Second and Third Language Immersion Students' Pronunciation in Foreign Language English Oral Reading

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Abstract

The present study deals with the English pronunciation of majority and minority language children attending a German-English elementary school immersion program in Germany. In this program, 50% of the teaching time was conducted in English. By using a reading aloud task, we assessed phonemic accuracy as well as reading fluency in English and related both to (i) the English input the children received from their teachers and (ii) possible sources of transfer. So far, cross-linguistic influences in young learners' L1, L2 and L3 phonological acquisition have received only very limited attention.

Articulatory transcriptions of the immersion students' English reading data indicate transfer patterns from German to English, independent of the children's L1. These findings are discussed in the light of teacher input and various sources which may account for transfer in majority and minority language children's English pronunciation.

1. Introduction

In Germany (as in many other countries) the number of elementary schools offering bilingual programs is steadily increasing. Currently, there are over 300 private and public elementary schools, corresponding to 2% of all elementary schools (FMKS, 2014). Immersion (IM) programs represent

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the most intensive type of bilingual education. In these programs, 50-100% of the teaching time is conducted in the target language. The effectiveness of these programs has been demonstrated in a large number of studies, which have mainly focused on majority language students' reading, writing, speaking, listening, and grammatical skills as well as on their attitudes and motivation (see reviews by e.g. Wesche, 2002, for North America, Pérez-Cañado, 2012, for Europe, and Piske, 2015, for Germany).

However, there are only a few studies that have assessed bilingual students' phonemic accuracy and fluency in the target language (see e.g., Harada, 2007; Rallo Fabra & Jakob, 2015; Wode, 2009). There are even fewer studies that have examined the phonological development of those students in bilingual programs for whom the target language is not the second but the third language (i.e. minority language students, e.g. Hart, Lapkin, Swain, 1987). In order to provide much needed additional data, the present study compares the phonological development of majority and minority language children enrolled in bilingual programs. All the children examined here attended a German-English IM elementary school program in Germany, in which 50% of the teaching time is conducted in English. We assessed accuracy (of selected English sounds) as well as fluency (i.e. speech rate) in English by relating it to (i) the English input which the children received from their English teachers and (ii) the transfer source (i.e., L1 German for the majority language children; and the minority language children's L1 and L2). The following review will be devoted to studies dealing with the L2 phonological development of majority language children in bilingual programs (section 1.1), studies examining phonological aspects in third language (L3[1]) acquisition (section 1.2) and studies examining the L2/L3 exposure students receive in the foreign language classroom, i.e. teacher input (section 1.3).

1.1 L2 phonology

Various models have been proposed to account for foreign accent in L2 speech, for example, Flege's *Speech Learning Model* (SLM, e.g. 1995), which posits that the processes and mechanisms used in the successful acquisition of the L1 sound system, including the ability to establish phonetic categories, remain intact across the lifespan and can also be

[1] The terms L2 and L3 will be used according to the chronological onset of acquisition, i.e. the term 'second language' (L2) refers to the first non-native language acquired by an individual, while 'third language' (L3) relates to the second non-native language being learned (see also Hahn & Angelovska, 2017).

exploited in the acquisition of L2 speech. However, the acquisition of L2 sounds depends on the perceived cross-language phonetic distance between sounds of the L2 and the L1 as well as on the state of development of the L2: An L2 sound that is not too similar to a native-language (L1) sound will be easier to acquire than an L2 sound that is relatively similar to an L1 sound (because it will be perceived as more obviously "different" by the learner). The SLM has also been applied to German learners of English and their production of English vowels (e.g. Bohn & Flege, 1992, see also Steinlen, 2005): Of particular interest for the present study is English /æ/ which is a phoneme not found in most dialects of German, including Standard German. Acoustic cross-language comparisons (Bohn & Flege, 1992) suggested that English /æ/ is a new vowel because there is hardly any spectral overlap between English /æ/ and the closest German vowels /e:, ɛ, a/; furthermore, English /æ/ is produced with a longer duration. Turning to the production of English /æ/ by German learners, the results of Bohn & Flege's (1992) study were largely consistent with Flege's hypothesis that extended L2 experience will enable adults to produce a new vowel in a nativelike fashion. The inexperienced learners, however, did not differentiate between English /æ/ and German /ɛ/, which suggests that they used only one vowel category where the native English speakers and experienced German speakers of English used two. We would, therefore, predict that German primary school children learning English would show similar production patterns as Bohn & Flege's inexperienced adult learners, i.e. they would not be able to produce English /æ/ in a target-like manner. Their teachers, in contrast, would have established a separate phonetic category for English /æ/ and produce this sound in a target-like way, just like Bohn & Flege's (1992) experienced German learners of English.

