The syllable frequency effect before and after speaking

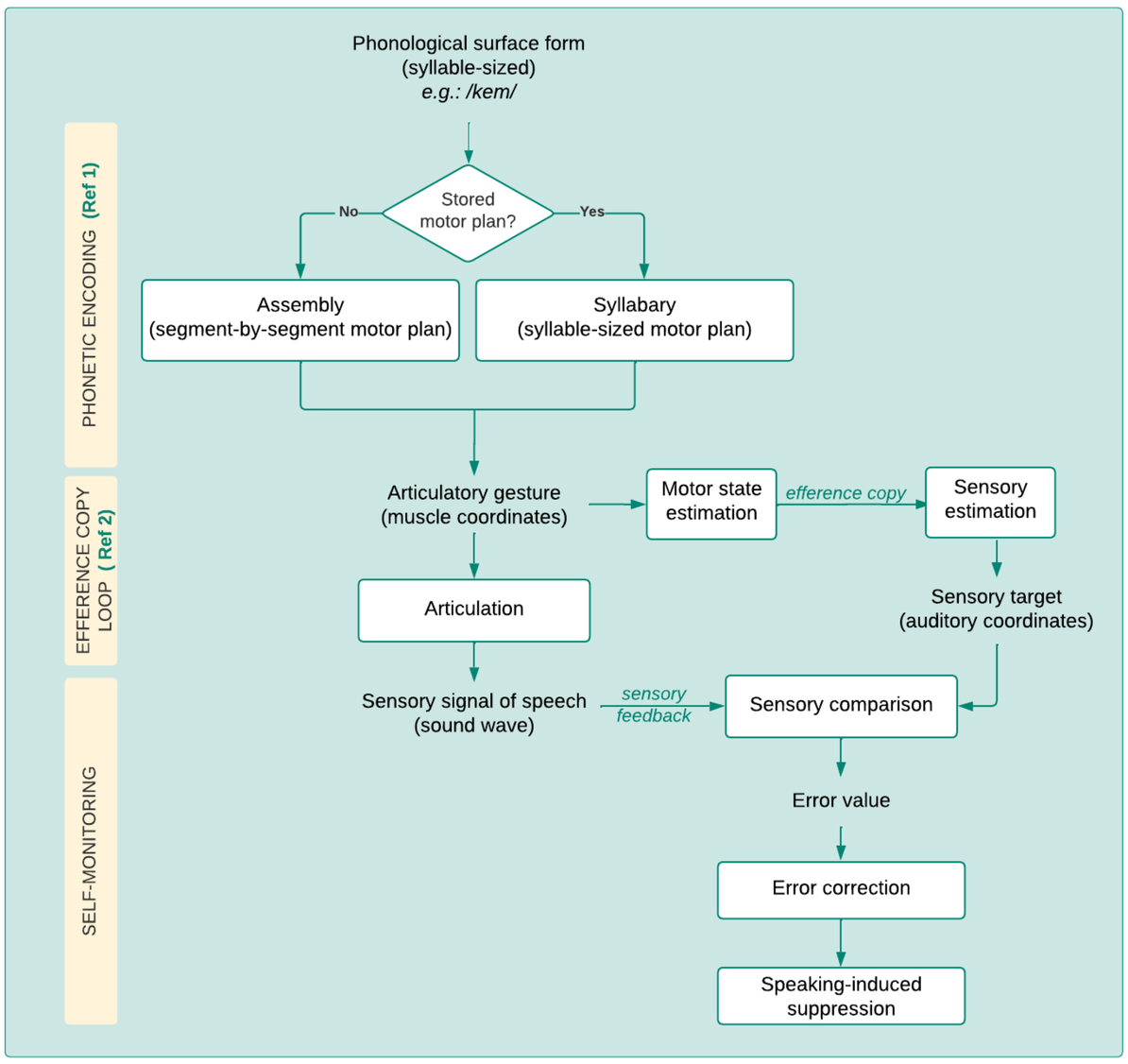
Julia Chauvet [1], Sophie Slaats [1], David Poeppel [3,4], Antje Meyer [1,2]

1) MPI for Psycholinguistics 2) Radboud University 3) Ernst Strüngmann Institute for Neuroscience 4) New York University

Is speech monitoring sensitive to the frequency of syllable-sized representations?

Speaking requires translating a concept that we wish to express into a sequence of sounds. In addition, speakers monitor their planned speech output using sensorimotor predictive mechanisms. Here we investigate the role of syllable-sized representations during the late stages of speech planning (namely, phonetic encoding) and monitoring.

1. What do we know?

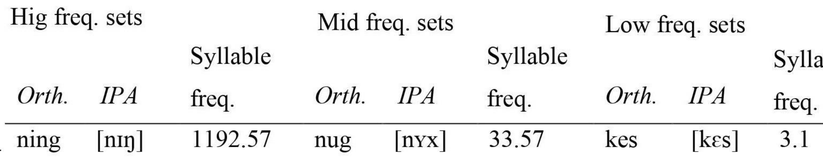


2. Material (Refs 3,4)

Hig freq. sets			Mid freq. sets			Low freq. sets		
Orth.	*IPA*	Syllable freq.	*Orth.*	*IPA*	Syllable freq.	*Orth.*	*IPA*	Syllable freq.
ning	[nɪŋ]	1192.57	nug	[nʏx]	33.57	kes	[kɛs]	3.1
reg	[rɛx]	339.86	wig	[ʋɪx]	31.55	suk	[sʏk]	3.02
mer	[mɛr]	313.12	kep	[kɛp]	29.59	tug	[tʏx]	1.97
luk	[lʏk]	209.14	teng	[tɛŋ]	18.29	meg	[mɛx]	1.4
wes	[ʋɛs]	162.6	zer	[zɛr]	16.98	zur	[zʏr]	0.69
bin	[bɪn]	127.26	sum	[sʏm]	13.57	lup	[lʏp]	0.66
sup	[sʏp]	82.55	rup	[rʏp]	13.02	bing	[bɪŋ]	0.48
zug	[zʏx]	63.8	mek	[mɛk]	11.20	wem	[ʋɛm]	0.1
kem	[kɛm]	62.24	bis	[bɪs]	7.92	nin	[nɪn]	0
tur	[tʏr]	34.88	lun	[lʏn]	5.76	rer	[rɛr]	0

Syllable frequency counts (CELEX database): obtained from word form occurrences per one million, as the number of the summed frequency of occurrence of each syllable within words.

