

## Language Acquisition and Language Revitalization

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Intergenerational transmission, the ultimate goal of language revitalization efforts, can only be achieved by (re)establishing the conditions under which an imperiled language can be acquired by the community’s children. This paper presents a tutorial survey of several key points relating to language acquisition and maintenance in children, focusing on four matters that are of direct relevance to work on language revitalization.

**1. Introduction**<sup>1</sup> It is a matter of consensus that the most telling measure of language vitality is intergenerational transmission. It is the decisive criterion in Fishman’s (1991) pioneering scale of language endangerment, and a major component of all subsequent work in the field (UNESCO 2003, Krauss 2007, Lewis & Simons 2010, Moseley 2010); see Lee & van Way (to appear) for a review. Indeed, the most sophisticated system for the assessment of language vitality, the recently developed Language Endangerment Index used by the Catalogue of Endangered Languages (<http://www.endangeredlanguages.com/>), assigns intergenerational transmission twice the weight of the other three factors on which it relies<sup>2</sup> (Lee & van Way to appear).

Intergenerational transmission is nothing more nor less than language acquisition: a language is transmitted to the next generation only to the extent that it is acquired by the community’s children. This simple fact raises two closely related questions:

- i) What are the conditions under which children acquire and maintain the language of their parents?
- ii) To what extent can an understanding of these conditions contribute to the design and evaluation of language revitalization programs?

We do not claim that only psycholinguistic factors are relevant to language loss and language revitalization. Social, economic and political factors also play a key role in determining a language’s fate. However, psycholinguistic factors mediate between external pressures and linguistic consequences in important ways. A language can be lost even when a community is committed to its preservation, if the right conditions

<sup>1</sup>A version of this paper was presented by the first author at a workshop on the assessment of language vitality sponsored by the Smithsonian Institution’s Center for Folklife and Cultural Heritage in September of 2014. Special thanks are due to the workshop organizers, Gabriela Perez-Baez and Michael Mason.

<sup>2</sup>The other three factors are: total number of speakers, speaker number trends, and domains of use.

for its acquisition and maintenance are not in place. Conversely, language loss can be slowed even in the face of external pressures if measures are taken to enhance children's opportunities to learn and use it.

Because language revitalization takes many different forms in communities around the world, several broad lines of research are relevant to its study, including work that examines naturalistic versus instructed learning, bilingual versus monolingual development, and language acquisition by children versus adults. A comprehensive survey of such a vast literature here is obviously not practical, and we will therefore focus on four matters that are relevant to language revitalization efforts in general: the importance of extensive exposure to language, the danger of language attrition, the challenges associated with bilingualism, and the reality of age-related decline in the ability to learn a language. Our focus throughout is on the importance of ample early exposure to the heritage language—a point on which there is an essential consensus in the literature.

**2. The importance of extensive exposure to language** Children are superb language learners, but their success is dependent on interaction with proficient speakers of the language. A very convincing and influential illustration of this point comes from Hart & Risley's (1995, 1999) study of 42 children growing up in monolingual families in the United States, under conditions in which language acquisition was traditionally thought to be more or less uniform and unproblematic. We will briefly outline Hart & Risley's principal findings before turning to a number of more recent studies that have helped clarify their relevance.

Hart & Risley's study drew on monthly one-hour recordings of children's spontaneous interaction with their families, beginning when they were 7 to 9 months old and extending for a two-and-a-half year period. Such sampling techniques are common in the literature on child development, and are considered reliable, especially when they involve a large number of children and extend over a longer period of time, as Hart & Risley's research did.

Hart & Risley's analysis revealed vast differences in the amount of language to which individual children were exposed. At one extreme were children from talkative families who heard several thousand sentences in a typical day—about 7,250 utterances on average.<sup>3</sup>

**Table 1.** Mean number of utterances per day and per year for children in talkative families

Sentence/day	Sentences/year
7,250	2.5 million+

In contrast, children from non-talkative families heard only about a third as much speech

<sup>3</sup>Other scholars have arrived at comparable input estimates using different data (e.g., Wells 1985, Roy 2009, van de Weijer 2001). The average utterance in Hart & Risley's study was about four words in length.

**Table 2.** Mean number of utterances per day and per year for children in non-talkative families

Sentence/day	Sentences/year
2,170	800,000

Do differences of this type matter? Hart & Risley's findings were unequivocal. Children from talkative families had vocabularies more than twice the size of children from non-talkative families at the age of 30 months<sup>4</sup> and went on to learn more than twice as many new words in the next 6 months.

