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Dissertation Topic:

Testing Reading Fluency

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1.0 Introduction

The increasing demands for rapid and accurate reading skills in a computer-literate society highlight the importance of understanding the factors that affect fluent reading (Hudson, Torgesen, Lane, & Turner, 2012; Katzir, Younsuk, Wolf, O'Brien, Kennedy, Lovett & Morris, 2006). Yet, research on reading development has focused on the metalinguistic components of word reading *accuracy,* and on the relationship of accurate word recognition to improved reading comprehension (hereafter- RC) (e.g. Adams, 1990; NRP, 2000; Snow, Burns & Griffin, 1998; Snow, Griffin & Burns, 2005) while marginalizing the element of speed (Katzir et al, 2006). Therefore, speed or fluency was not a major component in the conceptualization of reading development. This is true for First language (L1) and Second or Foreign language (L2/FL) research (Kim, 2012; Lesaux & Geva, 2006). Moreover, even when fluency was tested, previous research paradigms have adopted a narrow definition, which considered fluency as the *outcome* of reading rate and accuracy at the word level (word reading fluency, hereafter- WRF) while overlooking Text/Oral reading fluency (hereafter-TRF). This has had important negative impact on reading theory (Katzir et al, 2006). One practical outcome has been the fact that many children performing below the basic level of text comprehension have gone unnoticed because they exhibit normal isolated-word decoding accuracy skills (Katzir et al, 2006; Silverman, Speece, Harring, & Ritchey, 2013).

Fluency, both at the word and the text level, are essential components of RC in both L1 and L2. Yet, not much is known about whether they reflect one fluency construct or two different constructs (Crosson & Lesaux, 2010; Grabe, 2009; Katzir et al. 2006; Kim & Wagner, 2015). While generally overlooked, reading fluency has received more attention in L1 than in L2 (Kuhn & Schwanenflugel, 2008; Kuhn, Schwanenflugel, Morris, Morrow, Woo, Meisinger, Sevcik, Bradley & Stahl, 2006). For example, in a recent review, Lesaux & Geva (2006) reported just one study (Jackson & Lu, 1992) investigating the speed of word reading among English as a second language (hereafter ESL) readers. Given the fact that most L2 students read at one-half to one-third the rate of an L1 student (Grabe, 2009), the theoretical and practical importance of studying the nature of fluency in L2 is warranted. This investigation must address fluency at three different levels: metalinguistic awareness fluency, WRF, and TRF. Moreover, it is critical that these three levels of fluency be investigated in relation with RC and vis-à-vis parallel accuracy measures. Finally, the relationship between fluency in L1, especially at basic metalinguistic awareness skills, and L2 fluency is critical (Baddeley, 2003; Mather & Wendling, 2005), especially given solid evidence of cross-linguistic transfer in these domains (Geva, 2014).

2.0 Aim of Study

The proposed research investigates fluency among a sample of Arabic speaking learners of English as a foreign language (EFL) in beginning and more advanced grades. It addresses fluency at the level of basic metalinguistic skills, WRF and TRF. In addition, it probes the relationship between these three skills and RC in EFL. Moreover, the present study addresses metalinguistic fluency in Arabic L1 and its relationship to the same skills in EFL, as well as to WRF and TRF in EFL. Finally, it asks whether fluency measured at the different levels add more to our understanding of reading development in EFL than parallel accuracy measures. This study is expected to provide a deeper understanding of the nature of fluency in EFL, an area of study which has not received sufficient research attention (Crosson & Lesaux, 2010; Grabe, 2009; Kim, 2012; Lesaux & Geva, 2006), and of its developmental nature among this population of readers.

3.0 Literature Review

3.1 L1, L2 and FL: Terminology and Definitions

According to Baker and Jones (1997); the term “first language” (L1) (sometimes also called *native language* [NL] or *mother tongue*) refers to "the original language of an individual" and "is also used to talk about the heritage or native language of a group of people, especially a language minority within a language majority region" (p. 47). In contrast, a foreign language (FL) is defined as "a language not commonly used in the student's country of residence," and it is, hence, to be distinguished from a second language (SL), which describes "a language more widely used in the student's country of residence" (p. 667).

Despite this clear distinction between L2 and FL settings, as well as related differences between the two contexts in mode of acquisition (Natural in L2 versus formal in FL) and amount of exposure, research in reading development has been largely agnostic to these differences between the two contexts. Instead, the term ‘L2’ has been interchangeably used to refer to both SL and FL contexts. For example, the seminal volume on reading development in language minority students (August & Shanhan, 2006) is a review of research on L2 (mainly in the US) and FL contexts (mainly in Europe) without properly delineating the effect that the different learning conditions in these two contexts might have on reading development or on predictors of reading in the two contexts.

3.2. Reading in L1

Theories of reading fluency are grounded in LaBerge & Samuels’ (1974) *Information Processing Theory*. According to this theory, an individual has a limited amount of attentional resources available for any given cognitive task. Therefore, if the execution of a complex skill necessitates the coordination of many component processes within a short time frame, performance of this complex skill would exceed attentional capacity and become impossible. This theory was extended to reading in the form of a classic *Automaticity View of Reading.* This bottom-up model of reading considers lower level lexical processes, such as orthographic segmentation and phonological coding, to be better targets for automaticity, allowing enough attention to the higher-level comprehension processes (Breznitz, 2006; Fuchs, Fuchs, Hosp & Jenkins, 2001; Kim, Wagner, & Foster, 2011).

Perfetti’s (1985, 1992) *Verbal Efficiency Theory* is another model of reading that derives from LaBerge & Samuels’ (1974) theory of automaticity and, hence, assigns a primary role of word-level decoding fluency in reading development. According to this theory, capacity of the cognitive system is limited and cannot simultaneously decode words and extract meaning. Therefore, decoding must become automatic to free up cognitive resources needed to fully attend to the meaning of text. This theory assumes that if decoding is accurate but not automatic, attention and memory needed for processing meaning would be overburdened, resulting in poor RC, even in the presence of adequate decoding and general comprehension ability. Thus, according to this view, fluency mediates the role of decoding in RC (Breznitz, 2006; Ehri, 1995, 1998; Fuchs et al., 2001; Kim et al., 2011; Hudson, Pullen, Lane, & Togresen, 2009; Silverman et al., 2013).

