

Parental input patterns and transmission of high-status heritage languages: English and German as heritage languages in Norway

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Abstract

This study examines the mother-reported language practice in bilingual English/German-Norwegian, two-parent families in Norway, and explores the effects of (1) parental input patterns, (2) parental gender, and (3) status of the heritage languages (HL), on success of HL transmission and on children's language use with siblings when the children were age five. Using mother-reported questionnaire data from the Norwegian Mother and Child Cohort Study (MoBa; a national birth cohort in Norway), we collected information about the languages spoken by the children and the home language use of 204 English-Norwegian and 99 German-Norwegian families. The success rate of HL transmission was reported to be 79.9% in English-Norwegian families, and 72.2% in German-Norwegian families. However, less than half of the bilingual children interacted in HL with their siblings. Different parental input patterns were found to have different effects on HL transmission and on children's HL use with siblings. Additional HL input from the Norwegian parent seemed not only to promote HL transmission, but also increase the probability of children's HL use with siblings. Mothers being the HL user was associated with higher rates of HL transmission and higher rates of children's HL use with siblings.

Keywords: heritage/home language (HL), parental input patterns, transmission, English/German-Norwegian bilingual families, HL status, parental gender effect

Introduction

In the age of globalization, more and more children grow up exposed to more than one language. Heritage/home language (HL), defined as the language spoken by at least one of the

parents at home, but not spoken in the wider community, is often the first language(s) to which a child is exposed from birth in natural and spontaneous situations. Early exposure to a HL would seem to be the most practical and effortless way to achieve bilingual proficiency. However, research indicates that not all children living in bilingual environments become bilingual and retain their acquired language proficiency as they grow older (e.g. De Houwer, 2007; Pearson, 2007; Portes & Hao, 1998; Verdon, McLeod, & Winsler, 2014).

Heritage language research makes an important distinction between language transmission and language maintenance. The distinction was first made by Fishman (1991), and later refined by Nesteruk (2010), who referred to language transmission as “the passing of heritage language to young children in a family context”, and language maintenance as “the post-transmission process that occurs in a wider society and is aimed at further development of what has been transmitted” (p.272). The present paper focuses on bilingual families who have young children born and growing up in Norway, so the issues we highlight here relate to language transmission rather than language maintenance.

Bilingualism/multilingualism has attracted much research interest in relation to HL transmission. Researchers adopting a sociolinguistic approach to language acquisition seek to determine social and environmental factors that contribute to or impede transfer of HLs from one generation to another. While there are numerous factors that influence HL transmission, the present study focuses on the role of the family, particularly parental language input patterns and the gender of the parent using the HL at home.

There is a general consensus regarding the importance of parental language input in HL transmission. Fishman (1991) notes that effective HL transmission is predicted by the parent’s use of HLs in the home. This is further supported by two more recent longitudinal studies on language transmission in Australia, which showed a high correlation between parental use of a HL and children speaking the HL at various stages of early language development (Verdon & McLeod, 2015; Verdon, McLeod, & Winsler, 2014).

Parental input patterns could play an important role in HL transmission. A very clear example of the relationship between parental input pattern and rate of HL transmission was demonstrated in De Houwer’s (2007) survey of home language use of 1,899 families in Flanders, Belgium, where Dutch is the majority language. Parental input pattern is “a configuration of reported spoken home language use by mother and father combined” (De Houwer 2004, p123). There can be wide variations in the amount of input in each language the parent pair contributes to young children. De Houwer (2007) identified five parental language input patterns in her sample which corresponded to 1) *both HL only*, 2) *one parent HL, one parent both languages*, 3) *both parents both languages*, 4) *one parent one language*, and 5) *one parent Dutch, one parent both languages*. She found that parental input patterns influenced the rate of children’s bilingual use, with success rates of 96.9%, 93.4%, 79.2%, 74.2%, 35.7%

respectively from pattern one to five, supporting her conclusion that “...successfully raising children to speak two languages very much depends on the parental language input patterns” (De Houwer, 2007, p.421).

Bilingual children’s language use with siblings has long been a topic of interest for researchers of HL transmission. Some research has indicated that the majority language can be the language used predominantly for communication among siblings (e.g. Döpke, 1992; Okita, 2002). Other reported that bilingual use with siblings was most common (e.g. Yamamoto, 2001). Further, some studies showed that those bilingual children who have stopped interacting with siblings in HL are at risk of losing the HL as they grow older (e.g. Barron-Hauwaert, 2011; Shin, 2002). We know little, however, regarding the influence of parental input patterns on their children’s HL use with siblings.

