BREKKE STRAND

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Room Acoustical Parameters

CAN CONCERT HALL PREFERENCE BE PREDICTED?

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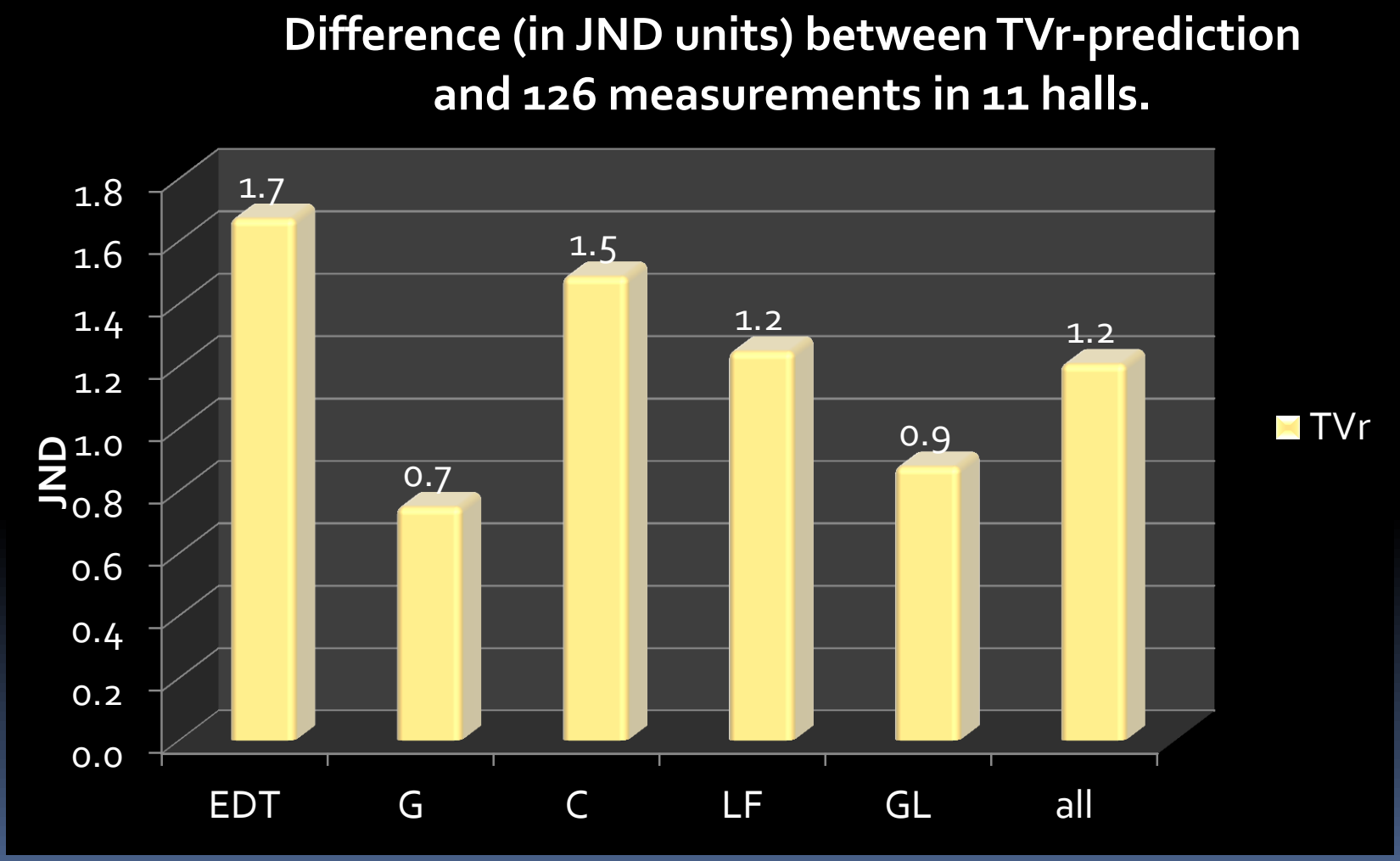
5 aspects 5 parameters ISO-3382

