindergarten-path effect: studying on-line sentence processing in young children. *Cognition*, 73, 89 – 134.
[https://doi.org/10.1016/S0010-0277\(99\)00032-3](https://doi.org/10.1016/S0010-0277(99)00032-3)
- Usanova, I. (2016). Transfer in bilingual und (bi)scriptual writing: can German-Russian bilinguals profit from their heritage language? The interaction of different languages and different scripts in German-Russian bilinguals. In: Rosenberg, P., & Schroeder, Ch. (Eds.). *Mehrsprachigkeit als Ressource in der Schriftlichkeit// Multilingualism as a Resource in the Written Domain* (pp. 159-174). Berlin, New York: de Gruyter.
<https://doi.org/10.1515/9783110401578-010>
- Wild, N. & Fleck, C. (2013). Neunormierung des Mottier-Tests für 5- bis 17-jährige Kinder mit Deutsch als Erst- oder Zweitsprache. *Praxis Sprache*. // Renorming Mottier-Test for 5- to 17 y.o. children with German as a First or Second Language. *Practice Language*, 3, 152-157.
- Zimmer, K. & Orgun, O. (1999). Turkish. In: *Handbook of the International Phonetic Association*. Cambridge: Cambridge University Press, 154-156.