Parental gender may also prove to be a potential factor associated with HL transmission. Research on monolingual families revealed that mothers were more verbal than fathers during interaction with their young children, however, it was fathers’ language to children, not mothers’ language that made unique contribution to children’s early language skills (Pancsofar & Vernon-Feagans, 2006). To date, there is limited literature on the relationship between parental gender and children’s bilingual outcome. Sirén (1995) suggested that children were more likely to learn the mothers’ HL as compared to that of fathers’. However, a re-examination of the comparison by De Houwer (2007) showed that there was no significant difference. De Houwer (2007) and Mueller Gathercole (2007) both reported that there was no evidence for a differential parental gender effect on HL transmission. Of note, however, there is yet to be a study examining how parental gender influences HL transmission in families where the parents each has a different mother language.

Research indicates that different types of bilingual families have a great effect on HL transmission (e.g. Hakuta & d’Andrea, 1992; Mueller Gathercole, 2007). Pearson (2007) pointed out that the language environment is more variable in families with only one HL speaker, or two fluently bilingual parents. This highlights the need to examine language practices in this particular type of bilingual families. In addition, very few studies have reported transmission of English as an HL in non-Anglophone countries where English a minority language. Although several previous studies covered English as one of the HLs (e.g. De Houwer 2007; Sirén 1995), they did not analyse data specifically about English. Only one early survey study has examined the effects of parental input patterns on transmission of English as an HL (Yamamoto, 2001). Using a sample of 111 Japanese-English families residing in Japan, the study found that the success rate was highest in families where both parents used English, and the lowest in families where both of them used Japanese. The principle of maximal engagement with the HL was proposed to promote HL transmission. Such studies are important because they deepen our understanding of HL transmission processes and how HL learners can be best supported in various linguistic and cultural contexts.

The Present Study

The present study refers to two HL groups, namely English and German, embedded in the Norwegian context. From a global perspective, English and German are both high-status international languages, whereas Norwegian is rarely used outside of Norway's borders. Within the territory of Norway, however, Norwegian is the national and dominant language. When viewed from a national perspective, English and German can be considered minority languages in Norway. As such, the present study contributes to our understanding of major international languages in a minoritized setting, a research focus which has hitherto received little attention within HL transmission research community.

In Norway, both English and German enjoy some measure of social prestige. Yet, English, as *lingua franca*, is no doubt of higher status than German. By status, we essentially mean how often the language is used, by the media, in education, and in international communication. According to *Store norsk leksikon* (a Norwegian language dictionary), in Norway, English is the most important language for international communication, followed by German and French. This relative difference in status between English and German, though not a large one, offers us a comparative perspective in terms of input patterns and the success rate of HL transmission in the two HL groups.

The present study focuses solely on children in two-parent families where each of the parents has a different mother language (Norwegian vs. English/German). The rates of HL transmission were examined when the children were age five, the age point when questions about home language use were included in the Norwegian Mother and Child Study (MoBa), from which data of the current study were drawn (see the Method section for a detailed description of the MoBa).

In addition to mothers' report of the language(s) used by the child, the present study also examined children's HL use with siblings. Specifically, the study examines these two outcomes' association with: 1) the particular HL that children hear (English vs. German), 2) parental language use patterns, and 3) gender of the parent(s) using the HL with the child. The following research questions will be addressed:

- a) How do English-Norwegian families compare with German-Norwegian families with regard to their reported choice of parental input patterns?
- b) What is the association between the HL status and HL transmission, as well as children's HL use with their siblings?
- c) What is the association between reported parental input patterns and HL transmission, as well as children's HL use with siblings?
- d) Is gender of the parent using the HL associated with HL transmission and children's HL use with siblings?

Method

Overview and sample

Data utilized in this study were from the Norwegian Mother and Child Study (MoBa). MoBa is a population-based prospective pregnancy cohort study initiated in 1999 by the Norwegian Institute of Public Health (NIPH). Pregnant women were recruited from hospitals and maternity units all over Norway from 1999 to 2009, and 41% of invited women consented to participate. Women giving their consent received three questionnaires during pregnancy: in gestational weeks 17 (Q1), 22, and 30. They later received questionnaires after delivery, when their child was six and eighteen months, and three, five, seven, and eight years (questionnaires available at <http://www.fhi.no/en/studies/moba>). Data collection is ongoing. The cohort comprises 114,500 children, 95,200 mothers and 75,200 fathers (Magnus et al., 2006; Magnus et al., 2016). The current study uses version nine of the MoBa quality assured dataset. The study was approved by the Regional Committee for Medical Research Ethics in South-Eastern Norway. All MoBa questionnaires were printed in Norwegian.

