

Perceived Interpersonal Speaker Attributes and their Acoustic Features

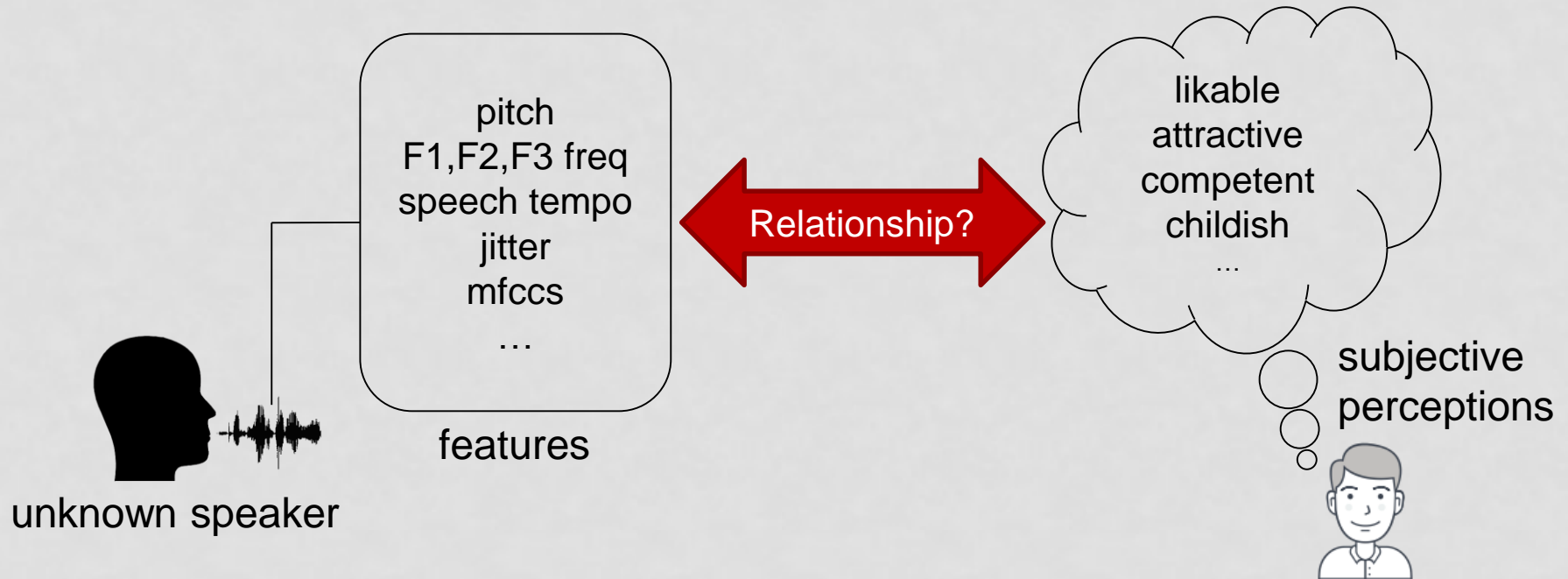