Rather problematic English consonants for German learners of English seem to be the dental fricatives /ð/ and /θ/, and the alveolar or retroflex approximant /r/ in prevocalic position. The last sound is often substituted with German /ʁ/, the dental fricatives are often realized either as labiodental or alveolar fricatives or alveolar stops (e.g. Eckert & Barry, 2002; König & Gast, 2012). Other transfer phenomena include syllable structure processes based on the learners' L1 German, such as devoicing of final voiced obstruents[2] or develarization of nonsyllabic-initial [ɫ]. These sounds (including English /æ/) have also been examined by Wode

[2] In English, voiced obstruents in word-final position are preceded by vowel lengthening, which additionally poses a problem for German learners of English (e.g. Smith, Hayes-Harb, Bruss, & Harker, 2009)

(2009) in a study of German-English immersion preschool and primary school students in Germany. In his paper, Wode (2009) stressed the large number of parallels between the errors produced by German learners of L2 English across different age groups (children and adults), who acquired the L2 in diverse learning situations (i.e. in naturalistic vs. IM vs. regular classroom contexts). Focusing on the IM context, Wode reported that preschoolers at age 3 already showed transfer patterns from their L1 German (apart from errors due to the development of children's L1 phonological system). These transfer-based substitutions included alveolar fricatives used instead of dental fricatives, clear /l/ instead of nonsyllabic-initial velarised [ɬ] and /ɛ/ for English /æ/. There were only a few cases of [ʁ] and [w] substituting for target /-r-/. Similar substitution patterns were noted for primary school IM children in Grade 4, who, according to Wode (2009), reflected the same segment substitutions, the same transfer patterns, the same range of individual variation, and the same kind of global German accent in their English as the IM-preschoolers. However, the frequency of the target-like productions increased from grade level to grade level, i.e. from 30% to 79% target-like productions for /ð/ and 69% to 86% for /θ/. However, [ɬ] did not show any more target-like production as a function of time (57% vs. 55%), and /æ/ was produced in a more target-like manner in only 9% and 13% of all cases, respectively. Similar substitution patterns are expected for the majority language students in the present study whose L1 is also German.

Only a few studies have examined L2 fluency in bilingual programs: For example, Rallo Fabra & Jacob (2015) focused on so-called CLIL (*Content and Language Integrating Learning*) programs, where only one subject, (i.e. History and Geography, respectively) was taught in English. They compared Spanish-English CLIL and non-CLIL students in Grade 8 with respect to fluency (operationalized as speech rate) in their L2 English, using reading-aloud data and extemporaneous speech. The results of their study indicated that both groups did not differ with respect to their speech rates, which the authors attributed to the teachers of either group who were not native English speakers, and who were, unfortunately, not tested for their speech rates in English. We would expect the primary school children in the present study to produce similar speech rates as their teachers because as IM students, they had received a very large quantity of English input from their teachers.

1.2 L3 phonology

As regards third language (L3) acquisition, phonological aspects constitute a relatively unexplored research area. In contrast to learners acquiring a phonological system in the L2, L3 learners have already acquired an L2 and can thus make use of conscious linguistic knowledge as well as of language-learning experience and strategies (e.g., De Angelis 2007; Lloyd-Smith, Gyllstad & Kupisch, 2016). Not surprisingly, L3 acquisition is characterized by the simultaneous influence of more than one previously acquired language (i.e., the L1 and the L2, De Angelis, 2007).

1.2.1 Age

Research on the relationship between age and cross-linguistic influence in L3 phonological acquisition has received very limited attention so far: Cenoz (2001) pointed out that cognitive and metalinguistic development may be related to cross-linguistic influence, and particularly, to psychotypology, because older children may have a more accurate perception of linguistic distance that could influence the source language they use when transferring terms from one of the languages they know.

Kopečková (2013) examined twenty 5th graders' productions of rhotic sounds in their L1 German, L2 English and L3 Spanish. Her results indicated that the intrinsic difficulty of the phonetic feature of the Spanish trill may have affected L3 pronunciation to a large degree as this sound requires a higher degree of articulatory and aerodynamic precision than the uvular fricative in German or the alveolar approximant in British English. Reyes, Arechabaleta-Regulez & Montrul (2017) examined Spanish rhotic sounds produced by Spanish native speakers, English native speakers acquiring Spanish as an L2 and Korean-English bilinguals acquiring Spanish as an L3. They reported that although all children rapidly developed a native-like pronunciation of the Spanish rhotic sounds, the Korean-English bilinguals outperformed the English-speaking children. According to Reyes et al. (2017), not only previous linguistic knowledge may thus play a role in L2 and L3 acquisition but children may overcome transfer errors because they are guided by universal developmental strategies from the initial stages of acquisition. If L3 learners have an advantage over L2 learners, this may be due to their complex linguistic knowledge and higher metalinguistic competence.