As part of studying neurodevelopmental disorders in children, MoBa is specifically focused on children's language development and the linguistic, social, behavioural and emotional influences on child development. Information about non-Norwegian language background in the child's parents and grandparents was included as a part of Q1, and questions regarding home language use and language(s) the child spoke were included in the five-year questionnaire (Appendix A). Altogether, version nine of the data covered 20,160 children with both Q1 and the five-year questionnaire completed and returned. The mothers were asked in Q1 to indicate whether she or the child's father had a mother tongue other than Norwegian. If she responded "yes", a follow-up question was asked to identify the parent(s) and HL spoken. Henceforth, if mothers indicated another language than Norwegian for either themselves or their child's father, the term HL speaker will be used. In this sample, 1,958 children (9.8%) were reported to have at least one parent who was an HL speaker. English and German are among the top four heritage language groups in MoBa participants (Swedish and Danish, closely related to Norwegian, being number 1 and 2, respectively). Altogether 274 MoBa children were reported to have at least one parent being an English HL speaker, and 163 were reported to have at least one parent being a German HL speaker. The children in English and German HL families were required to satisfy the following inclusion criteria: 1) they were in two-parent families, 2) one parent was a Norwegian speaker, the other parent was a HL speaker (either English or German). After excluding children not satisfying both criteria, the sample comprised 204 children with a Norwegian-English family and 99 children with a Norwegian-German family.¹ An examination of the home language use revealed that in 9 Norwegian-German families and 15 Norwegian-English families the parents only spoke Norwegian in daily interaction with their children. Given that these families did not use the HL at home and thus could not transmit it, they were further excluded from subsequent analyses. The number

¹ Due to MoBa's de-identification policy, demographic characteristics of the sample were not currently available.

of children with HL fathers and HL mothers in the final sample of two HL groups are presented in Table 1.

Table 1. Number (%) of children with HL fathers and HL mothers by HL group

| HL group | HL mothers | HL fathers | Total |
|----------|------------|------------|-----------|
| English | 51 (27.0) | 138 (73.0) | 189 (100) |
| German | 51 (56.7) | 39 (49.3) | 90 (100) |
| Total | 102 (36.6) | 177 (63.4) | 279 (100) |

Table 1 shows that there was a higher proportion of children with German HL mothers than German HL fathers, whereas the English HL fathers were more than double the proportion of English HL mothers.

Of note, 60.8% of the MoBa children began attending family- or center-based care by 15 months; by five years, the center-based care attendance rate was as high as 93.8% (Lekhal et al., 2011 Zachrisson et al., 2013). Thus a great majority of MoBa five-year-old children spent a significant part of their day in Norwegian-dominant environments.

Measures

The children’s bilingual outcomes were determined based on maternal report of the language(s) their children spoke on completion of the five-year questionnaire. Mothers were asked “What language(s) does the child speak?” There were four response categories: 1-Norwegian, Danish or Swedish, 2-Other Nordic languages or Sami, 3-Western European languages (German, English, Spanish), 4-Other languages (East European, Asian, African). Multiple selections were allowed. In our study children were categorized as “non-bilingual” when the mothers checked only response category 1, and as “bilingual” when the mothers checked both category 1 and category 3. The “non-bilinguals” were reported to speak only the Norwegian language, though they might well be so-called receptive bilinguals, i.e. those who understand some HL, but do not spontaneously speak it. In the present paper, we measured the success/failure of HL transmission solely based on whether children were reported to *speak* the HL or not. Thus “non-bilinguals” equated with failure of HL transmission, and “bilinguals” with success of HL transmission.

With respect to home language use, the MoBa collected information in the five-year questionnaire on three directions of language interactions: mother’s language spoken to child, father’s language spoken to child, and child’s language spoken to siblings. Each of these three language interactions were rated according to five possible language-use patterns: 1=Norwegian only; 2=More Norwegian than HL; 3= both languages equal; 4=More HL than

Norwegian; 5=HL only. Patterns 1 and 2 can be referred to as Norwegian dominant patterns, and pattern 3 as balanced input pattern, whereas patterns 4 and 5 as HL dominant patterns. A parental input pattern for a given child was represented by $N_i + H_j$. N denotes input from the Norwegian-speaking parent, and H denotes input from the HL parent. “i” and “j” stand for one of the five language use patterns specified above chosen by the Norwegian parent and the HL parent respectively. Thus the pattern N_3+H_3 means both parents offer equal Norwegian and HL input; the pattern N_1+H_5 indicates that the family conforms to the one-parent one-language principle, by which each parent speaks only his/her native language to the child.

For 245 out of the 279 children in the study sample, information was provided regarding their language use with siblings. Based on this information, the bilinguals in the subsample of these 245 children were further divided into two groups. A child who was reported as bilingual, but interacted with siblings only in Norwegian was defined as a bilingual, no HL use with siblings. A child who used at least some HL when talking with siblings was defined as a bilingual, some HL use with siblings.

