

First language attrition

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**Abstract:**

Speakers who live in an L2 environment for an extended period of time often experience change in the way in which they use their L1, a process referred to as L1 attrition. The present article provides an overview of language attrition phenomena at various linguistic levels. However, attrition cannot be trivially or linearly related to factors such as the frequency of use of the L1. It is argued here that attrition phenomena are not the outcome of a change to the underlying linguistic system nor of access problems due to an increase in activation thresholds, but of crosslinguistic influence in online speech production.

One of the most fundamental and most interesting characteristics of linguistic data of any kind is its inherent variability. Even mature, monolingual native speakers will usually not perform according to the 'target standard' one hundred percent of the time. In free spoken data, there are slips of the tongue, grammatical errors, variance in pronunciation and so on. Any kind of formal test on which all participants achieve the maximum score can be deemed to show a ceiling effect due to being too simple. In this context, it is interesting to ask what factors will have an impact on this variance, and in what way. If there are distracting factors, skills that rely on procedural memory and are therefore largely automatic, such as grammar or phonology, are less prone to interference than the accessing of information represented in declarative memory, such as lexical words (Paradis, 2004; 2009). Fatigue can also play a role, and it has recently even been suggested that linguists might do well to take into account insights from chronobiology on what have been called 'Circadian Rhythms', that is, the optimal time of day for an individual to perform at his or her best (a factor that varies considerably within populations) (de Bot, *forthc.*).

One of the strongest factors that determine variability in linguistic performance relates to the way in which the language under observation has been acquired, as well as other languages that the speaker might know. Comparisons of speakers who have been exposed to the target language from birth (native speakers or L1ers) with others for whom it was not the first language (L2ers) will usually find that the L1ers perform 'better', and that there is a wider range of scores represented among the L2ers. Factors that can contribute to this distribution include the age at which the L2ers started to learn the language in question, the manner of

acquisition (naturalistic vs. formal), the amount of time devoted to language learning and input received, and individual characteristics such as language learning aptitude, attitude and motivation.

While investigations into these types of variability and cross-linguistic influence (CLI) in a speaker's L2 are well-established, there is much less research into CLI affecting the bilingual's L1. This process, commonly known as L1 attrition, can become highly noticeable in speakers who have migrated to another country and henceforth lived in an L2-dominant environment, but is by no means confined to such relatively extreme settings (Schmid & Köpke, 2007). For example, it has been shown that some phonetic categories in the first language of bilingual speakers exhibit phonetic drift, that is, the assimilation of the properties of a sound towards the value specified by the other language. This phenomenon is strongest for very experienced long-term immersed bilinguals (Flege, 1987) but can even be observed in novice learners, as Chang (2010) demonstrates for a group of native English speakers enrolled in an intensive six-week (beginner's) course of Korean. Syntactic processing in the L1 appears to be similarly affected. For example, Dussias and Sagarra (2007) investigate relative clause attachment in English and Spanish. They point out that the sentences in (1) have different meanings for monolingual speakers of these two languages:

(1a) An armed robber shot the sister of the actor who was on the balcony.

(1b) Un ladrón armado le disparó a la hermana del actor que estaba en el balcón. (p.101, their examples (1) and (2))

While English monolinguals tend to interpret (1a) to mean that the actor was on the balcony (low attachment), in Spanish, most speakers would take it to be the sister in (1b). These tendencies can be investigated by introducing a disambiguating element (e.g. 'the sister of the actor who was pregnant' or 'the brother of the actress who was pregnant') and studying the way in which monolinguals and bilinguals resolve the potential conflict, e.g. by means of self-paced reading tasks or recording eye-movements. Dussias and Sagarra show that parsing strategies can, to some extent, be transferred from the L2 to the L1 among highly proficient L2 speakers, but that this transfer is contingent on the amount of exposure that the speaker has to the L2.