Subjective listener aspect	**Physical quantity (Parameter) notation and unit**	
Subjective level of sound	Sound Strength	**G** (dB)
Perceived reverberance	Early Decay Time	**EDT** (s)
Perceived clarity of sound	Clarity	**C80** (dB)
Apparent Source Width	Early Lateral Energy Fraction	**LF** (1)
Listeners Envelopment	Late Lateral Sound Level	**LG** (dB)

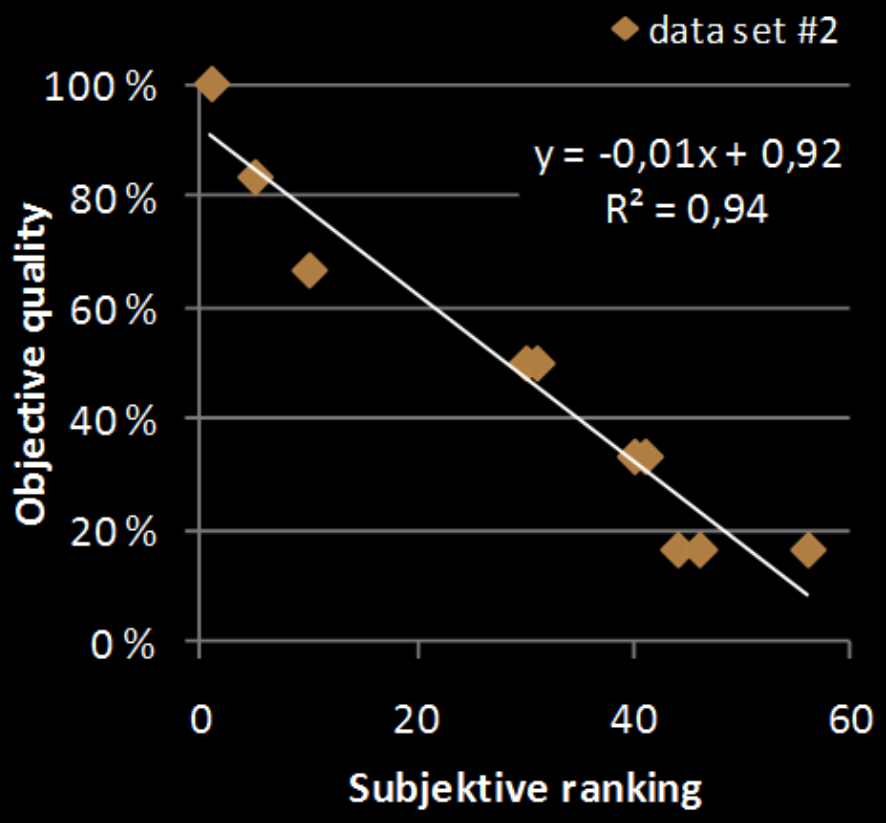
TVr-predictors (BNAM 2010)