Results

Comparing choice of parental input patterns

Excluding the children whose parents only spoke Norwegian, there were 24 possible parental input patterns, here represented by $N_i + H_j$ ($1 \leq i/j \leq 5$). However, not all the possible patterns were adopted by the families of children in our sample. An examination of the data revealed two important traits related to parental input patterns. First, the Norwegian parents were reported to mainly adopt the Norwegian-dominant patterns, whereas the HL parent exhibited all the five possible language choice patterns. Second, for all children the HL parent was reported to contribute more HL input than the Norwegian parent. That is to say that no children had parents who adopted patterns like N_2+H_1 or N_3+H_2 . The parent input patterns thus were limited to the combinations listed in Table 2.

Table 2. Number and percentage of children exposed to different parental input patterns

| No. | Input pattern | Children in German-Norwegian families (N=90) | | Children in English-Norwegian families (N=189) | |
|-----|---------------|--|------------|--|------------|
| | | Number | Percentage | Number | Percentage |
| 1 | N1+H2 | 22 | 24.4 | 20 | 10.6 |
| 2 | N1+H3 | 5 | 5.6 | 11 | 5.8 |
| 3 | N1+H4 | 17 | 18.9 | 28 | 14.8 |
| 4 | N1+H5 | 15 | 16.7 | 25 | 13.2 |
| 5 | N2+H2 | 6 | 6.7 | 17 | 9.0 |
| 6 | N2+H3 | 5 | 5.6 | 13 | 6.9 |
| 7 | N2+H4 | 12 | 13.3 | 47 | 24.9 |
| 8 | N2+H5 | 4 | 4.4 | 16 | 8.5 |
| 9 | N3+H3 | 0 | 0 | 1 | 0.5 |
| 10 | N3+H4 | 0 | 0 | 3 | 1.6 |
| 11 | N3+H5 | 1 | 1.1 | 4 | 2.1 |
| 12 | N4+H4 | 2 | 2.2 | 3 | 1.6 |
| 13 | N4+H5 | 0 | 0 | 1 | 0.5 |
| 14 | N5+H5 | 1 | 1.1 | 0 | 0 |

Note. N=Norwegian parent, H=HL parent, language use by each parent ranges from 1=only Norwegian/no HL input, to 5=only HL/no Norwegian input

For most of the input patterns, the percentage of children exposed to each of them was fairly similar between the two HL groups. The only two patterns for which the distributions clearly differed between the two HL groups were N1+H2 and N2+H4. Approximately one out of four children with a German HL parent were exposed to the Norwegian-dominant pattern N1+H2, and this was the most commonly used pattern in this group. By contrast, this pattern was less frequently used (10.6%) for children with an English HL parent. This smaller percentage of pattern N1+H2 for the English HL group was offset by its more frequent use of N2+H4, i.e. both parents offered more input in their respective mother tongue than their spouses' language. Almost one out of four children with an English HL parent were exposed to this pattern, as opposed to 13.3% of the children with a German HL parent.

Pattern N1+H4 was the second most common pattern for children in both the English (14.8%) and the German HL group (18.9%). This was followed by N1+H5, namely one-parent one-language principle, which was adopted by 13.2% of the English-Norwegian families, and by 16.7% of the German-Norwegian families. The patterns where both parents offered balanced or HL-dominant input were rare (ranging from 0-2.2% of the children were exposed to these).

These rarely adopted patterns (numbers 9-14 in Table 2) were thus collapsed for subsequent analysis, and termed as “both HL-dominant”.

Overall, in over half (55.6%) of children with an English HL parent, the Norwegian parent spoke some English with their child; in about one third (34.4%) of children with a German HL parent, the Norwegian parent spoke some German with their child. On the part of the HL parents, 24.3% (46/189) of children with an English HL parent and 23.3% (21/90) of children with a German HL parent spoke exclusively their native languages to their children. The remaining children with a HL parent were exposed to both languages in daily communication with their HL parent.

Association between parental input patterns and success of HL transmission and HL use

Before exploring the relationship between parental input patterns and success of HL transmission, we first examined whether the rate of HL transmission was associated with the HL status. The transmission rate was 79.9% (151 out of 189) if the parent’s HL was English, and 72.2% (65 out of 90) if the HL was German. A one sample chi-square test indicated that there was no significant difference in the rate of HL transmission comparing children in the English and German HL groups, $\chi^2(1) = 2.05, p = .152$. The two groups were thus collapsed in the subsequent analysis. By age five, on average 77.4% of the children growing up in English/German-Norwegian bilingual homes became bilinguals, and 22.6% of the children ended up as non-bilinguals.

