1 Methods

Participants

Information about the participants

Materials

Information about the general design of the experiment etc.

A phonetically trained female native speaker of German was instructed to realize two prosodic versions of each target sentence, and four versions of the target-related fillers. In addition to these sentences, a set of unrelated fillers and neutral control structures was also recorded. For these constructions, the speaker was instructed to realize prosodic contours as neutral and natural as possible.

For all target sentences (AS and ES), the determiner „some“ was produced with a contrastive pitch accent as well as with a neutral accent, respectively. Contrastive accents in German are realized by an H*L contour (***Refs***.), thus employing a generally falling pattern. A set of 15 experimental items was recorded for each condition (*accented* vs. *unaccented*), resulting in a total number of 60 target sentences.

In contrast to the accent manipulation, target-related fillers differed with respect to prosodic phrasing. Prosodic phrase boundaries in German are realized by a rise in F0 as well as by a durational increase on the final part of the constituent preceding the boundary (‘prefinal lengthening’) plus an optional pause (Vaissière, 1983; Féry, 1993). Boundaries for these filler sentences were either realized at the position separating the second PP from the preceding material (*late boundary*, corresponding to a high-attachment reading) or directly preceding the second conjunct in the first PP (*early boundary,* corresponding to a low-attachment reading). As the prosodic realization of the targets involved the comparison between an accented and a neutral variant, we also included a third version of target-related fillers, in which our speaker produced the sentences without any pronounced boundaries. Finally, an additional condition was recorded, using disambiguated sentences that were prosodically neutral (*explanation above*). For each prosodic variant, a set of 30 items was read, yielding 150 target-related fillers. Together with 30 unrelated fillers and 90 control sentences, a total number of 300 sentences was recorded. The session was recorded in an acoustically shielded booth (44.1 kHz sampling rate, 16 bit amplitude resolution).

Before entering the judgment task, experimental items and target-related fillers were analyzed with respect to their acoustic properties. As both accented elements as well as prosodic boundaries were expected to differ with respect to their F0 and/or durational properties, we calculated durational values as well as difference values between minimal and maximal F0 for each

word. As targets slightly differed with respect to the total number of words as well as with respect to certain lexical properties (i.e. *seinen* vs. *ihren*, see above (*where*?)), we considered the following analysis regions:

(xx)
AS: | $_{R1}$Alle | $_{R2}$diese | $_{R3}$NP1 | $_{R4}$sind | $_{R5}$mit | $_{R6}$einigen | $_{R7}$ihrer | $_{R8}$NP2 | $_{R9}$verbunden.
ES: | $_{R1}$Genau einer | $_{R2}$der | $_{R3}$NP1 | $_{R4}$ist | $_{R5}$mit | $_{R6}$einigen | $_{R7}$seiner | $_{R8}$NP2 | $_{R9}$verbunden

Note that differences between Regions 1, 2, 4 and 7 can be expected due to lexical differences between the AS and ES conditions. As target-related fillers did not differ with respect to their lexical properties, we carried out word-by-word analyses for these conditions. Durational values included the respective word plus any following silent interval. Note that we did not include the disambiguated fillers in these analyses as they involved very different sentence types (i.e. constructions involving prepositional phrases vs. relative clauses.)

Petra 1.6.12 14:27
Kommentar: Mir stellt sich hier die Frage, ob wir sie dann vielleicht nicht doch gleich separat auswerten sollen.

(xx)
| $_{R1}$D | $_{R2}$NP1 | $_{R3}$ist | $_{R4}$mit | $_{R5}$NP2 | $_{R6}$und | $_{R7}$NP3 | $_{R8}$mit | $_{R8}$NP4 | $_{R9}$verbunden.