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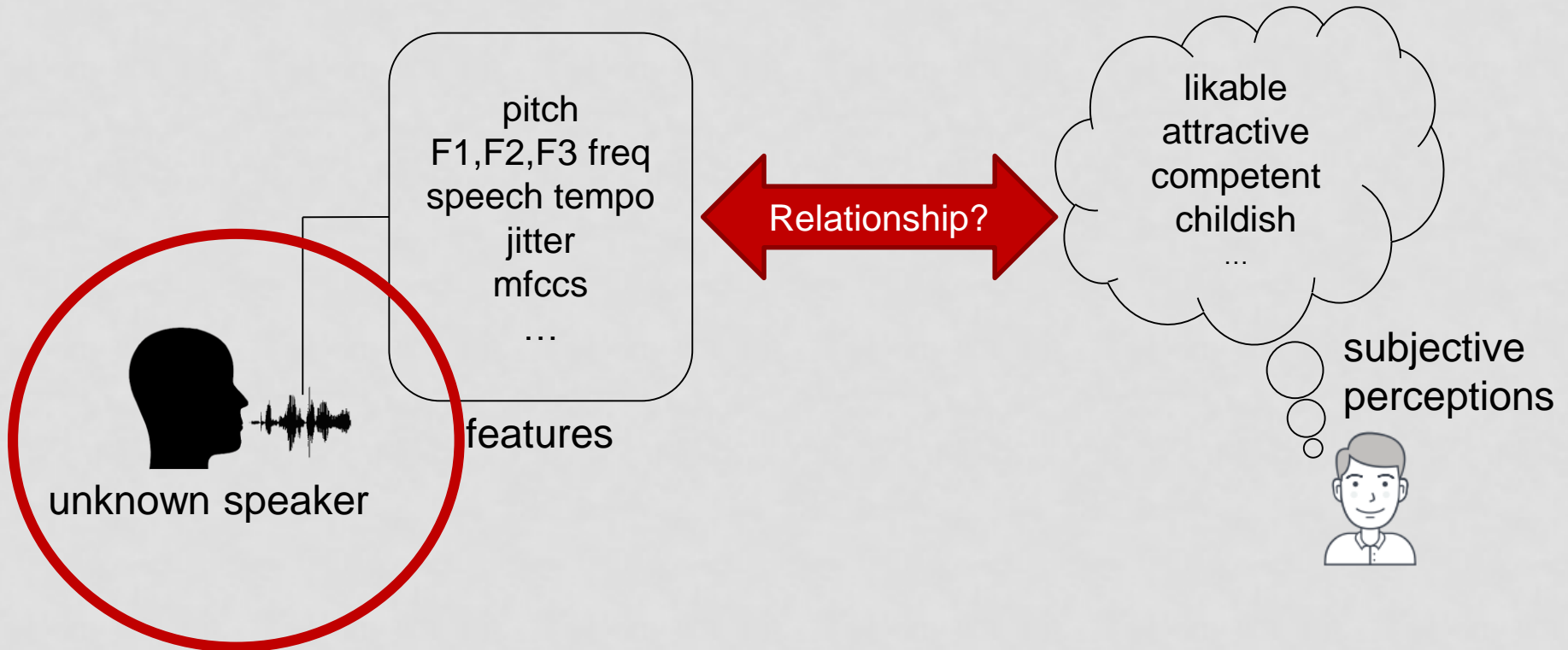