Table 3. Association between parental input patterns and rate of HL transmission

| Input Pattern | Success rate (%) | n (Adj. Res) | N |
|------------------|------------------|--------------------|----|
| N1+H2 | 35.7 | 15 (-7.0) | 42 |
| N1+H3 | 68.8 | 11(-0.9) | 16 |
| N1+H4 | 77.8 | 35 (0.1) | 45 |
| N1+H5 | 90.0 | 36 (2.1) | 40 |
| N2+H2 | 60.9 | 14 (-2.0) | 23 |
| N2+H3 | 94.4 | 17 (1.8) | 18 |
| N2+H4 | 88.1 | 52 (2.2) | 59 |
| N2+H5 | 100.0 | 20 (2.5) | 20 |
| Both HL dominant | 100.0 | 16 (2.2) | 16 |

Note. n=number of bilingual children, Adjusted residuals (Adj. Res) in bold are those that exceed +2/-2, N= total number of children exposed to the input pattern.

Table 3 shows the association between success of HL transmission and parental input patterns, using a one-sample chi-square test. The result was significant, $\chi^2(8) = 67.06$, $p < .001$. We used adjusted residual (Adj. Res) as a measure of strength of the difference between observed and expected values. An adjusted residual with a value beyond ± 2 is an indication of the cell's contribution to the significant chi-square statistics (Angresti, 2007).

From pattern N1+H2 to pattern N1+H5, the success rates increased respectively from 35.7% to 68.8% to 77.8% to 90%. A similar incremental trend (from 60.9% to 100.0%) was observed comparing the range of patterns running from N2+H2 to N2+H5. Note that children exposed to N1+H5, namely one-parent one-language principle, the success rate was quite high, i.e. 90.0%. However, only when pattern of the HL parent was HL dominant or exclusively HL and the Norwegian parent contributed additional HL input (as in patterns of N2+H5 and both HL dominant), was success of HL transmission guaranteed. In fact, when we compared transmission rates of the pattern pairs N1+H2 (35.7%) vs. N2+H2 (60.9%), N1+H3 (68.8%) vs. N2+H3 (94.4%), N1+H4 (77.8%) vs. N2+H4 (88.1%), and N1+H5 (90.0%) vs. N2+H5 (100%), we found that at any level of the HL input by the HL parent, the additional HL input provided by the Norwegian parent always resulted in higher rates of HL transmission.

Adjusted residual values in Table 3 revealed that the N1+H2, N1+H5, N2+H2, N2+H4, N2+H5, and "both HL dominant" patterns contributed the most to the Chi square statistics. Under patterns N1+H2 and N2+H2, there were fewer bilingual children than expected; under patterns N1+H5, N2+H4, N2+H5, and "both HL dominant", on the other hand, there were more bilingual children than expected. These indicate that the former patterns are most likely to contribute to failure of HL transmission, whereas the latter ones are more likely to contribute to success of HL transmission.

Before examining the association between parental input patterns and children's HL use with siblings, we first ran a one-sample chi-square test to check whether the HL status (English vs. German) was associated with children's HL use with siblings. As the test was not significant ($\chi^2(2) = 2.48$, $p = .289$), the two HL groups were combined in the subsequent analyses. In this sample of 245 children whose information about language use with siblings was provided, 21.2% (N=52) were reported to be non-bilinguals at age five, 30.2% (N=74) were reported to be bilinguals, but spoke exclusively Norwegian with their siblings, and 48.6% (N=119) were bilinguals and spoke some HL when talking with their siblings. Among the bilingual children who used some HL with siblings, 75.6% (N=90) were reported to interact with siblings using more Norwegian language than HL, 14.3% (N=17) using both languages equally often, 6.7% (N=8) using more HL than Norwegian, and 3.4% (N=4) using exclusively HL with their siblings.

Table 4 shows the association between children's HL use with siblings and parental input patterns.

Table 4. Association between parental input patterns and children’s HL use with siblings

| Input Pattern | Bilingual, some HL use with sib. | | Bilingual, no HL use with sib. | | Non-bilingual | | N*1 |
|------------------|----------------------------------|-------------|--------------------------------|-------------|---------------|-------------|-----|
| | % | n(Adj. Res) | % | n(Adj. Res) | % | n(Adj. Res) | |
| N1+H2 | 8.5 | 3 (-5.1) | 28.6 | 10 (-0.2) | 62.9 | 22 (6.5) | 35 |
| N1+H3 | 15.4 | 2 (-2.5) | 53.8 | 7(1.9) | 30.8 | 4 (0.9) | 13 |
| N1+H4 | 40.6 | 15(-1.1) | 43.2 | 16 (1.9) | 16.2 | 6 (-0.8) | 37 |
| N1+H5 | 51.4 | 19 (0.4) | 37.8 | 14 (1.1) | 10.8 | 4 (-1.7) | 37 |
| N2+H2 | 30.0 | 6 (-1.7) | 30.0 | 6 (0.0) | 40.0 | 8 (2.1) | 20 |
| N2+H3 | 68.7 | 11(1.7) | 25.0 | 4 (-0.5) | 6.3 | 1 (-1.5) | 16 |
| N2+H4 | 63.0 | 34 (2.4) | 24.0 | 13 (-1.1) | 13.0 | 7(-1.7) | 54 |
| N2+H5 | 84.2 | 16 (3.2) | 15.8 | 3 (-1.4) | 0.0 | 0 (-2.4) | 19 |
| Both HL dominant | 92.9 | 13 (3.4) | 7.1 | 1 (-1.9) | 0.0 | 0 (-2.0) | 14 |