**Table 3.** Child linguistic attainment as it related to language exposure

	Vocabulary size at 30 months	No. of words learned in next 6 months
Talkative families	766	350
Non-talkative families	357	168

These differences increased with time, creating disparities in later vocabulary growth, language use, and IQ test scores, all of which are critical predictors of success in school and in the workplace. Moreover, vocabulary growth has long been recognized a major marker of linguistic development, both in its own right (one cannot communicate effectively without an extensive vocabulary) and as an indicator of how well other aspects of language have been acquired, including morphology, syntax, and processing efficiency (e.g., Bates et al. 1988; Fernald et al. 2013).

The children in Hart & Risley's study were divided into three groups based on the family's socio-economic status. Although the least talkative families tended to be in the lowest group, delays in linguistic development were clearly associated with exposure to the language, not income. Addressing this point in an interview,<sup>5</sup> Todd Risley noted: "Some poor people talked a lot to their kids and their kids did really well [linguistically]. Some affluent business people talked very little to their kids and their kids did very poorly." Risley went on to observe, "When you look at the amount of talking the parents are doing, nothing is left over relating to socioeconomic status. [The amount of talk] accounts for all the variance" in children's linguistic development.

Subsequent work has confirmed this conclusion by controlling for socio-economic status. For instance, Weisleder & Fernald (2013) investigated language development in a group of 29 Spanish-speaking Latino children in the United States, all of whom belonged to families of low socio-economic status. Weisleder & Fernald found 'striking variability' in the total amount of adult speech in samples taken when the children

<sup>4</sup>Work by Fernald et al. (2013) shows disparities in vocabulary and language processing efficiency are evident even at 18 months.

<sup>5</sup>The interview can be accessed at <http://www.childrenofthecode.org/interviews/risley.htm>.

were 19 months old—input ranged from 29,000 words to fewer than 2,000 in the course of a day. More importantly, they found that the children to whom more speech was directed had substantially larger vocabularies six months later and were better able to identify words in the course of real-time language processing.

There is good reason to think that Hart & Risley's findings are also relevant to communities outside the United States. An important study by Shneidman & Goldin-Meadow (2012) of a Yucatec Mayan community in Mexico is particularly revealing in this regard. Based on data collected from 15 families, they report that the amount of speech directed to children at the age of 24 months was strongly correlated to the size of their vocabulary 11 months later—essentially the same finding that has been reported for English-speaking children in the United States, despite vast differences in language type and child-rearing practices.

Of course, more than just quantity counts; the *quality* of the input also matters. Various studies have shown that linguistic development is enhanced when children hear carefully articulated speech, are exposed to a diverse and rich set of vocabulary items, encounter utterances of increasing length and sophistication, hear narratives and stories, and have frequent opportunities for one-on-one conversations (Hoff 2003; Huttenlocher et al. 2002, 2010; Rowe 2012; Ramírez-Esparza et al. 2014). An especially important variable appears to involve the amount of speech that is directed specifically to the child, versus the amount that she or he simply overhears. A number of recent studies have documented the value of child-directed speech, identifying it as a major predictor and facilitator of development (e.g., Shneidman et al. 2013 for English, Weisleder & Fernald 2013 for Spanish, and Shneidman & Goldin-Meadow 2012 for Yucatec Mayan).

Findings such as these underline the importance of monitoring the quantity and quality of the language environment in revitalization programs. Exposure to just a few dozen (or even a few hundred) utterances per week is unlikely to result in the acquisition of more than a few vocabulary items and fixed expressions. The significance of this point only increases when we consider the special challenges associated with attaining and maintaining proficiency in two languages, to which we turn next.

**3. The challenges of bilingualism** The goal of virtually all language revitalization programs is bilingualism—the acquisition and use of the community's heritage language alongside the dominant language of the area. To take an obvious example, no one in the Hawaiian language revitalization movement has proposed that children learn only Hawaiian; the goal is to have them learn both Hawaiian and English—that is, to become bilingual.

Bilingualism appears to have many practical and cognitive advantages, ranging from enhanced opportunities for economic advancement to possible better management of attentional and processing resources—a key factor in academic success (Bialystok et al. 2012). However, acquiring two languages obviously takes more time and effort than acquiring one (e.g., Hoff et al. 2012:20–22), and the prospects for success in a bilingual setting depend heavily on the right amount and type of input, just as they do in a monolingual setting.

