



## Transfer of decoding skills in early foreign language reading

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### ABSTRACT

This longitudinal study investigated cross-linguistic transfer from native to foreign language decoding abilities in 787 Dutch first-year students in two differential tracks (high vs low) of secondary education. On two occasions, with a six months interval, we tested the students' word and pseudoword decoding fluency in their native language (Dutch) and their word decoding fluency in two foreign languages, English (L2) and French (L3). Our findings indicated that students' English word decoding development primarily depended on Dutch word decoding fluency. The development of their French decoding skills was mainly dependent on their Dutch pseudoword decoding fluency, and in the higher educational track also on their L2 word decoding ability. It is concluded that there is evidence of linguistic interdependencies in the development of word decoding in the native language and the subsequent development of word decoding in the foreign language. Theoretical as well as practical implications are discussed.

### 1. Introduction

A large body of research indicates that there is a strong correlation between native and non-native literacy development (e.g., Cheung, 1996; Durgunglu, Nagy, & Hancin-Bhatt, 1993; Geva, Wade-Woolley, & Shany, 1997; Lindsey, Manis, & Bailey, 2003; Melby-Lervåg & Lervåg, 2011; Van Gelderen et al., 2004). Less is known about language-specific, lower-order efficiency of information processing like word decoding in foreign language reading. When readers have substantial native-language reading experience and the languages have similar orthographic structures, a correlation is to be expected between native and non-native word decoding (Koda, 1996). A few studies indeed established a clear relationship between L1 and L2 word decoding development (e.g., Bernhardt, 2005; Commissaire, Duncan, & Casalis, 2011; Sparks, Patton, Ganschow, Humbach, & Javorsky, 2008). The study of non-native word decoding is important because of the relationship between word decoding efficiency and reading comprehension. A certain level of word decoding efficiency is necessary for the attainment of reading comprehension. L1 word decoding is a predictor of L1 reading comprehension ability, especially in less experienced readers (Braze et al., 2015; Freed, Hamilton, & Long, 2017; Protopoulos, Mouzaki, Sideridis, Kotsolakou, & Simos, 2013), and L1 reading comprehension is a strong predictor of L2 (Van Gelderen et al., 2004; Van Gelderen, Schoonen, Stoel, De Gloppe, & Hulstijn, 2007) as well as L3 reading comprehension ability (Van Gelderen et al., 2003). Yet, the development of word decoding is an important object of study in its own right as well (Koda, 1996). L1 word decoding fluency has been

shown to continue to increase during the first half-year of secondary education (i.e., when adolescents are 12–13 years old; Van de Ven, Voeten, Steenbeek-Planting, & Verhoeven, 2017), the period that students (begin to) receive systematic foreign language instruction. The present study investigated whether the development of L2 English and L3 French (two foreign languages taught in Dutch secondary education) word decoding skills are associated with proficiency in Dutch (L1) decoding skills, and whether there is a relationship between L2 and L3 word decoding development during that very early phase of foreign language instruction. Further, we tested whether these relations are similar across different developmental stages of L2/L3 learning. Dutch students are allocated to educational tracks at the beginning of secondary education, based on their past performance on Dutch and mathematics (i.e. resulting from school decisions). These educational tracks allowed us to assess L2/L3 word decoding development across different stages of L2/L3 learning. Theoretical models suggest that the relationship between L1 and L2 development is a complex one, which may vary as a function of cultural/educational background, and may also be influenced by linguistic factors (which may be related; e.g., Cummins, 1979; Ganschow, Sparks, & Javorsky, 1998; Koda, 2005, 2008). First of all, the linguistic coding differences hypothesis (Sparks & Ganschow, 1991) proposed that the same underlying language learning mechanisms determine the level of L1 and L2 competence learners can attain. In a similar vein, the linguistic interdependence model (Cummins, 1979) claims that L1 and L2 literacy development are highly related. According to this model, L1 competence partially determines the level of L2 language competence that learners can obtain (i.e. the

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“developmental hypothesis”). Further, learners' L1 competence needs to exceed a first threshold to avoid subtractive bilingualism, and a second, higher threshold to foster additive bilingualism (i.e. the “threshold hypothesis”). In a more recent approach to study the relation between L1 and L2 learning, Koda (2005, 2008) developed the transfer facilitation model, which proposed that L2 learning can be enhanced by metalinguistic awareness skills acquired in the L1. The influence of L1 on L2 learning is moderated by L1-L2 orthographic distance, as well as by exposure to L2 visual (i.e. orthographic) input.

Research suggests that L2 word decoding fluency strongly predicts L3 word decoding development, because L2 decoding reflects general language-learning aptitude (e.g., Dörnyei, 2005). However, in L3 learning, the situation is somewhat more complicated. The typological primacy model (Rothman, 2010) proposed that, in beginning L3 learners, the magnitude of cross-linguistic transfer is moderated by the typological similarities between the languages involved, regardless of language status (L1 or L2). Moreover, in beginning L2/L3 learners, languages in the multilingual mental lexicon are strongly interconnected (e.g., De Bot, 2004; Sánchez, 2014; Wei, 2006), and bilinguals activate the L1 and L2 simultaneously, regardless of whether they use one or both languages (e.g., Bialystok, 2013; Jared & Kroll, 2001). Consequently, there are fundamental qualitative differences between L3 and L2 learning (e.g., Cenoz & Genesee, 1998). With respect to L3 reading, research suggests that bilingualism benefits L3 reading development if learners are sufficiently proficient in the L1 and L2, and these benefits appear to be (partly) due to enhanced metalinguistic awareness in proficient bilinguals (Rauch, Naumann, & Jude, 2011), in line with the transfer facilitation model (Koda, 2005, 2008).