These findings show that processes of transfer that are to some extent similar to the crosslinguistic influence we witness in second language learners can also come to affect the L1 of bilingual speakers. This transfer becomes more intensive and noticeable among speakers who are highly proficient in another language, receive extensive input in that

language and (presumably) use it frequently (although none of the studies discussed above have quantified linguistic *output* as a factor) and it is noticeable across all linguistic levels. In particular where the lexicon is concerned, L2-to-L1 transfer appears to be very common (for an overview see Schmid & Jarvis, submitted; Schmid & Köpke, 2008) but at least some aspects of grammatical and phonetic categories also appear to be open to L2 impact (see e.g. the studies collected in Schmid, 2010, Schmid & Köpke, 2011)

### *The scope and limitation of attrition effects*

The situation of linguistic drift sketched above, where a migrant achieves a high level of proficiency in the language of his or her new environment, uses this language on a daily basis, and consequently experiences an increase in variability in the way some lexical, grammatical or phonetic properties of the language are applied, has been termed *language attrition*.<sup>1</sup> The metaphor underlying this label is not an entirely felicitous one, partly due to the many inherently negative collocations using the term *attrition* (e.g. 'war of attrition') but also because of the strong presumption it evokes that the process will be one of some sort of linguistic 'reduction' due to a constant 'grinding away' at the substance or fabric of the attriting language caused by the use of another (as is the implication of the term 'attrition' in other areas, e.g. geology or dental health). However, it is by no means established to what extent attrition is indeed the outcome of such a 'war of attrition' between the two competing languages (and thus for example dependent on the amount of exposure that a speaker retains with his or her L1, see below).

When asked about the extent to which they themselves are affected by attrition, most speakers will immediately latch on to problems of lexical access, and this is also often pointed out in attrition research as the aspect of linguistic knowledge that is most vulnerable to attrition effects (de Bot, 1996; Hulsen, 2000; Köpke and Nespoulous, 2001; Köpke & Schmid, 2004; Montrul, 2008; Opitz, 2011, to name but a few). However, most studies which have put this assumption to the test have failed to find any truly dramatic lexical loss, problems of lexical access (e.g. Schmid & Jarvis, submitted), nor substantially reduced speed of lexical retrieval (Yilmaz & Schmid, forthc.). Proficient bilinguals may, on occasion, indeed

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<sup>1</sup> The term *language attrition* pertains to the process of language change experienced among speakers for whom the language under observation had stabilized prior to the onset of attrition effects, ie. migrants who left the country in which their L1 was spoken and in which they had acquired it after puberty. This phenomenon should be distinguished from *incomplete acquisition*, that is, the restructuring of linguistic knowledge by the acquisition of another language earlier in life (see e.g. Montrul, 2008). In the present contribution, I will reserve the term *attrition* exclusively for the former case and not talk about pre-puberty migrants.

experience some crosslinguistic transfer in their lexicon. Schmid (2011), based on the taxonomy offered by Pavlenko (2004), attempts to provide a classification of such phenomena, comprising the following categories:

1. Borrowing: the use of an item from the L2 in the L1, often in such a way that it is integrated phonologically and/or morphologically (e.g. English tends to assign initial stress to bisyllabic French loanwords which are stressed on the second syllable in the donor language, and German forms the past participle of borrowed verbs by means of the circumfix *ge-verb-t*, leading to bizarre forms such as '*gedownloadet*').
2. Restructuring: the meaning of an existing L1 word is extended to include the meaning of its L2 translation equivalent. This process often involves verbs which have undergone semantic bleaching and been turned into quasi-auxiliaries, such as the English verb *to run* which occurs in the collocations 'to run short of something' or 'to run for office'. Attriters often transfer such fixed expressions from the L2 to the L1.
3. Convergence: where both languages offer lexical items that are similar in form but different in meaning (*faux amis*), attriters may sometimes be misled to use the L1 term with the L2 meaning. For example, Sharwood Smith (1983) quotes the example of an L1 English-L2 Dutch bilingual, who used the verb *to overdrive* to mean *to exaggerate*, based on the Dutch homophonic item *overdrijven*.
4. Shift: unlike the processes listed under 1-3 above, shift is not limited to individual lexical items but concerns entire lexical fields, as Pavlenko (2002, 2004) has demonstrated with respect to emotion terms. Shift usually affects areas of the linguistic repertoire which are highly culture-specific, such as politeness systems.