Note. n=number of children in each subcategory (bilingual, some HL use with sib/bilingual, no HL use with sib./ Non-bilingual). Adjusted residuals (Adj. Res) in bold are those that exceed +2/-2. N= total number of children exposed to the input pattern *1Smaller sample size due to either lack of siblings or missing report on children’s language use with siblings

One-sample chi-square test established that children’s HL use with siblings was significantly associated with parental input patterns, $\chi^2 (16)=85.76, p<.001$. A similar incremental trend as found in the association between input patterns and success of HL transmission emerged here as well. First, increased rates of HL use with siblings were associated with an increasing proportion of HL input from the HL parent: from pattern N1+H2 to N1+H5, the rate of HL use with siblings increased incrementally from 8.6% to 51.4%; from N2+H2 to N2+H5, the rate of HL use with siblings increased incrementally from 30.0% to 84.2%. Second, at any level of the HL input by the HL parent, additional HL input from the Norwegian parent seems to increase the probability of children’s HL use with siblings. Comparing input pattern pairs N1+H2 vs. N2+H2, N1+H3 vs. N2+H3, N1+H4 vs. N2+H4, N1+H5 vs. N2+H5, the percentages of children using the HL with siblings were respectively 8.6% vs. 30.0%, 15.4% vs. 68.8%, 40.5% vs. 63.0%, and 51.4% vs. 84.2%.

Interpreting the adjusted residual values in the table, there were more than expected bilingual children who used some HL with siblings when the input patterns were N2+H4, N2+H5, and “both HL dominant”. Hence, these patterns were most likely associated with children’s HL use with siblings. Under patterns N1+H2 and N1+H3, on the other hand, there were less than expected bilingual children who used some HL with siblings.

HL transmission and HL use with siblings in relation to gender of HL speaking parent

To examine the effect of HL use by parents of different genders on the likelihood of successful HL transmission and children’s HL use with siblings, a multinomial logistic regression analysis was performed. The maternal and paternal language use patterns when speaking with the child were used as explanatory factors (the scale of language use pattern ranges from 1=no HL input to 5=HL only), and child HL use (0=non-bilingual, 1=bilingual, no HL use with siblings, 2=bilingual, some HL use with siblings) as the outcome variable. Table 5 displays the effect of parental gender controlling for parents’ different input patterns.

Table 5. Odds Ratio (95% confidence intervals) for child HL use related to parental gender¹

| Predictor | Bilingual, no HL use with sib. | Bilingual, some HL use with sib. |
|-----------------|--------------------------------|----------------------------------|
| Maternal HL use | 4.81 (95% CI [2.47-9.38]) *** | 11.26 (95% CI [5.57-22.76]) *** |
| Paternal HL use | 1.68 (95% CI [1.20-2.33]) ** | 3.02 (95% CI [2.08-4.36]) *** |

Note. ***p<.001, **p<.01. ¹Multinomial logistic regression (the non-bilingual group used as reference category)

Both maternal and paternal HL use significantly predicted child HL use. With one-unit increase in HL input from the mother, the odds of having a bilingual child but no HL use with siblings increased 4.81 times, and the odds of having a bilingual child with some HL use with siblings increased 11.26 times. The corresponding odds ratios were respectively 1.68 and 3.02 when the father was the HL user. Therefore, the analysis seems to reveal a great difference between mothers and fathers in their influence on HL transmission and children’s HL use with siblings. The overall model provided adequate fit to the data, Pearson $\chi^2(38)=26.38$, $p=.922$, and explained a significant amount of variance (Nagelkerke $R^2 = .398$).

Discussion

The role of HL status on HL transmission and children’s HL use with siblings

By age five, the success rates of HL transmission were reported to be 77.4% in English/German-Norwegian families. These percentages were very close to those reported in De Houwer (2007), Pearson (2007), and Verdon et al., (2014). The present study of major international languages in a minoritized setting confirms previous results with relatively equal HL transmission rates.