In addition, we had specific predictions regarding the influences of L1 word and pseudoword decoding ability on the development of word decoding skills in a non-native language, depending on the stage of development, based on the Dual Route Cascaded model (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001). The model distinguishes between the lexical (direct) and the non-lexical (indirect) route. Beginning L2 learners are predicted to primarily use the non-lexical route in the L2, in other words rely on grapheme-phoneme correspondence rules, during word decoding. The lexical traces of many L2 words in the beginning learners' mental lexicon are still weak and many words have not yet been fully lexicalized. In moderately advanced learners, these lexical traces are much stronger, and most frequent L2 words have been lexicalized. As a consequence, these learners are predicted to rely more heavily on the lexical route (lexical access, measured primarily by word decoding) than on the non-lexical route (measured primarily by pseudoword decoding) during L2 word decoding.

The present study aimed to investigate the relationships between Dutch word decoding ability and the developments of English (L2) and French (L3) word decoding fluency during Grade 7, the first year of secondary education in the Netherlands. At the onset of Dutch secondary education (ages 12–13), students are divided into tracks, based on their Dutch language and math skills. We distinguished two tracks of learners, where Track 1 contained students in pre-vocational education, and Track 2 those in higher level of secondary education and pre-university education. We distinguished these two educational tracks to compare development across different levels of L1, L2, and L3 proficiency. Admittedly, some students in the lowest educational track were not sufficiently competent to perform the French word decoding test by the time of the first test session, and therefore did not complete this test at Time 1.

The English and French orthography differ in their relation to the Dutch orthography. As shown by Seymour, Aro, and Erskine (2003), Dutch and English share a complex syllable structure, whereas French, in contrast, has a relatively simple syllable structure. On the other hand, Dutch and French have much more shallow orthographies than English does. Further, although English is a Germanic language, it has borrowed approximately 50% of its lexicon from French and Latin (e.g., Gray & Atkinson, 2003) and may therefore be regarded as lexically

more similar to French than to Dutch. In terms of suprasegmental characteristics, however, English appears to be more similar to Dutch than to French (e.g., see Delattre, 1963; Domahs, Plag, & Carroll, 2014).

Although both English and French are being taught in Dutch secondary education, students' average amount of exposure to the two languages differs significantly. In the Dutch educational system, children receive an introductory English language course, approximately 15–20 min per week (Herder & De Bot, 2005), during grades 5 and 6 (the end of Dutch primary education), and an intensive English language course (approximately 2 h per week) and an introductory French language course (approximately 1.5 h per week) during the first three years of Dutch secondary education (Eurydice, 2005). Given the fact that children receive an introductory French language course starting at the beginning of secondary education, we measured early emergent French reading skills. In both educational tracks, instruction for both languages is largely based on the communicative approach, combined, especially in the higher track, with elements of language awareness (e.g., grammar). In addition, in the Netherlands, French is mostly solely learned in schools, whereas English is also learned outside the school setting, e.g., through the media. We assessed the influence of two L1 decoding skills, pseudoword decoding fluency (PWDF) and word decoding fluency (WDF), on the development of L2 and L3 word decoding fluency. In line with the Dual Route Cascaded model, PWDF reflects the success in using the non-lexical route (i.e., applying grapheme-phoneme correspondence rules), whereas WDF reflects the success in using the lexical route (i.e., lexical access). Our research questions can thus be summarized as

1. To what extent is there a positive relation between the level of English (L2) and French (L3) word decoding fluency on the one hand and Dutch (L1) word and pseudoword decoding fluency on the other?

As predicted by the theoretical model by Sparks and Ganschow (1991), we hypothesized positive relations between foreign-language and native-language word decoding fluency. More specifically, we hypothesized that level of English WDF would be most strongly related to level of Dutch WDF (rather than PWDF), since our participants were elementary learners of English, with one or two years of experience; we expected them to use both the lexical and non-lexical route during English word decoding. On the other hand, we predicted that level of French WDF would show a stronger relation with level of PWDF (rather than WDF), given that our participants were still only beginning learners of French; we expected them to predominantly use the non-lexical route during French WDF.

Furthermore, we expected all relationships to be the same for the two educational tracks.

2. To what extent is there a positive relation between the development during the school year of English (L2) and French (L3) word decoding fluency on the one hand and Dutch (L1) word and pseudoword decoding fluency on the other?

We expected the development of foreign-language word decoding fluency to show similar relationships with native-language word and pseudoword decoding fluency as hypothesized in connection with the first research question. Based on Cummins' (1979) threshold hypothesis, we expected developmental differences between Tracks 1 and 2, especially for French. More specifically, we expected to find positive effects of L1 on L2/L3 development only for students who are sufficiently competent in the L1.

3. Is there an additional influence of English (L2) word decoding fluency on French (L3) word decoding fluency?

We hypothesized that level of English WDF would predict the development of French WDF, because English WDF reflects general language-learning aptitude (e.g., Dörnyei, 2005). Based on Cummins' (1979) threshold hypothesis, any positive transfer effects of L2 on L3 decoding development may only occur for relatively

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