

# Disfluencies in spontaneous speech in younger and older adults in easy and difficult communicative situations

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Spontaneous conversational speech is notoriously disfluent (Bortfeld et al., 2001): disfluencies (DFs) such as word and phrase repetitions and false starts may form even up to 5-10% of everyday conversations (Clark, 1994). Disfluencies in spontaneous speech are often associated with disruptions in word-finding or formulating sentences, with distractions (Yairi & Seery, 2011) or with an increase in cognitive load (Bortfeld et al., 2001). It has also been shown that talkers become more disfluent when they are speaking in background noise (Jou & Harris, 1992, Southwood & Dagenais, 2001). There are well-documented changes in speech perception and production with increasing age. Older talkers have more difficulty retrieving words than do younger talkers (Burke et al., 1991) generating more disfluencies in discourse compared to younger adults (YAs) (Bortfeld et al., 2001). Older adult (OA) talkers also often report having particular difficulty communicating in challenging listening conditions, e.g. in noise or in the presence of other talkers.

When communication becomes effortful, talkers need to make various adjustments to their speech production to aid listener's understanding. For example, they may use a 'clear speaking style', which involves them speaking more slowly and reducing the complexity of their utterances amongst other characteristics. Adopting a more careful speaking style is likely to result in decrease in disfluencies in conversation, but it is not known whether OA talkers become less disfluent when speaking clearly than casually. Moreover, it is not known whether OA talkers become more disfluent than YA talkers when they are communicating in challenging listening conditions. The aim of the current study was to investigate disfluency rates in younger and older adults when they are speaking casually, when they are speaking clearly for the benefit of their interlocutor, and when they are speaking in background noise.

83 older adults aged 65 to 85 years (30 female) and 26 younger adults aged 18 to 35 years (15 female) were recorded while they completed a problem-solving spot-the-difference picture task (diapixUK; Baker & Hazan, 2011) with a young adult interlocutor (aged 18-33 years). The main participants (OA, YA) were told to take the lead in the interaction ('Talker A' role) while the young adult interlocutor had a more passive role ('Talker B'). Talker pairs completed the tasks in three different listening conditions: when no interference was present (NORM), when Talker B had a simulated severe-to-profound hearing loss (HLS),

and when both talkers heard 8-talker babble noise (BAB2). It was expected that the NORM condition would elicit a casual speaking style in Talker A while the HLS and BAB2 would elicit a clear speaking style, as this would be necessary to communicate effectively despite the communication barrier. DFs were classified from Talker As speech using a system adapted from Shriberg's Disfluency Types (Shriberg, 2001) that has previously been used to analyse spontaneous speech (see Table 1). DF types and their position in an utterance (not reported here) were identified manually in Praat (version 6.0.19) and their frequencies were extracted using an in-house Praat script. Because the length of the speech samples differed between different speakers, the disfluency rate was calculated as a percentage of disfluent items relative to the total number of words produced in each listening condition. We predicted that all talkers would produce more disfluencies in a casual speaking style than in a clear style. We also predicted that OA talkers would produce more disfluencies overall than YA talkers both when communication was easy (NORM) and difficult (HLS and BAB2), and that they would be particularly affected by the background babble. In addition to the effects of age, some studies have shown that men produce more disfluencies than women (Shriberg, 1994; Bortfeld, 2001), and we predicted that we would find these gender differences across all speaking styles.

Preliminary statistical results based on an analysis of a subset of talkers (N=20) across all disfluency types show that, as predicted, OA talkers produced more disfluencies (7.8%) than YA talkers (6.2%), and male talkers (8.3%) more than female talkers (5.5%) in the NORM condition. Furthermore, female talkers (both YA and OA) produced less disfluencies when they were talking clearly for the benefit of their interlocutor (HLS condition, see Table 2). However, male talkers did not show the same disfluency reduction in difficult communicative conditions. Against our predictions, when talking in background noise (BAB2), older adult male talkers produced less disfluencies than when communicating in good listening conditions (NORM). The other talker groups did not significantly increase or decrease the disfluencies in background noise (see Table 2). However, descriptive data (and preliminary statistical analyses) show that older adult female talkers produced marginally more disfluencies in the BAB2 condition than in the NORM condition indicating a potential difficulty communicating in background

noise. Together these preliminary results indicate that there are age- and gender-related differences in disfluency rates in casual spontaneous speech. Furthermore, there are potential age and gender differences when talkers are either adapting their speech for the benefit of their interlocutor or communicating in noise. However, these results are based on a subset of the data and should be treated as

showing possible statistical trends. Analysis from a larger set of talkers will be presented at the workshop. Analyses of other factors (such as speaking rate and hearing status) that might affect disfluency rates in these groups, along with analyses of different disfluency types (including within-speaker silent pauses) will also be presented.

**Table 1.** Disfluency types adapted from Shriberg, 2001.

Group of disfluency	Type of disfluency	Example
Filled pauses	Erm, err	Show flights from Boston on (erm) from Denver on Monday
	Other	Show flights from (like) Boston
Repetitions	Word repetitions	Show the – the morning flights
	Phrase repetitions	Show the – show the morning flights
	Part-word repetitions	Show the morn – morning flights
	Insertions	Show the flights – show the morning flights
	Articulation errors	Show me the flee – flights
Substitutions		Show the morning – show the evening flights
	False starts	Show me the – which flights go to Boston
Incomplete phrases		

**Table 2.** Percentage of disfluencies out of all words produced in younger and older adult talkers (SD in brackets).

	NORM	HLS	BAB2
YA female	5.1 (2.7)	3.5 (1.7)	3.9 (3.5)
YA male	7.3 (1.9)	7.3 (2.9)	8.2 (1.8)
OA female	6.0 (1.4)	3.6 (2.4)	8.1 (6.4)
OA male	9.2 (1.7)	9.4 (1.4)	7.8 (2.0)

## References

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