Moving beyond existing research protocols in this area, we added reported use of HL with siblings as an important outcome measure. Our analyses showed that less than half of the five-year-olds growing up in bilingual families interacted in HL with their siblings. Even among

these children, it was more common to use more Norwegian than the HL when interacting with siblings. Our study thus corroborates previous research findings that documented bilingual children's preference for communication in the majority language (e.g. Eilers, Pearson, & Cobo-Lewis, 2006; Pearson, 2007; Portes & Rumbaut, 2001). Even when the HL was a highly esteemed language such as English and the majority language was Norwegian, this trend of preference for the majority language remained the same.

In the present study the relatively higher status of English compared to German did not contribute to higher transmission rate. We further compared the proportions of bilinguals with and without HL use with siblings between the two HL groups, and found no significant differences. Although we failed to find an effect of HL status on HL transmission, we did find some differences between the two HL groups in their choice of parental input patterns. An importance difference lay in the more frequent use of Norwegian-dominant input pattern (i.e. N1+H2) by the German group and more frequent use of N2+H4 (i.e. both parents offered more input in their respective mother languages than the other language) by the English group. Another contrastive difference was observed on the part of the Norwegian parent: over half of the Norwegian parents in English-Norwegian homes spoke some English with their children, whereas only about a third of the Norwegian parents in German-Norwegian homes spoke some German with their children. These findings may somewhat mirror the status difference of the two HLs. But this was the only obvious difference between the two groups. For the remaining patterns, the proportions were all comparable.

Further, we have observed that the *one-parent one-language* strategy was adopted only by approximately one out of seven families, and was not the most commonly used pattern. Around 76% of the HL parents were reported to use both languages in daily communication with their children. The option for bilingual use may reflect the HL parents' efforts in trying to keep a balance between transmitting the HL to their children while keeping the communication lines open with them.

Association between parental input patterns, HL transmission, and children's HL use with siblings

Consistent with previous research by De Houwer (2007), we found that parental input patterns were associated with success/failure of HL transmission. In addition to exclusive Norwegian or HL language use patterns (i.e. 1=Norwegian only; 5=HL only), our scale also included relative proportion of parental input in each language (namely, 2=More Norwegian than HL; 3= both equal; 4=More HL than Norwegian). This allowed a finer-grained analysis of parental input patterns. We found that an increased proportion of HL input from the HL parent was associated with increased rates of HL transmission, when keeping the input from the Norwegian parent constant. Our findings indicated that failure of HL transmission was most likely to occur when both parents offered Norwegian dominant input (e.g. N1+H2, N2+H2).

The use of HL-dominant patterns by at least one of the parents (e.g. N2+H4, N2+H5, “both HL dominant”), on the other hand, was most likely to be associated with a higher success rate of HL transmission. These results provide corroborating evidence for the importance of parental input patterns in shaping children’s bilingual outcomes.

Parent input patterns were also found to have an effect on the child’s language use with siblings. An interesting aspect of the results was that combined HL input from both parents seemed to not only promote increased success rates, but also increase the probability of children’s language use with siblings. Results from this study demonstrate the benefit of additional HL input from the Norwegian parent. We suggest that in addition to maximizing quantity and diversity of HL input, HL input from the non-HL parent sends children the signal that the HL is valued in the family, thereby incentivizing the children to interact in HL with siblings, which in turn may increase the probability of achieving long-term success. This is in the spirit of Yamamoto’s (2001) principle of maximal engagement with the HL. Past research (e.g. Nesteruk, 2010, Frese, Röder, & Ward, 2015) also indicates that the non-HL parent who is supportive of HL plays an important role in reinforcing the HL parent’s efforts in the process of HL transmission. Therefore, the non-HL parents whose own level of HL proficiency is high should be encouraged to use some HL in addition to the majority language with their children.

A related finding from the present study which is in accordance with previous research (e.g. De Houwer, 2004) is that even sticking to the one-parent one-language strategy (namely N1+H5) does not guarantee success of HL transmission. It should be noted that the success rate in families adopting the one-parent one-language strategy in the present study was higher than that reported in De Houwer (2007). This could be due to a smaller sample in our study which is subject to random fluctuations. Even though HL transmission rate was found to be high under N1+H5, in many cases additional HL input from the non-HL parent was needed to ensure success. Compared to success of HL transmission, children’s language use with siblings seems to be an even harder task to achieve. Our data documents that a large proportion of bilingual children chose to speak only Norwegian to siblings despite extensive HL input from parents.