What these types of crosslinguistic influence have in common is that they are, to a greater or lesser degree, visible on the surface of an utterance; speakers, listeners and researchers observe and notice them immediately. This is probably why they are often (and in my opinion mistakenly) interpreted as evidence for L1 attrition. There is, however, no reason to conclude that, just because a speaker has borrowed an item or used it in an inappropriate collocation, s/he is at that point unable to retrieve or use the original and target form of the item. It simply means that, on this particular occasion, the resources provided by the L2 underpinned lexical choice.

More interesting from the point of view of the loss of linguistic proficiency, but also more difficult to establish in practice, is the question of whether the actual volume of

vocabulary (either productive or receptive) is truly reduced in the process of language attrition, and to what extent its accessibility can become affected. Investigations of L1 attrition using controlled tasks which allow the speaker to focus fully on the retrieval of lexical items (placing no demands on other components of language production), such as Picture Naming or Verbal Fluency tasks, typically find access problems to be extremely limited. Attriters may be slightly slower to name items (in particular low-frequency ones, see Yılmaz & Schmid, *forthc.*) or be slightly less productive in the number of items of a particular category that they can name within a certain time span (for an overview, see Schmid & Jarvis, *submitted*), but these findings may be ascribed to the fact that bilinguals have to manage a substantially larger number of lexical items than monolinguals.

Investigations of the way in which attriters make use of their productive vocabulary in (elicited) free speech - that is, in situations where all aspects of language production come into play and it is not possible for the speaker to focus attention solely on lexical retrieval - typically tend to find a higher number of disfluency markers (Schmid & Beers Fägersten, 2009), sometimes accompanied by a slight reduction in lexical diversity measures such as VOCD (for an overview see Schmid & Jarvis, *submitted*). Again, it is uncertain to what extent such findings may be ascribed to an actual reduction in lexical accessibility of the L1 items, or merely to the demands of managing two linguistic systems and inhibiting the (more highly activated) L2. The fact that bilinguals become slower to name objects in their first language very shortly after the onset of bilingualism (and so probably not due to attrition) has been demonstrated e.g. by Mägiste (1979). On the whole, the differences between attriters and monolingual controls tend to be robust but hardly dramatic, contradicting the general assumption that the lexicon is that part of the linguistic repertoire that is extremely vulnerable to L1 attrition.

Where grammar is concerned there is a substantial body of research investigating to what extent particular features of a language may be restructured under conditions of L1 attrition. Many of these studies are situated within the Chomskyan framework, e.g. the Principles and Parameters approach (e.g. Gürel, 2004, 2007; Gürel & Yılmaz, 2011; Kim, Montrul & Yoon, 2010) or the Minimalist Program (e.g. Tsimpli, Sorace, Heycock and Filiaci, 2004; Tsimpli, 2007). In the latter context, recent grammatical investigations of language attrition have often focussed on Sorace's Interface Hypothesis (e.g. Sorace, 2011) which predicts that "structures involving an interface between syntax and other cognitive domains are less likely to be acquired completely than structures that do not involve this interface" (Sorace, 2011: 1) and

also more likely to be affected by attrition. This assumption is based on findings on the use of overt vs. null pronouns and anaphora resolution in a number of languages (Tsimplici et al., 2004; Wilson, 2009) and unaccusativity in Spanish (Montrul, 2005).

A last area of interest for the study of language attrition is phonetics and phonology. Compared to the range of studies available on the lexical and the grammatical system, this area is to date dramatically underresearched. There are only a handful of studies measuring phonetic drift among attriters (de Leeuw, 2008; Flege, 1987; Major, 1992; Mennen, 2004; Sancier & Fowler, 1997) and even fewer investigations of the development of a global foreign accent among attriters (de Leeuw, Schmid & Mennen, 2010; Hopp & Schmid, 2013). What these studies seem to suggest, however, is that, while some attriters may indeed exhibit a limited amount of phonetic drift on some phonemes and come to be perceived as non-natives by native raters, these changes are again rather limited. At group level, attriters compare favourably to even the most advanced L2 learners (Hopp & Schmid, 2013) and it seems extremely unlikely that attrition could ever reach the level of phonological restructuring (Schmid, 2011). Again, the overall impression is one of cross-linguistic impact at the level of production and not of attrition, restructuring or loss of underlying knowledge.