For the durational analyses, constituents were automatically labeled by the *Aligner* Tool (Rapp, 1998), and the obtained values were manually corrected afterwards. For the targets, two-factorial ANOVAS with the factors QUANTIFIER (all vs. exactly one) and PROSODY (accented vs. unaccented) were carried out. For the target-related fillers, we carried out one-factorial ANOVAS with the factor PROSODY (early boundary, late boundary, neutral prosody). F0 values were extracted by means of special Praat scripts (http://www.fon.hum.uva.nl/praat/). For the present analyses, differences between minimal and maximal F0 values for each region or word were calculated. Again, two-factorial ANOVAs were carried out for statistical comparison of the fillers, and one-factorial ANOVAS were carried out for target-related structures.

Targets

Table A shows the durational values for each of the single regions in the sentence. Crucially, durational values of accented determiners were significantly increased as opposed to their non-accented counterparts. Overall, QUANTIFIER effects were observed, which might be attributed to the above-mentioned lexical differences, as well as to the fact that ES structures generally contained fewer words, thus leading to a tendency of a durational decrease for each of the single words.

Differences between maximal and minimal F0 values for each of the single words in the sentence are depicted in Table B. As is descriptively evident, accented determiners showed a larger F0 range compared to unaccented versions, an effect which is confirmed by statistical analyses. An additional QUANTIFIER*PROSODY interaction indicates that these differences are even more pronounced in the AS condition. Finally, comparable to the durational analyses, QUANTIFIER effects were observed when conditions exhibited lexical differences.

Table A: Durational values in ms for each of the single regions in the target sentences. Region 6 corresponds to *einigen*.

	AS		ES		STATISTICS
	acc	**ntr**	**acc**	**ntr**	
R1	225.8	216.9	563.0	530.0	**QUANTIFIER: *F* = 2251.3; *p* < .001** **PROSODY: *F* = 15.2; p < .01** QUANTIFIER*PROSODY: *F* = 3.6; *p* = .09
R2	245.3	234.7	128.7	128.0	**QUANTIFIER: *F* = 525.5; *p* < .001** PROSODY: *F* = 2.5; *p* = .13 QUANTIFIER*PROSODY: *F* = 3.2; *p* = .10
R3	397.0	414.6	398.6	400.0	QUANTIFIER: *F* = .3; *p* = .57 PROSODY: *F* = 1.2; *p* = .29 QUANTIFIER*PROSODY: *F* = 1.5; *p* = .25
R4	172.3	175.6	164.7	152.7	**QUANTIFIER: *F* = 16.1; *p* = .001** PROSODY: *F* = 2.1; *p* = .17 **QUANTIFIER*PROSODY: *F* = 8.7; *p* < .05**
R5	230.2	170.5	226.7	170.0	QUANTIFIER: *F* = .2; *p* = .7 **PROSODY: *F* = 79.0; *p* < .001** QUANTIFIER*PROSODY: *F* = .0; *p* = .90
R6	445.8	422.0	420.6	383.0	**QUANTIFIER: *F* = 31.4; *p* < .001** **PROSODY: *F* = 23.8; *p* < .001** QUANTIFIER*PROSODY: *F* = 1.0; *p* = .34
R7	199.7	194.7	235.3	249.3	**QUANTIFIER: *F* = 19.9; *p* = .001** PROSODY: *F* = .9; *p* = .36 **QUANTIFIER*PROSODY: *F* = 9.6; *p* < .01**
R8	503.0	494.7	494.6	494.7	QUANTIFIER: *F* = .04; *p* = .84 PROSODY: *F* = 2.2; *p* = .17 QUANTIFIER*PROSODY: *F* = 1.7; *p* = .2
R9	722.0	748.0	704.0	764.7	QUANTIFIER: F = .0; p = .98 **PROSODY: F = 10.9; p < .01** QUANTIFIER*PROSODY: F = 2.9; p = .11

Table B: Difference between minimal and maximal F0 values in Hz for each of the single words in the target sentences. Region 6 corresponds to *einigen*.