HL transmission and HL use with siblings in relation to gender of the HL parent

Although previous research has shown otherwise (De Houwer, 2007; Mueller Gathercole; 2007), the present study confirmed the commonly held belief that children in bilingual families tend to learn the mother’s language rather than the father’s. Results from our study indicate that it is more likely for an HL to be successfully transmitted when the HL parent is the mother rather than the father. A similar parental gender effect was observed when we examined the actual HL use by parents of different genders. As compared to fathers, mothers being the HL users were found to be much more likely to foster a child’s bilingualism and to have bilingual children using the HL with their siblings. Notably, Norway is considered to be one of the most

gender equal countries in the world, equality in childcare being one of its goals. Still, our results suggest that in Norway as in other countries, mothers contribute the most in shaping children's language behavior.

Limitations and future directions

The current study has several limitations. The first limitation stems from its sole reliance on maternal report. Although mothers have been shown to be accurate reporters of the amount of bilingual input at home (e.g. Gutiérrez-Clellen & Kreiter, 2003), some form of direct observation for a subsample of the bilingual families may further validate the maternal report measure. Second, as has been mentioned earlier, all MoBa questionnaires for mothers were printed in Norwegian, so the results may be biased toward bilingual families having HL mothers with higher level of proficiency in Norwegian. Further, information about home language use was only reported when the children were five years. We have no information about home language use in the earlier years of the child, nor do we know how language choice patterns in these bilingual homes change over time and what factors (internal and external to the family) drive change. Moreover, the wording of the response categories to the question about the languages spoken by the child does not identify the actual language(s) a certain child spoke at age five. We have assumed that the parents in our study sample most probably transmitted no other languages than Norwegian or the HLs to their children. These methodological limitations should be addressed in future research. Another limitation of the design is that the difference in status between the two HLs is relatively small. So the finding from the present study probably cannot be generalized to the extent that HL status does not play a role in determining HL transmission. In future research it would be illuminating to include an HL pair with a clearer contrast in status (for example English vs. Urdu in Norway) in order to explore the impact of HL status on HL transmission. Lastly, results presented in Tables 3 and 4 must be interpreted with caution, because random fluctuations in these small groups are strong. Further research addressing these methodological limitations is warranted in the study of HL transmission.

Conclusion

The present study has shown that transmitting even high-status world languages such as English and German in an environment dominated by Norwegian is not easily achievable. It is even more challenging to raise bilingual children who will use the HL when interacting with siblings. Although there are many additional social and environmental factors that could be examined underlying (un)successful HL transmission, it is clear that parental input patterns play a crucial role in determining whether or not a child communicates bilingually. As for the mother's and father's roles in HL transmission, mothers seem to be more successful than fathers in fostering a child's bilingualism. Overall, these findings support the view that much

of the responsibilities of HL transmission should be placed on parents (De Houwer, 2007), at least when the children are at preschool ages.

This analysis advances our knowledge about the dynamics of HL transmission because it offers a finer-grained analysis of the reported language practice in bilingual families, and demonstrates a close link between parent input patterns and HL transmission, as well as children's HL use with siblings. Furthermore, the study highlights the role of the parent's gender on HL transmission. Our findings should assist parents who attempt to raise their children bilingually to choose appropriate strategies to promote HL use at home. Conclusions should also help early child-care and education practitioners to make appropriate recommendations on best practices for bilingual families.

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Appendix A

Questions about language backgrounds in Q1

75. Do you or the baby's father have a mother tongue other than Norwegian?

- No
- Yes

76. If yes, which language?

| | You | Baby's Father |
|---------------|--------------------------|--------------------------|
| Sámi | <input type="checkbox"/> | <input type="checkbox"/> |
| Urdu | <input type="checkbox"/> | <input type="checkbox"/> |
| English | <input type="checkbox"/> | <input type="checkbox"/> |
| Other | <input type="checkbox"/> | <input type="checkbox"/> |

If other, which? _____

77. Do your parents or the baby's father's parents have a mother tongue other than Norwegian?

- No
- Yes

78. If yes, which language?

| | Your mother | Your father | Mother of the child's father | father of the child's father |
|---------------|--------------------------|--------------------------|------------------------------|------------------------------|
| Sámi | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Urdu | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| English | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

If other, which? _____

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Questions about the language (s) the child spoke and home language use in the five-year questionnaire.

29. What language (s) does the child speak?

- Norwegian, Danish or Swedish
- Other Nordic languages (Icelandic, Finish) or Sami
- Western European languages (for example German, English, Spanish)
- Other languages (Eastern European, Asian, Turkish, African)

30. About the child's language experiences

| | Only Norwegian | More Norwegian than other language | As much Norwegian as other language | More other language than Norwegian | Only other language |
|--|--------------------------|------------------------------------|-------------------------------------|------------------------------------|--------------------------|
| What language (s) do you speak with your child? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| What language (s) does your spouse speak with your child? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| What languages (s) does the child speak with his/her siblings? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |