

Disfluency markers in L1 attrition

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Abstract

Based on an analysis of the speech of long-term émigrés of German and Dutch origin, the present investigation discusses to which extent hesitation patterns in language attrition may be the result of the creation of an interlanguage system on the one hand or of language-internal attrition patterns on the other. We compare speech samples elicited by a film retelling task from German émigrés in Canada (n=52) and the Netherlands (n=50) and from Dutch émigrés in Canada (n=45) to retellings produced by predominantly monolingual control groups in Germany (n=53) and the Netherlands (n=45). Findings show that the attriting groups overuse empty pauses, repetitions and retractions, while the distribution of filled pauses appears to

conform more closely to the L2 norm. An investigation of the location at which disfluency markers appear within the sentence suggests that they are indicators of difficulties which the attriters experience largely in the context of lexical retrieval.

(153 words)

Es irrt der Mensch, solang er strebt.

Goethe, *Faust I*

“The fundamental reason for hesitating is
that speech production is an act of creation.”

(Chafe, 1980, p. 170)

Loosely translated, the quote from Goethe’s *Faust I* at the beginning of this section expresses that to go wrong is an integral part of the human condition of eternally striving. The same can be said for human communication: when people talk, they make mistakes, hesitate, repeat themselves, backtrack – in other words, they are disfluent. It has been suggested that disfluencies may affect 5-10% of all words and one third of all utterances in natural speech (Shriberg, 2001: 153)¹. Yet these phenomena do not usually impede communication – on the contrary: not only are they accepted and processed as a normal part of natural language, they have also been shown to have a variety of functions.

The first, and probably most obvious, function of disfluency markers is related to *cognitive* processes, and has been referred to as the “symptom” function (Levelt 1989, see also Clark & Fox Tree, 2002; Fox Tree & Clark, 1997). On this view, disfluency markers are indicators of a problem of lexical or information retrieval which the speaker encounters in mid-utterance. She resorts to interrupting her flow of speech, to backtracking or to repeating some linguistic material while planning the next stretch of discourse. “Symptomatic” or “cognitive” hesitations have been analyzed as having pragmatic and discursive functions in that they contribute to the fluency of spontaneous speech by enabling the speaker to better achieve content organization (Chafe, 1985; Garrett, 1975; Levelt, 1983; 1989; Mayer, 1999; Shattuck-Hufnagel & Klatt, 1979; Ward, 2004). This view is corroborated by the finding that the frequency of some hesitation markers varies in proportion to the amount of speech planning or cognitive difficulties experienced by the speaker (Bock, 1986; Bock & Levelt,

1994; Butterworth & Beattie, 1978; Chafe, 1980; Crystal, 1982; Garrett, 1975; Goldman-Eisler, 1968; Maclay & Osgood, 1959; Rochester, 1973; Shriberg, 2001; Van-Winckel, 1982).

Secondly, speakers may employ disfluency markers for more *semantic* purposes: to lend emphasis to a certain discourse element, to structure their speech, or in other ways to “convey a message to a listener or to reflect inner cognitive processes on the part of the speaker” (de Leeuw, 2007: 88). This semantic function has also been called the “signal”function (de Leeuw, 2007: 88; see also Clark & Fox Tree, 2002; Fox Tree & Clark, 1997), and on this view hesitation markers facilitate comprehension or influence meaning interpretation among listeners (Ball, 1975; Brennan & Schober, 2001; Brennan & Williams, 1995; Christenfeld, 1995; Fox Tree, 2002; Maclay & Osgood, 1959; Schachter et al, 1991; Shriberg, 1996; Swerts, Wichmann & Beun, 1996).

With respect to the distinction between cognitive and semantic discourse markers, it has been proposed (Clark & Fox Tree 2002) that filled pauses are different from other disfluency markers in that they are linguistic signals, or words. This would imply that filled pauses are predominantly related with the *semantic* function of discourse markers, while other hesitation markers – silent pauses, retractions, repetitions – are employed for strategies associated with the resolution of *cognitive* problems. Such a pattern is also indicated by two experiments which compared the use of filled and unfilled pauses between speakers of American English and German (O’Connell, Kowall & Hörmann, 1969 and O’Connell & Kowall, 1972). In these experiments, speakers were asked to read and re-tell stories, some of which were phrased predictably while others contained contextually unexpected sentences. All speakers had more and longer unfilled pauses in the unexpected reading condition, and longer pauses in the unexpected retelling condition, confirming the assumption that incidence and length of unfilled pauses would increase with cognitive task demands. Filled pauses were only analyzed in the retelling task (as the reading tasks did not elicit many filled pauses), and for this

disfluency marker, group differences were found: while the Germans had more filled pauses in the unexpected condition than in the predictable one, this pattern was reversed for the American English speakers. While the distribution of filled pauses therefore appeared to be language-specific, they did not seem to be associated with an increase of cognitive demands: there was no consistent increase of filled pauses in the more demanding task.

The suggestion that the patterns of filled pauses may be language-specific has received corroboration from investigations of, among others, Dutch (de Leeuw, 2004), French (Dewaele, 1996; Duez, 1982) German (Künzel, 1997; de Leeuw, 2004), Italian (Giannini, 2003), Japanese (Watanabe & Ishi, 2000), Korean (Trofimovich & Baker, 2006), Russian (Riazantseva, 2001; Stepanova, 2007), Spanish (Edmunds, 2006) and Swedish (Horne, Frid, Lastow, Bruce, & Svensson, 2003).

To sum up, it is widely assumed in research on disfluencies that some hesitation markers, in particular filled pauses, serve semantic functions linked to information structure, emphasis or discourse organization. These functions, and consequently the distribution of filled pauses, vary across languages. For the purpose of the present paper, filled pauses will therefore be referred to as ‘semantic disfluency markers’ (SDMs). Other hesitation markers, such as unfilled pauses, retractions and repetitions, are taken to have the non language-specific function of signalling or resolving a cognitive problem of lexical or information retrieval on the part of the speaker. We will refer to these as ‘cognitive disfluency markers’ (CDMs).

The findings that CDMs, but not SDMs, will increase when the speaker has to deal with a task that is cognitively more complex, and that SDMs, but not CDMs, differ crosslinguistically imply that the controversy on the different functions of disfluency markers may benefit substantially from investigations of bilingual speech and bilingual development.

The overview of disfluency markers presented in the previous section suggests the possibility that there will be differences in the use and distribution of disfluency markers between monolingual and bilingual speakers. There are two reasons for this assumption: firstly, the task of the bilingual is cognitively somewhat more complex, since she has to manage and access two linguistic systems at the same time. This may lead to an increase in the incidence of CDMs, which will be more strongly perceptible in her weaker language but may also affect the dominant language, as it has been shown that all linguistic systems remain, to some degree, active in the bilingual's mind at all times (Grosjean 2001). Secondly, the cross-linguistic difference of SDMs, and the fact that they are cognate across most languages, may lead to interlanguage effects in their distribution. Bilinguals can therefore be expected to have both a higher incidence and a different distributional pattern of disfluency markers than monolinguals.

In line with common practice in research on multilingualism, we will henceforth assume the term 'bilingual' to refer to an individual who uses or is able to use more than one language. The term 'L1' will be used to refer to such an individual's first learned, or native, language, while the term 'L2' refers to any language learned later in life. For the purpose of this paper, we will not be referring to simultaneous or early bilinguals but assume speakers for whom the onset of L2 acquisition took place after the onset of puberty (late bilinguals).

In the process of second language acquisition (SLA), deviations from the native norm in the use of disfluency markers can initially be assumed to be rather large in the L2, but to decrease as the speaker's proficiency advances. However, it is also possible that the presence and development of the L2 system may impact on disfluency in the L1 of a bilingual. Such effects will be most noticeable in speakers who use their L1 infrequently – in migrants for whom the L2 has become the dominant language in daily life, and whose L1 is starting to show signs of language attrition.

Hesitation markers in L2 acquisition

“There is some sense in the idea that one of the very first things to learn in a foreign language is how to hesitate in it.”

(Crystal & Davy, 1979, p. 6)

The classification of the different functions of unfilled and filled pauses as cognitive/non-language specific and semantic/language-specific, respectively, receives some support from the perception of L2 learners by native speakers: it has been suggested that the frequency and, in particular, the location of unfilled pauses may impact negatively on the proficiency ratings which L2 learners are awarded by native judges (Dewaele, 1996; Lennon, 1990; Trofimovich & Baker, 2006), while hesitation markers which are ‘more typical’ of the target language (i.e. appropriately used filled pauses) lead to higher scores (Dewaele, 1996; Lennon, 1990).

It has been shown that CDMs are massively overrepresented in the speech of beginning or low-proficiency learners, but decrease as proficiency becomes more advanced (Hilton, 2007; de Leeuw, 2004; Riazantseva, 2001; Trofimovich & Baker, 2006). On the other hand, a comparison of the use of filled pauses between bilinguals of different proficiency levels and different combinations of L1 and L2 (de Leeuw, 2004) showed no consistent decrease of the incidence of these hesitation markers among the more proficient speakers. Instead, this analysis suggested that these speakers were developing a use of filled pauses which was more in accordance with native norms.²

Naturalistic input appears to play a strong role in the development of hesitation patterns, as classroom learners appear to benefit less from their exposure than immersion learners in this respect (Freed, Segalowitz & Dewey, 2004; Segalowitz & Freed, 2004). Learners also find it difficult to distinguish the appropriate function of the different types of hesitation markers (CDMs vs. SDMs), and have been shown to employ filled and silent pauses for the same functions, suggesting that interlanguage hesitation patterns differ from those of native

speakers (Cenoz, 2000). Bilingual speakers furthermore transfer the phonetic characteristics of hesitation markers from their L1 to their L2 (de Leeuw, 2004; who also finds that hesitation markers in the L1 of a proficient bilingual may show a certain development towards the L2 norm). Transfer of both formal and functional characteristics of native hesitation patterns may therefore be among the reasons why L2 learners can be recognized as non-native speakers (Clark & Fox Tree, 2002, p. 93).

Consequently, target-like use of hesitation markers is an important concern for foreign language teaching (Dewaele, 1996). Not only do speakers need hesitation markers for cognitive and communicative reasons, but in order to sound ‘natural’ and ‘native’, the discourse itself has to contain appropriate use of hesitation markers: “teaching students how to be ‘disfluent’ makes them sound more native-like” (Sajavaara & Lehtonen, 1978, p. 51).

Hesitation markers in L1 attrition

L1 attrition is a process which is governed by two factors: the presence and development of the L2 system on the one hand, and the diminished exposure to and use of the L1 on the other (Schmid & Köpke, 2007); that is, it is a process typically witnessed among migrants who use the later-learned environmental language in daily life. The current consensus is that attrition manifests itself first and most noticeably in lexical access and the mental lexicon (e.g. Ammerlaan, 1996; Schmid & Köpke, 2008) while grammatical and phonological representations appear more stable among speakers for whom emigration took place after puberty (Schmid, *forthc.* a).

Attrition research has often wrestled with the problem of how to establish the border between the ‘normal’ influence of the L2 on the L1, which all bilinguals probably experience to some degree (as is suggested by, among others, Cook 2003), and the (consequently to some degree ‘abnormal’) process of L1 attrition, which is confined to migrants. It has recently been

suggested that this distinction is not only impossible to draw, but also unhelpful, as “bilinguals may not have one ‘normal’ language (in which they are indistinguishable from monolinguals [...]) and one ‘deviant’ one (in which knowledge is less extensive than that of monolinguals, and also tainted by interference from L1 in SLA and from L2 in attrition)” (Schmid & Köpke 2007:3). Rather, while L1 attrition may be the most clearly pronounced end of the entire spectrum of multicompetence, and therefore a more satisfying object of investigation than the L1 system of a beginning L2 learner (which may not show substantial and noticeable signs of change), attrition is undoubtedly part of this continuum, and not a discrete and unique state of development.

It is possible for lexical representations in the L1 to be influenced by the semantic potential of corresponding items in the L2. Instances of such interlanguage effects are reported by e.g. Pavlenko (2003, 2004), who concludes that for her L1 Russian speakers, a number of Russian terms appear to have gained a different meaning by semantic extension from their L2, English. Secondly, it has been noted that among attriters, lexical access can become impaired, resulting in poorer performance on picture naming tasks (Ammerlaan, 1996; Hulsen, 2000, Montrul 2008) and reduced lexical diversity in free speech (Schmid, 2002). One may therefore expect similar changes in the distribution and use of disfluency markers among L1 attriters as have been shown to obtain for L2 learners: a change in the use of SDMs due to interlanguage effects, and an increase of CDMs due to impaired lexical accessibility.

The definition of L1 attrition as a change in the native language among L2 speakers who use their later-learned language equally or dominantly in their daily lives implies that some of the research on disfluencies in L2 discussed above may have investigated populations whose L1 was also undergoing attrition, in particular those studies which investigated naturalistic, as opposed to classroom-based, SLA. Unfortunately, most of this research is confined to the

analyses of these phenomena in the L2, and those studies which do include data for the L1 (Edmunds, 2006; de Leeuw, 2004; Riazantseva 2001) do not provide any baseline data from non-attributed or monolingual speakers or longitudinal development which would allow us to interpret these observations in an attrition context.

However, two phenomena emerge incidentally from these studies which may be noteworthy in the context of the development of disfluencies in L1 attrition. It was pointed out above that the level of proficiency in the L2 has a strong impact on the incidence of disfluencies in that language. While this trend is largely corroborated by the findings of de Leeuw (2004) and Riazantseva (2001), their findings on hesitations in the L1 do not appear to differ between the speakers in the different L2 proficiency groups (intermediate and high L2 proficiency). This suggests that there is no direct trade-off between a bilingual's languages, by which the fluency gained in one language is detrimental to that of the other.³

Secondly, while both these studies report a lower incidence (and, in the case of Riazantseva, a shorter average duration) of hesitation markers in the L2 among their higher proficiency groups, both still indicate that speakers generally used more (and longer) disfluencies in their L2 than in their L1.⁴ This may suggest that, where fluency is concerned, the roles of the native and the nonnative language will not become reversed in the attritional process even for very experienced and highly proficient L2 speakers. However, as the maximum length of exposure to L2 is 20 years in de Leeuw's study and 8 years for Riazantseva, this conclusion may be premature: investigations of attrition typically consider incubation periods of several decades.

The only study to date which considers the development of disfluency during the attritional process in some detail is Yukawa's (1997) investigation of the attrition and subsequent regaining of an L1 among two young speakers of Japanese. Her study is complicated by the consistent refusal of one of her subjects to speak Japanese during the

attrition period; for the other speaker, however, she does note a slight increase in pauses towards the end of the attrition periods⁵, and a subsequent decrease after re-exposure.

Yukawa applied Levelt's (1983) distinction of hesitation markers for the use of "macro-planning" (giving attention to information retrieval) and "micro-planning" (finalizing messages for expression). Macro-planning, which is indicated by the use of a hesitation marker at utterance boundaries, is involved primarily with the content of the utterance. Since language attrition is a linguistic phenomenon, not a cognitive one, Yukawa hypothesized that it will lead to an increase of intra-constituent hesitation markers.

While the limited scope of Yukawa's analysis does not permit a full validation of this hypothesis, the underlying assumption seems worthy of further investigation: Since the attriter cannot process language as smoothly as an unattrited speaker, she will hesitate more often while accessing particular lexical or grammatical items, and these disfluencies may occur constituent-internally at the point where the missing item is to be inserted. Since lexical access has been shown to be one of the more vulnerable features in the attritional process (Schmid & Köpke, 2008; Montrul, 2008), it can furthermore be expected that a larger incidence of hesitation markers preceding lexical items (content words) as opposed to grammatical ones (function words, inflectional suffixes etc.) will be found.

Summary and research questions

Based on the discussion presented above, it may be assumed that the distribution of disfluency phenomena in the speech of bilinguals will be dissimilar from the monolingual target norm in both of their linguistic systems. Where the L1 is concerned, this difference will be largest for those bilinguals who live in an L2 speaking environment and have relatively little exposure to their L1, leading to a possible process of L1 attrition.

The present investigation will attempt to determine whether migrants have a different pattern of incidence and distribution of disfluency markers than unattrited native speakers. In particular, it will be investigated whether there is a difference between filled pauses (FPs) on the one hand and other disfluency markers, such as empty pauses (EPs), retractions (RTs) and repetitions (RPs) on the other. The hypothesis is that the use of FPs in the speech of attriters may be determined less by problems linked to difficulties they experience in the process of attempting to retrieve linguistic information from memory, and more by interlanguage effects, so that their distribution will be more similar to the L2 norm.

The first research question to be addressed by this study (RQ1) is therefore whether migrants/attriters use hesitation markers more frequently than predominantly monolingual speakers⁶. Specifically, the following issues will be addressed:

RQ1a: do attriters make more frequent use of cognitive discourse markers (CDMs) than predominantly monolingual speakers in their L1?

RQ1b: do attriters show a distribution of semantic discourse markers (SDMs) which conforms to the norm of their L2 rather than their L1?

The second research question concerns the points of the utterance at which attriters overuse hesitation markers. It was pointed out above that attrition has been shown to be most noticeable in the area of the lexicon, and it may therefore be expected that disfluencies will be predominantly associated with problems in lexical retrieval, and less so with grammatical difficulties. One possible way of measuring this is to examine the word class of the item which is immediately preceded by the disfluency marker. For example, Schmid (2008) quotes the following example from a German attriter:

- (1) GU: wir hatten einen ähm # äh äh refrigerator äh
we had an_{MASC} ahm # ah ah refrigerator ah
I: Kühlschrank_{MASC}

refrigerator

GU: Kühlschrank, elektrischen

[refrigerator], electric_{MASC}

In this example, the speaker hesitates because she cannot retrieve the noun *Kühlschrank* from memory, and eventually says the word in English with an intonational pattern which expresses both frustration and a request to the interviewer to supply the word for her.

Interestingly, the article preceding the hesitation marker is in the appropriate masculine form, as is the postposed adjective in the next utterance. This suggests that, in this particular instance, while the speaker is unable to access the actual lexical item, she retains knowledge of its grammatical properties. On the other hand, it is also possible that in other cases, hesitation markers before particular free grammatical morphemes, e.g. articles, may signal attrition-linked problems in certain lexically-determined areas of grammar: while a speaker may know the actual lexical item, she may be uncertain as to its gender, or both gender and phonological form may be inaccessible.

In an analysis of free speech (which is the only type of data within which fluency can reliably be investigated), the location of the hesitation marker is the only available clue as to the type of linguistic information with which the speaker may be encountering a specific problem at that point in time. This information may be masked, to some extent, in planning strategies which occur in advance of the production of a particular item: It has been pointed out, for example, that both lexical and syntactic deficits in impaired L1 acquisition are reflected in higher rates of disruptions at phrase boundaries (Guo, Tomblin & Samelson 2008). Since it is impossible to determine whether hesitation markers at such boundaries signal problems with the retrieval of general content or specific linguistic information and, if the latter, which part of the phrase is the one that causes problems at this point, the present analysis will focus on phrase-internal disfluencies.

We will therefore follow Yukawa's (1997) approach towards distinguishing those hesitation markers which serve a macro-planning function and occur at the boundaries of units of discourse from those which are used for micro-planning purposes. It is predicted that disfluencies linked to macro-planning will not increase in language attrition, as they depend on overall cognitive processes which remain unimpaired. Hesitations in the context of micro-planning, on the other hand, are expected to differ between the attrited and the control populations.

For disfluency markers occurring within the phrase, we will conduct an analysis of the word class of the element immediately following the hesitation marker, and attempt to assess to what degree disfluency phenomena can help indicate areas of linguistic knowledge which may become problematic in the language attrition process.

RQ2a: is there a difference in the use of hesitation markers intra-constituently vs. at the boundaries of discourse units between the populations under investigation?

RQ2b: is there a difference in the use of hesitation markers preceding lexical items (content words) vs. other linguistic items (function words) between the populations under investigation?

The study

Participants

This study is based on an analysis of spoken data from 245 speakers. The participants fall into five categories:

- GECA: a group (n = 52) of native speakers of German, living in Canada. This group consisted of 19 men (36.5%) and 33 women (63.5%) with an average age of 63.27 years (SD 11.02). They had lived in Canada for a minimum of 15 years (mean 37.07 years, SD 12.49) and had been at least 17 years old when they emigrated (mean 26.19,

SD 7.20). All participants in this group lived in the Greater Vancouver area in British Columbia (none had ever lived in the French-speaking areas of Canada).

- GENL: a group (n = 50) of native speakers of German, living in The Netherlands. This group consisted of 17 men (34.0%) and 33 women (66.0%) with an average age of 63.28 years (SD 9.48). They had lived in The Netherlands for a minimum of 15 years (mean 34.52 years, SD 11.27) and had been at least 17 years old when they emigrated (mean 28.76, SD 7.19). All participants in this group lived in The Netherlands (none had ever lived in areas where Frisian is spoken).
- GECCG: a control group (n = 53) of native speakers of German, living in Germany. This group consisted of 18 men (34.0%) and 35 women (66.0%) with an average age of 60.88 years (SD 11.60). None of the participants in this group had ever lived outside Germany, nor did any of them use a language other than German on a regular basis.
- NLCA: a group (n = 45) of native speakers of Dutch, living in Canada. This group consisted of 21 men (46.5%) and 24 women (53.5%) with an average age of 66.44 years (SD 7.38). They had lived in Canada for a minimum of 17 years (mean 22.02 years, SD 5.99) and had been at least 15 years old when they emigrated (mean 44.42, SD 9.11). All participants in this group lived in Ontario, none of them had ever lived in the French-speaking area of Canada.
- NLCCG: a control group (n = 45) of native speakers of Dutch living in The Netherlands. This group consisted of 21 men (46.5%) and 24 women (53.5%) with an average age of 66.24 years (SD 7.95). None of the participants in this group had ever lived outside of The Netherlands for an extended period of time, nor did any of them use a language other than Dutch on a regular basis.

While all efforts were made to keep the groups homogenous with respect to factors such as sex, age and length of residence which may impact on overall L1 performance in general and on the use of hesitation markers in particular (e.g. Bortfeld et al., 2001), this was not always possible, as is evident from this overview.

The experiment on which the present study is based was one component of a larger investigation on language attrition among Dutch and German migrants, conducted in 2004-2005 by Merel Keijzer (TU Delft) who collected the data from the L1 Dutch speakers, and by the first author of the present paper who conducted the data collection among the L1 German speakers. Apart from the free spoken data samples analyzed in the present study (see below) a number of general proficiency and personal and linguistic background measures were collected.

The former set of experiments included a C-Test and a verbal fluency task. Detailed descriptions of these measures and results have been provided elsewhere (see Schmid, 2007; Schmid & Dusseldorp, *forthc.* for the German speakers; Keijzer, 2007 for the Dutch speakers; Schmid & Keijzer *forthc.* for some group comparisons), and only the findings relevant to the present discussion will be reported here.

Firstly, it was assessed on the basis of the formal tasks (C-Test and verbal fluency task) whether there was any evidence of L1 attrition among the experimental groups, that is, whether the migrants were outperformed on these measures by the control groups. This was indeed the case: on all measures, the attriting groups achieved lower average scores than the controls. The group differences and comparisons of means are summarized in Table 1 for the L1 German speakers and in Table 2 for the L1 Dutch speakers. As can be seen from these tables, the group differences are significant and stable with a moderate effect size, indicating that there are indeed consistent differences: the attriters are reliably outperformed by the controls.

/ insert Table 1 here /

/ insert Table 2 here /

Given these findings, an obvious question is what has caused this attrition to occur, and the obvious answer to this question would probably appear to lie in the amount of exposure to L1 which the individual attriter has, potentially modified by his or her attitudes towards the native language and culture. In order to capture the intricacies of these complex and diverse factors, information on personal, linguistic and attitudinal background for each speaker was collected by means of a detailed questionnaire on personal and linguistic background, L1 and L2 use in a wide variety of situations, and attitudes towards both languages and cultures.

Attempts have been made elsewhere to establish to what degree individual variation in L1 attrition and maintenance among these speakers are conditioned by these factors. Schmid (2007) applied a classification of L1 use based on Grosjean's model of language mode (e.g. Grosjean 2001), while Schmid & Dusseldorp (forthc.) established L1 use factors based on a principle component analysis of the data at hand. In both cases, the explanatory power of language use and attitude factors for the performance of the attriters was surprisingly low, indicating a much less important role for exposure to L1 than henceforth suspected.

Method of the present study

The present investigation is based on the Charlie Chaplin film retelling task (Perdue, 1993). The excerpt selected for this task was taken from the silent film *Modern Times*. It lasts around 10 minutes, starting ca. 34 minutes into the film, with a scene where Charlie Chaplin (newly released from prison) is unsuccessfully looking for employment. He then meets a young woman, who is similarly without means. After a few adventures involving the police, a get-

away and a long daydream about how life could be, the two resolve to attempt a life together. Participants were shown this film excerpt on a computer screen and told beforehand that they would be required afterwards to retell what they had seen. They were shown the excerpt only once, and not prompted during the retelling. This task was chosen since it allows the elicitation of relatively free spoken data with a controlled content, so that choice of vocabulary, style etc. can be assumed to be relatively homogenous across the sample.

Procedure

All narratives were recorded and transcribed orthographically in CHAT format (MacWhinney, 2000). The transcription and coding of each narrative was checked by at least three coders (the researcher and two student assistants in the case of the German data, the researcher, an MA student and the first author of this paper in the case of the Dutch data). Four types of disfluency markers were coded according to the CHILDES standards: filled pauses, empty pauses, repetitions and retractions.

1. Filled pauses

Filled pauses were coded and counted regardless of their pronunciation (vocalic or vocalic-nasal) as *ah* in the German data and as *uh* in the Dutch data:

(15) Das Mädchen wird ah freigelassen

the girl is uh released

(16) hij uh hamerde dat stuk hout van die paal vandaan

he uh knocked the piece of wood out from under the pillar

2. Empty pauses

The identification and measurement of empty pauses has been debated in detail elsewhere (e.g. Lennon 1990). For the purpose of the present investigation, the measurement of all pauses by means of acoustic software was not possible due to the large amount of data. All

coders were instructed to mark a pause when there was a break in intonational contour or other indication of an interruption of the flow of speech. In the checking and re-checking process, those pauses for which the next judge agreed were retained, so that the pauses coded in the final versions of the transcripts represent the converging judgment of three speakers. Spot-checks with the program SoundForge revealed that the perceived pauses were generally more than 300 ms long (no upper threshold was set) and interrater reliability was very good (Cronbach's $\alpha = .817$). It is hoped that at some later stage, this process can be repeated in a more precise manner with the help of analytic software tools.

Empty pauses were coded with a pound sign # according to the CHILDES conventions (see (4) and (5)).

(17) und # dann hat er # bisschen (he)rum gekuckt
and # then he # looked around a bit

(18) dus # de politieagent pakt hem mee
so # the policeman takes him away

3. Repetitions

Repetitions were coded according to the CHILDES standards, by enclosing linguistic material which was repeated by the speaker between angled brackets and following it with the code [/]. Repetitions only concern words and phrases which were repeated in exactly the same way:

(19) er sagte dann < zu dem > [/] zu dem jungen Mädchen
then he said <to the> [/] to the young girl

(20) <als de> [/] als de vrachtwagenchauffeur weer naar buiten komt
<when the> [/] when the truck driver comes back out

4. Retractions

Retractions were coded in a similar manner with the code [//] following the linguistic material which the speaker had modified, enclosed between angled brackets. A retraction was coded in those cases where a speaker backtracked, modified part of the sentence, and then went on to finish the sentence. In other words, retractions concern sequences where the speaker self-corrects:

(21) <hat den Brief gekriegt> [//] hat den Brief bekommen

<got the letter> [//] received the letter

(22) en dan staat ze <op de hoek van de corner@s⁷> [//] op de hoek van de straat

and then she is standing <on the corner of the corner> [//] on the corner of the street

The interviews totalled 166,099 words (not counting hesitation markers, repetitions and retractions) (see Table 3). They were between 4 and 12 minutes in length.

/ insert Table 3 here /

The differences in average words per speaker between the five groups were not significant ($F(4, 244) = .507, p = .731$).

*Results*⁸

Incidence of disfluency markers

The corpus contained 8,187 filled pauses (FP), 3,089 empty pauses (EP), 1,154 repetitions (RP) and 2,531 retractions (RT) (see Table 4).

/ insert Table 4 here /

The first impression is that the experimental groups use proportionally fewer filled and more empty pauses than the control groups. These differences are significant (L1 German groups: $\chi^2(6) = 149.226, p < .001$, L1 Dutch groups: $\chi^2(3) = 157.443, p < .001$).

In lieu of post-hoc procedures which are not available for the χ^2 , pairwise comparisons of the incidence of each hesitation marker in the attriting groups were made with the control groups of the relevant L1 by means of Mann-Whitney procedures. All attriting groups used more empty pauses, repetitions and retractions than the control groups (the overuse of RPs by the GENL speakers was marginally significant). On FPs, however, only the GENL group differed from the controls (Table 5).

/ insert Table 5 here /

Furthermore, there seem to be cross-language differences:

- the L1 Dutch speakers use a higher proportion of empty pauses
- for all L1 German groups, there is a large difference between the proportion of repetitions and retractions, while the L1 Dutch speakers appear to use both to a similar extent.

A cross-language comparison of all L1 German speakers ($n = 155$) on the one hand and all L1 Dutch speakers ($n = 90$) on the other is significant ($\chi^2(3) = 531.690, p < .001$). The group differences become more apparent when the number of disfluency markers is related to the total number of words used by the individual groups (see Table 6), where ten out of the total twelve experimental-control comparisons show significant or marginally significant differences.

/ insert Table 6 here /

While the L1 German groups use between four and five times as many retractions as they do repetitions, the two phenomena are represented evenly in the data from the L1 Dutch groups. On the other hand, both the L1 Dutch groups and the German-speaking group with Dutch as a second language have a higher incidence of filled pauses than the other groups ($t=-4.194$, $p < .001$), and the L1 Dutch speakers also have more empty pauses ($t=-7.584$, $p < .001$) (see Fig. 1).

/ insert figure 1 here /

In answer to RQ1a, it can therefore be said that the attriters have overall a higher incidence of all three cognitive discourse markers (EPs, RTs and RPs) than the controls. FPs appear to be less vulnerable to attrition than the other disfluency markers investigated here, in accordance with the assumption made by RQ1b, since the only attriting group which has an increased incidence of FPs are the GENL speakers. This conforms to findings from previous studies which have found that native speakers of Dutch use a higher proportion of FPs than speakers of British English or German (de Leeuw, 2007). The GENL speakers in the present study may therefore be shifting to the L2 norm. Unfortunately no baseline data from L1 speakers of Canadian English are available for further testing of this hypothesis.

The impact of personal background factors on the incidence of hesitation markers

Since it has been reported that the incidence of hesitation markers may vary with gender and age (e.g. Bortfeld et al. 2001) it was determined to what degree such effects might be present

here. Table 7 shows that there was indeed a gender effect for FPs and RTs, with a higher average incidence of these markers in the data from men, while the overuse of EPs by men was marginally significant. The only disfluency marker for which there was no gender effect was the use of RPs.

/ insert Table 7 here /

In view of the crosslinguistic differences reported above and the fact that gender distribution was unequal across language groups, it was determined to what extent this finding was due to unequal group size and gender distribution by assessing the gender effect only within language groups (Table 8).

/ insert Table 8 here /

Among the German L1 group, men only used filled pauses more frequently than women, while among the Dutch L1 group, both filled pauses and retractions were overrepresented in the data from the male speakers. Within L1 groups the marginally significant overuse of empty pauses by men disappeared.

Correlations of the incidence of hesitation markers per 100 words and the age of the speakers showed that there was only a weak correlation with repetitions which older speakers used slightly more frequently (see Table 9 below). A puzzling and apparently contradictory finding is that there is a negative correlation between this hesitation marker on the one hand and the length of residence on the other, suggesting that the use of RPs decreases across time. The same effect was found for EPs.

/ insert Table 9 here /

We suspected that this phenomenon was a product of the large crosslinguistic differences with respect to the proportion of repetitions and retractions mentioned above and the fact that the two L1 groups differed somewhat in their average age and (particularly) the average emigration span. Correlations per L1 group confirmed this suspicion: no significant correlations were found within the groups.

/ insert Table 10 here /

The initial results therefore indicate that the attriters, irrespective of their age and length of residence, show an overall increase in their use of EPs, RTs and RPs.

The impact of L1 use factors on the incidence of hesitation markers

It was furthermore assessed to what degree the amount of use the speakers had reported in a variety of situations might have influenced the presence of disfluencies in their data. The measurement of L1 use in a variety of situations is complex (for a discussion see Schmid, 2007), and for the purpose of the present investigations it was decided to include three variables. The first is the informal and familiar L1 use with other bilinguals (BILMOD). This variable is based on a number of questions about the use of the L1 with partner, children and friends. Secondly, we included the use of the L1 with other bilingual speakers in situations where code-switching is inappropriate, either because the context is more formal (e.g. L1 use for professional purposes) or because the other speakers disapprove of code-switching (INTMOD). Thirdly, a variable was established measuring the use of the L1 with speakers in the country of origin (MONMOD). For all three variables the possible maximum is 1.00 (L1

used always or daily in all of these contexts) and the possible minimum is 0.00 (L1 never used in any of these contexts).

Correlations between the incidence of disfluency markers on the one hand and the amount of L1 use in these contexts on the other revealed no significant relationship between the L1 use factors and the amount of hesitation markers (see Table 11)

/ insert Table 11 here /

This finding confirms the observations made by Schmid (2007) and Schmid & Dusseldorp (forthc.) that the degree of disfluency does not appear to be dependent on the amount of use an attriter makes of their L1.

Placement of disfluency markers

One of the challenges of this investigation was to separate those disfluency phenomena which are indicative of cognitive or macro-planning (content of the narrative) from those which indicate a linguistic problem on the micro-level. Yukawa (1997) investigated this by comparing the incidence of those hesitation markers which appeared at the boundaries of constituents against those which appeared constituent-internally. A similar approach seemed desirable for the present study. However, the coding of hesitation markers at the beginning and the end of constituents in the present data was complicated to some degree by the languages under investigation here.

Like many other Germanic languages, Dutch and German encode grammatical relations across constituent boundaries, due to the grammatical frame provided by the verb. In both languages, main clauses follow the Germanic verb second rule: if any constituent other than the subject is fronted in the clause, the subject has to appear after the finite verb, while non-

finite components of the verb (infinitive, participle or particle) appear at the end of the main clause. Finite and non-finite verb components may therefore ‘frame’ other constituents, such as objects or prepositional phrases, a feature known as discontinuous word order (DWO).

This is illustrated in ex. (10) (German) and (11) (Dutch).

(10) da hat er (e)s noch mal mit dem Gefängnisdirektor versucht
there has he it another time with the prison director tried

“he made another attempt to talk with the director of the prison”

(11) daar moest hij dus een wigje van hetzelfde formaat opzoeken
there must he therefore a wedge of the same shape find

“so there he had to find a wedge of the same shape”

As in many other Germanic languages, the verb appears at the end of subordinate clauses which follow SOV word order. Again, other constituents can intervene between subject and verb:

(12) dass er einen zweiten Keil suchen sollte
that he a second wedge search should

“that he should find a second wedge”

(13) dat hij dat brood gepikt had
that he the bread nicked had

“that he had stolen the bread”

This means that a classification of hesitation markers into constituent-initial/-final vs. constituent-internal, ie. the classification adopted by Yukawa, was not appropriate for the present analysis. We therefore decided to take those stretches of discourse which are governed

by a finite verb as the basis for this analysis. Ex. (14) and (15) illustrate such units, which we will refer to here as ‘verb frame structures’ (VFSs).

(14) er wird also zu seiner eigenen grossen Überraschung sofort eingestellt
he is so to his own big surprise immediately hired
so to his own big surprise he is hired immediately

(15) Charlie is net uit de gevangenis gekomen
Charlie is just from the prison come
Charlie has just come out of prison

A comparison of the incidence of hesitation markers at the beginning and the end of VFSs between attriters and controls revealed that these were distributed very similarly across the groups (Table 12). The only difference between the groups was that attriters used slightly less filled pauses at the beginning of VFSs. In other words, in answer to RQ2a, the attriters in general did not hesitate more often than the controls at the borders of grammatical frames. Hesitation markers in VFS-initial and VFS-final position were excluded from further analysis.

/ insert Table 12 here /

For all other hesitation markers, the word class of the subsequent element was assessed by means of the mor-routine offered by the CLAN program⁹ (see Fig. 2).

/ insert Fig. 2 here /

A χ^2 analysis revealed these differences to be significant ($\chi^2 (8) = 40.546, p < .001$). As proportional representations may be misleading in cases where overall quantitative

differences between the groups are large, and as the analyses presented above showed substantial differences between how often the different speaker groups used particular types of disfluency markers, the distribution of subsequent elements per hesitation marker was then examined.

/ insert Table 13 here /

What is noticeable here is that in every case there are proportionally more incidences of hesitation before items of a particular word class in the speech from the attriters than in the speech from the controls. However, proportions differ: while EPs are five times more frequent before articles and three times more frequent before nouns, the number of RPs and RTs preceding a noun differs only slightly between attriters and controls.

For FPs the syntactic distribution between attriters and controls is similar across all word classes, as Table 14 shows.

/ insert Table 14 here /

Mann-Whitney analyses were then conducted on the absolute numbers of word class of subsequent element by hesitation marker and speaker group. These analyses revealed no differences with respect to the placement of filled pauses for any group. For the other hesitation markers, a number of differences between the experimental and the control groups were found. The statistics pertaining to the significant differences are summarized in Table 15 (the full findings are reported in the Appendix).

/ insert Table 15 here /

Empty pauses

EPs are the disfluency marker which has changed most for all attriting groups, both in incidence and distribution. Both L1 German experimental groups use almost three times as many empty pauses as the controls, while the L1 Dutch attriters have almost double the amount of pauses that the control group has. In terms of their syntactic distribution, there are also a number of interesting observations:

- EPs before lexical items

For all attriting groups, EPs appear disproportionately more often before nouns, while the attriting groups with English as L2 (GECA and NLCA) also overuse them before verbs.

Instances of these structures are illustrated by the following examples:

(16) und der # Besitzer ruft noch jemand anders

and the # owner calls someone else

(17) dass dieser Keil den # Rumpf eines Schiffes in Bewegung setzte

that this wedge made the # bulk of a ship move

(18) en daarnaast was een sigaren # koopman

and next to that there was a cigar # vendor

(19) met een bepaalde # hoek eraan

with a certain # angle to it

(20) und er # versorgte sie

and he # looked after her

That this type of hesitation signals problems of lexical access appears particularly likely in cases where the speaker fails to locate a specific word, and the pause is then followed by a relatively generic term, as illustrated by example (21).

(21) alle möglichen # Holzteile

all sorts of # bits of wood

Similarly, in the following example, the speaker may have been searching for a word to describe a particular type of bread loaf, but then settled for the generic 'bread'.

(22) und als nächstes war glaube ich die Episode

wo er die Straße entlang geht

und das Mädchen <das> [/] das # Brot aus dem Wagen stiehlt.

and then I think came the episode where he goes down the street, and the girl

steals <the> [/] the # bread from the car

- EPs before articles and pronouns

All attriting groups have substantially more empty pauses before articles than the controls, and the attriting groups with English L2 (GECA and NLCA) also have more pauses before pronouns, as illustrated by the following examples:

(23) bewirbt sich da bei # einer Werft

applies for a job on # a wharf

(24) en dan heeft ie daar # de, wat noem je dat # de # de bill@s¹⁰ you know ?

and then he has got # the, what do you call it # the # the bill you know?

(25) und dann wird also # einen Behälter unter den Euter gestellt

and then # a container is placed under the udder

(26) aber es aus # seinen Leben nicht machen kann

but cannot make anything of # his life

The gender of the article or pronoun preceded by the pause is correct in all of the above cases, even in example (24) where the speaker eventually fails to locate the appropriate lexical item (*de rekening*, 'the bill'). However, this is not always the case, e.g. example (27) below, where the speaker has difficulty accessing the German term *Keil* (masc.)

‘wedge’. While trying to locate the word, he stalls and repeats the article three times – interestingly, he (inappropriately) uses the feminine form and does not deviate from it during any of the repetitions. The next utterance indicates that he is aware of the term in his L2, Dutch. He asks the interviewer for assistance, which is not given, and then manages to retrieve the item himself. However, he does not correct the feminine article which he had used three times previously, although it becomes clear in the next utterance that he is aware that the proper form should have been the masculine:

(27) und dann soll er # (ei)ne (ei)ne (ei)ne, ja *keg* ist das in Niederländisch
wie heißt das auf Deutsch?

Keil finden, na ja und dann nimmt er natürliche (ei)nen verkehrten Keil.

and then he's supposed to find a_{FEM} a_{FEM} a_{FEM}, yes, it's called keg in Dutch, what's it called in German? # wedge, well and then of course he takes the_{MASC} wrong wedge.

- EPs before prepositions

The fact that empty pauses are overused before prepositions by the GECA and the NLCA group might, at first sight, appear to contradict our claim that it is mainly lexical access which is compromised in the attritional process and therefore affected by disfluencies.

However, while prepositions themselves are function words, they, too, are often lexically assigned in language-specific ways. For example, learners often experience problems with the fact that, in German, you congratulate someone *to* (‘zu’) their birthday, in Dutch you congratulate them *with* (‘met’) their birthday and in English, it is *on* their birthday.

In the following examples, it is possible that the speakers were uncertain about the preposition needed in particular collocations such as *om de hoek* ‘around the corner’ or *um Arbeit nachsuchen* ‘enquire about a job’:

- (28) oder hat dort # um Arbeit nachgesucht
or he enquired # about a job there
- (29) en toen Charlie Chaplin # om de hoek heen kwam
and when Charlie Chaplin came around the corner
- (30) en op hetzelfde moment kwam er een politie # om de hoek
and at the same moment a police came # around the corner

Repetitions and retractions

Although there are fewer types of word classes which appear to play a role in the distribution of RPs and RTs during the attritional process than was the case for EPs, there are some interesting observations to make. The discussion here will be confined to those word classes where an overall pattern can be detected.

- RTs before articles

Retractions before articles have increased for all three groups. Subjects often appear uncertain as to which is the correct article for a particular noun, and self-correct until they are satisfied, as the following examples illustrate:

- (31) er hat < das > [/] die Kanne darunter gesetzt
he put <the_{NEUT}> [//] the_{FEM} pot underneath
- (32) und < die > [//] <das > [/] <das Polizeiauto > [//] also <das > [//] der Paddywagon der ist weitergefahren.
and <the_{FEM}> [//] <the_{NEUT}> [/] <the_{NEUT}> [//] police car so <the_{NEUT}> [//] the_{MASC} paddywagon went on
- (33) zuerst dacht ich es war <ein> [/] <ein> [//] eine Baustelle
at first I thought it was <a_{MASC/NEUT}> [/] <a_{MASC/NEUT}> [//] a_{FEM} construction site

(34) meegenomen naar uh <de> [//] <naar het > [//] naar de gevangenis

taken along to uh <the_{COM}> [//] <to the_{NEUT}> [//] to the_{COM} prison

(35) onder <het> [//] uh onder die balk

under <the_{NEUT}> [//] uh under that_{COM} beam

A case where semantic knowledge and grammatical knowledge appear to clash is illustrated by the fact that both L2 English groups seem to have problems with the fact that the term for ‘girl’ is neuter in German and Dutch, and examples of the following type are common:

(36) und denn war <eine > [//] ein hungriges Mädchen

and then there was <a_{FEM}> [//] a_{NEUT} hungry girl

(37) dat was <die uh andere jonge> [//] uh dat andere jonge meisje daar

that was <that_{FEM} other young> [//] uh that_{NEUT} other young girl there

- RPs before prepositions

Repetitions before prepositions have increased for all three experimental groups, as had been the case for empty pauses, as the following examples illustrate:

(38) wie <an der Bäckerei> [//] vor einer Bäckerei das # Lieferauto anhält

that the delivery van stops <at the bakery> [//] before a bakery

(39) het schip dat <op de> [//] # uh <in> [//] uh uh # <dat> [//] uh # <dat > [//]

<daaraan> [//] # waar aan gewerkt werd

the ship that was <on the> [//] # uh <in> [//] uh uh # <that> [//] uh # <that >

[//] <on which> [//] # on which they were working

(40) en dan zitten ze in de tuin <bij een> [//] # uh <in een> [//] bij een huis

and then they are sitting in the garden <at a> [//] uh <in a> [//] uh at a house

On the whole, although the distributional patterns for retractions and repetitions are less clear-cut than for empty pauses, the impression is confirmed that the increase of these disfluency

markers most often indicates problems which are linked to lexical access. In answer to RQ2b, the analysis has thus established that it was found that the attriting groups use more CDMs (in particular empty pauses) before lexical and lexically-assigned items than the reference groups.

Discussion

The analysis presented here reveals that there are clear differences in the use of disfluency markers in the L1 of long-term migrants on the one hand and the reference population on the other. While all attriting groups made more use of empty pauses, repetitions and retractions than the controls, only the GENL group used filled pauses more often than the reference group. This may indicate that attriters use the former kinds of hesitation markers to cope with the increased cognitive demands of bilingual speech production and decreased accessibility of their L1 system, while their deployment of filled pauses may shift towards the L2 norm due to interlanguage effects in those cases where the L2 employs them differently from the L1. This finding is interesting in view of Clark & Fox Tree's (2002) hypothesis that FPs have a communicative and semantic potential which other disfluency markers lack, and that they are governed by syntactic rules.

The conclusion that CDMs are used more often by the attriters due to cognitive demands is backed up by the fact that this overuse was confined to clause-internal contexts, while the use of CDMs at clause boundaries did not differ between the populations. This suggests that the higher incidence of CDMs is indeed due to the increased demands of bilingual processing and L1 attrition affecting micro-planning. Macro-planning strategies linked towards organizing the overall content and structure of the utterance, on the other hand, show no difference between the attriting and the control populations. A different possibility is that the strategies used by the three languages under observation here, which are all closely typologically related, may not have changed because of their similarity across languages.

Further investigations of typologically more distant languages will have to ascertain which of these two explanations is the more convincing one.

An interesting finding is the fact that the attriters overuse CDMs particularly preceding lexical items (nouns and verbs), indicating that lexical access has become compromised over the attritional period. The finding that for the GENL group EPs have increased only before nouns, while the GECA and NLCA groups also have more pauses before verbs may be linked to the fact that German and Dutch are closely related and a substantial part of the lexicon of the two languages consists of cognates. A similar explanation might account for the fact that EPs appear more often before prepositions for the two L2 English groups, since the use of prepositions in Dutch and German overlaps to a large extent.

The fact that the most clear-cut and consistent difference between attriters and controls was found with respect to CDMs preceding articles and pronouns suggests the intriguing possibility that, for the attriting groups, lexical access problems may have 'spread' to include other types of information activated by the noun. There is considerable evidence that unattrited native speakers have access to gender information in tip-of-the-tongue phenomena: they know the gender of the word that they are trying to access (e.g. Caramazza & Miozzo, 1997), as was the case in example (1) above. We might therefore speculate that this type of knowledge is not immune to the attritional process, and that attriters may occasionally prefer to retrieve the lexical item in question from memory before committing themselves to its gender. Since the German article does not only have to be marked for grammatical gender but also for case, it is possible that these hesitation patterns indicate insecurities linked to case-marking. This explanation, however, appears less likely for two reasons: firstly, case is also marked on adjectives, which are very rarely preceded by disfluency phenomena of any kind in the data at hand. Secondly, Dutch articles carry no case inflection, but EPs before articles have increased more strongly for the Dutch attriters than for the Germans.

The only non-lexical items before which hesitation phenomena occur more frequently among the attriters are prepositions. This is an interesting development in view of the proposal that free grammatical morphemes are more vulnerable in processes of language contact and language attrition than bound morphemes (e.g. Andersen, 1982; Haugen, 1978; Schmid, 2002), and that errors involving the choice of preposition are common (Olshtain, 1989). The fact that prepositions are often repeated or corrected (and are also often preceded by an unfilled pause) may therefore be an indication that attriters were sometimes unsure about which preposition goes with particular phrases.

Conclusion

The present investigation has demonstrated that disfluency phenomena can change in the process of first language attrition. Disfluency markers with a cognitive function (CDMs) have been shown to be more frequent in data from attriters than from controls, while markers with a semantic function (SDMs) may be subject to interlanguage effects.

The increase of CDMs in the data from the attriters was interpreted as a symptom of the fact that the attritional process can lead to reduced accessibility of lexical and grammatical information. In other words, the higher incidence of disfluency markers was taken as an indication of slower processes of activation of (predominantly lexical) information. It was argued that the increase is not due to content planning, since the distribution of hesitation markers at clause boundaries did not vary between the experimental and the control populations.

Finally, the analysis of the syntactic placement of the disfluency markers indicated that hesitation strategies were mainly employed in connection with the retrieval of lexical information. However, it was also suggested that it is not only the pure lexical form which may be affected in the process of language attrition, but also lemma-specific grammatical

information such as the gender of nouns. This suggests that the attrition of lexical retrieval is more complex than has previously been assumed, and that investigations of disfluency markers can further our understanding of this process.

Notes

Authors' note

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- ¹ No empirical validation for this claim is presented by the author.
- ² Note that these findings are in accordance with the assumption that CDMs fulfill a cognitive function, while SDMs are language specific.
- ³ It is, perhaps, interesting to note that Riazantseva (2001) appears to consider the lack of correspondence between incidence and length of pauses in L1 and proficiency in the L2 a given, since she notes that this “was to be expected” (p. 510). This remark seems to suggest an unawareness of the possibility of changes or attrition in the L1 among speakers residing in an L2 environment.
- ⁴ An exception is formed here by de Leeuw’s group of L1 Dutch speakers, for whom the incidence of filled pauses in L1 and L2 varied according to level of proficiency and L2 (pp. 37ff.). This finding may be due to the fact that native spoken Dutch makes more use of filled pauses than English or German (see below).
- ⁵ Yukawa’s second speaker is investigated twice, once during an extended stay in Hawaii and once during a period in Stockholm. Each sojourn is followed by a ‘regaining’ period in Japan.
- ⁶ In the populations under investigation, Germans and Dutch, it is becoming increasingly difficult to find speakers who are entirely monolingual. The control group speakers who participated in the present investigation do not routinely make use of a second or foreign language, and do not report having high proficiency in any such language.
- ⁷ The code @s added at the end of lexical item indicates that this item belongs to the L2 (in this case English).
- ⁸ Given the complexity of the data and the large number of analyses to be conducted, we opted for a relatively conservative alpha level of .01. In other words, we considered a finding significant when $p < .01$.

⁹ <http://chilides.psy.cmu.edu/morgrams>, see also MacWhinney 2000. Lexical items which were unknown to the German and Dutch Part-of-Speech programs downloadable on the CLAN website were added to the lexicon by hand. In those cases where there was an ambiguous classification of a word, the first definition was used.

¹⁰ @s designates a codeswitch (see footnote 7 above).

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Appendix: Comparison of element following hesitation markers by group, significant differences (Mann-Whitney U)

		FP			EP			RP			RT		
		GECA	GENL	NLCA	GECA	GENL	NLCA	GECA	GENL	NLCA	GECA	GENL	NLCA
		vs. GECG n = 105	vs. GECG n = 103	vs. NLCA n = 90	vs. GECG n = 105	vs. GECG n = 103	vs. NLCA n = 90	vs. GECG n = 105	vs. GECG n = 103	vs. NLCA n = 90	vs. GECG n = 105	vs. GECG n = 103	vs. NLCA n = 90
ADJ	U	1302.00	1084.00	737.50	1348.50	1186.50	964.50	1325.00	1325.00	877.50	1217.00	1295.50	1012.50
	p	0.523	0.062	0.020	0.662	0.088	0.612	0.151	1.000	0.134	0.043	0.601	1.000
	r	0.00	0.03	0.06	0.00	0.03	0.00	0.02	0.00	0.03	0.04	0.00	0.00
ADV	U	1362.50	1129.50	956.00	1031.50	1276.50	955.00	1378.00	1261.00	884.50	1060.50	1159.50	911.50
	p	0.920	0.192	0.636	0.012	0.697	0.606	1.000	0.478	0.175	0.024	0.215	0.292
	r	0.00	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.05	0.01	0.01
ART	U	1231.00	1031.00	877.50	1016.50	1021.50	692.50	1206.50	1132.00	893.00	936.00	849.00	704.00
	p	0.329	0.046	0.251	0.002**	0.007**	<.001**	0.078	0.048	0.174	0.002**	0.001**	0.002**
	r	0.01	0.04	0.01	0.09	0.07	0.15	0.03	0.04	0.02	0.09	0.11	0.10
CONJ	U	1076.00	1124.00	743.00	1263.00	1230.50	592.50	1354.50	1320.50	789.50	1366.50	1283.00	738.50
	p	0.024	0.113	0.028	0.237	0.308	<.001**	0.683	0.942	0.028	0.931	0.745	0.020
	r	0.05	0.02	0.05	0.01	0.01	0.14	0.00	0.00	0.05	0.00	0.00	0.06
N	U	1331.00	1023.00	969.00	859.50	1082.00	565.00	1298.00	1323.50	802.00	1348.50	1170.00	933.00
	p	0.756	0.042	0.723	<.001**	0.04	<.001**	0.165	0.967	0.076	0.821	0.202	0.442
	r	0.00	0.04	0.00	0.15	0.04	0.16	0.02	0.00	0.03	0.00	0.02	0.01
PREP	U	1217.50	1019.00	886.00	1002.00	1125.50	699.00	927.00	994.50	724.50	1244.00	952.00	895.50
	p	0.286	0.038	0.301	0.002**	0.070	0.007**	0.001**	0.008**	0.014	0.367	0.011	0.315
	r	0.01	0.04	0.01	0.09	0.03	0.08	0.11	0.07	0.07	0.01	0.06	0.01
PRO	U	1241.00	1184.00	866.50	1009.50	1071.50	648.50	1286.00	1259.50	587.00	1181.50	1301.50	662.00
	p	0.373	0.345	0.236	0.004**	0.034	0.003**	0.397	0.529	<.001**	0.174	0.864	0.004**
	r	0.01	0.01	0.02	0.08	0.04	0.10	0.01	0.00	0.14	0.02	0.00	0.09
V	U	1361.00	1034.50	729.50	1022.00	996.00	631.00	1229.00	1220.50	646.00	1111.00	1077.50	665.00
	p	0.913	0.054	0.022	0.011	0.016	0.002**	0.145	0.273	0.002**	0.076	0.093	0.004**
	r	0.00	0.04	0.06	0.06	0.06	0.11	0.02	0.01	0.10	0.03	0.03	0.09

Table 1: Comparison of overall proficiency measures of attriters and controls for German L1

(One-Way Anovas)

	GECA	GENL	GECG	F (2, 156)	p	η
C-Test	75.26	77.21	82.21	5.025	.008	0.25
Verbal fluency	20.24	20.91	25.09	16.943	<.001	0.42

Table 2: Comparison of overall proficiency measures of attriters and controls for Dutch L1 (t-tests)

	NLCA	NLCG	T (88)	p	r
C-Test	56.78	79.62	-6.008	<.001	0.54
Verbal fluency	17.98	21.90	-4.487	<.001	0.44

Table 3: Word count

Group	Total words	Words per speaker	
		mean	Std.dv.
GECA	39,635	747.83	284.75
GENL	42,298	798.08	267.08
GECG	40,839	770.55	399.77
NLCA	34,215	760.33	311.68
NLCG	37,348	829.96	314.20
Total	166,099		

Table 4: Distribution of hesitation markers across groups (percentages refer to group totals)

Group	FP		EP		RP		RT		Total
GECA	n	%	n	%	n	%	n	%	2,614
	1,310	50.11	526	20.12	156	5.97	622	23.79	
	mean	SD	mean	SD	mean	SD	mean	SD	
	25	19	10	9	3	3	12	9	
GENL	n	%	n	%	n	%	n	%	3,052
	1,808	59.24	529	17.33	126	4.13	589	19.30	
	mean	SD	mean	SD	mean	SD	mean	SD	
	36	24	12	4	3	2	8	8	
GECG	n	%	n	%	n	%	n	%	2,022
	1,312	64.89	198	9.79	83	4.10	429	21.22	
	mean	SD	mean	SD	mean	SD	mean	SD	
	24	21	4	5	2	2	8	5	
NLCA	n	%	n	%	n	%	n	%	4,139
	1,877	45.35	1,176	28.41	531	12.83	555	13.41	
	mean	SD	mean	SD	mean	SD	mean	SD	
	42	35	26	24	12	9	12	9	
NLCG	n	%	n	%	n	%	n	%	3,134
	1,880	59.99	660	21.06	258	8.23	336	10.72	
	mean	SD	mean	SD	mean	SD	mean	SD	
	42	20	15	8	6	5	7	4	
Total	n	%	n	%	n	%	n	%	14,961
	8,187	54.72	3,089	20.65	1,154	7.71	2,531	16.92	
	mean	SD	mean	SD	mean	SD	mean	SD	
	33	25	13	15	5	6	10	8	

Table 5: Comparison of hesitation markers between groups (Mann-Whitney U)

	FP	EP	RP	RT
GECA vs. GECG n = 105	U = 1255.00 p = .430	U = 645.00 p < .001**	U = 892.50 p = .001*	U = 957.50 p = .007*
GENL vs. GECG n = 103	U = 907.00 p = .006*	U = 765.00 p < .001**	U = 997.00 p = .026	U = 925.50 p = .008*
NLCA vs. NLCG n = 90	U = 891.50 p = .329	U = 686.00 p = .008*	U = 542.50 p < .001**	U = 624.50 p = .002*

Table 6: Hesitation markers per 100 words

	FP/100 words		EP/100 words		RP/100 words		RT/100 words	
	mean	SD	mean	SD	mean	SD	mean	SD
GECA (n = 52)	3.26	2.81	1.31**	1.28	0.39**	0.49	1.55**	0.94
GENL (n = 50)	4.33*	5.45	1.27**	2.15	0.30(*)	0.46	1.41**	1.92
GECG (n = 53)	3.17	6.15	0.48	0.66	0.20	0.40	1.02	1.22
NLCA (n = 45)	5.49	4.18	3.44**	2.67	1.55**	1.65	1.62**	1.10
NLCG (n = 45)	5.03	2.46	1.77	1.33	0.69	0.44	0.90	0.42

(*): comparison with control group (t-test) $p < .05$, *: comparison with control group $p < .01$,

** : comparison with control group $p < .001$

Table 7: Distribution of hesitation markers per 100 words across genders

Sex	male	female	
FP/100 words	6.27	4.20	t (248) = 4.859, p < .001
EP/100 words	2.15	1.70	t (248) = 1.963, p = .051
RP/100 words	0.97	0.54	t (248) = -.762, p = .447
RT/100 words	1.48	1.55	t (248) = 3.558, p < .001

Table 8: Distribution of hesitation markers across genders by L1 group

Sex	German L1			Dutch L1		
	male	female		male	female	
FP/100 words	5.58	3.64	$t(158) = 3.565, p < .001$	7.41	5.55	$t(88) = 2.681, p < .01$
EP/100 words	1.41	1.16	$t(158) = 1.059, p = .291$	3.44	3.04	$t(88) = .742, p = .460$
RP/100 words	0.40	0.32	$t(158) = -.139, p = .889$	1.38	1.58	$t(88) = -1.063, p = .291$
RT/100 words	1.49	1.51	$t(158) = 1.178, p = .240$	1.64	1.04	$t(88) = 2.698, p < .01$

Table 9: Pearson Correlation of age and hesitation markers per 100 words

	Age	Length of residence
FP/100 words	.063	-.014
EP/100 words	.091	-.234**
RP/100 words	.165**	-.298**
RT/100 words	.071	.022

** = $p < .01$

Table 10: Pearson Correlation of age and hesitation markers per 100 words per L1 group

	L1 German Age	Length of residence	L1 Dutch Age	Length of residence
FP/100 words	.088	.172	.088	.172
EP/100 words	.022	-.044	.022	-.044
RP/100 words	.104	.172	.104	.172
RT/100 words	.144	.190	.144	.190

Table 11 Pearson Correlation of amount of L1 use and hesitation markers per 100 words

		BILMOD	INTMOD	MONMOD
FP/100 words	r	-0.129	-0.033	-0.101
	p	0.118	0.691	0.224
EP/100 words	r	-0.19	-0.128	-0.195
	p	0.021	0.121	0.018
RP/100 words	r	-0.209	-0.091	-0.183
	p	0.011	0.275	0.026
RT/100 words	r	-0.114	-0.179	-0.049
	p	0.17	0.03	0.555

Table 12: Comparison of 'clause'-initial and -final hesitation markers between attriters and controls (Mann-Whitney U)

	FP		EP		RP		RT	
	mean	SD	mean	SD	mean	SD	mean	SD
Attriters	2.39	1.66	3.93	3.32	1.48	.68	1.00	.00
Controls	3.77	3.08	4.94	6.06	1.57	.75	1.35	.65
Clause-initial	U (195) = 3100.5 p = .001*		U (168) = 3013.5 p = .402		U (42) = 207.0 p = .698		U (29) = 51.0 p = .170	
Attriters	5.35	5.15	2.57	1.76	1.93	1.33	2.92	2.02
Controls	5.78	4.72	3.61	3.97	1.76	1.18	2.98	2.05
Clause-final	U (218) = 5233.5 p = .284		U (153) = 2324.5 p = .201		U (60) = 281.0 p = .421		U (121) = 1571.0 p = .973	

Table 13: Word class of subsequent element by hesitation marker per 100 words of spoken data (speaker averages)

	EP				RP				RT			
	ATT (n = 147)		CON (n = 98)		ATT (n = 147)		CON (n = 98)		ATT (n = 147)		CON (n = 98)	
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
ADJ	0.040	0.13	0.024	0.11	0.022	0.09	0.016	0.09	0.021	0.06	0.016	0.05
ADV	0.105	0.15	0.079	0.16	0.035	0.08	0.025	0.06	0.112	0.15	0.057	0.11
ART	0.085	0.17	0.016	0.08	0.043	0.08	0.018	0.06	0.204	0.25	0.057	0.11
CONJ	0.131	0.28	0.078	0.18	0.035	0.10	0.025	0.07	0.128	0.20	0.096	0.14
N	0.181	0.25	0.061	0.13	0.083	0.21	0.070	0.13	0.063	0.10	0.058	0.10
PREP	0.119	0.22	0.097	0.16	0.038	0.10	0.018	0.06	0.091	0.15	0.081	0.12
PRO	0.129	0.19	0.060	0.13	0.149	0.20	0.069	0.13	0.245	0.23	0.144	0.17
V	0.212	0.31	0.121	0.22	0.131	0.26	0.070	0.12	0.264	0.33	0.193	0.22
OTH	0.358	0.49	0.184	0.35	0.171	0.35	0.108	0.17	0.379	0.38	0.259	0.33

Table 14: Word class of element following filled pauses per 100 words of spoken data
(speaker averages)

	FP			
	ATT		CON	
	mean	SD	mean	SD
ADJ	0.089	0.15	0.147	0.27
ADV	0.377	0.42	0.336	0.37
ART	0.293	0.36	0.202	0.25
CONJ	0.265	0.43	0.195	0.36
N	0.440	0.44	0.426	0.46
PREP	0.407	0.49	0.442	0.50
PRO	0.385	0.43	0.334	0.36
V	0.614	0.72	0.629	0.54
OTH	0.947	0.84	1.101	0.92

Table 15: Comparison of element following hesitation markers by group, significant differences (Mann-Whitney U)

element following hesitation marker		EP			RP			RT		
		GECA vs. GECG	GENL vs. GECG	NLCA vs. NLCG	GECA vs. GECG	GENL vs. GECG	NLCA vs. NLCG	GECA vs. GECG	GENL vs. GECG	NLCA vs. NLCG
		n = 105	n = 103	n = 90	n = 105	n = 103	n = 90	n = 105	n = 103	n = 90
ART	U	1016.50	1021.50	692.50				936.00	849.00	704.00
	p	0.002**	0.007**	<.001**				0.002**	0.001**	0.002**
	r	0.09	0.07	0.15				0.09	0.11	0.10
N	U	859.50	1082.00	565.00						
	p	<.001**	0.04	<.001**						
	r	0.15	0.04	0.16						
PREP	U	1002.00		699.00	927.00	994.50	724.50			
	p	0.002**		0.007**	0.001**	0.008**	0.014			
	r	0.09		0.08	0.11	0.07	0.07			
PRO	U	1009.50		648.50			587.00			662.00
	p	0.004**		0.003**			<.001**			0.004**
	r	0.08		0.10			0.14			0.09
V	U	1022.00		631.00			646.00			665.00
	p	0.011		0.002**			0.002**			0.004**
	r	0.06		0.11			0.10			0.09

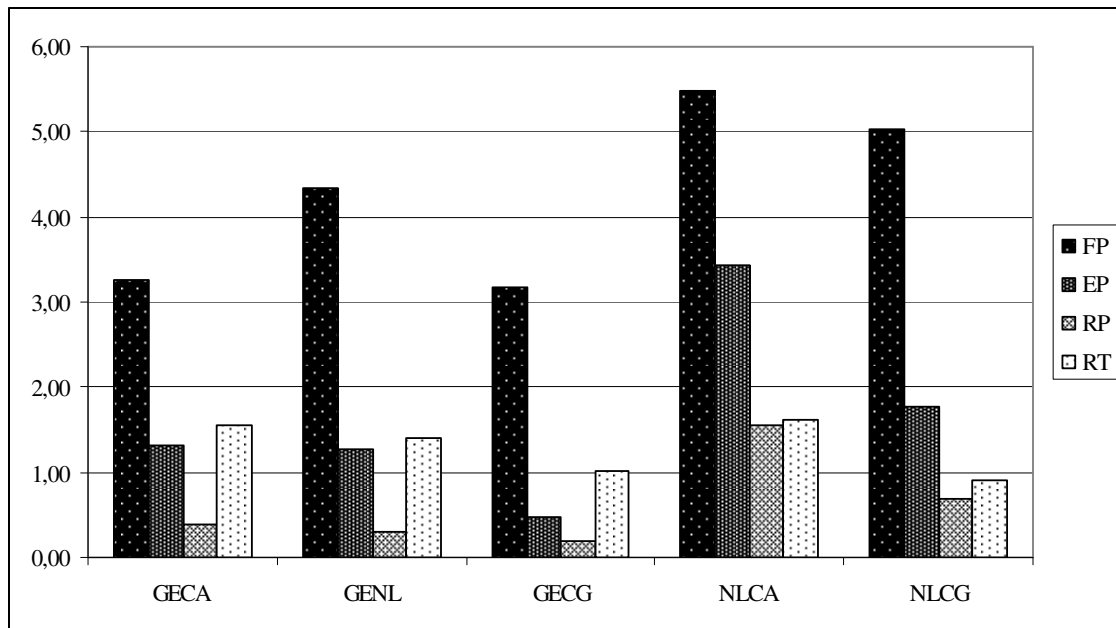


Fig. 1: Distribution of hesitation markers per 100 spoken words

Note: GECA = German attriters in Canada, GENL = German attriters in the Netherlands, GECG = German control group, NLCA = Dutch attriters in Canada, NLCG = Dutch control group, FP = filled pauses, EP = empty pauses, RP = repetitions, RT = retractions

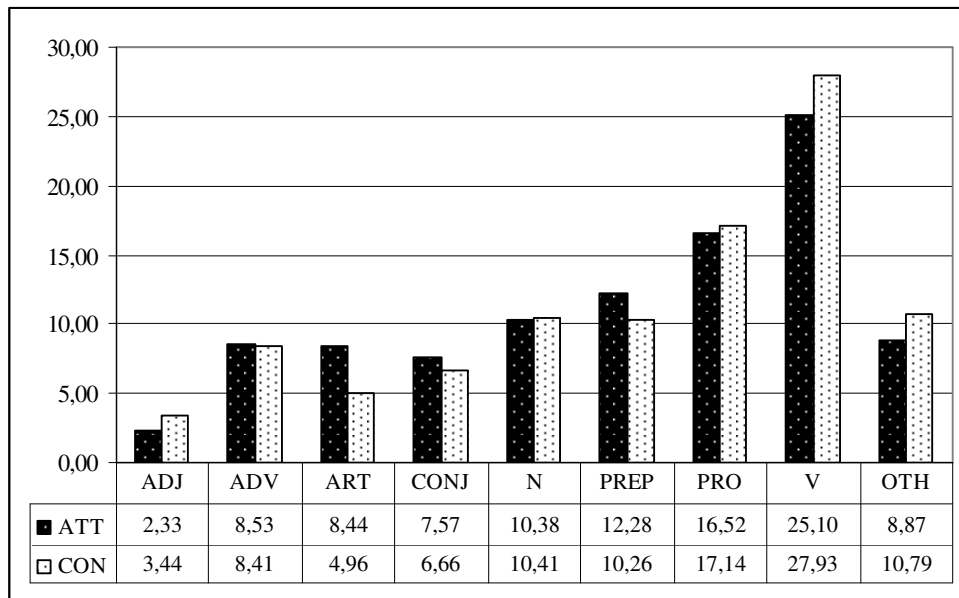


Fig. 2: Type of element (%) following hesitation markers

Note: ATT = attriters, CON = controls, ADJ - adjective, ADV = adverb, ART = determiner,
 CONJ = conjunction, N = noun, PREP = preposition, PRO = pronoun, V = verb, OTH = other