#### *The impact of external factors*

With few exceptions, the investigations of L1 attrition across linguistic levels listed above mainly find that attriters are outperformed by controls in (statistical) group comparisons. Such effects are usually stronger in formal tasks than in free speech, suggesting that the difference may to some extent be linked more to issues of confidence in the speaker's own proficiency than to an actual erosion of knowledge. However, wherever ranges of results are given, it becomes evident that not all attriters in any given investigation fall outside the native range. There is thus considerable interindividual variation in the extent to which a particular speaker has been affected by attrition.

Since most theories of memory and the accessibility and retrieval of knowledge stress frequency and recency as the overriding factor (e.g. Paradis' 1993 *Activation Threshold Hypothesis*, for an overview of memory and attrition research see Ecke, 2004) it is hardly surprising that the amount and frequency of use with which a speaker has been exposed to the attriting language is usually assumed without question to be the determining factor when it comes to degree of loss (e.g. Cook, 2005; Paradis, 2007). However, as Schmid (2007) points out, until very recently there were only very few studies attempting to investigate this

assumed link (de Bot, Gommans & Rossing, 1991; Jaspaert & Kroon, 1989; Köpke, 1999), and their findings were inconclusive. Schmid also argues that the approach of dichotomizing frequency of language use (into only two groups, 'high' and 'low') does not do justice to the extremely complex factor of which language is used for what purpose, and how often.

Over the past five years, a number of studies have attempted to put the investigation of the impact of L1 use on L1 attrition on a more solid quantitative basis, following the methodology proposed by Schmid & Dusseldorp (2010) and Schmid (2011). A range of investigations on a number of languages and attrition contexts have adopted the test battery and analytical framework suggested here (Cherciov, 2011, Dostert, 2009, Keijzer, 2007, Opitz, 2011, Schmid, 2007; Varga, 2012, Yılmaz, *forthc.*) and, without exception, have failed to establish a link between the frequency with which an attriter uses his or her L1 and the degree of attrition s/he exhibits on any linguistic level. There is only one area of L1 use that does appear to have a (limited) protective factor, and that is in the professional sphere (Schmid, 2007; Schmid & Dusseldorp, 2010). Not all of the studies mentioned above were able to test this factor, since for some migrant populations the scope for using their L1 professionally is obviously very limited (such as, e.g., the Dutch Canadians tested by Keijzer (2007), the Romanian Canadians investigated by Cherciov (2011) or the Hungarians in Denmark that were the focus of Varga's (2012) investigation). However, in those attrition studies that did have a sufficient subgroup of attriters who used their L1 at work, this setting often appeared to have a protective effect.

Schmid (2007) thus sought an explanation for the impact of L1 use on L1 attrition situated within the framework of Grosjean's (2001) language mode. According to this model, bilingual language use can take place in either monolingual, intermediate or bilingual mode. When in the monolingual mode, all other language systems are largely (though never completely) deactivated, making crosslinguistic interference unlikely. This would, for example, be the case when an attriter visits his or her home country, where there are no external stimuli that call upon the L2, and the interlocutors do not know this language. In the bilingual mode, both (or all) systems are active simultaneously, leading to frequent code-switching and -mixing, for example in an informal conversation an attriter might have with his or her spouse or children who are also bilingual. In the former setting (monolingual mode), an attriter will have to expend relatively little effort on inhibiting the L2, since it is largely deactivated, while in the bilingual mode, inhibition is not necessary since communication is not impeded by CLI.