It has long been acknowledged that balanced bilingualism is rare: equal fluency in two languages is “the exception, not the norm” (Grosjean 1982:235). Not surprisingly, children end up with stronger skills in the language to which they receive more exposure. For example, in Hoff et al.’s (2012) study of 47 Spanish-English bilingual children (22 to 30 months of age), the amount of home language input was strongly correlated with lexical and grammatical development in both languages. Children who heard more Spanish were more linguistically sophisticated in that language, and the reverse was true for children who were exposed to more English.

Is there a minimum amount of exposure that will suffice for acquisition of the second language in a bilingual situation? No precise estimate is possible at this time, but one suggestive finding is worth considering. In a study of 25 Spanish-English bilingual children who received varying amounts of exposure to the two languages, Pearson et al. (1997:56) noted that six of the seven children who had received less than 20 percent of their exposure to one of the languages were “very reluctant” to use that language and appeared to be “tuning it out” when it was used around them in laboratory play sessions; see also Hoff et al. (2012:22) and Baker (2014:38), who suggests a minimum of 30 percent exposure to each language, based on work by Fred Genesee.

For the sake of argument, let us take the figure of 25 percent as a rough minimum for exposure to a second language, as Pearson et al. (1997) end up doing for their own purposes, and use it as a tentative guideline for school-based language revitalization programs. Assuming an 84-hour week (consisting of 12 hours a day of on-and-off interaction with others), a minimum of 20 or so hours of that weekly total should present opportunities to hear and use the heritage language. That translates into an average of about three hours a day, assuming a seven-day week, or four or so hours a day if exposure takes place only five days a week, as might happen in a school setting).<sup>6</sup>

**4. The danger of attrition** The study of language loss in children is still in its infancy, and to date only one genuinely large-scale study has been conducted—yielding results that are perhaps open to question, since information about the methodology was not included in the author’s report and the findings have not been subjected to peer review. The study in question, authored by Gindis (2008), focused on 800 children from Eastern Europe (mostly Russia) who were adopted by Americans, brought to the U.S., and placed in English-speaking homes. According to Gindis’ findings, children aged three-and-a-half to four lose the ability to speak their language within 7 to 12 weeks, and the ability to comprehend it a few weeks after that. Even children as old as nine find themselves in a similar state within a matter of months, Gindis reports. Isurin’s (2000) peer-reviewed study of a nine-year-old Russian adoptee, whose vocabulary retention was studied over a two-year period, reveals a steady but somewhat less precipitous drop.

<sup>6</sup>As an anonymous referee observes, school-based programs include instruction and literacy materials that might change the input calculus in ways that are yet to be determined. This matter calls for further attention.

The rate of attrition in adoptees is surprising, and one cannot help but wonder whether it might be attributable to the wrenching circumstances of the children involved (orphans, uprooted from their country and placed in new families in a new culture). However, the speed of their linguistic decline is not out of line with what has been reported in other work, including Berman's (1979) study of a three-and-a-half-year-old Hebrew-speaking child who lost her ability to speak and understand Hebrew after just a few months in the United States with her family. Moreover, in work with Sunyoung Lee, the first author of this paper has conducted a case study of a young Korean girl, who spent several months in the United States with her bilingual mother. The child, who was 6;10 at the time of her arrival in the United States, quickly became immersed in a monolingual English environment—she attended English-language school and her mother spoke to her almost exclusively in English. During the course of her stay in the U.S., the child participated in a regimen of testing that included a 120-item picture-naming task that was administered monthly. The results are summarized in Figure 1.