So far, minority and majority language students have only been compared in terms of their oral fluency in the new language (but not regarding their pronunciation accuracy) and even such studies are scarce and relate to IM programs only: Hart, Lapkin, & Swain (1987) compared the oral fluency of minority and majority language students in a middle IM program in Grade 8 and found that minority language students outperformed their majority language peers. In general, oral fluency ratings did not appear to be related to their parents' occupation, independent of the students' language background. Hart et al. (1987) reported similar results for early IM programs and also reported general effects of program, i.e. better oral fluency ratings for students in early IM programs than in middle IM programs.

Previous research in L3 acquisition – and most of the studies in L3 phonology – have examined more advanced adult L3 learners and possible transfer patterns. These have largely been discussed in the light of three models (see e.g. Lloyd-Smith, Gyllstad & Kupisch, 2016, for a review): The Cumulative Enhancement Model (CEM, e.g. Flynn, Foley & Vinnitskaya, 2004) maintains that any language available to the multilingual learner can be the source of transfer, irrespective of the order of acquisition. Transfer only occurs when such knowledge has a facilitative effect; otherwise it is neutralized or "blocked". According to such a view, the learner does not transfer an entire system but only individual properties. According to the Typological Primacy Model (TPM, Rothman, 2011, 2015), multilingual transfer is determined by structural similarities between languages (Rothman, 2011, 2015), where transfer is assumed to occur completely from one previous system, much like in Schwartz and Sprouse's (1996) Full Transfer Model. Finally, the L2 Status Factor Model (L2SFM, Bardel & Falk, 2007) hinges on the distinction between L1 and L2 acquisition and predicts L2 transfer into L3 due to similarities in the learning procedures in L2/L3 acquisition as opposed to L1 acquisition. Lloyd et al. (2016) point out that although these models pertain to L3 transfer at the initial state, more advanced adults L3 learners have been used as subjects. In addition, studies conducted so far have not completely testified to the CEM, the TPM, or the L2SFM models.

Most studies to date point to the existence of the so-called "foreign language effect" in L3 phonological acquisition, which typically seems to exist in the early stages of L3 acquisition, suggesting that a foreign accent may be based on aspects such as age, L2 proficiency, L2 status, or psycho/typological distance (e.g., Ringbom, 1987).

1.2.2 Status

Llisteri & Poch (1987) acoustically analyzed L3 French vowels and consonants produced by native speakers of Catalan and L2-Spanish and found that the learners' L1 affected their L3 oral production without any interference of their L2. Based on these results, they postulated a privileged status of the L1 system as the main source for L3 phonology. Similar results were reported by Wrembel (2012): Her participants were native speakers of Polish who were all proficient users of L2 English but differed in terms of their proficiency level in their L3 French. Their speech samples were evaluated online by expert raters who found that the prevailing source of transfer was the participants' L1 (although some L2 influence was also noticeable). Finally, a study with five Turkish-German heritage speakers learning L3 Spanish tentatively indicated that higher proficiency in the heritage language may also facilitate positive transfer from the L1 (Gabriel & Rusca-Ruths, 2014). The Turkish-German heritage speakers tended to produce the rhythm of L3 Spanish more monolingual-like than five German monolinguals, suggesting positive transfer from Turkish, which is syllable-timed like Spanish. This effect was stronger in individuals with a higher frequency of use in Turkish.

Studies in favor of L2 proficiency include Hammarberg's (2001) single-case study, in which an L3 Swedish learner with L1 English and L2 German was perceived to have a "prominent" German accent during her first year in Sweden, yet speech samples recorded one year later were perceived by the same raters as distinctly English. The activation of the L2 at the initial stage of acquisition was seen as an unconscious strategy employed by the speaker to cope with unfamiliar phonological forms. As proficiency in L3 increased, this strategy was overridden by the highly-automated articulatory patterns of the L1 (Hammarberg, 2001, p. 35). Similar results were reported by Wrembel (2010) who examined L1 Polish, L2 German, and low proficiency L3 English speakers who were mistaken as German speakers more frequently than those with a higher proficiency, suggesting that L2 transfer was more noticeable at the initial stage of L3 acquisition. However, this effect decreased with higher proficiency (see also Gut, 2010, for similar results). Finally, in their study of perceived foreign accent by German and German-Turkish adult learners of L3 English, Lloyd et al. (2016) found that the bilinguals with a high proficiency in German were predominantly perceived as German by English raters, while the others were perceived as non-German. In addition, the bilinguals' amount

of Turkish use seemed to be related to perceived accent in L3 English (although this relation did not yield any significance).