The most taxing situation for a bilingual is the intermediate language mode. This is a setting where there are cues that stimulate the activation of the language that is not being used, but where code-switching is inappropriate. Such a situation obtains, for example, when an attriter is a language teacher. The students will all be proficient speakers of the environmental language, and probably themselves frequently experience CLI (manifesting itself in a foreign accent, grammatical errors etc.), but for the teacher it would be inappropriate to allow the L2 to impinge on his or her language use. Considerable effort thus has to be expended in order to inhibit the L2. Similar situations obtain for other areas of professional use (be it secretarial work, interpreting or waitressing in an ethnic restaurant).

This has led Schmid (2007) to hypothesize that language attrition phenomena cannot be explained on the basis of the Activation Threshold Hypothesis alone. Frequency and recency of L1 use do not seem to be the overriding factor in determining the degree to which access to the L1 be impaired or CLI will affect it. It is only speakers who routinely use the L1 in settings where they have to inhibit the L2 who show advantageous effects. Schmid (2007) proposes that there may be some sort of a saturation effect in the accessibility of linguistic memories at a certain stage in the L1 acquisition process, since these have been activated so often that frequent access is no longer required in order to maintain them. Symptoms of attrition may then be caused by a failure to inhibit the L2, not by a failure to access the L1. Attriters who regularly use the L1 in a professional (ie. formal) setting presumably have more practice with this inhibition mechanism, and consequently are more successful when using the L1 in preventing L2 knowledge from encroaching on their output. Use of the native language within the family or with friends in the country of migration, that is, informally and with other speakers who are also bilingual, does not place the same constraints against mixing the languages on the speaker, and is therefore less conducive to language maintenance. On the contrary, it may even have a negative impact in a kind of vicious circle, as suggested by Grosjean and Py (1991), where speakers become less confident in their own proficiency and begin to take the input from other bilinguals, which is also affected by crosslinguistic influence, as corroborative evidence.

The implication of this assumption is thus that the degree of attrition visible in any one individual is not so much a matter of underlying knowledge but of executive control. The links between executive control and bilingualism at various stages in life have recently become an important topic for research into psycholinguistics and cognition (see e.g. the work by Abutalebi & Green, 2008; Bialystok et al., 2005; Costa et al., 2009; to name but a few) but



it has not, so far, been investigated whether there is a link between these factors and attrition, with the exception of an ongoing investigation at the University of Utrecht, Netherlands, led by Merel Keijzer. Keijzer is interested in particular in the effects of long-term bilingualism on cognitive aging and *vice versa*, since investigations such as the one by Bialystok et al. (2005) appear to suggest that the decline in executive control and thus inhibitory processes experienced by the elderly can be attenuated for bilinguals. A preliminary investigation of a group of elderly attriters (Schmid & Keijzer, 2009) does indeed point to the conclusion that, at older ages, the gap in factors such as word retrieval speed between attriters and controls begins to close, suggesting that the bilingual experience may have slowed down cognitive aging for the attriters.

A second cluster of predictor variables is related to attitudes towards both host and target language and culture. Such factors have been shown to be highly predictive for ultimate success in second language acquisition, for socioethnic as well as neurobiological reasons (e.g. Masgoret & Gardner, 2003; Schuman, 1994, 1998). The assumption here is that speakers with a more positive attitude towards their L1 would experience less attrition effects than those with a more negative orientation. This might then possibly be due to neurocognitive processes (as suggested by Paradis, 2007) or simply because speakers who 'feel good' about their L1 may more actively seek out opportunities to use it (Varga, 2012).

It has, however, been proven exceedingly difficult to establish such a link in attrition research, possibly due to the fact that attrition is a process that takes place across decades, while attitudes are typically variable across the lifespan (Breakwell, 1986). The only study that was able to find a statistical correspondence between attitudes on the one hand and attrition on the other is Schmid's (2002) investigation of Holocaust survivors. In less dramatic and unique settings, the impact of attitudes on attrition may be too variable and unstable to establish. The test battery by Schmid (2011) suggested above includes a set of instruments geared towards eliciting attitudinal judgments and has been applied in a number of studies, however, the results are inconclusive: while Cherciov (2011) does find some evidence for a role of attitude as a predictor, Opitz (2011) and Varga (2012) find the performance of their participants to be unrelated to this factor.