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Outline



Outline



Nautilus Speaker Characterization (NSC) Corpus



300 speakers
(126 m, 174 f)
Native German



acoustically-isolated room



AKG C 414B-XLS
microphone



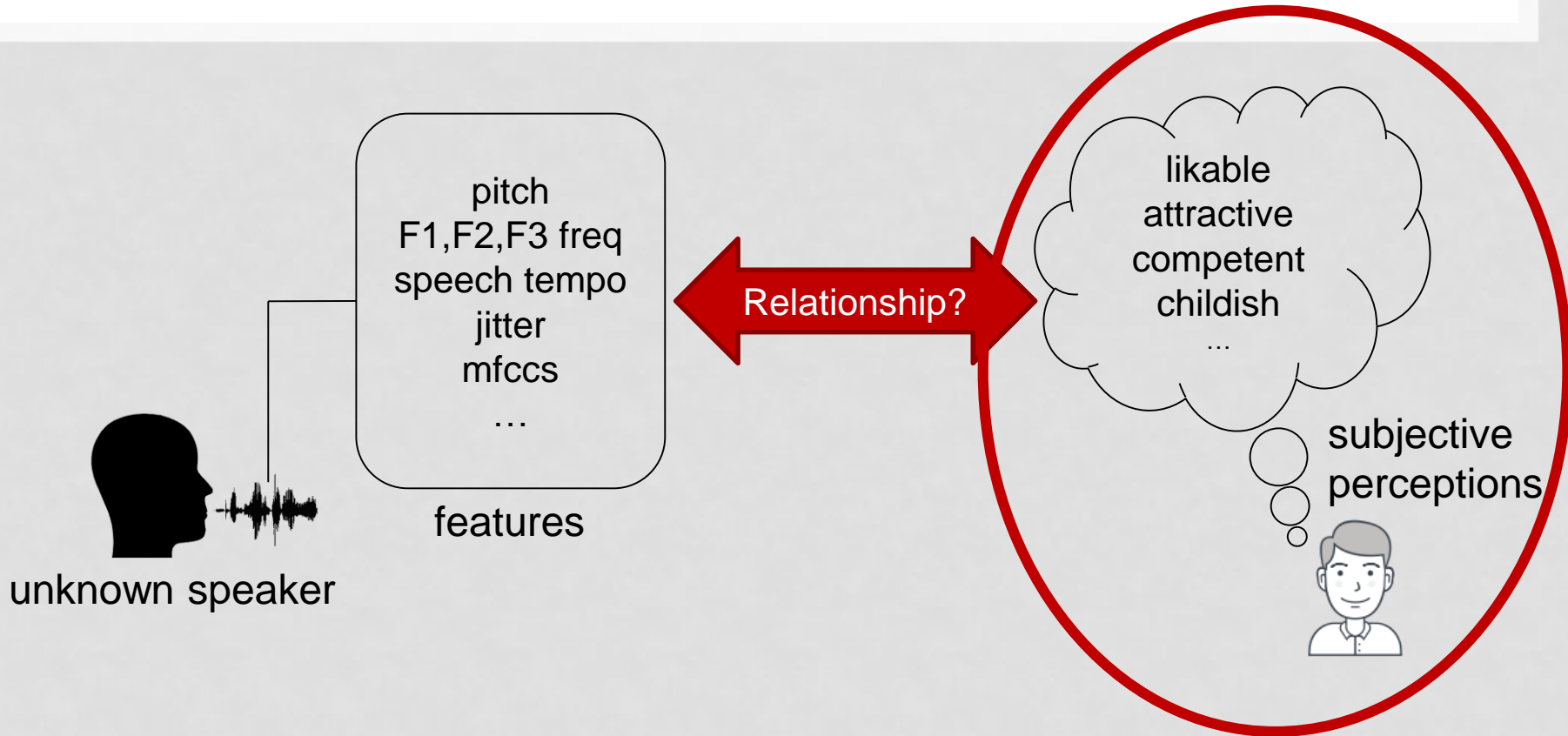
Scripted, semi-spontaneous and spontaneous
conversational speech
 $F_s = 48 \text{ kHz}$

Released for non-
commercial research
and teaching
purposes only



Fernández Gallardo, L. and Weiss, B., "The Nautilus Speaker Characterization Corpus: Speech Recordings and Labels of Speaker Characteristics and Voice Descriptions," submitted to International Conference on Language Resources and Evaluation (LREC), 2018.

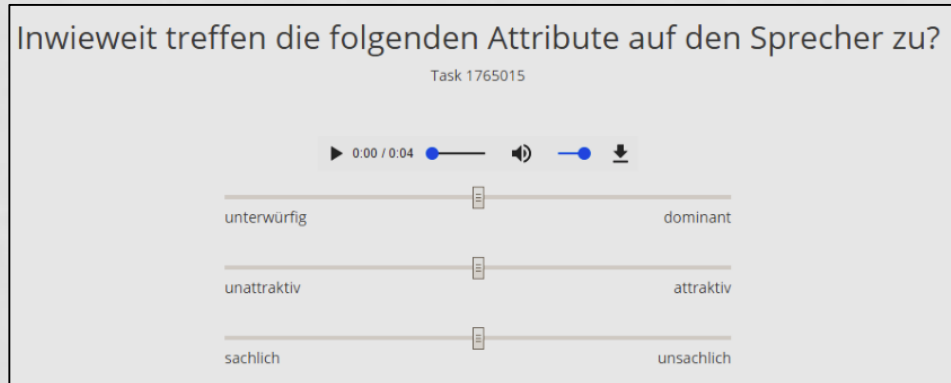
Outline



NSC labels

Interpersonal Speaker Characteristics SC-Questionnaire

- 34-item semantic differential rating scale, completed ~15 times for each speaker by different listeners
- Stimuli: Dialog 6 (semi-spontaneous, pizza order)
- 114 labellers (70 m, 44 f)



