

SUMMARY

Listeners with impaired hearing show decreased speech recognition performance, and complain about communication problems in difficult acoustic environments. Recently, the effect of impaired hearing on speech reception thresholds (SRTs) was examined in [1]. Two domains of assumed linear relationship between SRTs and the pure-tone average (PTA) were identified; one for listening in noise and one for listening in *quiet*. Two models were used to predict the SRTs, i.e., the framework for auditory discrimination experiments [FADE, 2] and the speech intelligibility index [SII, 3]. Overall, FADE was found to be more accurate than the SII, especially for very steep hearing losses. In the listening-in-noise domain, the SRTs were underestimated by FADE and overestimated by the SII. This is because FADE here explicitly assumes no supra-threshold component of hearing loss, while the SII evidently does. These results suggest that a supra-threshold component of hearing loss should be considered separately from the hearing threshold even both are probably correlated. Further, the absolute hearing threshold could only partly explain the SRTs

METHODS

- Empirical SRTs of 315 subjects acquired with the German matrix test [4].
- Four listener groups from normal (A) to severe hearing impaired (D), and one group with special cases (E).
- Stationary noise masker at 65 dB SPL.
- Two domains: Listening in noise (ABC₁) and *effectively* listening in quiet (C₂D)
- Models: FADE and the SII.
- Only absolute hearing thresholds used for modeling
- Half of group ABC₁ used for fitting *typical* correction of SRTs (for FADE^s, and SII^s):

$$C_{SRT}(PTA) = \alpha + \beta \cdot PTA$$

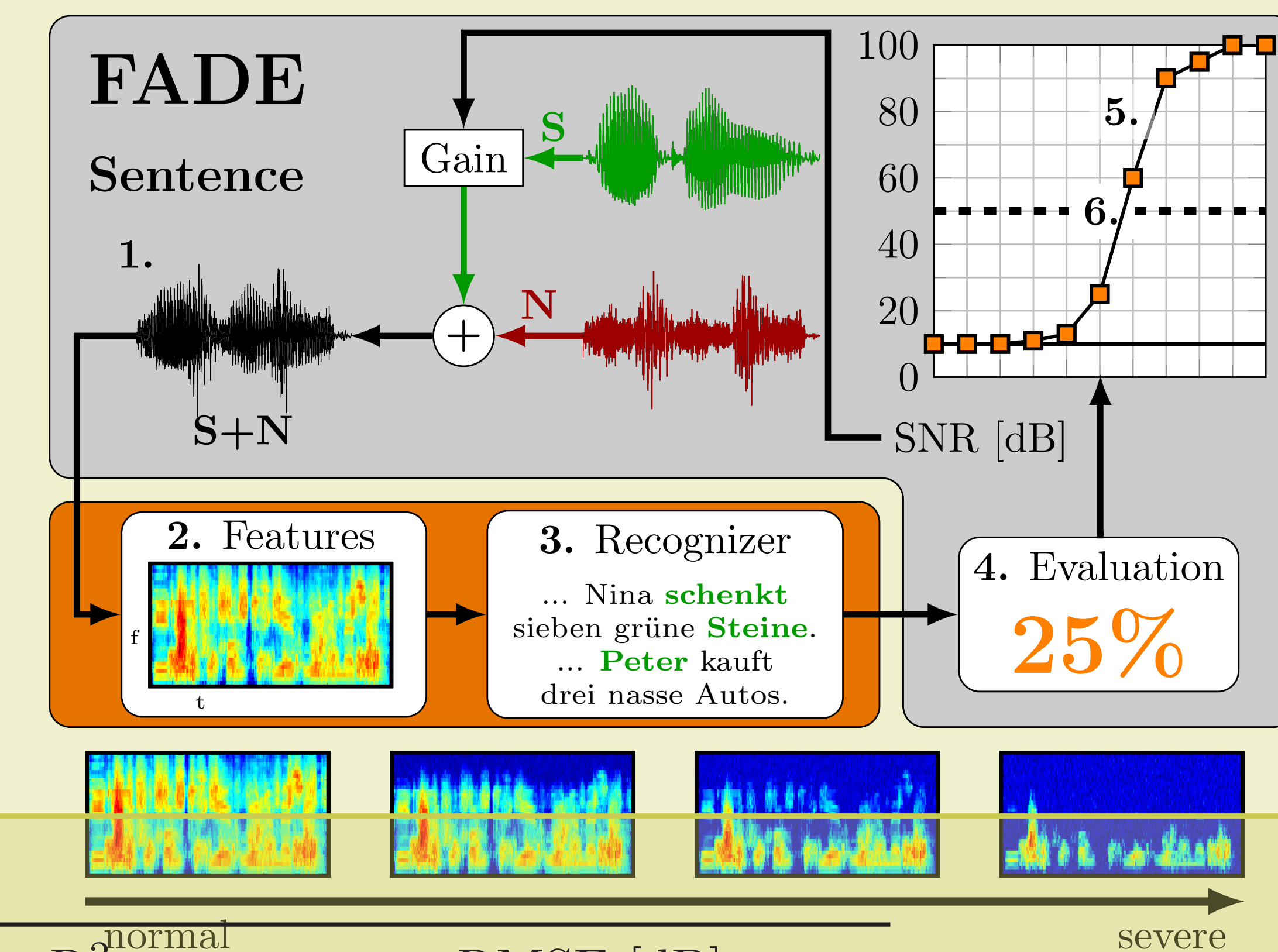
DISCUSSION

- Models can hear noise with FADE being more sensitive than the SII.
- FADE predicted the SRTs of all groups contrary to the SII which failed when predicting SRTs of hearing-impaired listeners with intense drops in threshold at high frequencies (group E)
- Best subjects are as good as FADE: Room for improvement
- Subjects generally better than the SII: Over the top
- FADE^s: FADE misses crucial supra-threshold factors of hearing-impairment
- SII^s: The SII evidently incorporates supra-threshold factors, as a typical correction did not lead to better predictions