Another related perspective on reading is the *Simple View of Reading* (SVR) (Gough & Tunmer, 1986; Hoover & Gough, 1990) which postulates that (RC), the end goal of reading, is the product of decoding and linguistic comprehension (RC=D x C). The SVR model has been mainly tested using word decoding accuracy tasks, and the model was found to be a good longitudinal predictor of RC differences in L1 (Oakhill, Cain, & Bryant, 2003) and in L2 (e.g., Gottardo & Mueller, 2009). Nonetheless, it has been criticized as overlooking fluency as an additional significant component of reading development (Katzir, 2003; Katzir, Breznitz, Shaul, & Wolf, 2004; Katzir et al., 2006; Wolf & Katzir,, 2001). Adolf, Catts, & Little (2006), for instance, in a longitudinal study of second-, fourth-, and eighth-grade students, found that fluency did not add to SVR. On the other hand, Tilstra, McMaster, van den Broek, Kendeou, & Rapp (2009), in a cross-sectional study of fourth-, seventh-, and ninth-grade students, found that fluency as well as expressive aspects of verbal proficiency (using expressive measures of comprehension) added unique variance to the explanatory power of the SVR beyond decoding and linguistic comprehension. Silverman et al. (2013), in a review of earlier L1 research findings, argued that fluency may be considered a separate construct from decoding and linguistic comprehension in fourth grade and beyond (e.g. Speece, Ritchey, Silverman, Schatschneider, Walter, & Andrusik, 2010). The authors based their analyses on data from 248 fourth-grade English L1 speaking children and examined whether the influence of fluency on RC is direct, or whether fluency plays an indirect role on RC as a mediator or moderator of decoding. The findings of this and other research were incorporated in the *Componential Model* (Joshi, 2003; Joshi & Aaron, 2003, 2006) which presents decoding fluency as an independent factor alongside decoding accuracy and oral language measures in explaining differences in RC.

Another more recent fluency related hypothesis- the *Synchronization Hypothesis* (Breznitz 2001a, Breznitz & Mistra, 2003) proposes that accurate integration of information in decoding words can take place only when the modalities (visual and auditory) and brain systems are in synchronization with each other. Breznitz proposed that it is not only the content of information that matters for successful synchronization, but the speed at which the information is processed and transferred within and between the various systems activated in the process. The asynchrony phenomenon, in that case, would stem due to lack of speed coordination in the modalities and brain systems. In different studies conducted by Breznitz (Breznitz, 2001a, 2003b; Breznitz & Mistra, 2003) relative slowness among dyslexic readers was observed as compared to normal age-matched readers in processing information in the visual, auditory, and cross-modal modalities. Slowness in this group was observed when processing both lower-level and higher-level linguistic information at the various stages of information processing: perception, working memory, and output stage. This model was developed and tested among dyslexic readers in L1. It would be interesting for future research to study the validity of this model in the context of EFL reading development.

3.3. Reading in L2/FL

Theories of reading in L2 have for long been impacted by theories of reading in L1, particularly by theories of reading in English L1 (Frost, 2012; Share, 2008). However, when applying L1 reading theories to the L2 contexts, important contrastive features of L2/FL literacy development emerge: context (natural versus formal) of language learning/acquisition, modality (oral versus written) of learning/acquisition, starting age of learning/acquisition, extent and quality of feedback, amount of exposure, and related oral language skills. Some of these features also distinguish L2 from FL contexts. Perfetti's (1985, 1992) verbal efficiency theory, stressing the need for achieving automaticity in word reading as a requirement for releasing cognitive resources for text reading comprehension, was found valid in L2 reading contexts. Similarly, the SVR with its two components- word reading and oral language comprehension- also proved valid in the context of L2 learning (e.g. Gottardo & Mueller, 2009). However, one implicit assumption that implicitly underlies these hypotheses is that children's oral language skills are in place. In other words, for oral language skills to play a role in reading fluency or in RC, children need to have achieved oral language proficiency in addition to word reading fluency (Kim et al, 2011). Yet, this assumption does not apply in many L2/FL contexts, and differences between L2 and FL contexts on this parameter are huge, especially when younger children are compared. Research has shown that word decoding in L2 can develop at a similar rate as L1 as long as quality code-based instruction is provided (e.g., Genesee, Lindholm-Leary, Saunders, & Christian, 2006; Lesaux, Geva, Koda, Siegel, & Shananhan, 2008; Lesaux & Siegel, 2003; Lindsey, Manis, & Bailey, 2003). On the other hand, L2 readers were found to lag behind their L1 counterparts in RC, arguably due to their insufficient oral language skills (Kim, 2012; Lesaux et al., 2008). Kim (2012a) showed that while children's oral language proficiency in L2 was uniquely and directly related to RC in L2, over and above L2 WRF, L2 TRF, and L1 literacy skills; they were not uniquely related to TRF even for skilled word readers. According to the author, these results indicate that a certain threshold level of oral language skill (in addition to word reading fluency) is necessary for oral language proficiency to play a role in TRF.

Besides limited L2 oral language skills, another distinctive feature of L2/FL reading development is its dual-language involvement and the inevitable interaction between L1 and L2 language and orthography (August & Shanahan, 2006; Koda, 2005, 2008; Saiegh-Haddad & Jayusi, 2016). Recent L2 research focused on L1-L2 transfer of reading related skills (Genesee, Geva, Dressler & Kamil, 2006) and on universal vs language-specific predictors of L2 literacy development (Genesee & Geva, 2006). The concept of transfer, which was first introduced in Lado's (1957) *Contrastive Analysis* theory, provides a framework for understanding L2 language development based on similarities and differences between L1 and L2 (Gass & Selinker, 1994; Geva, 2014; Koda, 2008). Since then, the concept has undergone changes both in theoretical and operational definition (Geva, 2014; Koda, 2008). This concept was anchored in Cummin's (1981, 1991) *Linguistic Interdependence Hypothesis*. According to this hypothesis, literacy related skills are part of a common language proficiency. Once cognitive literacy skills are established in L1, they may transfer to other subsequent languages given attainment of a threshold of language proficiency in this language and under effective, supportive, and motivational learning contexts. Such transfer may occur from L1 to L2 and the other way around, from L2 to L1. On this assumption, transfer research has focused on three literacy-related metalinguistic awareness skills- phonological, morphological, and orthographic, and showed that these constructs may be subsumed together within an underlying common language proficiency construct (Koda, 2008). Similar arguments are captured by the *Linguistic Coding Differenced Hypothesis* (LCDH) (Ganchow & Sparks, 1995); and the *Central Processing Hypothesis* (Geva & Siegel, 2000). These theories argue for core cognitive and linguistic skills affecting both L1, and L2/FL reading development, and acknowledging the concept of skill transfer as a central mechanism, even in the presence of structural and orthographic differences between languages (Durgunoglu, Nagy & Hancin-Bhatt, 1993; Geva & Siegel, 2000; Geva, Wade-Woolley, & Shany, 1997; Saiegh-Haddad & Geva, 2008; Kahn-Horwitz, Shimron & Sparks, 2005; Sparks, Patton, Ganschow, & Humbach, 2008). For example, Durgunoglu et al. (1993) investigated factors influencing English word identification performance of Spanish-speaking beginning readers. Beginning readers were administered tests of letter-naming, Spanish phonological awareness, Spanish and English word recognition, and Spanish and English oral proficiency. Multiple-regression analyses revealed that the readers' performance on English word and pseudo-word recognition tests was predicted by the levels of both Spanish phonological awareness and Spanish word recognition accuracy, indicating cross-language transfer. Other studies supported the view that L1 reading ability (besides L2 oral language ability) affect L2 RC (e.g. Carrell, 1991; Kahn-Horwitz et al., 2005). For example, Kahn-Horwitz et al. (2005) showed that Hebrew (L1) morphological awareness, phonological awareness, orthographic ability, and word reading (accuracy and speed) predicted EFL knowledge of letter sounds and names, word decoding and RC among 145 fourth Grade learners. However, further results reached by the authors showed that in addition to the Hebrew (L1) skills, English (EFL) word recognition (accuracy and speed) was also a strong predictor of RC in EFL. Finally, a third group of researchers conjecture that although L2 reading is affected and predicted by L1 literacy skills, L2 proficiency and oral language skills are stronger predictors of L2 reading development than L1 skills (e.g. Cook & Bassetti, 2005; Droop & Verhoeven, 2003).