While attriting populations thus almost invariably exhibit a higher degree of variability on linguistic tasks and language production than monolingual control populations, attrition research has so far been unable to identify predicting factors for this variability. It remains an

open question what makes one speaker attrite to a higher degree and another maintain his or her language at native levels.

#### References:

- Abutalebi, J., & Green, D. W. (2008). Control mechanisms in bilingual language production: Neural evidence from language switching studies. *Language and Cognitive Processes*, 23, 557-582.
- Bialystok, E., Martin, M. M., & Viswanathan, M. (2005). Bilingualism across the lifespan, the rise and fall of inhibitory control. *International Journal of Bilingualism*, 9, 103–119.
- Bot, K. de. (1996). Language loss. In *Contact Linguistics. An International Handbook of Contemporary Research. Vol. I.*, H. Goebel, P.H. Nelde, Z. Stary and W. Wölck (eds), 579-585. Berlin/New York: Walter de Gruyter.
- Bot, K. de. (forthc). Not my time of day! Circadian rhythms in second language development. *International Journal of Bilingualism* (2013).
- Bot, K. de, Gommans, P. & Rossing, C. (1991). L1 Loss in an L2 Environment: Dutch Immigrants in France. In *First Language Attrition*, H.W. Seliger & R. M. Vago (eds), 87-98. Cambridge University Press.
- Breakwell, G. M. (1986). *Coping with Threatened Identities*. London/New York: Routledge.
- Chang, C. B. (2010). Rapid and multifaceted effects of second-language learning on first-language speech production. *Journal of Phonetics* 40: 249-268.
- Cherciov, M. (2011). *Between Attrition and Acquisition: the Case of Romanian in Immigrant Contexts*. PhD dissertation, University of Toronto.
- Cook, V. 2005. The changing L1 in the L2 user's mind. Paper presented at the 2nd International Conference on First Language Attrition, Amsterdam, 18.8.2005.
- Costa, A., Hernandez, M., Costa-Faidella, J., & Sebastian-Galles, N. (2009). On the bilingual advantage in conflict processing: Now you see it, now you don't. *Cognition*, 113, 135–149.
- Dostert, S. (2009). *Multilingualism, L1 attrition and the concept of 'native speaker'*. PhD dissertation, Heinrich-Heine Universität Düsseldorf.
- Dussias, P. E. & Sagarra, N. (2007). The effect of exposure on syntactic parsing in Spanish–English bilinguals. *Bilingualism: Language and Cognition* 10(1): 101-116.
- Ecke, P. (2004). Language attrition and theories of forgetting: A cross-disciplinary review. *International Journal of Bilingualism* 8(3): 321-352.