	AS		ES		STATISTICS
	acc	**ntr**	**acc**	**ntr**	
R1	17.6	19.6	52.7	31.6	**QUANTIFIER: *F* = 14.6; *p* < .01** PROSODY: *F* = 2.5; p = .14 QUANTIFIER*PROSODY: *F* = 3.8; *p* = .07
R2	27.4	36.4	19.0	17.1	**QUANTIFIER: *F* = 17.1; *p* = .001** PROSODY: *F* = 1.9; *p* = .19 QUANTIFIER*PROSODY: *F* = 3.4; *p* = .09

R3	82.6	115.1	67.6	91.7	**QUANTIFIER: $F = 8.7$; $p < .05$** **PROSODY: $F = 20.5$; $p < .001$** QUANTIFIER*PROSODY: $F = .5$; $p = .50$
R4	32.6	60.6	17.6	28.4	**QUANTIFIER: $F = 16.4$; $p = .001$** **PROSODY: $F = 8.6$; $p < .05$** QUANTIFIER*PROSODY: $F = 1.9$; $p < .19$
R5	62.4	46.0	39.8	65.1	QUANTIFIER: $F = .1$; $p = .80$ PROSODY: $F = .3$; $p < .59$ **QUANTIFIER*PROSODY: $F = 5.2$; $p < .05$**
R6	211.3	69.9	174.3	75.1	QUANTIFIER: $F = 2.9$; $p = .11$ **PROSODY: $F = 94.8$; $p < .001$** **QUANTIFIER*PROSODY: $F = 13.7$; $p < .01$**
R7	57.6	51.7	30.4	24.6	**QUANTIFIER: $F = 9.4$; $p < .01$** PROSODY: $F = .6$; $p = .45$ QUANTIFIER*PROSODY: $F = .1$; $p = .80$
R8	36.7	71.4	32.5	53.5	QUANTIFIER: $F = 3.1$; $p = .1$ **PROSODY: $F = 45.5$; $p < .001$** QUANTIFIER*PROSODY: $F = .4$; $p = .51$
R9	47.1	61.5	42.3	60.7	QUANTIFIER: F = .2; p = .69 PROSODY: F = 3.3; p = .09 QUANTIFIER*PROSODY: F = .1; p = .7

Target-related fillers

Table C shows the durational values of each of the single words in the sentence. As is descriptively evident, the largest durational differences were realized at the boundary regions (i.e. Region 5 and Region 7). Interestingly, smallish differences between conditions also yielded significance at other positions, suggesting that our speaker produced the different conditions very consistently (i.e. with little variance).

Table C: Durational values in ms for each of the single regions in the target-related fillers. Regions 5 and 7 correspond to the nouns preceding the boundaries.

	early	**late**	**ntr**	**STATISTICS: EFFECT OF PROSODY**
R1	105.7	100.7	98.1	***F* = 5.0; *p* < .05** Early vs. late: $F = 3.4$; $p = .07$ **Early vs. ntr: $F = 9.1$; $p < .001$** Late vs. ntr: $F = 1.7$; $p = .21$
R2	332.3	306.6	313.6	***F* = 28.1; *p* < .001** **Early vs. late: $F = 70.4$; $p < .001$** **Early vs. ntr: $F = 28.7$; $p < .001$** Late vs. ntr: $F = 3.0$; $p = .09$
R3	168.0	167.0	169.3	$F = .2$; $p = .77$
R4	135.3	139.7	141.3	$F = .7$; $p = .52$