In parallel to the previously mentioned theories emphasizing relatedness in L1/L2 reading related skills, bilingual reading research presents an alternative language specific approach. According to the S*cript-Dependent Hypothesis* (Gave & Siegel, 2000), orthographic depth (Katz & Frost, 1992) exerts a major impact on the development of reading skills and constrains the relationship between L1 and L2 reading skills. Empirical support for this hypothesis comes from research comparing reading development in different languages that vary in orthographic depth (Akamatsu, 1999; Geva, 1995; Gholamain & Geva, 1999; Frost, 2005; Koda, 1999; Leong & Tamaoka, 1998; Oney, Peter & Katz, 1997; Saiegh-Haddad & Geva, 2008; Seymour, 2005; Seymour, Aro, & Erskine, 2003; Shimron, 1993; 2006; Taylor & Taylor, 1983; Wang & Koda, 2005; Ziegler, Bertrand, Tóth, Csépe, Reis, Faísca, & Blomert, 2010), showing shallow orthographies to make reading accuracy and speed acquisition easier and faster than in deep orthographies. Moreover, orthographic depth was shown to reveal different patterns of reading errors reflecting reliance on different reading mechanisms (Geva & Siegel, 2000). Developmental studies have also shown that individuals rely on other orthographic, visual, and linguistic information sources to achieve accuracy and speed in word recognition (Breznitz, 2006; Chikamatsu, 1996; Frost, 2005; Koda, 1990; Seymour, 2005) as a function of the simplicity of the phonological structure of the target language. For example, Koda (1990), applying the Script Dependent Hypothesis for L2 reading research, suggests that L1 orthography affects L2 word-recognition processes. She found that the Japanese, who have a deep L1 orthography, utilized orthographic information in recognizing English words, whereas the Spanish and Arabic (Voweled-Arabic) L1 readers, whose L1 orthography is shallow, relied on phonological information rather than orthographic information in processing English words. Similar results were reached by Chikamatsu (1996) comparing American and Chinese readers (whose L1 is relatively deeper than English) learning to read Japanese.

Research has also shown that differences between L1 and L2 in linguistic and orthographic structure may result in language-specific constraints on transfer and context-dependent patterns of L1 and L2 interrelations (Leiken, Schwartz, & Share 2010; Saiegh-Haddad, Kogan & Walters 2010). Such language-specific patterns are captured by the *Linguistic Facilitation Model* (Koda, 2008), as a framework for understanding L2 literacy development in light of shared L1 metalinguistic resources combined with specifics of L2 linguistic and orthographic input structure. Transferability of metalinguistic awareness from L1 to L2 have been shown to be affected by *Language distance*, and facilitated when the two languages have shared linguistic structures. Empirical research testing the emergence of metalinguistic awareness in different L1 and L2 settings supported the Linguistic Facilitation Model (e.g. Koda, 2000; Russak & Saiegh-Haddad, 2011; Saiegh-Haddad & Geva, 2008; Kahn-Horwitz, Schwartz & Share, 2011; Kahn-Horwitz, Kuash, Ibrahim & Schwartz, 2014; Wang, Perfetti & Liu, 2005). For example, Koda (2000) showed that morphological segmentation in English L2 was easier among speakers of agglutinative Korean than among speakers of isolating Chinese. Saiegh-Haddad and Geva (2008) showed that morphological awareness in L2 Arabic, a language with a mainly non-concatenated morphological structure, failed to correlate with morphological awareness or with word-level reading in English L1, a morphologically concatenating language. Russak and Saiegh-Haddad (2011) showed that English L2 phonological awareness was enhanced when the target phoneme was one that existed only in English FL but not in Hebrew L1. This finding supported the *Linguis*tic *Affiliation Constraint* (Saiegh-Haddad, 2007) on phonological processing in L2.

3.4. Fluency: The nature of the construct

Research outlines three main sub-components of fluency: automaticity, accuracy and rate (Grabe, 2009; Kuhn & Stahl, 2003; Kuhn, Schwanenflugel, & Meisinger, 2010; National Reading Panel, 2000; Samuels, 2002). *Automaticity* as a sub-component of fluency refers to modular operation (Karmiloff-Smith, 1988), namely to “processing operations that are rapid, relatively resource-free, not subject to interference, unconscious, and hard to suppress” (Grabe, 2009, p. 291). *Accuracy*, the second sub-component, involves recognition skills at the sub-word level, word level, or text level (Perfetti, 2007). As a component of reading fluency, accuracy is associated with word recognition, since fluent word recognition must not only be rapid and automatic, but also complete and accurate. Moreover, without word-reading accuracy, comprehension would not be attainable (Perfetti, 1985, 2007). The third sub-component of fluency is a *rapid overall rate of reading* needed for maintaining ease of comprehension throughout an extended text. It is at this level of extended fluent reading that the concept reading efficiency connects fluency with RC. This latter sub-component ability assumes attainment of the former sub-components, as well as vocabulary knowledge, automaticity with basic syntactic processing and practice (Breznitz, 2006; Carver, 1997, 2000; Perfetti, 1985). An additional fourth sub-component of fluency, which is not relevant to the current study, has also been outlined (e.g., Grabe, 2009) and it captures prosodic structuring- the recognition of prosodic phrasing and contours of the text while reading (e.g., Hudson et al., 2009; Kuhn, Schwanenflugel, & Meisinger, 2010; Kuhn & Stahl, 2003).

3.5 Fluency of basic lower level cognitive-linguistic processes

In an attempt to understand word decoding fluency, research has targeted micro-level sub-word cognitive-linguistic processing fluency, including phonological, morphological, and orthographic processing fluency (e.g., Badian, 2005; Bourassa & Treiman, 2003; Perffetti & Hart, 2001; Perfetti, 2007; Vellutino, 2003; Wolf & Katzir, 2001; Wolf, Katzir-Cohen, Cirino, O'Brian, Morris, & Lovett, 2001).