item	Antonyms (German)	
1	sympathisch	unsympathisch
2	unsicher	sicher
3	unattraktiv	attraktiv
4	verständnisvoll	verständnislos
5	entschieden	unentschieden
6	aufdringlich	unaufdringlich
7	nah	distanziert
8	interessiert	gelangweilt
9	emotionslos	emotional
10	genervt	nicht genervt
11	passiv	aktiv
12	unangenehm	angenehm
13	charaktervoll	charakterlos
14	reserviert	gesellig
15	nervös	entspannt
16	distanziert	mitfühlend
17	unterwürfig	dominant
18	affektiert	unaffektiert
19	gefühlskalt	herzlich
20	jung	alt
21	sachlich	unsachlich
22	aufgeregt	ruhig
23	kompetent	inkompetent
24	schön	hässlich
25	unfreundlich	freundlich
26	weiblich	männlich
27	provokativ	gehorsam
28	engagiert	gleichgültig
29	langweilig	interessant
30	folgsam	zynisch
31	unaufgesetzt	aufgesetzt
32	dumm	intelligent
33	erwachsen	kindlich
34	frech	bescheiden

NSC labels

Factor analysis for male and for female speakers separately

	Warmth	Attract.	Confid.	Compl.	Matur.
herzlich	0.85				
mitfuehlend	0.84				
distanziert	-0.76				
freundlich	0.59				
verstaendnislos	-0.58				
unsympatisch	-0.52				
nicht.genervt	0.51				
attraktiv		0.85			
haesslich		-0.79			
angenehm		0.58			
interessant		0.48			
sicher			1.00		
unentschieden			-0.6		
gehorsam				0.87	
zynisch				-0.71	
alt					0.82
kindlich					-0.73



	Warmth	Attract.	Confid.	Compl.	Matur.
herzlich	0.84				
mitfuehlend	0.84				
distanziert	-0.78				
freundlich	0.56				
verstaendnislos	-0.49				
nicht.genervt	0.49				
unsympatisch	-0.45				
attraktiv		0.83			
haesslich		-0.81			
angenehm		0.59			
gehorsam			0.8		
zynisch			-0.72		
sicher				0.82	
unentschieden				-0.81	
kindlich					-0.81
alt					0.68



NSC labels

Factor analysis for male and for female speakers separately

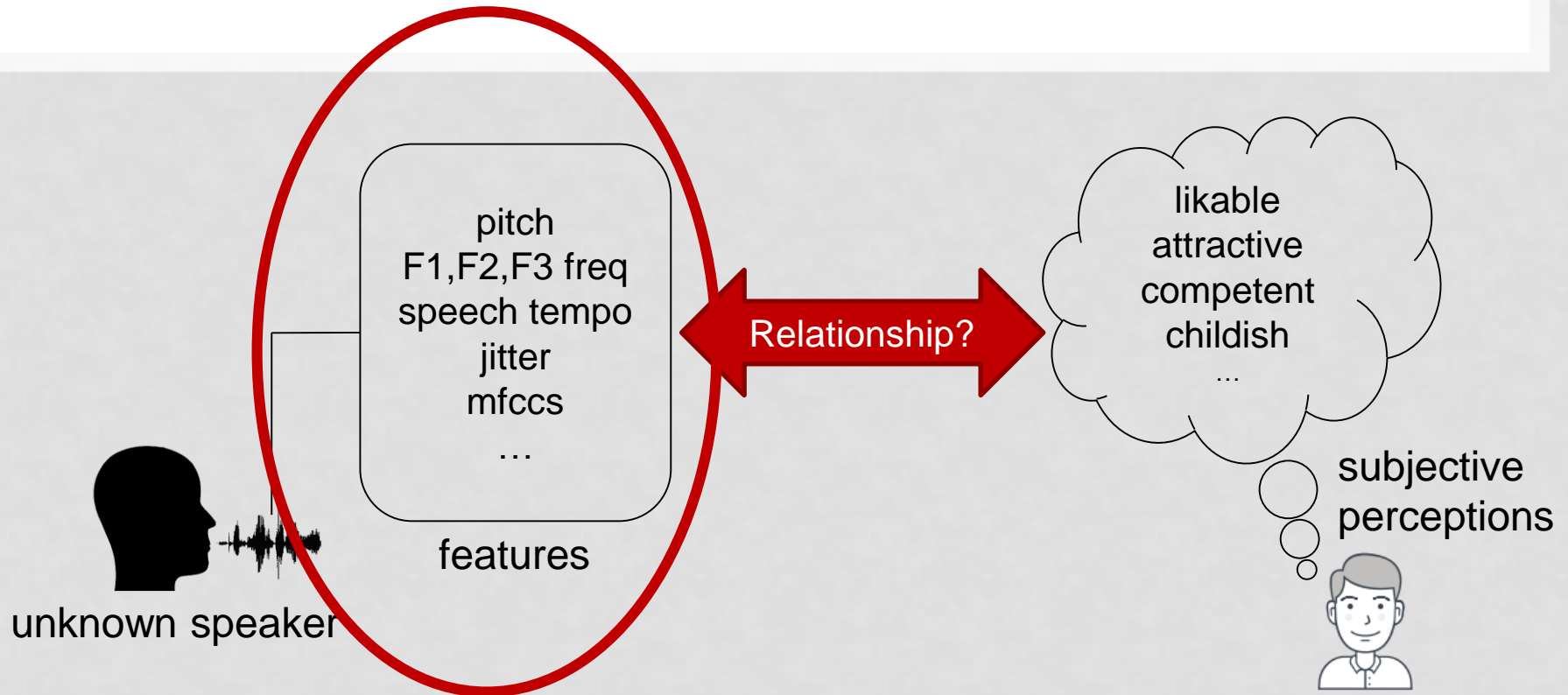
1: warmth
2: attractiveness
3: confidence
4: compliance
5: maturity