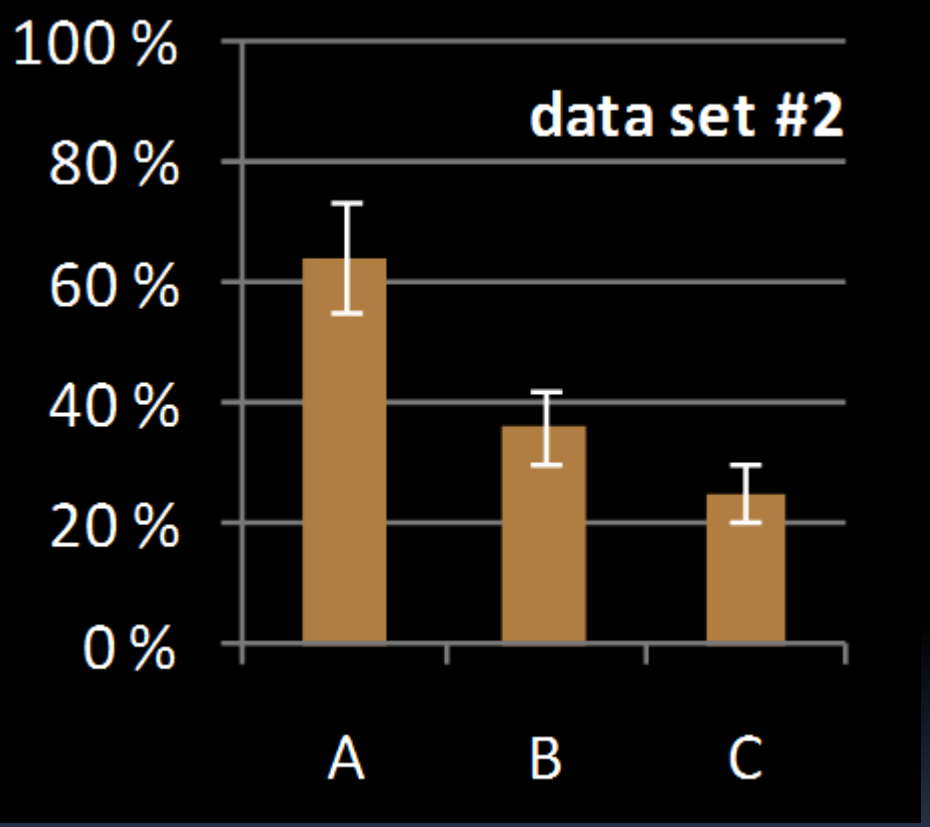


Does parameter data correlate with subjective preference data?

- Let's take parameter data for 10 of the halls included in Beraneks rank ordering of 58 halls
- The 10 halls
  - Musikverein, Vienna
  - Concertgebouw, Amsterdam
  - St David, Cardiff
  - Gasteig, Munich
  - Konserthus, Gøteborg
  - Festspielhaus, Salzburg
  - Liederhalle, Stuttgart
  - Usher, Edinburg
  - Royal Festival Hall, London
  - Barbican, London

10 halls: Objective vs Subjective





	EDT	G	C	LF	G_{late}	G_{125}
Criterion	2.0	4.3	-0.3	0.20	1.5	4.7
Tolerance ±	1.1	1.0	0.7	1.1	1.0	1.0