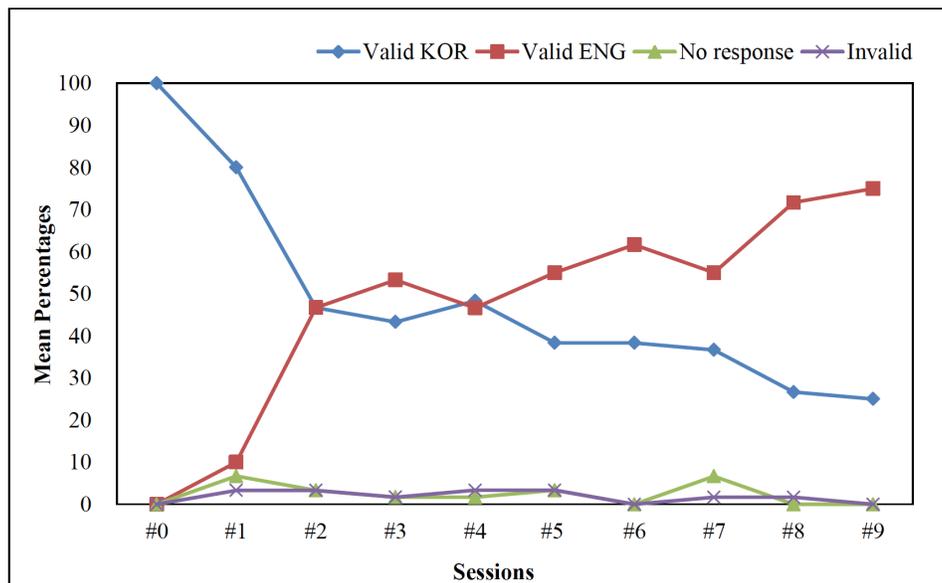


Figure 1. Vocabulary loss in a six-year-old Korean child

As can be seen here, the child's ability to access Korean vocabulary began to decline within the first month of her departure from Korea, and her success rate fell to less than 50 percent after just two months in the United States. An equally dramatic decline was observed in her ability to produce narratives and to carry on conversations in Korean—in fact, she quickly reached the point where she could no longer speak in Korean to her father, who had remained in Korea but contacted her frequently for telephone conversations.

There has been little systematic study of how and whether lost linguistic skills can be recovered, but it is evident that age and the amount of time that elapses be-

fore re-exposure to the language are crucial (Köpke & Schmid 2004, Bylund 2009, Hyltenstam et al. 2009). Recovery of a lost childhood language upon re-exposure is possible for children (Berman 1979, Hubbell-Weinhold 2005), but the prognosis for adults is poor. Pallier et al. (2003) report that adults in their twenties and early thirties who had been adopted between the ages of 3 and 8 were unable to distinguish sentences of their native Korean from sentences of Polish and Japanese. Along similar lines, Hyltenstam et al. (2009) found that even after two years or more of study, a group of 21 ethnic Korean adults who had been adopted as children performed no better on Korean grammar tasks than did native speakers of Swedish who were studying Korean as a second language.

If there is a bright spot in this otherwise quite grim picture, it involves perception. Research on Korean adoptees suggests that adults may retain a sensitivity to subtle phonetic contrasts in their first language and that this sensitivity can be enhanced through practice and exposure (Bowers et al. 2009, Oh et al. 2010, Park 2015).

It is worth noting that adults who have used their first language throughout childhood and adolescence are relatively resistant to attrition. Even after many years of later disuse, they show only relatively minor deficits and can use the language effectively for communicative purposes (e.g., Köpke 2004, Köpke & Schmid 2004, Tsimpli et al. 2004).

In sum, the beneficial effects of early exposure to language can be quickly erased. Early signs of language breakdown, such as difficulty accessing vocabulary, a decrease in fluency, and related problems, are manifested in children soon after exposure to the first language ceases, perhaps in as little as one month. In fifteen weeks, little more than the length of a school's summer recess, attrition can critically undermine young children's hold on their first language. Language revitalization programs that do not provide children with continuous exposure to the heritage language are thus unlikely to produce a satisfactory outcome in the long run.

**5. Age-related decline in the ability to learn a language** Many revitalization programs include a variety of options for adult second language learners, ranging from university courses to master-apprentice programs (e.g., Hinton et al. 2002). Moreover, a number of immersion programs now rely on second language learners to make up for the shortage of native-speaker teachers (e.g., NeSmith 2012 for Hawaiian, and Te Paepae Motuhake 2011 for Māori). Nonetheless, an important fact must be acknowledged: the ability to acquire language declines with age.

The earliest signs of this decline take place in the first year of life, as children begin to lose the ability to distinguish among new speech sounds (Werker et al. 1996, Yoshida et al. 2010, Kuhl 2011). One consequence of this decline is manifested in non-native pronunciation. In Granena & Long's (2012) study of 65 Chinese-speaking immigrants to Spain, no one whose first exposure to Spanish took place after age 5 developed native-like pronunciation (as judged by a panel of 12 native speakers), no matter how long they had been in their new country (more than 20 years in some cases).

The ability to acquire grammatical contrasts also declines quite rapidly, although apparently more slowly than phonetic perception: some studies suggest that children can acquire the grammar of a second language in much the same way as native speakers if they are exposed to it by age four (e.g., Schwartz 2004). The results of Grenada & Long's (2012) study are roughly consistent with this estimate: regardless of their length of residence, none of the 65 immigrants whose first exposure to their new language took place after age six was able to attain native-like proficiency in morphology and syntax. A study of 195 Spanish-speaking immigrants to Sweden yielded roughly comparable results: only 6 percent of those who had been exposed to Swedish after age 11 performed within the native-speaker range on a battery of proficiency tests (Abrahamsson and Hyltenstam 2009).

