

A prosodic contribution to the understanding of stuttering in European Portuguese

Marisa Cruz & Sónia Frota

Universidade de Lisboa (Laboratório de Fonética – FLUL/CLUL)

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Background

Past studies showed that:

- There was more stuttering at initial words of long sentences than of short sentences containing exactly the same sequences of words (Törnrick & Bloodstein, 1975);
- The relation between syntactic structure and fluency could vary according to the task proposed to speakers (Gordon & Luper, 1989);
- Stuttering is a prosodic disturbance (Bergmann, 1986). This is further explored by Bloodstein (1995) or Hubbard (1998), where the relevance of prosodic constituents and word stress is argued for;
- Syntactic complexity plays an important role in stuttering (Silverman & Bernstein, 1997).

More recently:

- In Gordon and Luper's vein (1989), Logan (2001) saw that speakers produce more disfluencies in spontaneous speech;
- Logan's results do not support the hypothesis that one type of syntactic structure affects the speech fluency of adults who stutter, more than any other type of syntactic structure;
- There are no differences in either the percent of syllables stuttered or the percent of syllables with other types of disfluency across the 4 categories of length matched sentences (Logan, 2001);
- Participants articulated syntactically complex sentences at a significantly faster rate than syntactically simple sentences (Logan, 2001);
- Arbisi-Kelm (in press) showed that stutters appear to be sensitive to prosodic breakdowns well before articulation of the problematic material because they frequently produce disfluencies both in prosodically predictable anticipatory and target positions (e.g. final PhP within ip)

Phrasing in EP

Clitic (CL):

- function word, unstressed, prosodically dependent. A pronominal post-verbal clitic incorporates the preceding host, forming a PW (enclitic). The remain clitics (I) may occur in initial position without a left host, thus, they are adjoined to the PW at its right (proclitics), (ii) may not have a right host and, thus, they may receive prominence (nuclear accent) in the I-phrase (post-lexical PW, except pronominal clitics), (iii) or they may form a single I-phrase (except pronominal clitics). [Vigário 2003]

Prosodic Word (PW):

- presence of word stress, dominates the next lower prosodic level (Minimal PW) or may dominate two or more constituents of the same type (Compound PW). Both focus assignment and pitch accent distribution provide important evidence for this constituent. It is dominated by the Phonological Phrase (Maximal PW). [Vigário 2003; but see Vigário 2007 for the PWG]

Phonological Phrase (PhP):

- lack of final lengthening, lack of intonational and segmental evidence [Frota, 1994, 2000].

Intonational Phrase (I):

- pre-boundary lengthening, presence of a nuclear accent, final boundary tone, initial tone associated to the right-edge of the first prosodic constituent within de I-phrase (Vigário 2003; Frota 2000, 2003), its edges constitute the *loci* of potential pause insertion.
- utterances predominantly display a (SVO) type of phrasing. When the subject is more than 8 syllables long (a long branching subject), it displays a (S)(VO) phrasing. This tendency is gradual (it gets stronger as subjects become longer) and arises from two properties: (i) the parameter of prosodic weight (number of syllables) already mentioned and (ii) the syntactic position of subject (internal to Extended VP). [Elordieta, Frota & Vigário 2005]

Present Research

Our goal: test the importance of syntactic complexity, (prosodic) length and (other) prosodic factors on the fluency of stuttering adults, in European Portuguese (EP).

Measurements: (i) segmental and syllabic lengthening in stuttering and its prosodic distribution; (ii) duration and prosodic distribution of both filled and silent pauses (excluding breathing pauses); (iii) prosodic *loci* of all stuttering events (within the PW, the PhP and the I, and relative to stress); (iv) prosodic distribution of stuttering by complexity type; (v) prosodic distribution of stuttering by length (in terms of number of both syllables and PW).

Predictions: we predict that the production of disfluencies increases (i) as the syntactic structure of NP Subject becomes more complex (following Logan's 2001 syntactic complexity definition), and (ii) as the NP Subject becomes longer (in terms of number of syllables/PW). We also hypothesise that disfluencies occur more frequently at the head of prosodic constituents (PW, PhP and I).