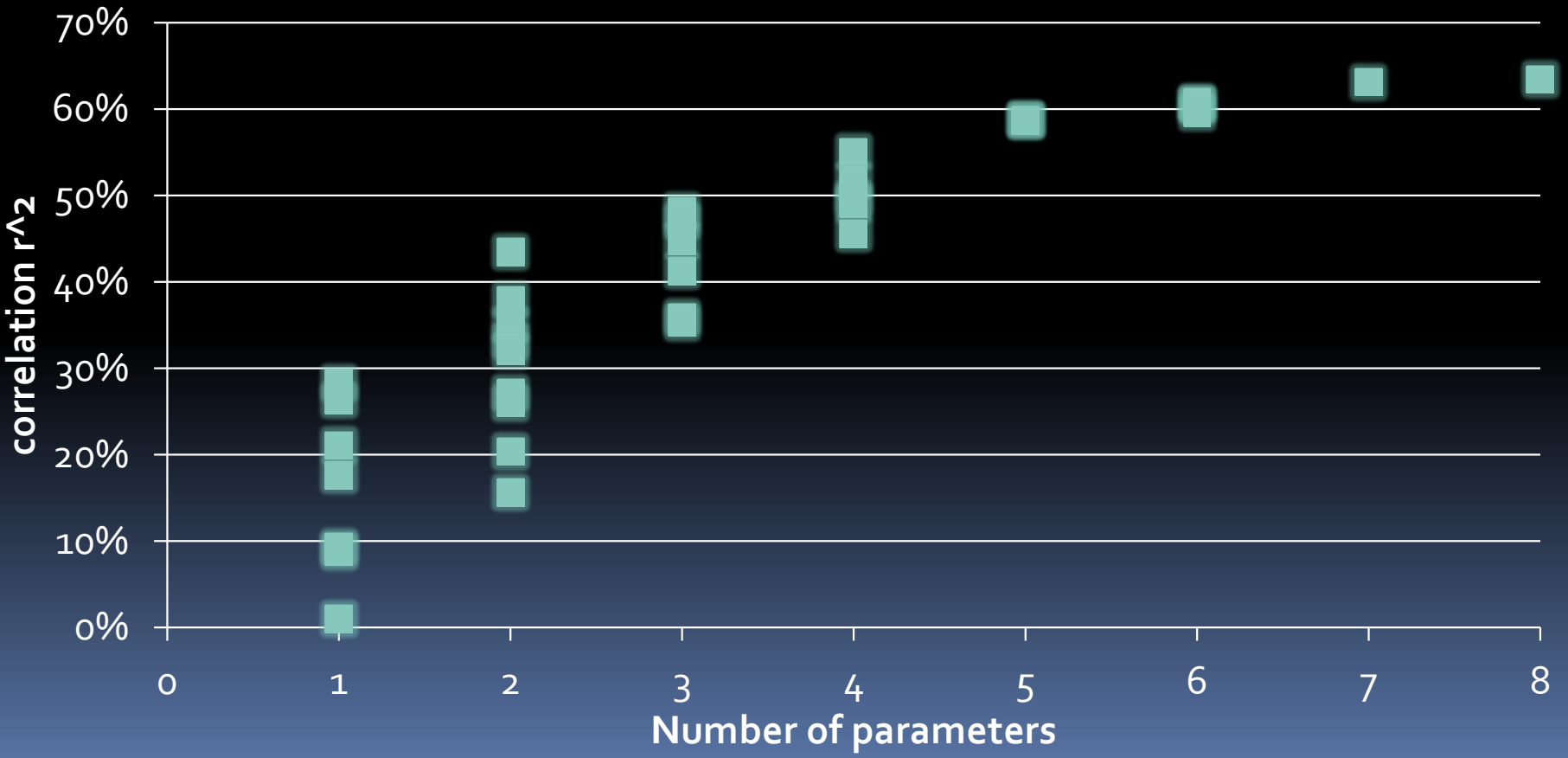
10 halls too few? Now take 53 halls

- Beranek subjective ranking of 58 concert halls
- $T_{occupied}$ and geometrical data in 53 of 58 halls
- Using TVr-predictors (Barron Revised Theory)
- Our set of physical data:

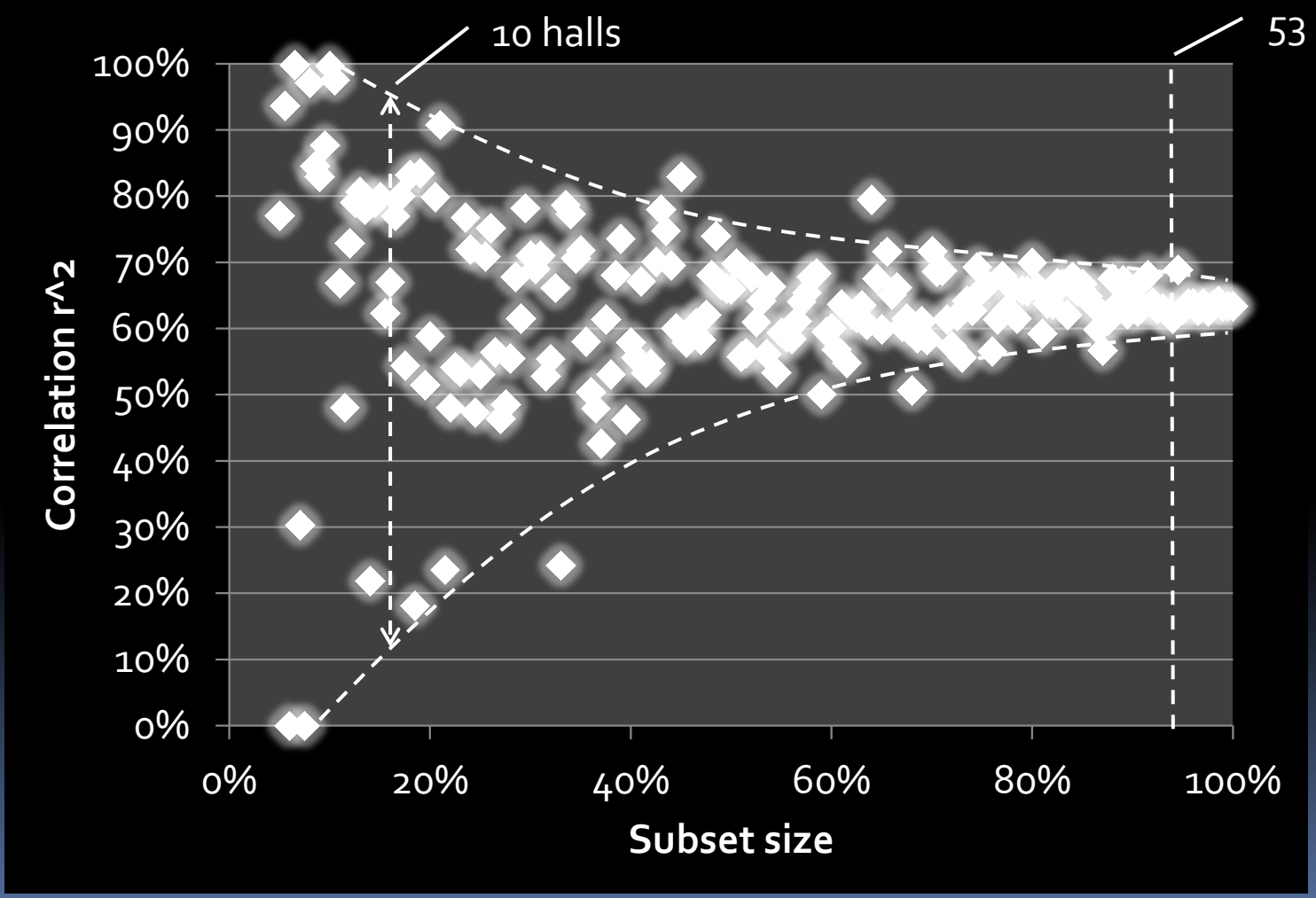
T EDT G C G_{Late} G_{125} W H/W

Subjective-Objective correlation converge with more data, 53 halls

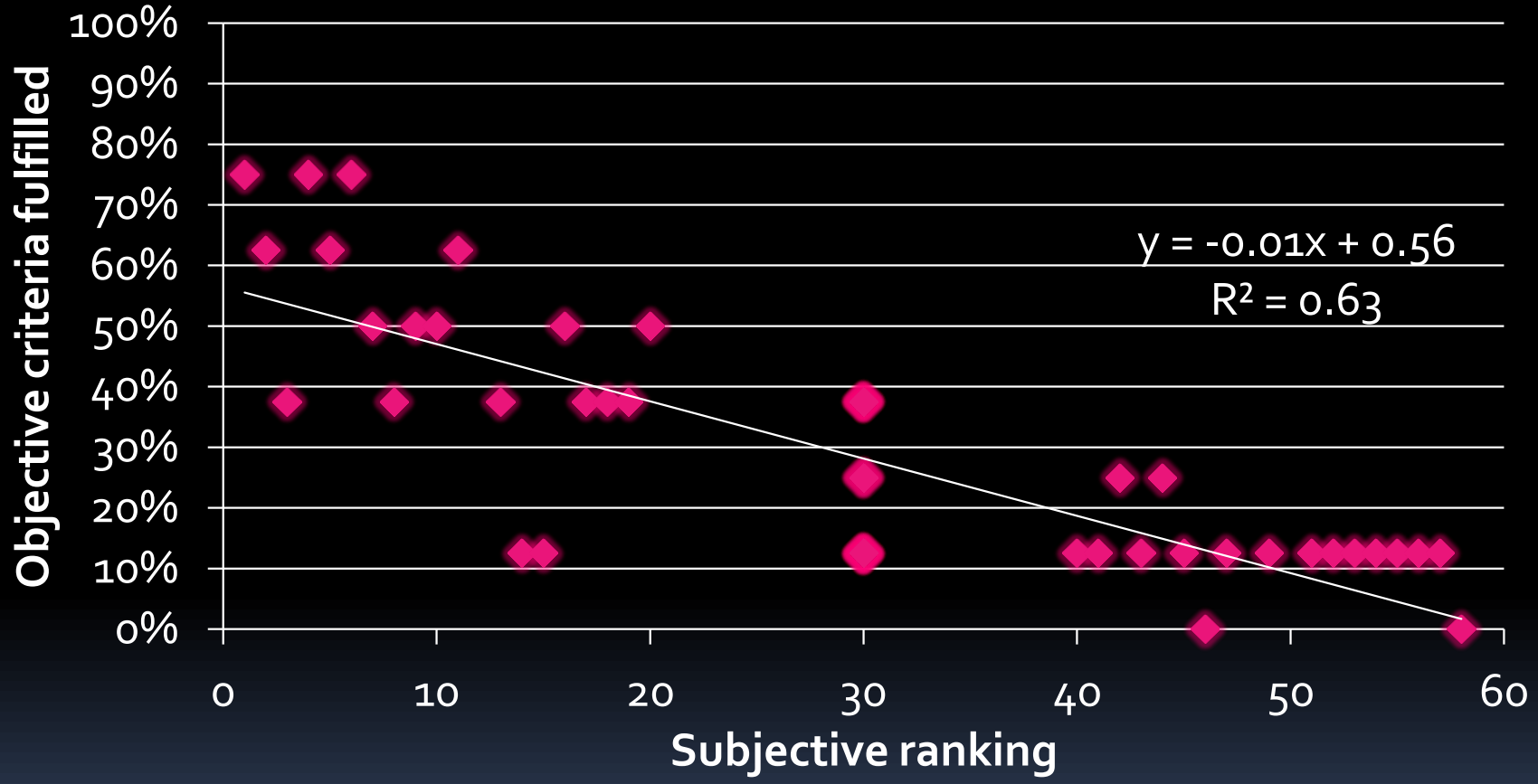
Data: T EDT G C G_{Late} G_{125} W H/W



How does size of random subset affect correlation uncertainty?

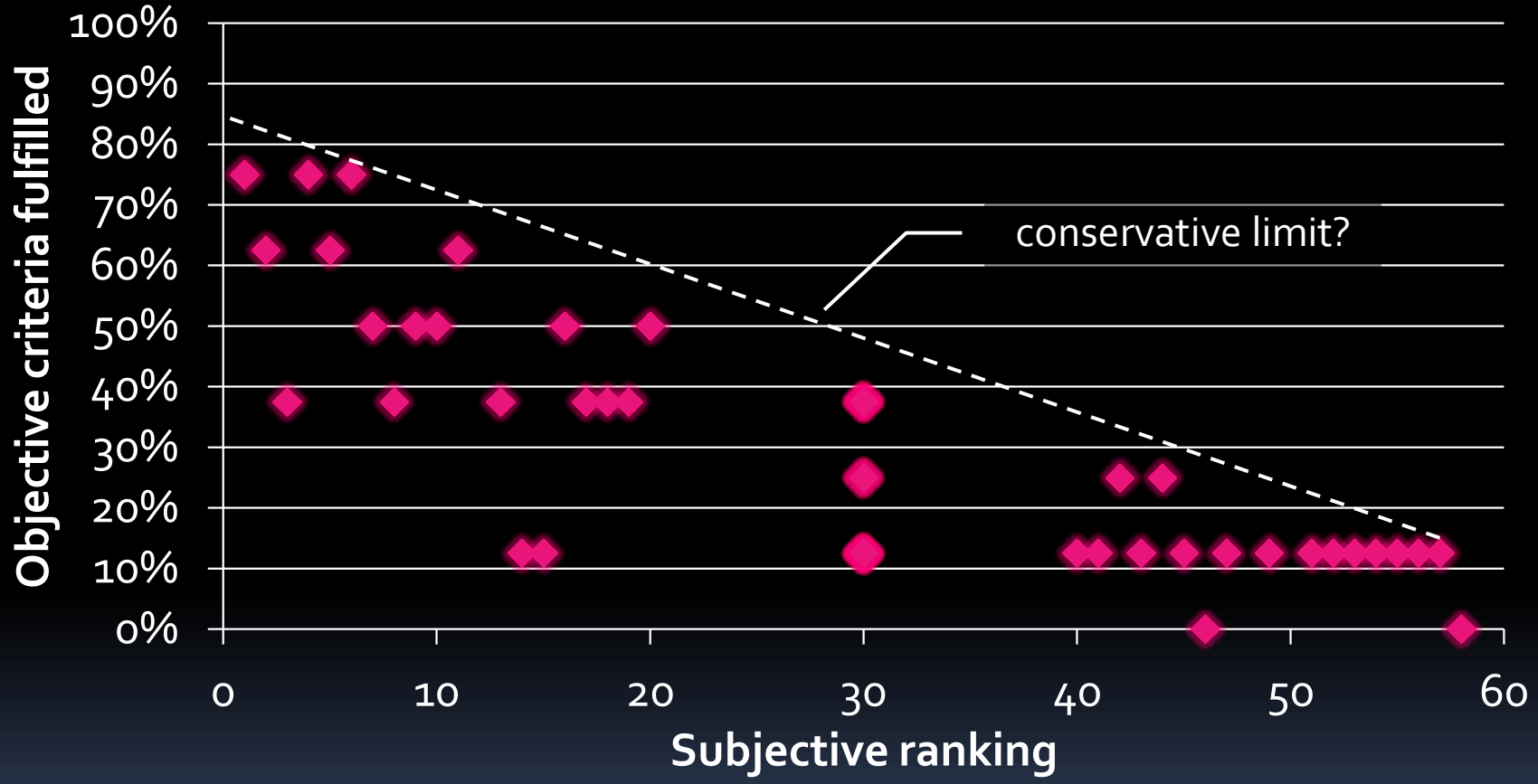


53 of 58 halls



	T	EDT	G	C	G_{Late}	H/W	G_{125}	W
High limit	2.1	2.2	5	1	4	1.2	5	28
Low limit	1.9	1.8	3	-1	2	0.8	3	18

53 of 58 halls



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Conclusion

- Conservative use of parameter prediction in concert hall planning can reduce risk of overestimating a hall
- However, some halls may be underestimated => some could-have-been-good halls may not be built
  - Can we live with this?
- If more than the 5 ISO-parameters provide more certainty, why not use them?

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Thank you

More info?

The www center for search, research and open sources in acoustics

www.akutek.info

On-line listening tests – check it out:
http://www.akutek.info/demo_files/listening_tests

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