This is not to say that attempts by older children and adults to acquire a second language are doomed to failure. Clearly, second language acquisition can be successful to varying degrees. There are documented reports of polyglot savants who retain into adulthood a remarkable ability to acquire at least certain aspects of a second language (Smith & Tsimpli 1995, Tammet 2007), and there is good reason to think that individual differences in aptitude in the normal adult population make language learning easier for some individuals than for others (e.g., DeKeyser 2000, DeKeyser et al. 2010). Nonetheless, the fact remains that few adult learners attain native-like proficiency—even, as the immigrant studies show, when they spend much of their life immersed in the new language.

**6. Concluding remarks** We have focused here on a series of fundamental facts about language acquisition—first and second, monolingual and bilingual—that are relevant to the problem of language loss and the challenge of language revitalization. Typically, of course, these are not the only factors that matter; the situation is almost invariably complicated by social, political, and economic variables as well. Nonetheless, there is much to be said for maintaining a focus on linguistic considerations, which can often be addressed on a smaller and more manageable scale—at the level of a neighborhood, a school, or even a family.

Although we have deliberately refrained from proposing or evaluating any particular revitalization plan, we would be remiss not to make recommendations for any program that seeks to restore the natural cycle of language transmission and acquisition in an endangered language community. First and most obviously, the prospects for full transmission of the language are best with very young learners (ideally infants or toddlers), whose skills as language learners have not yet been compromised by age-related decline. Second, steps should be taken to ensure that these young children receive adequate (that is, quite massive) exposure to the heritage language; no precise lower bound can be stated at this time, but it seems safe to say that exposure should amount to at least several thousand utterances per week. Third, because language revitalization programs have bilingualism as their goal, care must be taken to ensure appropriate amounts of exposure to both languages—with neither making up more than, say, 75 percent of the total input. Finally, in order to avoid attrition in

either language, children must receive continuous opportunities to hear and use both, at least into the adolescent years.

We do *not* claim that it is pointless to pursue programs that cannot satisfy these four criteria—say, programs that offer smaller amounts of exposure or programs that target older children and adults. Although the prospects for reestablishing intergenerational transmission are perhaps reduced in these circumstances, positive results can nonetheless be achieved. A partially acquired language lives on in some form, at least for a generation, and can have educational and social benefits for individuals and their community above and beyond fluency in the heritage language (McCarty 2011, Engel de Abreu et al. 2012).

Our point, then, is not that all revitalization programs can or should seek to restore full intergenerational transmission of the community's language. Rather, it is that the success of programs that *do* have this objective will be enhanced if they heed the findings that come from several decades of research on language acquisition in monolingual and bilingual settings. Moreover, even if communities choose to embark on a more modest revitalization plan, as will surely often be the case for practical reasons, its design and implementation can still benefit from an understanding of the more ideal conditions under which language is acquired and maintained.

A final point calls for attention. Although there are hundreds, perhaps thousands, of language revitalization projects around the world, there is almost no published research on their outcomes. Yet we know from the few studies that do exist that research of this type can yield very valuable insights. For example, Peter et al. (2008) found that children in a first-grade Cherokee immersion program were receiving input that consisted of a disproportionate number of commands ('Sit down.' 'Write on your paper.' 'Read page 5.'). with the result that the children had failed to learn the language's third person verb forms ('S/he is swimming'; 'They are drinking'; etc.).<sup>7</sup> And Housman et al. (2011) report that even after several years in a Hawaiian language immersion program, children had trouble choosing the right form of the first person plural pronoun.<sup>8</sup>

Studies like these do not undermine the validity of immersion programs; rather, they reinforce and enhance their value by identifying places where improvements can be made. It is thus regrettable that so little is known about the successes and failures of individual communities in their efforts to improve the plight of their language. Not only does the absence of this information create the risk of misdirected efforts and resources, it robs communities everywhere of the opportunity to learn from each other. We hope and believe that this situation can be remedied in the years ahead.

<sup>7</sup>Action verbs of this type in Cherokee require prefixes marking agreement in person and number with the subject.

ga-tliha	ani-aditasga
3A.Sg-sleep	3A.Pl-drink
'S/he is sleeping.'	'They are drinking.'

<sup>8</sup>There are four such forms: *kāua* = I and you; *māua* = I and someone else (but not you); *kākou* = I, you and at least one other person; *mākou* = I and other people (but not you).

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