1.2.3 Typology

Typological similarity between an L2 and an L3 are also believed to affect the process and the product of learning a third language in the sense that typological similarity may facilitate learning at the phonological level. For example, Bouchhioua (2016) found that her adult learners with L1 Tunisian Arabic and L2 French produced L3 English target words with French word stress patterns. Similar results were reported by e.g. Llama, Cardoso & Collins (2010) on L1-/L2 learners' pronunciation of L3 English, and Wrembel (2010, 2012) with L1 Polish, L2 French and L3 English. However, as Cabrelli Amaro (2012) critically pointed out, L3 phonological research has yet to agree on general aspects that constitute a typological relationship between languages (i.e., typological distance referring to the linguistic system as a whole, the phonological system as a whole, or the relationship of a single property across languages).

In a study that teased apart language status and distance in the production of VOT, Llama, Cardoso & Collins (2010) used adult groups with L1/L2 mirror images (L1 French/L2 English, L1 English/L2 French) acquiring L3 Spanish. The results showed that both groups transferred from L2, with the L2 French group producing target-like VOT values, and the L2 English group producing L3 stops with longer VOT than required in Spanish, a likely effect from English. Typological proximity was apparently not the motivating factor for transfer, although both French and Spanish are characterized by non-aspirated stops. In addition, psycho-affective factors may also account for transfer due to L2 status, as some participants of studies have been reported to express a desire to suppress their L1 in an effort to sound non-foreign (e.g. Lloyd-Smith et al. 2016).

1.3 Teacher input

According to the Stifterverband (2013), 98% of the teachers in Germany have a German background. It is not clear, however, how many of the remaining 2% are native speakers of English. Medgyes (2013, p. 509) defines nonnative teachers as people "for whom the foreign language they teach is not their mother tongue; who usually work with monolingual groups of learners; whose mother tongue is usually the same as that of their students". Many studies have examined advantages and disadvantages of

being a nonnative or native teacher (e.g. Llurda, 2005) and foreign accent has been identified as one of the disadvantages of being a nonnative speaker. For the primary school context in Germany, in particular, it has often been criticized that the English teachers' pronunciation is far from being target-like (e.g. Süddeutsche Zeitung, 2012; FAZ, 2015). This was also shown in some studies examining English primary school teachers' pronunciation of English words in other countries, which found non-target like renderings on the segmental level as well as on the sub- and suprasegmental level (e.g. Kanoksilapatham, 2014; Yani, 2012). Thus, teachers' pronunciation errors may also be reflected in their students' speech, in particular because young learners like to imitate their teachers, who are, incidentally, the children's main source of foreign language input (e.g. Böttger, 2005; Piske 2008; Kanoksilapatham, 2014; Karakaş, 2012; Yani, 2012). However, studies relating teachers' pronunciation errors to those produced by their students have apparently not been conducted so far.

1.4 Research questions

In summary, previous research leaves open whether the same mechanisms that operate in majority language students also apply to minority language students, and thus, whether the existing models aiming to explain transfer in L2/L3 phonology can predict cross-linguistic influences for minority language children. Similarly, the role of teacher input has remained rather vague. The aim of the present study is, therefore, to address the following research questions:

> i. Do majority and minority language students attending an elementary immersion school program differ in their pronunciation of English, which is their L2 and L3, respectively?
> ii. Is there any relation between the English teachers' pronunciation and their students' English pronunciation regarding the general phonological error rate?

2. Method

2.1 School

The data presented in this paper were collected in a (non-private) district primary school in a city in the south of Germany. The school has offered a partial IM program since 2008, with one cohort per year. In this program, all subjects are taught in English from the first day of Year 1 onwards, except

for German language arts, religious education and math. The immersion students are thus exposed to both English and German for about 50% of the teaching time. Although technical terms are always introduced in both English and German, the subject lessons are taught entirely in English. The students usually receive their instruction from native speakers of German who studied English in order to become English teachers. The children are allowed to answer questions in German if they want to do so, but they are always encouraged to speak English (e.g. Steinlen & Piske, 2013).

2.2 Sample

For the present study, the data of 14 children (8 girls and 6 boys) in Year 4 were selected; they had all started the IM-program in Year 1 but attended different classes. On average they were 10.6 years old (*SD*=8,3 months). Five of the children (i.e. 36%) had a minority language background, reflecting the overall demographics of the school, and nine had a majority language background. Such a background was attested when one or both parents were born abroad (see also OECD, 2016) and, most importantly, when a language other than the majority language German was spoken at home. The minority language children had all been born in Germany, and they all used their family language plus German at home. The parents' questionnaire, unfortunately, did not ask for information concerning the use of the family language and the use of German before the children had entered school. It is, therefore, not clear whether the minority language children had learned German as an L1 or an L2. In informal interviews, however, most parents stated that the family language was their children's L1, with German being acquired in preschool (at age 3) at the latest. The foreign language English is, therefore, the children's L3. The family languages included Turkish (2 children), Arabic (2) and Russian (1 child). The parents did not report any hearing problems of their children. The majority and minority language children were comparable in terms of their socioeconomic background as an informal look at the parents' questionnaires indicated.

In order to investigate how input contributes to the children's pronunciation of English sounds, data were also gathered from the students' four teachers in the IM program. All the teachers were female, between 27-34 years old at the time of testing and had a German background. They had studied English at a university in Germany (with a focus on bilingual teaching) and had spent at least a year in an English-speaking country

(Canada, Great Britain, New Zealand, South Africa, USA). Furthermore, they rated their English proficiency at level C2, following the levels proposed by the Common European Framework of Reference (Council of Europe, 2001).

2.3 Speech materials

The *Gray Oral Reading Test* (GORT, Wiederholt & Bryant, 2001) was used to analyze the students' pronunciation after four years in the bilingual program. It was originally designed for L1 individuals aged 6 to 18 years and contains 14 separate stories. Each story is followed by five multiple-choice comprehension questions. Testing is discontinued if the student misses at least three of five comprehension questions for any one story. For the present study, however, the analysis of the data is restricted to the children and teachers reading aloud the first three stories (which were completed by all 14 children), disregarding the comprehension part.

2.4 Recordings

At the school premises, the children were recorded in a quiet room by one of the members of the research group using an Olympus digital voice recorder (VN-3100/VN-3100PC). Two of the teachers, who were still working at the school at that time, were recorded with the same device. The other two teachers, who were not working at the school anymore because they had moved abroad with their families, sent their voice recordings via WhatsApp. All subjects were allowed a few minutes to silently read the text before they were recorded. Note that the recordings were originally not intended to be used for phonetic analyses.

2.5 Measurement procedures

The three texts consisted of 113 words. All sound files were imported and annotated with the Praat program 6.0.05 (Boersma & Weenink, 2013) and transcribed orthographically as well as aurally. Because of the poor quality of the recordings (which were originally collected to assess oral reading skills and not pronunciation), the analysis of the number of syllables was conducted by hand, only pauses were detected automatically with Praat. The minimum silence interval duration was set at 0.2 seconds. Following Rallo Fabra & Jacobs (2015), the total number of syllables was divided by the total time required to produce the speech sample, including pauses, hesitations and fillers.

For the phonological error analysis, the words were marked in a separate annotation tier. After listening to the recordings, consonant and vowel identity was coded, using the symbols of the International Phonetic Association (1999). The focus of this pilot study is on the English targets /æ/ (9 targets, e.g. *at, can, have*), [ɬ] (20 targets, e.g. *little, play*), prevocalic /r/ (9 targets, e.g. *red, green*), the dental fricatives /ð/ and /θ/ (13 targets, e.g. *the, father, something*) and voiced obstruents in word-final position (20 targets, e.g. *rides, stars, good*) as these sounds are the most problematic ones for German learners of English (e.g., König & Gast, 2012). Altogether the corpus comprises of 1278 items (71 targets x 18 subjects). In a few cases, the children omitted a word while reading the text (14 omissions). Unfortunately, acoustic analyses of sounds were not possible due to the poor quality of the recordings.

3. Results

In order to examine differences between groups, mean speech rate measures as well as hit/miss scores for speech sounds obtained for each of the 18 subjects (fourteen children and four teachers) were submitted to one-way ANOVAs. The results of the descriptive analyses are presented in Table 1.

	Majority language students (*N*=5)	**Minority language students (*N*=9)**	**Teachers (*N*=4)**
Fluency: speech rate	2.28 syll/sec [*SD*=0.3]	2.34 syll/sec [*SD*=0.3]	2.97 syll/sec [*SD*=0.4]
Accuracy:			
/æ/	13,3%	38,9%	62,2%
[ɬ]	93.0%	96.2%	95.2%
prevocalic /r/	86.7%	100%	100%
dental fricatives /ð/ + /θ/	36.2%	61.5%	93.9%
w/f voiced obstruents	54.3%	54.8%	82.0%

Table 1. Descriptive analyses for mean speech rate (syllables per second) and mean hit rate in percent regarding the pronunciation of selected sounds (w/f = word final).

As Table 1 illustrates, teachers and students did not read the English texts at the same pace. This was confirmed by a one-way ANOVA, which yielded significant differences for group [$F(2, 16)=6.262$, $p=.010$, $\eta_p^2=.963$].

Post-hoc tests indicated that the teachers' speech rates were considerably faster than those of the majority and minority language students ($p<.05$). However, the two student groups did not differ significantly regarding their speech rate ($p>.05$). Apparently, language background (majority vs. minority language students) did not exert any influence on speech rate but experience (teachers vs. students) did.

Some of the English sounds examined here are reported to be notoriously difficult for German learners of English to pronounce. However, the results listed in Table 1 suggest that this is not generally true: Indeed, prevocalic /r/ and [ɬ] were pronounced almost always in a target-like way by the three groups (the hit rate ranged between 87% and 100%). One-way ANOVAs did not yield any significant differences between the three groups, neither for [ɬ] [$F(2, 16)=1.847$, $p=.218$, $\eta_p^2=.810$] nor for prevocalic /r/ [$F(2, 16)=2.381$, $p=.153$, $\eta_p^2=.239$]. These two sounds apparently neither posed any difficulty for German learners of English (independent of their age/experience) nor for minority language students whose L1 was not German. In the few cases of incorrect pronunciation, [ɬ] was substituted for [l] and /r/ was replaced with /ʁ/, i.e. with the German sound that was most similar to the English sound.

The dental fricatives did not pose any problems for the English teachers; they were almost always pronounced in a target-like way, corresponding to a hit rate of 93.9%. They were, however, problematic for the students: Minority language children obtained a hit rate of 61.5%, whereas majority language children pronounced only a third of the dental fricatives correctly. A one-way ANOVA yielded significant differences of group [$F(2, 16)=14.806$, $p=.000$, $\eta_p^2=.887$], and post hoc tests indicated significant differences between all three groups ($p<.005$). Usually /d/ was used instead of /ð/ (only once did a child use /z/ instead of /ð/ for <the>), the same pattern applied to /ð/ in word-medial position (only one child produced a /t/ in <father>). Substitution patterns, however, varied for the word <with>: In two thirds of the cases, the children used /d/ instead of /ð/, followed by /f/ (4 instances), /t/ (2), and /s/ (1). The dental fricative in the word <something> was substituted by /f/ only.

Final devoicing posed a problem even for experienced learners of English: The teachers of the present sample obtained a hit rate of 82%. The students (independent of their language background) devoiced around half of all voiced obstruents in word-final position; language-specific patterns for devoicing were not detected. A one-way ANOVA revealed significant differences for group [$F(2, 16)=4.327$, $p=.033$, $\eta_p^2=.857$], with teachers

performing considerably better than either group of students (p<.05), who did not show any significant differences as a function of language background (p>.05). Due to the poor quality of the recordings, acoustic measurements of vowel length could not be included in the analysis.

The teachers pronounced the vowel /æ/ in a target-like way in 67% of all cases, in the other instances they substituted English /æ/ with German /ɛ/. The majority language students showed stronger transfer effects with a hit rate of 13%. Minority language children, however, produced almost 40% of all /æ/ tokens in a target-like way. Therefore, there was a significant main effect of group in a one-way ANOVA [F(2, 16)=11.985, p=.001, η_p^2=.704] and post-hoc tests revealed significant between-group differences (p<0.05) between teachers, minority and majority language children regarding their target-like use of /æ/.

4. Discussion

The present study examined English reading-aloud data produced by majority and minority language children who all attended a German-English IM elementary school program in Germany, in which 50% of the teaching time was conducted in English. We assessed phonemic accuracy of selected English sounds as well as fluency (operationalized as speech rate) in English with regard to (i) the English input the children received from their English teachers and (ii) sources of transfer. So far, cross-linguistic influence in young learners' L2 and L3 phonological acquisition in educational contexts has received only very limited attention.

4.1 Majority vs. minority language students

With regard to phonemic accuracy, the results for majority language children with a German background were very similar to those reported by Wode (2009) for preschool and primary school students in German-English IM programs in Germany: The 4th graders in our study indeed had problems with some English sounds (in particular /æ, ð, θ/). As expected, /æ/ was usually rendered as German /ɛ/ in almost all of the cases (87%), indicating that this vowel was still problematic for the learners. A similar result was obtained by Bohn & Flege (1992) for inexperienced adult L2 German learners of L2 English. Acoustic analyses would be a welcome addition to determine in more detail whether the children already show a slow phonetic shift from the native to the non-native vowel.

In contrast to Wode (2009), the dental fricatives were not only substituted by alveolar fricatives but also by labiodental fricatives and

by alveolar stops (see also König & Gast, 2012). For example, the word-initial sound in the very frequent word <the>, if not produced target-like, was pronounced with an alveolar stop, the same applies to word-medial /ð/ in <father>. The dental fricative in <something>, though, was regularly substituted by /f/, pointing to progressive assimilation processes at work. Prevocalic /r/ did, in line with Wode's study, not pose any difficulty for majority language children, the same applied to [ɬ]. However, the children based their pronunciation of English final voiced obstruents on their L1 German syllable structure and devoiced half of these items.

In terms of fluency, minority and majority language students in grade 4 did not significantly differ in their speech rate when they were reading the three texts aloud. This result differs from findings obtained by Hart, Lapkin & Swain (1987) who reported minority language students in grade 8 to outperform their majority language peers. It may be possible that four years are not sufficient for such effects to occur. However, as the sample size is only small, additional research with minority language students of different ages attending different IM programs is needed to examine such effects in more detail.

In general, the minority language children showed a more target-like production of the English sounds /æ/, [ɬ], /r/, /ð/, /θ/ and of voiced obstruents in word-final position, indicating that they were not disadvantaged compared to their majority language peers. However, the substitution patterns of both groups did not differ: English /æ/ was replaced by German /ɛ/, English dark [ɬ] by German clear [l], and the dental fricatives by either alveolar obstruents (e.g. <with>, <father>, or labiodental fricatives (<something>). Minority language students also devoiced obstruents in word-final position – just to a smaller extent as compared to their majority language peers.

The minority language children's data, therefore, suggest an influence of L2 German on their pronunciation of L3 English sounds: For example, the children's L1 Turkish and Arabic do not exhibit final devoicing, but they did not resort to their L1 when producing English voiced obstruents in word-final position but devoiced these sounds, in line with the phonological rules of the L2 German. Even though our learners have been exposed to English for four years, their foreign accent (at least with the English sounds being tested) is not based on their L1 Turkish or Arabic, rejecting their L1 as a possible source of transfer for L3 pronunciation. Aspects such as L2 proficiency and/or psycho/typological distance seem to play a greater role: For example, minority language children in the IM program of this particular school may generally be described as having a high command

of German, as shown in standardized tests of German reading and writing (e.g. Steinlen 2016, 2018). The same is true for the individuals of the present sample, as an informal look at their test values showed. Thus, they are highly proficient users of L2 German and use this language not only in the school context but also during the rest of the day with their friends and siblings, as an informal look at their questionnaires revealed. In line with many studies examining L3 phonology (e.g. Hammarberg, 2001; Lloyd et al., 2016; Wrembel, 2010), L2 proficiency is a likely candidate in order to account for L2 German transfer patterns in minority language students' L3 pronunciation of selected English sounds, in particular because the students mentioned in a questionnaire that L2 German was usually their dominant language.

However, it cannot be ruled out that the typological similarities between L2 German and L3 English may also have facilitated L3 learning at the phonological level. Such effects have been reported in other studies (e.g. Bouchhioua, 2016; Llama et al., 2010; Wrembel, 2010, 2012) but further studies are necessary to disentangle effects of L2 proficiency and typology by systematically comparing larger groups of speakers with various language backgrounds (e.g. Arabic, Turkish, including also other family languages such as Swahli or Urdu). It would also be interesting to examine L2s that are typologically closer to L3 English than L2 German (e.g. Frisian) or learners with L2s that are typologically closer to their L1 (e.g. different varieties of Arabic). In such studies, it could be determined whether a linguistic system as a whole, a phonological system as a whole, or single properties across languages are transferred from one language to the next (e.g. Cabrelli Amaro, 2012).

As regards the different models that have been proposed in order to account for transfer effects in L3 phonology, our results cannot be used to support any of the L3 phonology models, because we did not investigate initial state learners (or adult learners). In addition, we only considered selected L3 sounds of English and did not include the minority language learners' L1 to a sufficient extent in order to be able to prove or disprove any model of transfer in L3 phonology.