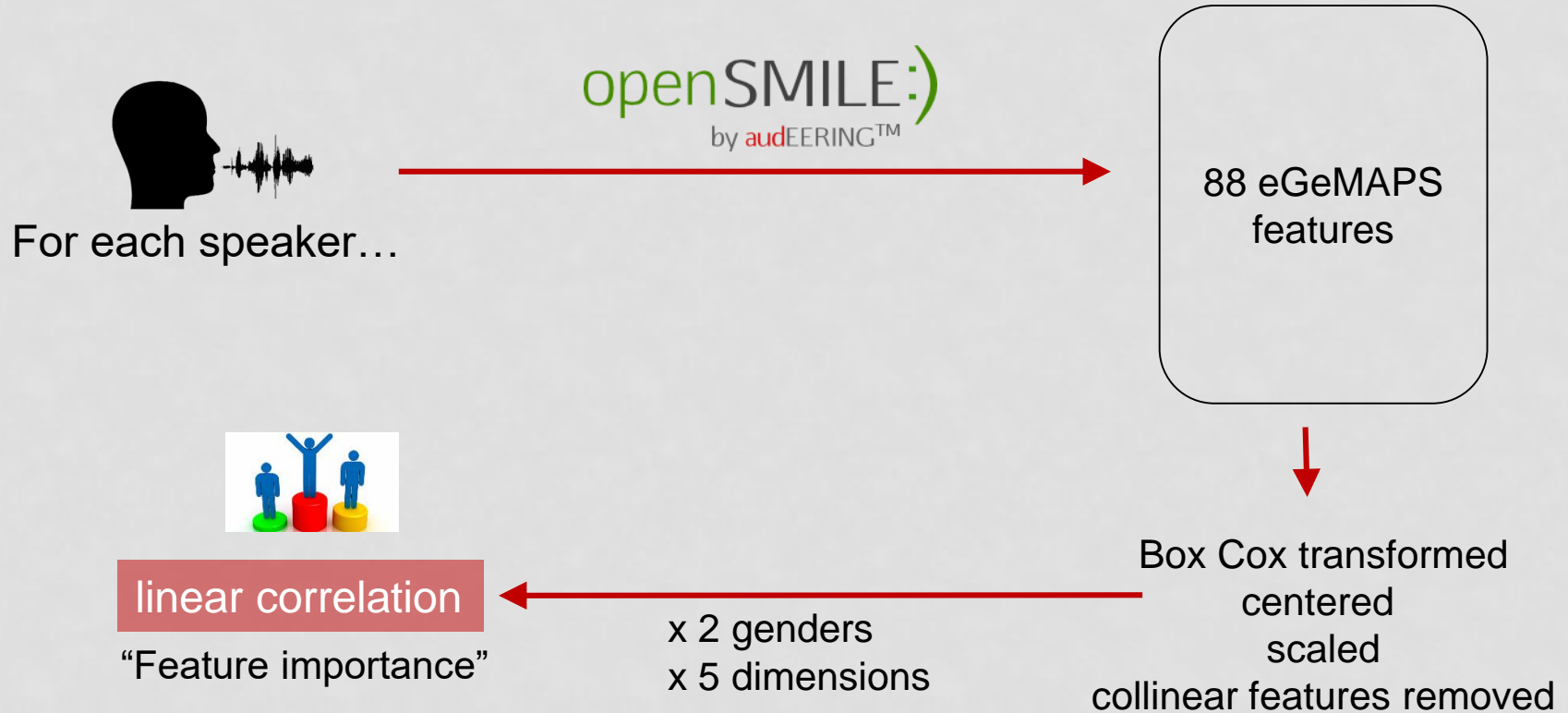
1: warmth
2: attractiveness
3: compliance
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5: maturity