3.5.1 Phonological awareness fluency

Phonological awareness (PA) is awareness of the phonological structure of language and it is tested as the ability to access and manipulate the phonological units of spoken words: rhymes, syllables, onset-rimes and phonemes (Adams, 1990; Lee, 2005; Lesaux & Geva, 2006). A sub-skill of PA is phonemic awareness, which is the specific ability that requires identification and manipulation of the smallest units of sound, the phonemes .

Despite strong evidence demonstrating that PA is a critical component of reading development in all langauges (Goff, Pratt & Ong, 2005; Gottardo, Stanovich, & Siegel, 1996; Landerl, Ramus, Moll, Lyytinen, Leppanen, P. H., 2013; Stanovich,1992, 2000; Ziegler & Goswami, 2005; Ziegler et al, 2010), relatively little research has addressed the role of PA in L2 reading. This research has shown that PA in L2 is a strong predictor of word-level reading in L2 (Geva, 2006), implying a universal phonological processing mechanism in reading in all orthographies and writing systems (Perfetti & Dunlap, 2008; Perfetti & Liu, 2005). For example, Muter & Diethelm (2001) tested various aspects of PA and word level reading accuracy in English L2 among various multilingual groups and found that English PA in Kindergarten (age 5) significantly predicted word reading accuracy in English L2 a year later; Regression analysis further showed that first grade reading was uniquely predicted by PA, even after cognitive skills had been partialled out. Gottardo (2002) also found that PA in English L2 among Spanish-speaking children predicted word-level reading accuracy in L2. Moreover, there are consistent findings that PA transfers between languages and it predicts reading across languages, both for learners of language pairings that share the same written units, such as Spanish and English (e.g. Durgunoglu et al., 1993) and those that do not, such as Chinese and English (e.g., Gottardo, Yan, Siegel & Wade-Woolley, 2001).

While increasing attention to fluency as a necessary skill for reading proficiency was observed in recent years, very few studies have directly and systematically tested the cognitive-linguistic correlates of reading fluency, and hardly any studies looking for relations between PA-fluency, WRF, TRF, and RC. PA tasks involve various operations, including identifying/segmenting, blending, generating or deleting sounds. Such phonological awareness tasks usually index accuracy. Yet, when rate is added to the accuracy element, the task is said to measure PA-fluency. To illustrate, in a Phonemic Segmentation Fluency task (Kaminski & Good, 1996, 1998), a participant is asked to fully segment the phonemes in an orally presented word containing three or four phonemes. The number of correct segments produced in 1 minute is used as an index of segmentation fluency. Similarly, in Phonemic Blending Fluency tasks, participants are presented with an item orally, phoneme by phoneme, with a short pause (usually one second) between phonemes (e.g., f-a-t). Then, the experimenter measures the time it takes participants to blend the phonemes into words. Katzir et al. (2006) used Phonemic bending and phonemic Elision (Deletion) subtests to examine the relative contributions of PA accuracy to WRF and TRF in a dyslexic sample of 123 English L1 children in second and third grades. Regression results showed that the two PA tasks used (Blending and Elision) provided different patterns of correlation results with WRF. Children's performance in the Blending task was correlated only with Word Attack, while Elision was correlated with all three word-reading measures (Word Attack, Word Identification and Word Reading Efficiency). According to the authors, this finding indicates that although both phonological tasks contributed independent variance, they tap into different cognitive and linguistic requirements. Hudson et al., (2012) examined the structural relations of PA accuracy and rate (using a phonemic blending fluency task), letter-sound fluency, phonogram reading fluency (i.e., letter groups within a word that share a pattern across words), pseudo- word reading fluency (or word attack fluency), word reading fluency (WRF), text reading fluency (TRF) and RC among English L1 speaking second graders. Their results showed that phonological blending fluency predicted letter-sound fluency, which predicted phonogram reading fluency, which predicted pseudo-word reading fluency. WRF was predicted by pseudo-word reading fluency, and TRF was predicted by phonogram reading fluency and pseudo-word reading fluency. The authors concluded that automaticity in decoding, in addition to accuracy, and recognizing words with shared phonograms accurately and quickly, would be likely to promote the development of TRF. Finally, in another recent cross-linguistic study, Kim (2012a) tested relations between phonemic segmentation fluency and pseudo-word reading fluency in L1; and WRF, TRF and RC in L2 among Spanish L1-English L2 1st grade learners. Results showed that fluency in phonemic segmentation and pseudo-word reading in L1 were moderately related to WRF and TRF in L2. On the other hand, phonemic segmentation fluency and pseudo-word reading fluency in L1 were not uniquely related to L2 RC at this early stage of learning, after accounting for WRF and TRF in L2. The authors indicated in their conclusions that since their study population were 1st grade students, relations among L1 and L2 variables are expected to change as children's reading skills in L1 and L2 develop.

3.5.2 Morphological awareness fluency

Morphemes are "the smallest phonological units that carry semantic information" and morphological awareness (MA) refers to "the ability to reflect upon and manipulate morphemes and to control word formation process" (Kuo, & Anderson, 2008, p. 47). Since morphemes have phonological, semantic as well as syntactic properties (Mahony, Singson, & Mann, 2000), MA provide readers with additional linguistic and distributional insight into the structure of language (Nagy, Berninger, Abbott, Vaughan, & Vermeulen, 2003). Research has shown that morphemes help in the identification of the meaning of unknown complex words and in word learning, because words in the lexicon are organized according to morphological principles. (Chialant & Caramazza, 1995; Elbro & Arnback, 1996; Marslen-Wilson, Tyler, Waksler & Older, 1994). Moreover, fluency in morphological processing reduces working memory required for word recognition during reading, this in turn contributes to word reading fluency and frees up cognitive processing to attend to RC at the sentence level and beyond (Sweller, 1988; Schnotz & Kürschner, 2007).

When discussing assessment of MA skill, a distinction should be made between inflectional, derivational and compound morphology tasks, though all of them were found to correlate with word decoding and reading comprehension among L1 learners across different languages (Kirby, Deacon, Bowers, Izenberg, Wade-Woolley & Parrila, 2012; Ko & Wang; 2015). Inflectional morphemes alter the grammatical function of a word, without changing the word class. For example, the word played is formed when the suffix -ed is added to the base play. The word changes from present to past tense, altering the grammatical function, while the word class, as a verb, remains unchanged. In contrast, derivations involve the generation of new words from a base morpheme that differ in meaning and may also differ in word class. For example, adding the derivational suffix -ful to the free-standing base play creates the word playful, thereby altering the meaning of the word and changing the word class from a verb to an adjective (Kirby, et al., 2012). Compounds, on the other hand, are morphologically complex words in which at least two free morphemes are combined to form a new word, such as ‘basketball’ or ‘blueberry’ (Dressler, 2006; Verhoeven & Carlisle, 2006). MA tasks require participants to operate on the morphological structure of words by either deriving complex words from morphemes, or decomposing complex words into morpheme, or by judging whether pairs of words are morphologically related or not. MA tasks can be presented in oral, written, or combined oral and written modalities. While MA tasks typically index accuracy, speed is measured in addition to accuracy when MA-fluency is targeted, i.e., when the experimenter measures the speed with which a morphological operation is executed and completed .

L1 research provides ample evidence that MA promotes literacy development in L1; vocabulary development (Carlisle, 2000; Champion, 1997; Chow, McBride-Chang, Cheung, Chow, & Sze-Lok, 2008; Wagner, Muse, & Tannenbaum, 2007); word reading accuracy (Deacon & Kirby, 2004; Nagy, Berninger, & Abbott, 2006), WRF (Saiegh-Haddad & Geva, 2008), TRF (Kirby et al., 2012), and RC (Carlisle, 2000; Champion, 1997; Freyd & Baron, 1982; Kirby et al., 2012; Mahony, 1994; Tyler & Nagy, 1990). These relations were found to hold in early reading development (Casalis & Louis-Alexandre, 2000), and in later literacy development (Carlisle, 2000; Singson, Mahony, & Mann, 2000). For instance, in a longitudinal study, Deacon & Kirby (2004) examined the role of MA, besides PA in word reading accuracy, pseudo word decoding accuracy and RC among second-fifth grade English (L1) children. They found that morphological derivational awareness contributed rather weak, yet unique and significant contribution to both pseudo-word reading accuracy and RC, even after controlling for prior reading, intelligence and PA in all tested grades. Research has also shown that the role of morphology in word identification accuracy may vary across languages depending on their orthographic depth (Frost, Katz, & Bentin, 1987; McBride-Chang, Cho, Liu, Wagner, Shu & Zhou, 2005; Ramirez et al., 2010; Saiegh-Haddad & Geva, 2008) and their morphological richness (e.g. Vannest, Bertram, J¨avikivi, & Niemi, 2002). As such, MA was found to be associated more closely with reading in deep than in shallow orthographies (e.g. Saiegh-Haddad & Geva, 2008), and more in morphologically rich than in morphologically sparse languages (e.g. Bertram, Baayan & Schreuder, 2000). However, while many L1 studies have studied MA and its relation to reading, it was MA accuracy that was mainly tested not MA-fluency. To our knowledge, MA-fluency and its relation to word reading accuracy and fluency were not addressed in previous research.

MA in second language literacy has not yet been sufficiently explored (Ko & Wang, 2015; Koda, 2008; Wang & Verhoeven, 2015). Only lately has MA received attention in second language reading research, with different researchers providing evidence that there is a strong relationship between MA and reading acquisition in a second language among learners from different L1 backgrounds, including deep and shallow orthographies: English L2 (Wang, Cheng, & Chen, 2006) Dutch L2 (Droop & Verhoeven 1998), French L2 (Deacon, Wade-Woolley & Kirby 2007) Spanish L2 (Ramirez, Chen, Geva & Kiefer 2010), and Arabic L2 (Saiegh-Haddad & Geva 2008), and Hebrew L2 (Saiegh-Haddad & Jayusi, 2016. Results of these studies have shown that MA accuracy in L2 contributes to word-level reading accuracy and fluency in L2 as well. Recent research has also shown that L2 MA contributes to RC in L2, even when differences in phonological awareness, word reading ability, and vocabulary are controlled for (Kieffer & Lesaux 2008, 2012; Goodwin, Huggins, Carlo, August & Calderon 2013). To our knowledge, no study has tested MA-fluency in L2, and its relation to accuracy and fluency of L2 reading and RC.

In addition to within language relationships between MA and reading in L2, some research studies addressed cross-linguistic relationships between MA and reading (e.g., Deacon et al., 2007; Ko & Wang, 2015). For example, Deacon et al. (2007) investigated relationships between MA (using past tense analogy tasks) in L1 French and L2 English, and word reading accuracy in the two languages in a group of 58 Canadian-French immersion children across Grades 1-3. The results showed that English L1 MA in grade 1 predicted French L2 word reading accuracy in grades 1,2 and 3; and grade 2 French morphological awareness predicted English word reading in grades 2 and 3. This shows that morphological awareness can be applied to reading across orthographies and that this relationship changes as children build their language and literacy skills.

3.5.3 Orthographic awareness fluency

Orthographic awareness (OA) refers to knowledge about and access to lexical and sub-lexical orthographic patterns of a specific language, and consists of using the visual-orthographic cues of written words to assist in word recognition (Nassaji & Geva, 1999) and RC (Wagner & Barker, 1994). Longitudinal studies have shown that OA develops with time through exposure to the language being learned, and results in memorizing word specific orthographic sequences (Stanovich & West, 1989; Stanovich, West & Cunningham, 1991).

Traditionally, sensitivity to orthographic regularities reflecting OA has been assessed with lexical-level measures. In these tasks, participants choose between two phonologically plausible alternatives (e.g. bowl and bole; Olson, Forsberg, Wise & Rack, 1994). The specificity of the representation of individual word spellings was argued to reflect, at least in part, sensitivity to script-general orthographic patterns (Barker, Torgesen & Wagner, 1992; Stanovich & West, 1989). More recently, researchers have developed measures to evaluate sensitivity to these with sub-lexical measures contrasting pseudowords (e.g. choosing the most word-like of two options: *filk- filv*; Cassar & Treiman, 1997; *vake-vayk*; Conrad & McNutt, 2008). It has recently been argued that these sub-lexical measures best evaluate sensitivity to orthographic regularities, in that they are separable, at least to some extent, from the reading measures that they are often used to predict (Castles & Nation, 2006). Both lexical and sub-lexical level measures usually index accuracy. Therefore, little is known about the nature of OA-fluency and its relationship to the development of reading accuracy and fluency development.

With respect to relationship with reading, research has shown that OA underlies the rapid and effortless extraction of phonological information from printed words through linking the letters together into multi-letter patterns (Adams, 1990; Ehri, 1994, 1998). Many research studies suggest that OA can contribute significantly to word recognition accuracy among children over and above phonological factors (Cunningham & Stanovich, 1990). Moreover, OA was found to foster RC through accurate, rapid, and effortless word reading (Stanovich, 2000). There is reasonable evidence that OA accuracy is related to reading outcomes in monolingual children learning to read in English (e.g. Roman, Kirby, Parrila, Wade-Woolley & Deacon, 2009; Stanovich, West & Cunningham, 1991). For example, Roman and colleagues (2009) have shown that OA contributed uniquely to real word and pseudo-word reading accuracy in a sample of English speaking children in Grades 4, 6, and 8 (ages 10, 12, and 14 years).

In contrast, there are hardly any studies measuring OA- fluency in L1 reading research. However, Saiegh-Haddad (2005) found pseudo-word reading fluency at the end of the first grade in Arabic L1 to be predicted by an orthographic measure of letter recoding speed, the fluency of linking letters with sounds, in addition to verbal working memory and rapid naming. Katzir et al. (2006) examined the relative contribution of orthographic pattern recognition (the participants' accuracy in recognizing letters by name or sound, by choosing the correct spelling of a spoken word out of four choices), to word and connected-text reading fluency within a dyslexic sample of 123 English L1 speaking children in second and third grades. Results showed that orthographic pattern contributed to WRF, and showed moderate prediction ability of different dimensions of connected-text reading (i.e., rate, accuracy, and comprehension). Finally, Jayusi (2012) found OA accuracy measured in Arabic L1 to be a significant within-language correlate of WRF and RC. To our knowledge, no study has tested OA-fluency at the lexical and sub-lexical levels and their role in WRF and TRF.

Reading in L2, and even more in FL, may rely more heavily on orthographic knowledge and processing. This is because of the dominance of the visual modality in the acquisition of the L2/FL and because of the poor phonological representations and skills of L2/FL learners in the target language (Saiegh-Haddad, forthcoming). At the same time, acquiring OA in L2 might be much more challenging than that in L1 because of the rather limited exposure to the orthographic representations of words that L2/FL learners have and relatively small vocabulary (Koda, 2010). Nonetheless, research has shown that OA develops rather quickly among young L2 learners (Commissaire, Pasquarella, Chen & Deacon 2014) and is used in L2 reading among children and adult learners alike. Similarly, within-language relationships were also reached in studies examining L2 learners from a wide range of dual language backgrounds incorporating lexical orthographic tasks (e.g. Arab-Moghaddam & Sénéchal, 2001), and sub-lexical tasks (e.g. Abu-Rabia, 2001; Gottardo et al., 2001; Wang, Park & Lee, 2006; Wang et al., 2005). Across studies, OA accuracy measured in a given language has been shown to be related to reading outcomes within that language in readers of diverse languages. For example, Abu-Rabia (2001) has shown that performance on a sub-lexical measure of OA accuracy in English L2 correlated with English word - and pseudo-word decoding accuracy among L1 Russian-speaking university students.

There are hardly any L2 studies testing OA-fluency. Excluded, is a recent study (Erbeli & Pižnguage, 2012) examining Slovene L1 learners of English as a FL. In this study, the researchers tested OA-fluency in English and its relation to English silent word and text reading fluency. The study looked for difference between 102 skilled readers and 93 less-skilled readers in the 7th grade, using 3 orthographic processing fluency tasks:(Grapheme Matching, Letter Choice, and Sight Spelling) In the *Grapheme Matching* task, students were shown a series of rows, each of which had five figures. They were asked to identify two identical figures in each row by making a slash through them; 45 seconds were given to complete the subtest. In the *Letter Choice* task, the students were shown rows of words that have one of four letters (p, d, b, q) missing from each word. Students were given two minutes to write in the letters that would correctly complete as many words as possible. In the third task, *Sight Spelling*, the experimenter said a word while students looked at part of the word with one or more of the letters missing. The students were asked to fill in the missing letter or letters (which included an irregular or unusual orthographic element) to complete the spelling of the word. The correlations among all variables showed that English as a FL orthographic processing fluency skills and FL silent reading fluency scores were positively correlated among both groups, suggesting that higher FL reading fluency scores are associated with higher FL orthographic processing scores.

Though research acknowledges the independent contribution of accurate and fluent orthographic skills to word reading accuracy and fluency, TRF and RC, it also suggests that the relative contribution of this skill to reading in different languages may be subject to differences in orthographic depth. Namely, while phonological skills may be fairly sufficient to guide early efficient word reading in a language with a shallow orthography, such as voweled Arabic and pointed Hebrew, early efficient word reading in a language with a deep orthography, such as English, may require the integration of both phonological and orthographic skills (Seymour et al. 2003; Ziegler & Goswami, 2005). A recent novel interesting finding, however, revealed within language relationships between OA accuracy (measured through a sub-lexical orthographic processing task), and word- reading skill among Spanish L1-English L2 4th and 7th graders, not only in English, but also in Spanish- a shallow orthography as well (Deacon, Chen, Lue & Ramirez, 2013).

There is little evidence of a positive relationship between OA accuracy and reading across languages, especially when there are substantial differences in the nature of the writing systems under acquisition (Deacon et al., 2013). Absence of cross-language effects has been recorded in studies of bilingual learners of languages with entirely different writing systems (e.g. Chinese and English; Gottardo et al., 2001; McBride-Chang & Ho, 2005; Wang et al., 2005), and learners of languages that are represented with different alphabets (e.g. Persian and English; Arab-Moghaddam & Sénéchal, 2001). These studies also used different tasks: lexical (e.g. Arab-Moghaddam & Sénéchal, 2001) and sub-lexical tasks (e.g. Abu-Rabia, 1997; Wang et al., 2006), hence contributing to the mixed results. The absence of findings of a cross-language relationship for orthographic processing to reading has been taken to indicate that orthographic skills need to be learned separately for each script under acquisition (e.g. Abu-Rabia, 2001). However, two recent studies have shown that orthographic processing might transfer to reading across languages when the two languages are written in the same unit (letters within the Roman alphabet) (for French-English bilinguals e.g., Deacon, Wade-Wolley & Kirby 2009; and Spanish-English bilinguals e.g., Deacon et al., 2013). Deacon et al. (2009), for example, examined this possibility in a study on English first-language children in the second grade of a French immersion program. There were significant contributions of orthographic processing to word reading accuracy within each language and, critically, across the two languages. The cross-language relationships remained robust after the inclusion of within-language measures of orthographic processing and several other control measures. Cross linguistic evidence of OA skill on reading was documented in few studies examining languages with different alphabets as well, as in the case of Hebrew readers learning EFL (Kahn-Horwitz et al., 2005; Kahn-Horwitz, Shimron & Sparks, 2006). Yet no study has yet tested OA-fluency using lexical and sub-lexical measure and examined relationship with reading accuracy and fluency at the word and text level.

3.6 Word Reading Fluency (WRF)

Word reading fluency (WRF) (fluency at decoding words in isolation, or out of context) also called list reading fluency (Jenkins et al., 2003a), is measured by having students read lists of words of increasing difficulty orally as quickly and accurately as possible, and by measuring the number of correctly read words within 45 seconds (Kim, Wagner, & Foster, 2011). Silverman et al., (2013) point out that accuracy and fluency in word reading constitute the same construct for younger children (e.g., in first and second grade when children are learning to read), but separate constructs for older children who read to learn (e.g., in fourth grade; Adolf, Catts, & Little, 2006). Older children, but not younger ones, who have proficient accuracy but poor automaticity may struggle in RC. Correlations between WRF and TRF (e.g. Kim et al., 2011) and between WRF and RC (e.g., Gough, Hoover, & Peterson, 1996; Jenkins et al., 2003b; Kim et al., 2011; Klauda & Guthrie, 2008) from different English L1 studies provide support for the critical role of fluency in word-reading in addition to accuracy. In L2 contexts, and among the very few available studies discussing the role of WRF in L2 reading development, mainly English, correlations between WRF and TRF were also found. For example, Crosson and Lesaux (2010) found that WRF and decoding accuracy in L2 were significant predictors of L2 TRF among 76 fifth grade Spanish speakers learning English. Moreover, WRF as a sole predictor explained a significant 13% of the variance in RC, with TRF explaining an additional 7% of the unique variance in RC when added simultaneously. Similarly, Kim

(2012) found that English L2 WRF was strongly related to TRF in L2 among 150 Spanish L1 speaking first graders.

3.7 Text reading fluency (TRF)

TRF **(**also referred to as oral reading fluency**)** refers to the oral translation of text with speed and accuracy (Fuchs et al., 2002). This reading related skill is gaining increasing attention in recent years and is measured by timing a student reading one or more passages orally for 1 to 2 minutes, counting the total number of words read during that time period, subtracting error words, and calculating the average number of words read correctly per minute (Klauda & Guthrie, 2008; Denton et al., 2011), or the number of words accurately read within the first minute of reading. The latter approach has been criticized by some researchers arguing that one-minute timing may be problematic because some learners may be able to sustain a certain rate for one minute, but not for longer periods of time in longer passages (e.g., Hudson et al., 2009).

Although there is some overlap between what is measured by WRF and TRF (Ehri & Wilce, 1983; Jenkins et al., 2003b; Stanovich, 1980), TRF is seen as a more complicated multi-faceted construct. Besides the reader's perceptual skill at automatically translating letters into coherent sound representations, unitizing those sound components into recognizable wholes and automatically accessing lexical representations which are needed for WRF as well; TRF requires processing meaningful connections within and between sentences, relating text meaning to prior information, and making inferences to supply missing information (Fuchs et al., 2001), similar to processes used for understanding a text (Klauda & Guthrie, 2008). It is therefore not surprising that TRF gained much empirical attention in recent years with respect to its relationship with RC, beyond WRF, and especially among readers with reading difficulties (Fuchs et al., 2001; Jenkins et al., 2003b; Kim & Wagner, 2015; Klauda & Guthrie, 2008; Wolf & Katzir-Cohen, 2001).

The nature of this relationship, however, was differently captured by different researchers. Kim et al. (2010), for example, argue that TRF is an efficient *predictor* of RC skills, in line with findings reached by other previous researchers (e.g., Fuchs et al., 2001; Yovanoff, Duesbery, Alonzo, &

Tindal, 2005). In this longitudinal study, data was collected from 12,536 English-speaking children who were followed from kindergarten to 3rd grade. TRF and vocabulary skills measured in the 1st grade were strong predictors of RC in the 3rd grade. Moreover, TRF measured in the 2nd grade was the strongest predictor of RC in the 3rd grade. Other researchers view TRF as a bridge or a *facilitator*, mediating the relationship between WRF and RC (e.g., Keenan et al., 2008; Kim et al., 2014; Kim & Wagner, 2015; Kuhn et al., 2010; Pikulski & Chard, 2005). For example, Kim & Wagner (2015) have shown that TRF completely mediated the relation between WRF and RC among second to fourth grade English L1 learners. However, recent research looking into the mediating hypothesis reveals that the reason why TRF is dissociable from WRF is because automaticity in word reading allows children to focus on meaning construction. Therefore, TRF depends not only on WRF, but upon children's language comprehension as well (e.g., Klauda & Guthrie, 2008). Findings reached by different researchers in this regard led to a third perspective regarding the relationship between TRF and RC, according to which the two reading skills have a *reciprocally predictive* relationship. This view was first introduced by Stecker, Roser & Martinez (1998), and more recently espoused by other researchers (e.g., Klauda & Guthrie, 2008; Pikulski & Chard, 2005). Klauda & Guthrie (2008), for example, examined the relationships of 3 levels of reading fluency (word, sentence and connected text) to RC among 278 English speaking 5th graders heterogeneous in reading ability. Hierarchical regression analyses revealed that reading fluency at each level related uniquely to performance on RC. Better performance on the TRF measure was linked with better performance on the word and sentence fluency measures. In addition, hierarchical regression using longitudinal data collected at the beginning of the study and 12 weeks later revealed that reading fluency at the sentence level (defined in this study as accuracy and speed in processing phrase and sentence units of text) and RC have a bidirectional predictive relationship.

Different recent TRF related studies have argued for a developmental and dynamic rather than static view of the relationship between TRF and RC. The developmental perspective of TRF hypothesizes a changing nature of TRF in predicting RC as a function of children's reading proficiency (Wolf & Katzir-Cohen, 2001). This view suggests that at beginning stages of reading, when children's focus is decoding, the influence of word reading fluency and TRF on RC overlaps, such that TRF does not mediate relations between WRF and RC. However, as children develop their WRF, and their oral language skills (vocabulary and listening comprehension) can contribute to TRF, then TRF might begin to mediate relations of WRF and oral language skills to RC. For example, it was shown that TRF made a unique contribution to RC for fourth graders (Jenkins et al., 2003) and for second graders (Kim, Wagner & Lopez, 2012b) with skilled word reading proficiency, but not for second graders with average word reading fluency or for first graders (Kim et al., 2012b). More evidence from English speaking children (Kim, Wagner, & Foster, 2011) and Korean-speaking children (Kim et al., 2014) indicates that TRF is predicted by listening comprehension as well as WRF after children have reached a certain level of WRF. More recent findings from a 4-year longitudinal study conducted by Kim & Wagner (2015) with data collected from English speaking children followed from grade 1 to 4 add support for the developmental view. In grade 1, TRF was not independently related to RC over and above WRF. In grades 2 to 4, however, TRF completely mediated the relation between WRF and RC, and partially mediated the relation between listening comprehension and RC.

In spite of the increasing body of research investigating the nature of TRF and its relationship to RC, the populations of focus have typically been monolingual children and adults, and very little is known about TRF for L2 and FL readers, who acquire oral and written language simultaneously in a language in which they may not be fully proficient. Riedel (2007) examined the relationship between TRF and RC in English with 1,518 first graders, including 59 language minority first graders. The correlation between TRF and RC was even stronger for language minority students (.69) than for native English speakers (.51) at the end of first grade. In another study with 69 language minority and native English-speaking third and fifth graders, Wiley and Deno (2005) found that TRF in English significantly correlated with RC in English for both language groups at both grade levels (.71 and .57 for native speakers and .61 and .69 for language minority students in the third and fifth grades respectively). These studies might suggest, according to the authors, that TRF in L2 could be strongly related to RC in L2 as is true for monolinguals. Building on previous work, Crosson and Lesaux (2010) tested the moderating role of L2 oral language in reading skills for L2 learners. In this study, similar to results reached in L1 reading contexts (e.g., Jenkins et al., 2003a), TRF skills in L2 were strongly related to RC skills in L2 for Spanish L1 English L2 language minority children in the 5th grade, but only for those with relatively high scores in L2 oral language skills (vocabulary and listening comprehension). This implies, according to the authors, that for L2 learners with insufficient oral skills in L2, oral language competences covary with TRF in explaining RC skills. Finally, (Kim, 2012a) investigated relations of TRF in L2, oral skills in L2, and basic cognitive-linguistic skills in L1 (fluency in letter naming and phonemic segmentation and pseudo-word reading) to RC in L2 among Spanish L1-English L2 1st grade learners. Children's L1 literacy skills were not uniquely related to their L2 RC after accounting for L2 language and literacy skills. At the same time, relation between L1 literacy skills and RC was completely mediated by TRF and oral language skills. The author points out in her conclusion that it is important to keep in mind that this is a snapshot at the end of first grade, and relations among these predictors are likely to change as children's reading skills develop.

4.0 Research Questions

<u>The study has three main objectives:</u>

The first objective is to test fluency in metalinguistic awareness skills in EFL: PA, MA and OA and probe whether these skills predict word reading and text reading fluency, as well as RC beyond measures of metalinguistic awareness and decoding accuracy. The second objective is to investigate whether these relationships between metalinguistic skills and reading fluency is dynamic and changes with grade-level and with increase in EFL language proficiency. The third is to test metalinguistic skills in L1 and probe their relationship with parallel skills in EFL, as well as with EFL word and text reading fluency and RC.

The study will address the following questions:

Cluster #1: Relationship between Metalinguistic Awareness Fluency and Reading Fluency in EFL

1. Is fluency in metalinguistic awareness skills: PA, MA, and OA associated with word reading and text reading fluency, and with RC in EFL?

2. Does metalinguistic awareness fluency predict word and text reading fluency, as well as RC, beyond metalinguistic and decoding accuracy?

Cluster # 2: Grade-level Effects

1. Does the relationship between metalinguistic awareness fluency and reading fluency (word and text) change with grade-level?

2. Does the relationship between word and text reading fluency and RC change with grade-level?

Cluster # 3: Cross-linguistic Relationships

1. Is fluency in metalinguistic awareness in L1: PA, MA, and OA associated with the same skills in EFL?

2. Does metalinguistic awareness fluency in L1 predict word and text reading accuracy and fluency in EFL?

The study will test the following hypotheses:

1. Fluency in metalinguistic awareness in EFL is expected to be positively correlated with word reading and text fluency and with RC in EFL.

2. Metalinguistic awareness fluency is expected to predict word and text reading fluency beyond metalinguistic accuracy, especially among older children.

3. Word and text reading fluency are expected to predict RC beyond word and text reading accuracy, especially among older children.

4. Accuracy and fluency in metalinguistic skills in L1 are expected to be associated with the same skills in EFL.

5. Metalinguistic skills in L1 are expected to predict word and text reading accuracy and fluency in EFL.

5.0 Method

5.1 Participants

The sample of the study will consist of a total of 150 Arabic speaking students learning English as a FL. Data will be collected from two cross-sectional samples of students from grades 5, 7, and 9 from three local schools in the North of Israel, with similar socio-economic backgrounds. All students will be monolingual Arabic Native speakers of the same regional, spoken Arabic vernacular. All students will have started their formal English learning in the fourth grade. The sample will include heterogeneous normal readers excluding diagnosed dyslectic and learning disabled students.

5.2 Materials

<u>Metalinguistic awareness in L1 and EFL:</u>

Phonological Awareness: Phoneme Blending and Phoneme Elision tasks in Arabic L1 and in EFL will be developed for the study. The Arabic tasks will be adopted from Taha & Saiegh-Haddad (2016a) and Saiegh-Haddad & Taha (under revision), which have proven satisfactory reliability and suitability for the grade-levels tested. The English tasks will be adopted from Saiegh-Haddad & Geva (2008) and from Jayusi (2012). Fluency of phonological awareness will be tested by measuring response latency.

Morphological Awareness: Word relatedness and morphological analogy tasks in Arabic L1 and in EFL will be used to measure morphological awareness. The Arabic tasks will be adopted from Taha & Saiegh-Haddad (2016a) and Saiegh-Haddad & Taha (under revision), which have proven satisfactory reliability and suitability for the grade-levels tested. The English tasks will be adopted from Saiegh-Haddad & Geva (2008) and from Jayusi (2012). Fluency of morphological awareness will be tested by measuring response latency.

Orthographic Awareness: Pseudo homophone choice (real word choice) and Word likeness in Arabic L1 and in EFL will be used to test orthographic awareness at the lexical and sub-lexical levels respectively. The Arabic tasks will be adopted from Jayusi (2012) and the English tasks will be adopted from Russak (2009). Fluency will be tested by calculating latency of response.

<u>Word and Pseudo-Word Reading:</u>

Word recognition will be measured using the Wide Range Achievement Test—Revised (1984) subtest, and Pseudo-word reading will be measured using the Woodcock Reading Mastery Test—Revised (1987) subtest. Even though these tests are standardised measures of reading, raw scores rather than standard scores will be used. This is because the norms are based on native speakers of English. WRF in EFL will be tested using the Test of word efficiency task (TOWRE; Torgesen, Wagner, & Rashotte, 1999). In addition to these tests, we will use the word and pseudo-word reading tasks developed by Russak (2009), which are simpler tasks and adapted for EFL learners.

<u>Text Reading</u>

Text reading rate will be measured using the Gray Oral Reading Test, forth edition (Gort; Weiderholt & Bryant, 2001). To be consistent with existing research on TRF (e.g., Togresen, Rashotte, & Alexander, 2001), we will report GORT Fluency raw scores representing a com-bined index of the accuracy and reading rate of connected text.

Reading Comprehension:

The Gates McGinitie Reading Comprehension Subtest (GMRC; MacGinitie, MacGinitie, Maria, & Dreyer, 2000) will be used as our measure of RC. This test was used in earlier research among English L2 learners in the fifth grade (e.g., Crosson & Lesaux, 2010).

Receptive Vocabulary

The study will employ a receptive task in English that is modelled after the Peabody Picture Vocabulary Test (PPVT-IIIA; Dunn & Dunn, 1997) task. The task we will use will be based on the first 1000 words compiled by the ministry of education.

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