- Flege, J. E. (1987). The production of 'new' and 'similar' phones in a foreign language: evidence for the effect of equivalence classification. *Journal of Phonetics*, 15: 47-65.
- Grosjean, F. (2001). The bilingual's language modes, in J. Nicol (Ed.), *One Mind, Two Languages: Bilingual language processing* (pp. 1-22). Oxford: Blackwell.
- Grosjean, F. & Py, B. (1991). "La restructuration d'une première langue: L'intégration de variantes de contact dans la compétence de migrants bilingues." *La Linguistique* 27 (2): 35-60.
- Gürel, A. (2004). Attrition in L1 competence: The case of Turkish. In: M. S. Schmid, B. Köpke, M. Keijzer & L. Weilemar, (eds.), *First language attrition. Interdisciplinary perspectives on methodological issues*, pp. 225-242. Amsterdam: John Benjamins.
- Gürel, A. (2007). (Psycho)linguistic determinants of L1 attrition. In Köpke, B., Schmid, M. S., Keijzer, M., and Dostert, S., editors, *Language attrition: Theoretical Perspectives*, Amsterdam/Philadelphia: John Benjamins, 99-119.
- Gürel, A. & Yılmaz, G. (2011). Restructuring in the L1 Turkish grammar. Effects of L2 English and L2 Dutch. *Language, Interaction and Acquisition* 2(2), 221-250.
- Hopp, H. & Schmid, M. S. (2013). Perceived foreign accent in L1 attrition and L2 acquisition: the impact of age of acquisition and bilingualism. *Applied Psycholinguistics*.
- Hulsen, M. (2000). *Language Loss and Language Processing. Three Generations of Dutch Migrants in New Zealand*. PhD dissertation, Katholieke Universiteit Nijmegen.
- Jaspaert, K. & Kroon, S. (1989). Social determinants of language loss. *Review of Applied Linguistics (I.T.L.)* 83/84, 75-98.
- Keijzer, M. (2007). *Last in first out? An investigation of the regression hypothesis in Dutch emigrants in Anglophone Canada*. PhD dissertation, Vrije Universiteit Amsterdam.
- Kim, J-H., Montrul, S. and Yoon, J. (2010). Dominant language influence in acquisition and attrition of binding: Interpretation of the Korean reflexive *caki*. *Bilingualism: Language and Cognition*, 13, 73-84.
- Köpke, B. (1999). *L'attrition de la première langue chez le bilingue tardif: implications pour l'étude psycholinguistique du bilinguisme*. Ph.D. Dissertation, Université de Toulouse-Le Mirail.
- Köpke, B. & Nespoulos, J.-L. (2001). First language attrition in production skills and metalinguistic abilities in German-English and German-French bilinguals. In *Sociolinguistic and Psycholinguistic Perspectives on Maintenance and Loss of Minority Languages*, T. Ammerlaan, M. Hulsen, H. Strating and K. Yağmur (eds), 221-234. Münster/New York/München/Berlin: Waxmann.
- Köpke, B. & Schmid, M. S. (2004): First language attrition: the next phase. In Schmid, M. S., Köpke, B., Keijzer, M., and Weilemar, L., editors, *First Language Attrition*:

- Interdisciplinary perspectives on methodological issues. Amsterdam/Philadelphia: John Benjamins, 1-43.
- Leeuw, E. de. (2008). *When your native language sounds foreign: A phonetic investigation into first language attrition*. PhD thesis, Queen Margaret University Edinburgh.
- Leeuw, E de, Schmid, M.S. & Mennen, I. (2010). Perception of foreign accent in native speech *Bilingualism: Language and Cognition* 13(1): 33-40.
- Mägiste, E. (1979). The competing language systems of the multilingual: a developmental study of decoding and encoding processes. *Journal of Verbal Learning and Verbal Behavior*, 18: 79-89.
- Major, R.C. (1992). Losing English as a first language. *The Modern Language Journal*, 76(2): 190-208.
- Masgoret, A.-M. & Gardner, R. C. (2003). Attitudes, motivation, and second language learning: A meta-analysis of studies conducted by Gardner and associates. *Language Learning* 53(1): 123-163.
- Mennen, I. (2004). Bi-directional interference in the intonation of Dutch speakers of Greek. *Journal of Phonetics* 32: 543 – 563.
- Montrul, S. (2005). On knowledge and development of unaccusativity in Spanish L2 acquisition. *Linguistics*, 43: 1153-1190.
- Montrul, S. (2008). *Incomplete Acquisition in Bilingualism. Re-examining the age factor*. Amsterdam/Philadelphia: John Benjamins.
- Opitz, C. (2011). *First language Attrition and Second Language Acquisition in a Second-Language Environment*. PhD dissertation, Trinity College Dublin.
- Paradis, M. (1993). Linguistic, psycholinguistic, and neurolinguistic aspects of interference in bilingual speakers: the activation threshold hypothesis. *International Journal of Psycholinguistics*, 9 (2), 133-145.
- Paradis, M. (2004). *A neurolinguistic theory of bilingualism*. Amsterdam: John Benjamins.
- Paradis, M. (2009). *Declarative and Procedural Determinants of Second Languages*. Amsterdam/Philadelphia: John Benjamins.
- Pavlenko, A. (2004). L2 influence and L1 attrition in adult bilingualism. In M. S. Schmid, B. Köpcke, M. Keijzer & L. Weilemar (Eds.), *First Language Attrition: Interdisciplinary perspectives on methodological issues*, (pp. 47-59) Amsterdam/Philadelphia: John Benjamins.
- Sancier, M. L. & Fowler, C. A. (1997). Gestural drift in a bilingual speaker of Brazilian Portuguese and English. *Journal of Phonetics*, 25(4): 421 – 436.