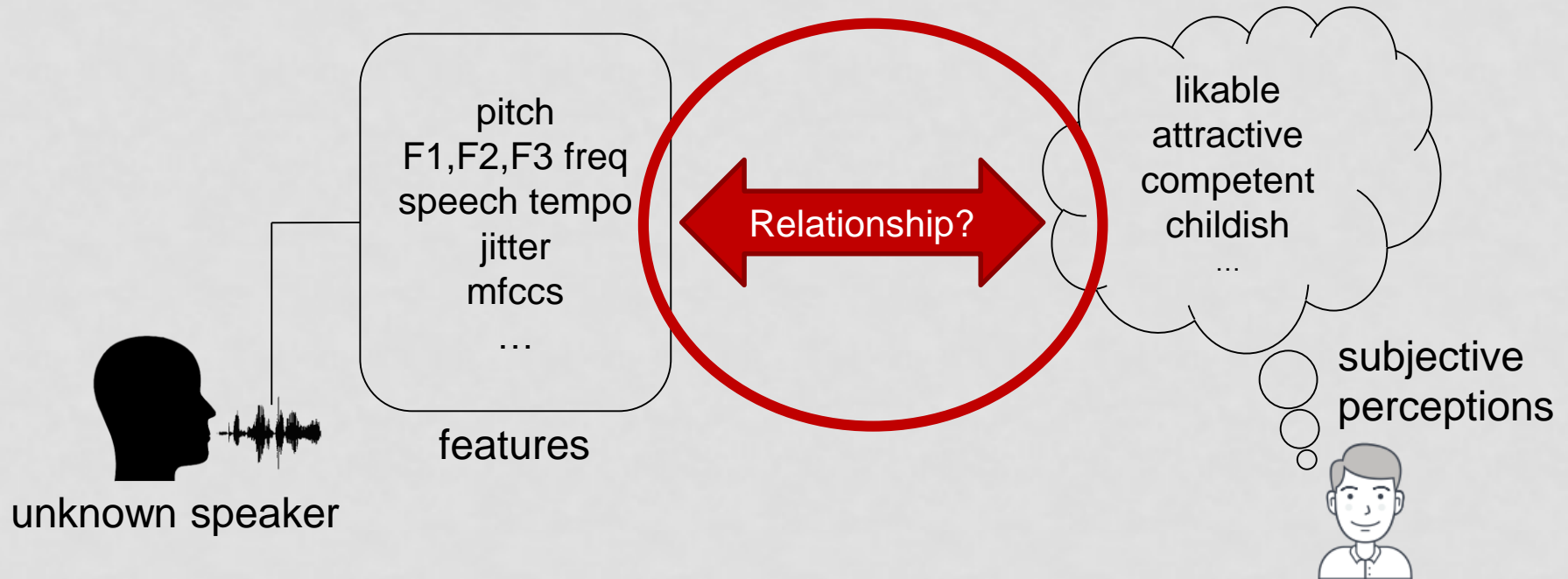
Outline



Speech features

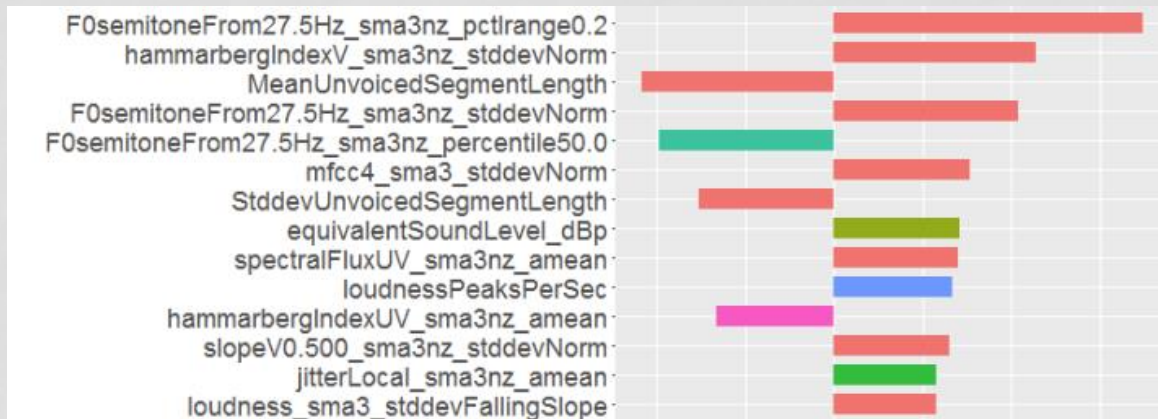


Outline



Acoustic correlates of speaker characteristics

- factor(cluster)
- Dynamics
 - Intonation
 - Loudness level
 - Noise
 - Pitch Level
 - Setting
 - Tempo
 - Timbre
 - Unvoiced



attractiveness



attractiveness

Acoustic correlates of speaker characteristics

- Higher warmth:
 1. Higher F0 range
 2. Higher spectral slope 0-500Hz
 3. Lower std of F1 and F3 frequencies
- Higher attractiveness:
 1. Higher F0 range
 2. Higher std of Hammarberg Index
 3. Lower length of unvoiced segments
 4. Higher std of F0
 5. Lower median F0



- Higher confidence:
 1. Lower median F0
 2. Higher F0 range
- Higher compliance:
 1. Lower std length voiced segments
 2. Lower std of F1 frequency
 3. Lower std of falling slope for loudness
 4. Higher F1 and F2 bandwidth
- Higher maturity:
 1. Lower median F0
 2. Higher std of F3 frequency
 3. Higher std of F3 bandwidth

Most warm+attractive



Least warm+attractive



Acoustic correlates of speaker characteristics

- Higher warmth:
 1. Higher F1 frequency
 2. Higher F0 range
 3. Higher std of F2 bandwidth
 4. Higher std of spectral flux
- Higher attractiveness:
 1. Higher F1 frequency
 2. Higher std of F2 bandwidth
 3. Lower std of F1 frequency
 4. Higher F0 range
 5. Lower spectral slope 0-500Hz
- Higher compliance:
 1. Lower std of F1 frequency
 2. Higher F1 frequency
 3. Lower loudness range
- Higher confidence:
 1. Higher std of falling slope for loudness
 2. Higher F0 range
- Higher maturity:
 1. Lower median F0
 2. Higher mean mfcc4
 3. Lower F1 frequency
 4. Higher mean mfcc2



Summary

- Nautilus Speaker Characterization (NSC) Corpus
 - 300 German speakers
 - Speaker and interlocutor speech, interactions
 - Labels: speaker characteristics
- Perceived speaker characteristics
 - 5 traits: warmth, attractiveness, confidence, compliance, maturity
- Most contributing speech features
 - Pitch and spectral features (formants, mfcc,...)
 - More investigation needed
- Future work
 - Automatic recognition of subjective speaker traits



Thank you for your attention!

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Questions?



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