R5	561.3	1268.3	642.6	***F* = 819.5; *p* < .001** **Early vs. late: *F* = 1110.4; *p* < .001** **Early vs. ntr: *F* = 94.4; *p* < .001** **Late vs. ntr: *F* = 680.1; *p* < .001**
R6	143.3	176.3	150.0	***F* = 16.1; *p* < .001** **Early vs. late: *F* = 25.3; *p* < .001** Early vs. ntr: *F* = 1.1; *p* = .30 **Late vs. ntr: *F* = 22.4; *p* < .001**
R7	1183.7	535.3	557.3	***F* = 1920.3; *p* < .001** **Early vs. late: *F* = 2251.4; *p* < .001** **Early vs. ntr: *F* = 2108.1; *p* < .001** **Late vs. ntr: *F* = 9.5; *p* < .01**
R8	167.0	150.3	151.0	***F* = 12.8; *p* < .001** **Early vs. late: *F* = 17.7; *p* < .001** **Early vs. ntr: *F* = 15.8; *p* < .001** Late vs. ntr: *F* = .0; *p* = .85
R9	384.7	381.0	402.7	***F* = 11.7; *p* < .001** Early vs. late: *F* = .7; *p* = .48 **Early vs. ntr: *F* = 11.2; *p* < .01** **Late vs. ntr: *F* = 22.7; *p* < .001**
R10	691.3	681.3	730.0	***F* = 10.0; *p* < .001** Early vs. late: *F* = .8; *p* = .39 **Early vs. ntr: *F* = 11.8; *p* < .01** **Late vs. ntr: *F* = 16.8; *p* < .001**

Finally, differences between maximal and minimal F0 values for each of the single words in the sentence are given in Figure D. Again, the most reliable differences occur at the boundary regions.

	early	**late**	**ntr**	**STATISTICS: EFFECT OF PROSODY**
R1	31.2	23.1	31.7	*F* = .9; *p* = .43
R2	332.3	306.6	313.6	***F* = 7.3; *p* < .01** **Early vs. late *F* = 14.1; *p* = 001** Early vs. ntr. *F* = 1.1 ; *p* = . 30 **Early vs. late *F* = 11.1 ; *p* < .01**
R3	168.0	167.0	169.3	***F* = 4.2; *p* < .05** **Early vs. late *F* = 14.9 ; *p* = .001** Early vs. ntr. *F* = 1.7 ; *p* = . 21 Early vs. late *F* 3.7 = ; *p* = .07
R4	135.3	139.7	141.3	*F* = 1.3; *p* = .39
R5	561.3	1268.3	642.6	***F* = 129.3; *p* < .001** **Early vs. late *F* = 314.1; *p* < .001** **Early vs. ntr. *F* = 84.4; *p* < .001** **Early vs. late *F* = 39.2; *p* < .001**

R6	143.3	176.3	150.0	***F* = 6.7; *p* < .01** Early vs. late $F = 1.4$ $p = .24$ **Early vs. ntr. *F* = 14.8; *p* = .001** **Early vs. late *F* = 5.1; *p* < .05**
R7	1183.7	535.3	557.3	***F* = 132.5; *p* < .001** **Early vs. late *F* = 145.1; *p* < 001.** **Early vs. ntr. *F* = 303.9; *p* < . 001** Early vs. late $F = 1.5$; $p = .23$
R8	167.0	150.3	151.0	$F = .8$; $p = .47$
R9	384.7	381.0	402.7	$F = 3.1$; $p = .06$
R10	691.3	681.3	730.0	***F* = 25.8; *p* < .001** **Early vs. late *F* = 39.7; *p* < .001** Early vs. ntr. $F = .2$; $p = .7$ **Early vs. late *F* = 60.4; *p* < .001**

In sum, our speaker reliably produced (i) differences in accent realization for the target sentences and (ii) different boundary realizations for the target-related fillers. Whereas accented elements clearly differed from their unaccented counterpart by showing an increase in duration and F0 range, prosodic boundaries for our target-related fillers were realized by pre-final lengthening (i.e. an increase in F0 and duration at the position preceding the boundary).

Petra 1.6.12 14:45

Kommentar: Dem leser stellt sich hier vielleicht die Frage, warum wir überhaupt zwischen Akzenten und Grenzen unterscheiden können. Wir könnten noch die Zusatzanalysen präsentieren, die aber sehr aufwendig sind. Durch diese könnte man zeigen, dass Akzente sich eher zu Beginn der NP unterscheiden, Phrasengrenzen aber ganz klar am Ende der Konstituente realisuert werden. Ich finde den Akustikteil aber eh schon recht lang. Was meint Ihr?