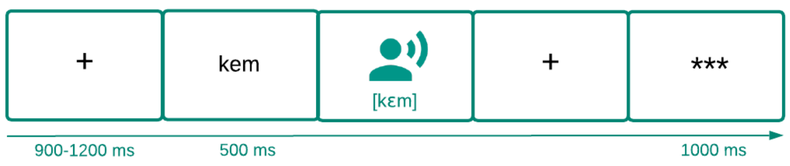
3. Behavioural Experiment 1: Immediate repetition of spoken syllables



Set	Production latencies
High-frequency	$M = 267ms\ (SD = 139\ ms)$
Mid-frequency	$M = 264\ ms\ (SD = 148\ ms)$
Low-frequency	$M = 264\ ms\ (SD = 148\ ms)$

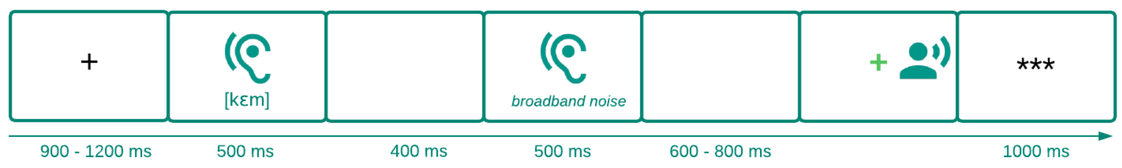
No syllable frequency effect, and timing issue (insertion of a 1-19 ms random interval). In some trials, production was initiated before the end of the spoken syllable stimulus.

4. Behavioural Experiment 2 (ongoing): Immediate naming of written syllables



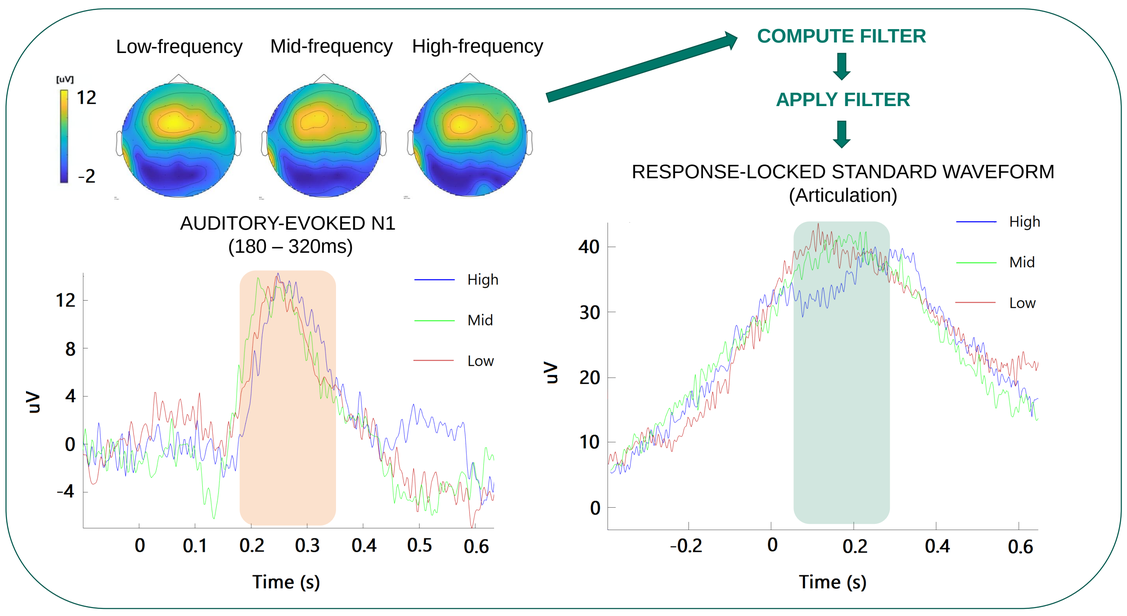
We predict shorter naming latencies for high- vs. low-frequency syllables.

5. Planned EEG experiment: Delayed repetition of spoken syllables



Time-window	Planned analyses
450 ms before articulation (planning)	Standard waveform; Decoding; Spatio-temporal segmentation
250 ms after articulation (self-monitoring)	Response-locked standard waveform after spatial filtering*

** **Within-subject** spatial filter based on the topographies of the auditory-evoked N1 response to spoken syllables (ongoing).*



Planning: We predict diverging waveforms and different classification of the data as a function of frequency.

Self-monitoring: The production of low-frequency syllables, putatively less automatised, is predicted to require closer monitoring and therefore less suppression, as reflected in attenuated N1/P2 amplitudes.

Pilot result (n = 2) shows feasibility of experiment. If borne out, it would suggest that self-monitoring during speaking may be affected by syllable frequency.

1) Levelt, Roelofs & Meyer, 1999 2) Tian & Poeppel, 2010
3) Cholin, Levelt & Schiller, 2006 4) Cholin & Levelt, 2009

Julia.Chauvet@mpi.nl • Twitter @ChauvetJulia