- Schmid, M. S. (2002). *First Language Attrition, Use and Maintenance: The case of German Jews in Anglophone countries*. Amsterdam: John Benjamins.
- Schmid, M. S. (2007). The role of L1 use for L1 attrition. In B. Köpke, M. S. Schmid, M. Keijzer and S. Dostert (Eds.), *Language attrition: theoretical perspectives* (pp. 135-53). Amsterdam/Philadelphia: John Benjamins.
- Schmid, M. S. (2011) *Language Attrition*. Cambridge University Press.
- Schmid, M.S. (ed.) (2010). *Bilingualism: Language and Cognition. Special Issue on Language Attrition* (issue 13:1).
- Schmid, M.S. & Beers Fägersten, K. (2010) Fluency and language attrition. *Language Learning* 60 (4): 753–791.
- Schmid, M. S. & Jarvis, S. (submitted). Lexical access and lexical diversity in first language attrition
- Schmid, M. S. & Keijzer, M. (2009). First language attrition and reversion among older migrants. *International Journal of the Sociology of Language*, 200, 83–101
- Schmid, M. S. & B. Köpke. (2007). Bilingualism and attrition, in: B. Köpke, M. S. Schmid, M. Keijzer and S. Dostert (Eds.), *Language attrition: Theoretical perspectives* (pp. 1-8). Amsterdam/Philadelphia: John Benjamins.
- Schmid, M. S. & B. Köpke (2011). *Language, Interaction and Acquisition: Special Issue on L1 Attrition* (issue 2:2).
- Schmid, M. S, & B. Köpke (eds). (2008). L1 attrition and the mental lexicon, in: Aneta Pavlenko (ed.), *The Bilingual Mental Lexicon*. Clevedon: Multilingual Matters, pp. 209 – 238.
- Schumann, J. H. (1994). Where is cognition? Emotion and cognition in second language acquisition. *Studies in Second Language Acquisition*, 16, 231-242.
- Schumann, J. H. (1998). The neurobiology of affect in language. *Language Learning*, 48: Supplement 1.
- Sharwood Smith, M.A. 1983b. On first language loss in the second language acquirer: Problems of transfer. In Gass, S. & Selinker, L. (eds.), *Language transfer in language learning*, S. Gass and L. Selinker (pp. 222-231). Rowley, MA: Newbury House.
- Sorace, A. (2011). Pinning down the concept of “interface” in bilingualism. *Linguistic Approaches to Bilingualism* 1(1): 1–33.
- Tsimpli, I. (2007): First language attrition from a minimalist perspective: Interface vulnerability and processing effects. In Köpke, B., Schmid, M. S., Keijzer, M., and Dostert, S., editors, *Language attrition: Theoretical Perspectives*, Amsterdam/Philadelphia: John Benjamins, 83-98.

- Tsimpli, I., Sorace, A., Heycock, C. & Filiaci, F. (2004). First language attrition and syntactic subjects: A study of Greek and Italian near-native speakers of English. *International Journal of Bilingualism* 8(3), 257-277.
- Varga, Z. (2012). *First language attrition and maintenance among Hungarian speakers in Denmark*. PhD dissertation, Århus University.
- Wilson, F. (2009). *Processing at the syntax–discourse interface in second language acquisition*. PhD dissertation, University of Edinburgh.
- Yılmaz, G. & Schmid, M. S. (forthc.). L1 lexical accessibility among Turkish speakers in the Netherlands. *The Mental Lexicon*.
- Yılmaz, G. (forthc.) *First language attrition and second language acquisition among Turkish speakers in the Netherlands*. PhD dissertation, University of Groningen.