4.2 Teachers vs. students

In the present study, the teachers showed significantly faster (i.e. more native-like) speech rates and better phonemic accuracy in their English pronunciation than both groups of students: For example, [ɬ], /r/, /ð/ and /θ/ were produced almost always in a target-like way by the teachers. Even

voiced obstruents in word-final position did not pose a great problem for the English teachers who correctly produced these sounds in 80% of all instances.

Some inconsistencies, however, remain: Only two thirds of all /æ/ sounds were produced in a target-like way by the teachers, indicating that even these experienced learners are still in the process of forming a distinct phonetic category for English /æ/ (e.g. Bohn & Flege, 1992). These examples of mispronunciations may also have an impact on the students' pronunciation of English sounds because the teachers are their main source of foreign language input (e.g. Böttger, 2005; Piske, 2008; Yani, 2012, Kanoksilapatham, 2014). In other words, students' problems with voiced obstruents in word-final position or with /æ/ (see e.g. section 4.1. and 4.2) may not only be due to transfer patterns from their L1/L2 German (i.e. learner-inherent) but also to their teachers who provide them with input which is not native-like regarding these sounds. However, as the sample is very small, additional studies are warranted in order to examine the relationship between teachers' and students' pronunciation of English in the foreign language classroom in more detail.

In summary, the results of the present study suggest that the teachers are fairly adequate role models for their students in terms of their English accuracy and fluency. Furthermore, it has been reported that English learners seem to prefer a teacher who is easier to understand (i.e. one with the same language background), rather than one with a native accent (e.g. Braine, 2010 but see Butler, 2007 for different results). As previous research (e.g. Levis, 2005) indicates, the curricula for English as a foreign language nowadays rather emphasize intelligibility than nativeness in the foreign language classroom anyway, so that it is not regarded as problematic to let non-native qualified English teachers teach subject content as long as their competence in English is at least near-native like (Böttger, 2005; Piske, 2008; Kanoksilapatham, 2014; Karakaş, 2012; Yani, 2012).

4.3 Role of orthography

In contrast to extemporaneous speech, pronunciation errors in reading-aloud data may also be" orthography induced" as a consequence of a mismatch between L1 and L2 grapheme-phoneme conversion rules. For example, Rallo Fabra & Jacobs (2015) reported their learners made fewer vowel errors when the target words had more transparent spellings and were closer to Spanish-Catalan phoneme-grapheme conversion rules, suggesting that in such cases, the learners had relied on orthography (see

also Piske, Flege, MacKay & Meador, 2002). In our sample, we only found a few instances of pronunciation errors that appeared to be due to grapheme-phoneme discrepancies in English, or German and English: These include instances of *come* (often realized as [kɔm] as in German kommen), *said* ([sɛɪd]), ran ([ɹʌn] pronounced as German /a/ as in <an>). Phonological coding (i.e. the recoding of written, orthographic information into a sound based code, e.g. Leinenger 2014) as a source of error occurred only for the unknown words <pretty> and <laughed>, which were realized as [pɹɛti]) and [laʊged]. The last two words were apparently not familiar to the students who evidently resorted to the more familiar German phoneme-grapheme correspondences to read these words aloud. In line with Rallo Fabra & Jacobs (2015), it indeed seems to be easier for students in reading aloud tasks to pronounce English words in a target-like way if they are spelt transparently.

4.4 Future studies

As this study only included a small sample of majority and minority language students and their teachers, there is a dire need of studies examining L1 and L2 effects in L3 acquisition with larger samples. It would be particularly interesting for the school context to also include students in mainstream programs in which English is taught as a subject for only 1-2 lessons per week with teachers who are not always qualified English teachers as it is still often the case, for example, in elementary schools in Germany. Moreover, many previous studies included foreign accent ratings obtained from native speakers of English (e.g. Lloyd et al., 2016), which would be a possibility to also evaluate global accuracy of our majority and minority language students' English pronunciation. Finally, an interesting question is whether Flege's SLM (e.g. 1995) could also be extended to L3 phonological acquisition, taking into account the acoustic properties of L1, L2 and L3 sounds as well as students' and teachers' perception of L2/L3 sounds in order to examine how L2 and L3 phonetic categories shift towards native-like categories in the course of acquisition. In times in which a steadily increasing number of people develop a multilingual competence inside and outside of the foreign language classroom it will become more and more important for language acquisition research to focus on the acquisition of more than two languages and to examine in detail the processes underlying and the factors affecting multilingual development.

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