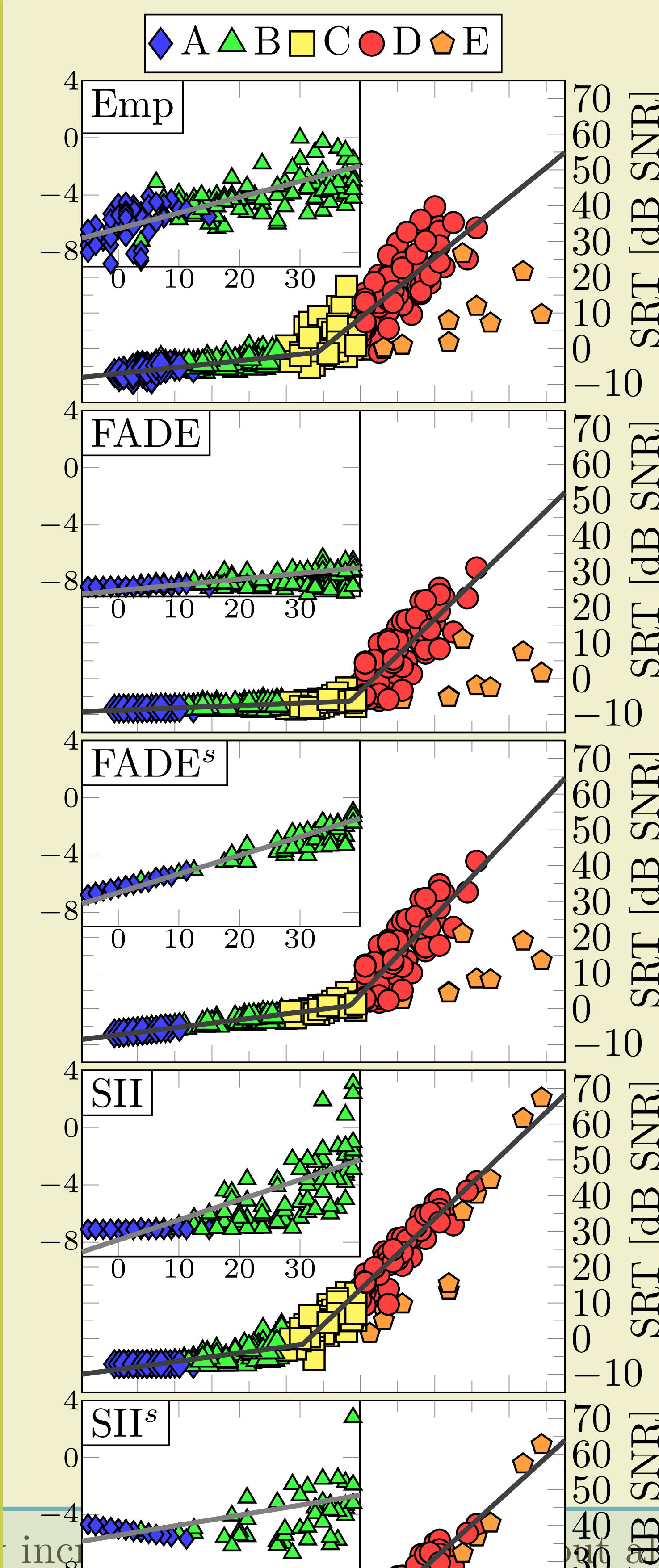
CONCLUSION

- Speech recognition of many hearing-impaired listeners is not only affected by inc

MODEL



RESULTS



Group	Data	R ² ^{normal}	RMSE [dB]		
All	FADE	0.84 [0.81 0.87]	7.57	[7.06 8.07]	
	FADE ^s	0.88 [0.86 0.91]	3.81	[3.34 4.27]	
	SII	0.82 [0.75 0.89]	6.77	[5.19 8.34]	
	SII ^s	0.79 [0.70 0.88]	6.82	[5.00 8.61]	
ABC ₁	FADE	0.34 [0.25 0.45]	4.30	[3.98 4.63]	
	FADE ^s	0.65 [0.58 0.76]	1.38	[1.06 1.74]	
	SII	0.57 [0.50 0.65]	2.12	[1.93 2.31]	
	SII ^s	0.41 [0.30 0.52]	1.95	[1.68 2.21]	
C ₂ D	FADE	0.81 [0.76 0.85]	10.63	[9.93 11.33]	
	FADE ^s	0.81 [0.76 0.86]	5.02	[4.39 5.61]	
	SII	0.81 [0.77 0.85]	6.94	[6.28 7.60]	
	SII ^s	0.81 [0.76 0.85]	5.75	[5.16 6.33]	
E	FADE	0.92 [0.72 0.99]	9.04	[7.11 10.72]	
	FADE ^s	0.93 [0.78 0.99]	2.97	[2.44 3.51]	
	SII	0.59 [0.40 0.92]	22.59	[12.34 30.54]	
	SII ^s	0.56 [0.36 0.92]	20.85	[10.83 28.60]	