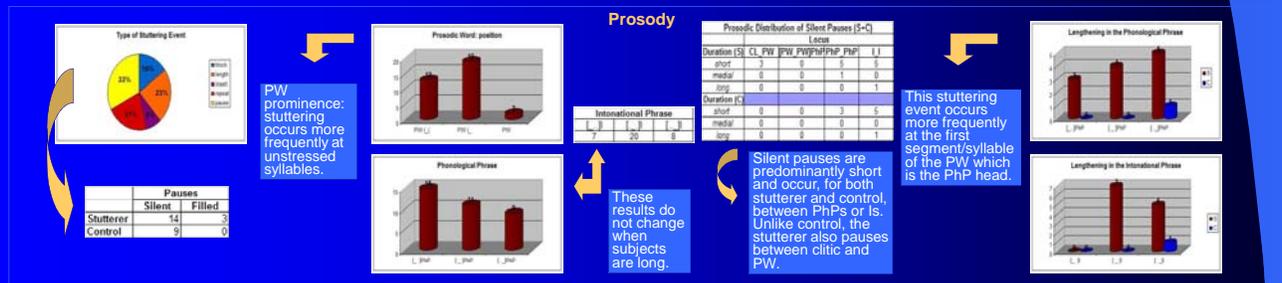
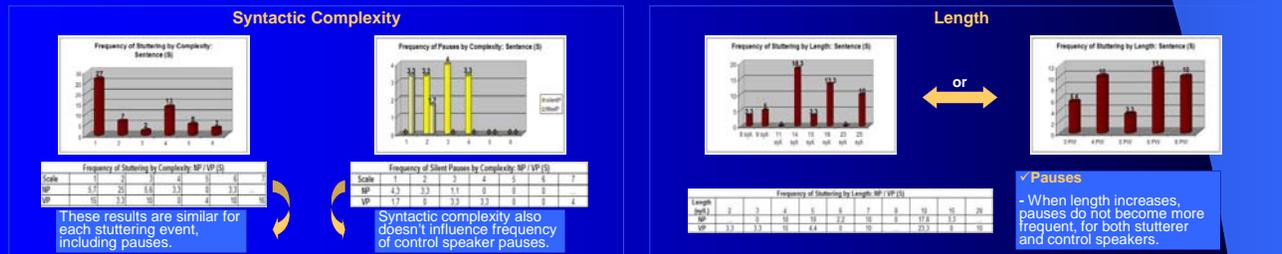
Methodology

Procedure: sentences read in random order by two male age matched adult speakers (a stuttering and a non stuttering speaker) and recorded in a quiet room with Marantz PMD670 and two microphones Beyerdynamic Opus 55.18 MK II. The 44100Hz digital files were converted to 22050Hz format, edited with Adobe Audition 1.5 tool (Adobe Systems Incorporated, 2004) and each sentence was annotated using Praat 5.0.01 (Boersma & Weenink, 2007).

Corpus: a total of 30 sentences (38 Is) manipulated in terms of NP Subject, VP and Sentence (i) syntactic complexity (see table aside) and (ii) length (number of syllables – 2 to 25 – and PWs – 3 to 8) x 2 speakers.

Scale	NP Subject	VP
1	Syntactic Structure: Det + N	Syntactic Structure: V
2	Det + Adj + Adj + N	V + CL
3	Det + N + PP	Adj + PCL + V
4	Det + N + PP + PP	V + Adj // V + Adj // V + Predic.
5	Det + N + Rel. Cl	V + N // V + Det + N
6	Det + N + Rel. Cl + Mod.	V + CL + Det + N
7	...	V + N + PP // V + Det + N + PP

Results



Main findings

- The higher or lower frequency of stuttering events is not dependent on:
 - the syntactic complexity of NP, VP or sentence;
 - the length of NP, VP or sentence (in terms of number of syllables or number of PWs).
- Pauses and Lengthening are the two most frequent types of stuttering events.

- Prosodic constituency is shown to constrain stuttering patterns: PW(; [_]PhP; [_]PhP
 - Stuttering occurs at the beginning of the PhP's first PW (usually unstressed), except lengthening which occurs at the opposite edge of PhP (the last PW – head);
 - Stuttering occurs at the Intonational Phrase medial position, even with subjects longer than 8 syllables;
 - Short silent pauses are predominantly produced between PhPs and between Is; unlike control, the stuturer also pauses between clitic and PW: PW(CL _ PW).

Future work: prosodic phrasing and intonation in the spontaneous and read speech of stutters and non-stutters (4 speakers)