ACT-R Landscapes

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How to make pretty plots without having to buy an expensive scanner

Hedderik van Rijn
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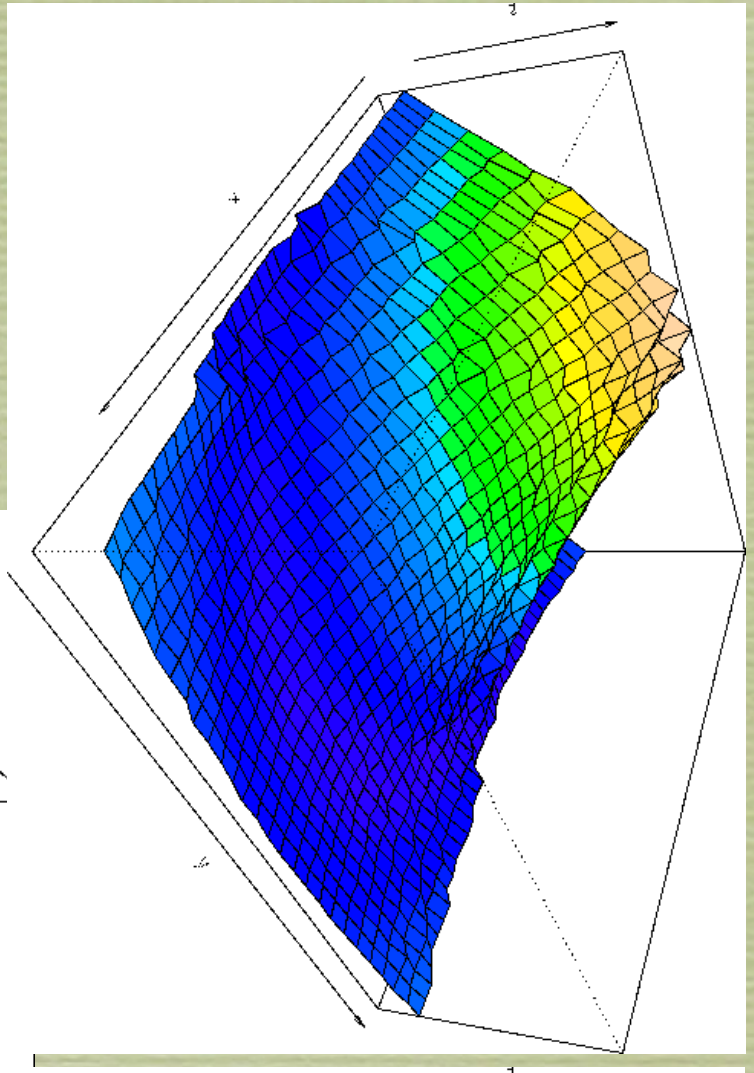
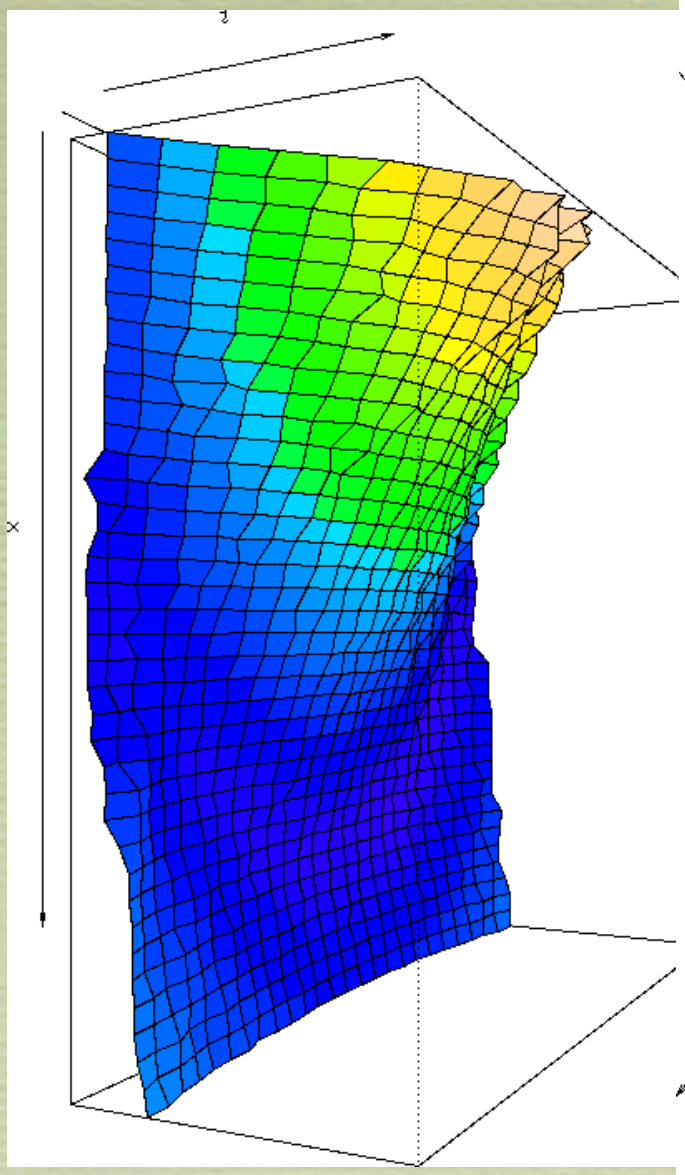
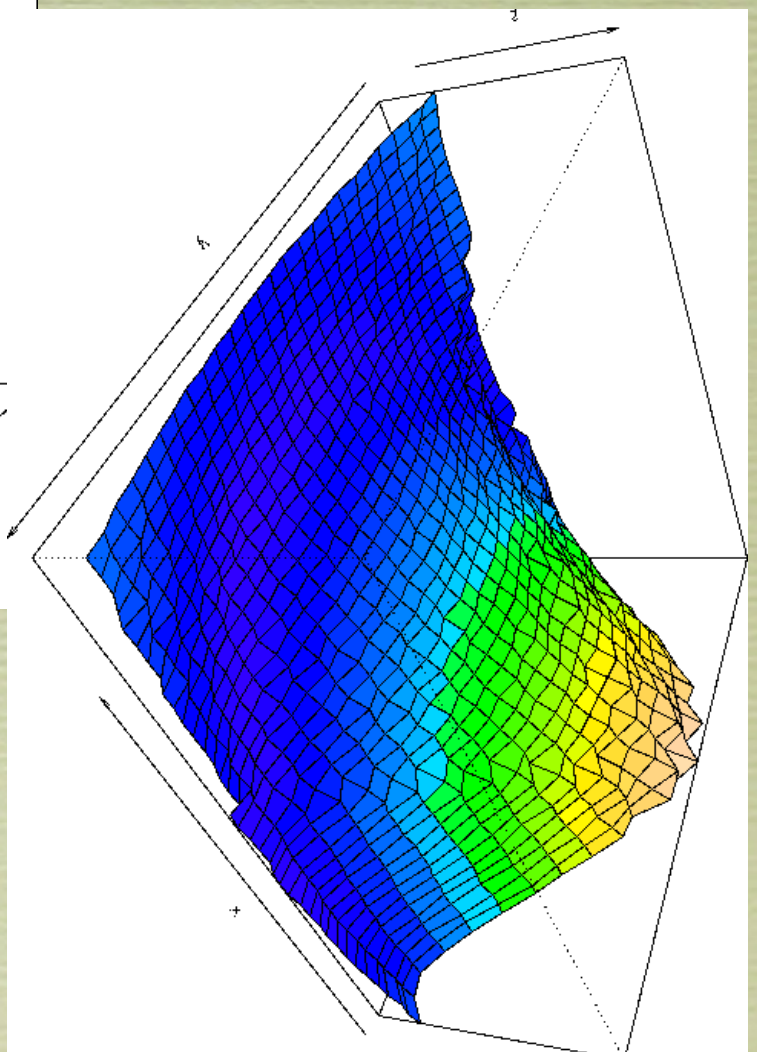


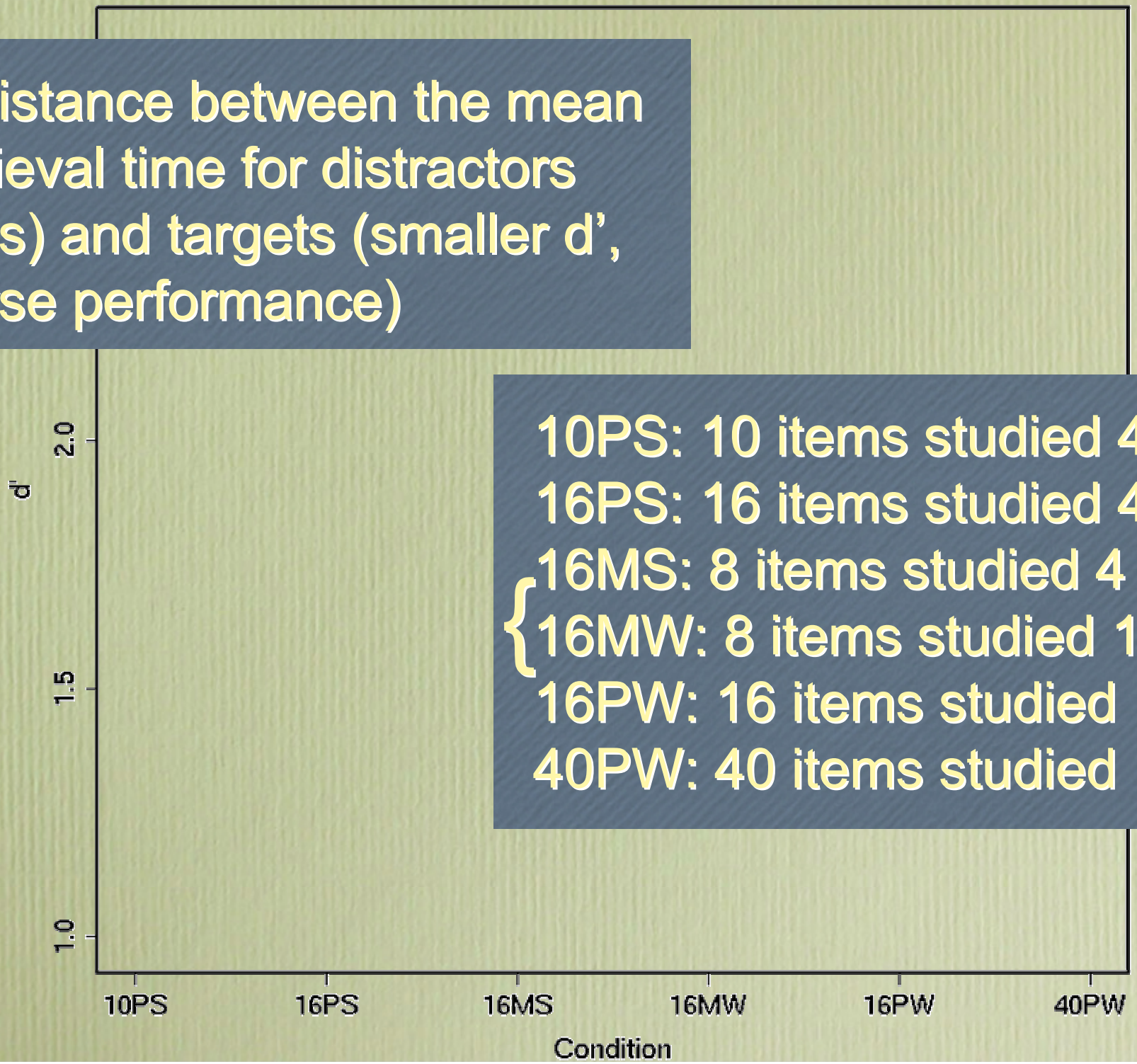




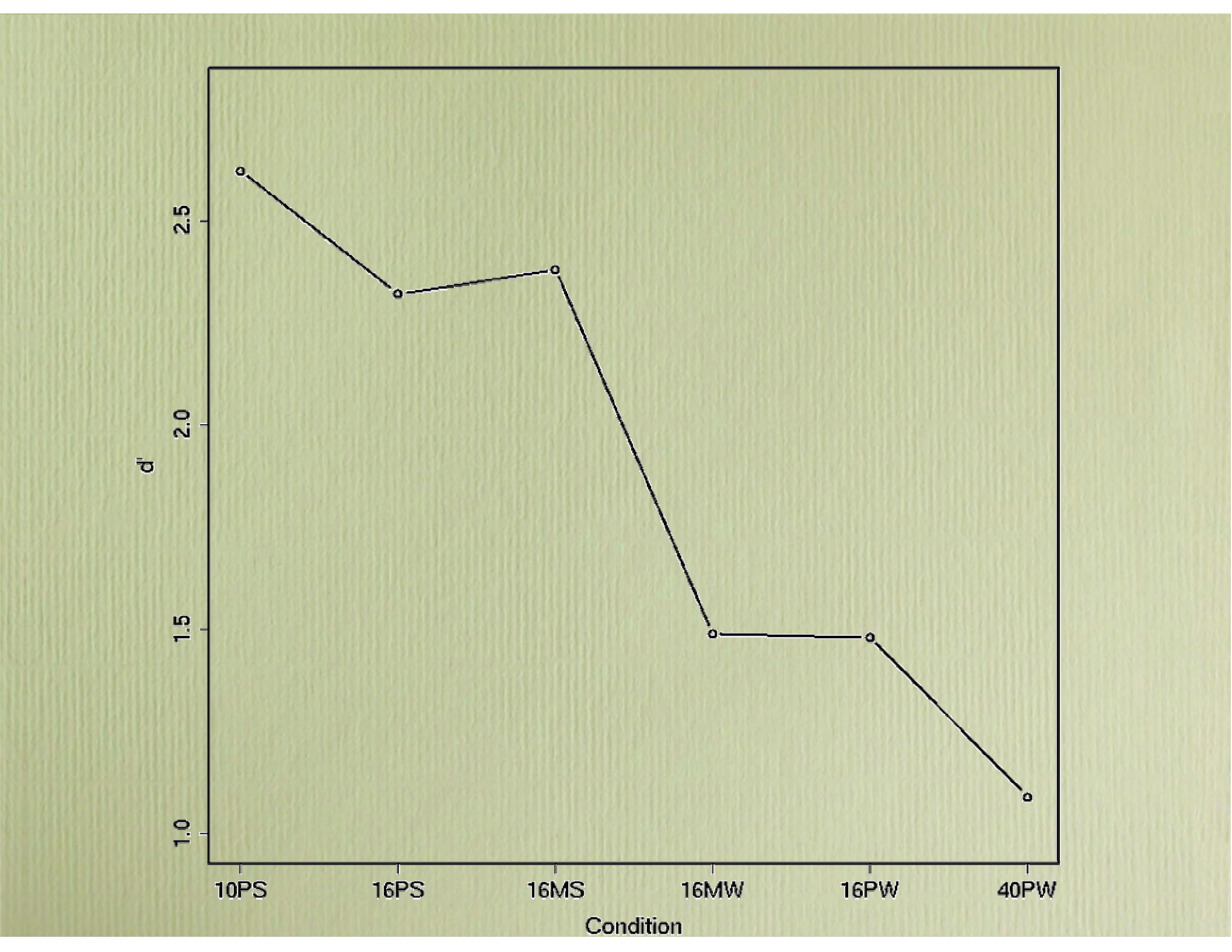
Chapter 7, ‘98 book

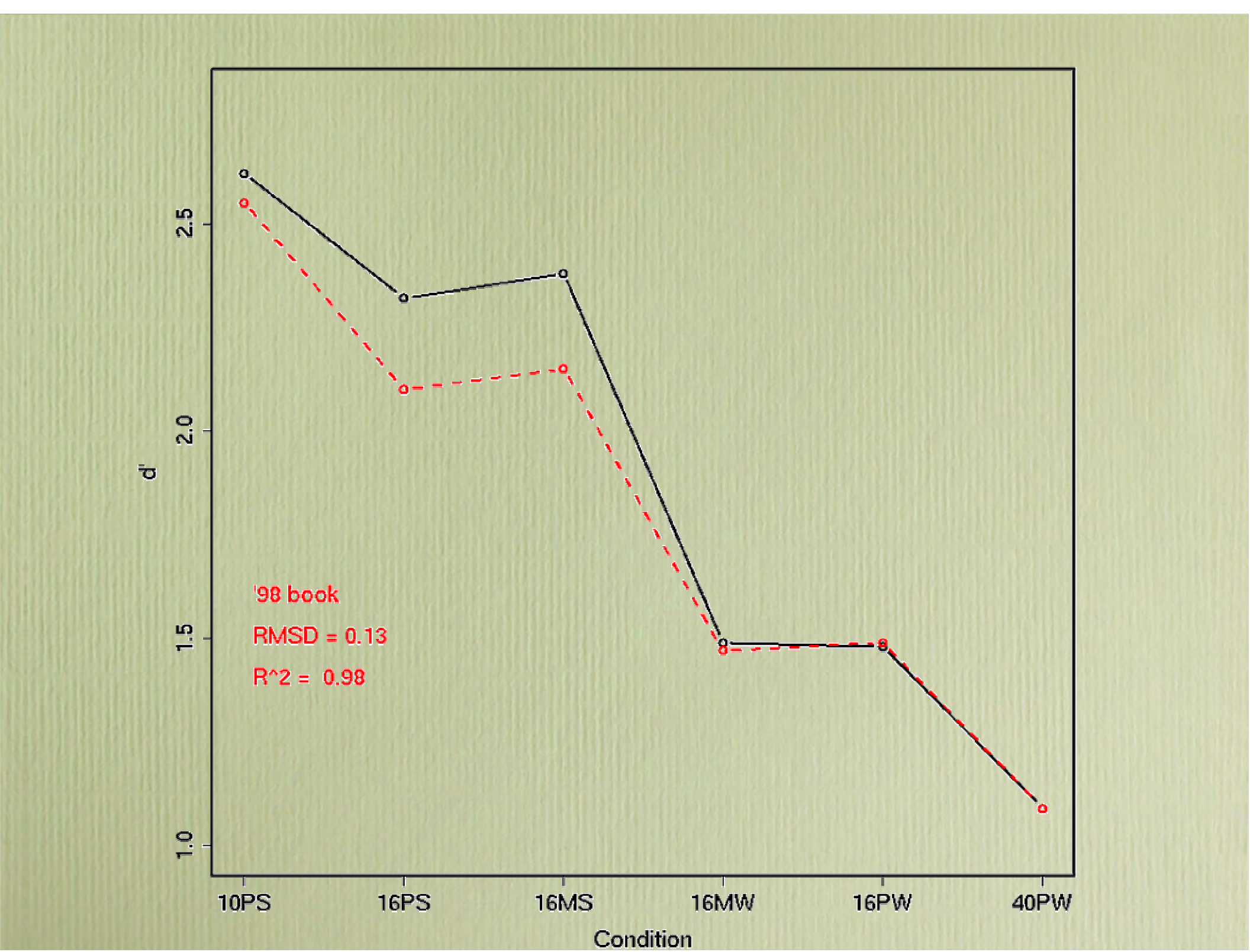
- Ratcliff, Clark & Shiffrin (1990)
- “Recognition memory for individual items deteriorates as the list has more items *(the list length effect)*. It also gets better as items are studied more *(the list strength effect)*”
- Chapter 7 presents a model of these effects that shows a reasonably good fit

d' distance between the mean retrieval time for distractors (foils) and targets (smaller d', worse performance)



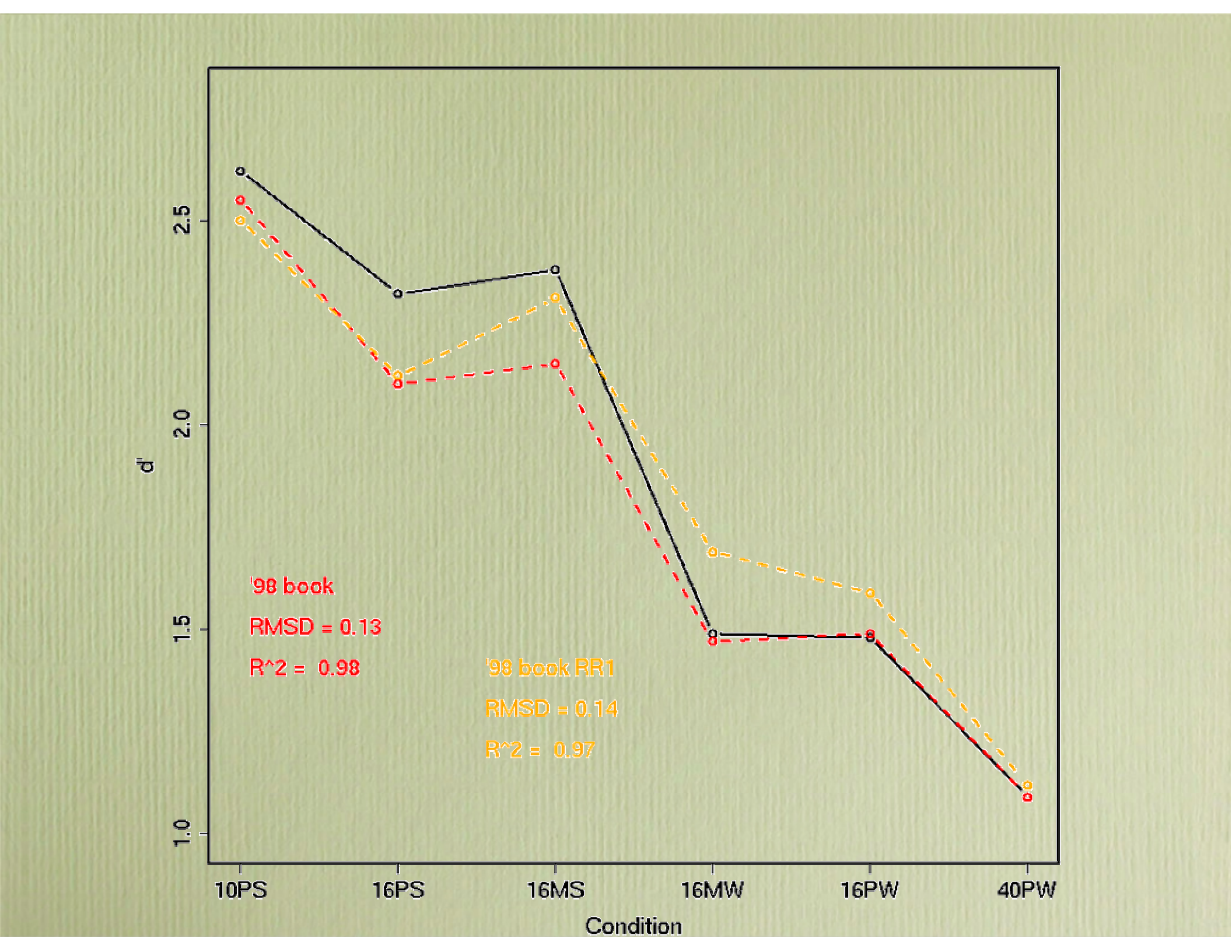
10PS: 10 items studied 4 times
16PS: 16 items studied 4 times
16MS: 8 items studied 4 times
16MW: 8 items studied 1 times
16PW: 16 items studied 1 time
40PW: 40 items studied 1 time

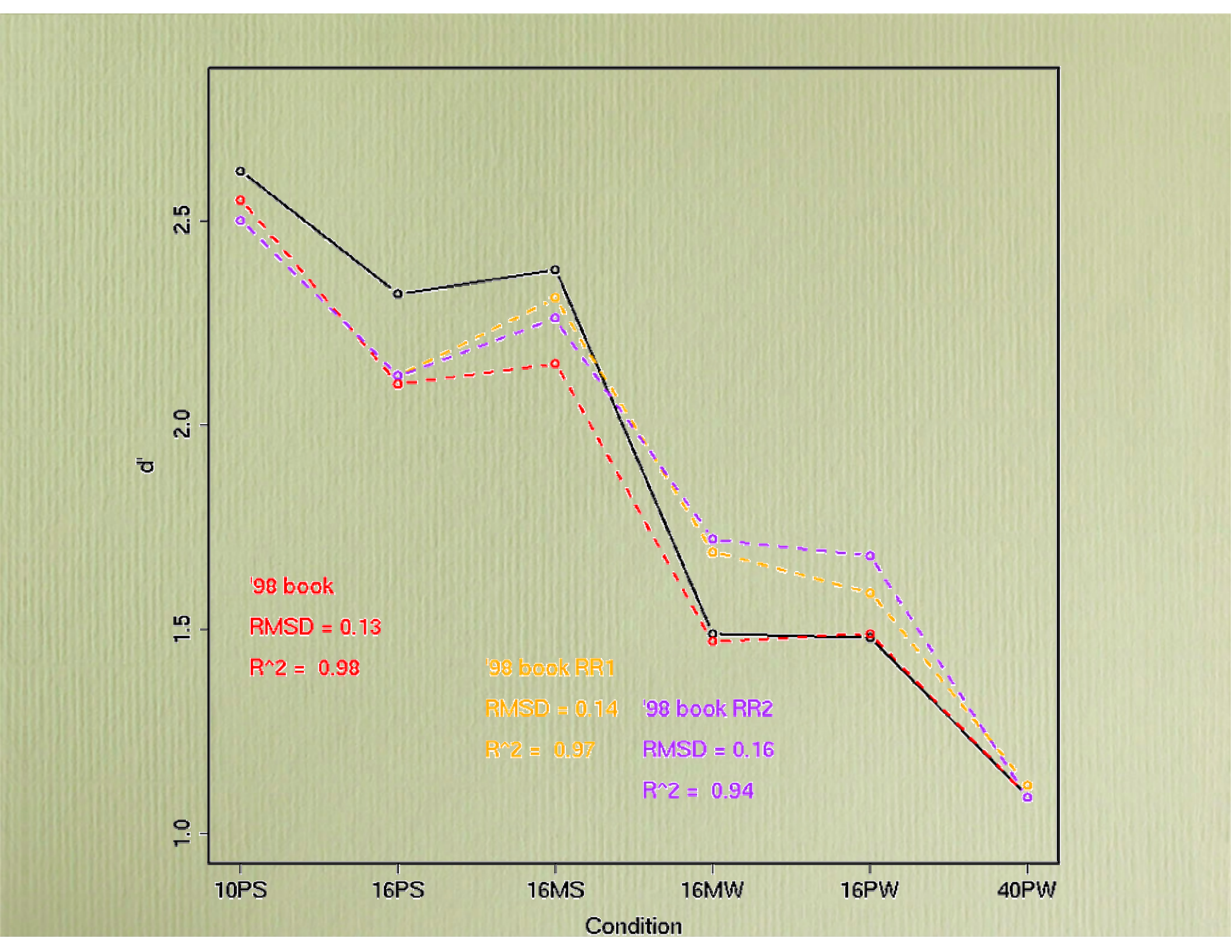

d'
2.5
2.0
1.5
1.0
10PS
16PS
16MS
16MW
16PW
40PW
Condition


d'
2.5
2.0
1.5
1.0
'98 book
RMSD = 0.13
R^2 = 0.98
10PS
16PS
16MS
16MW
16PW
40PW
Condition

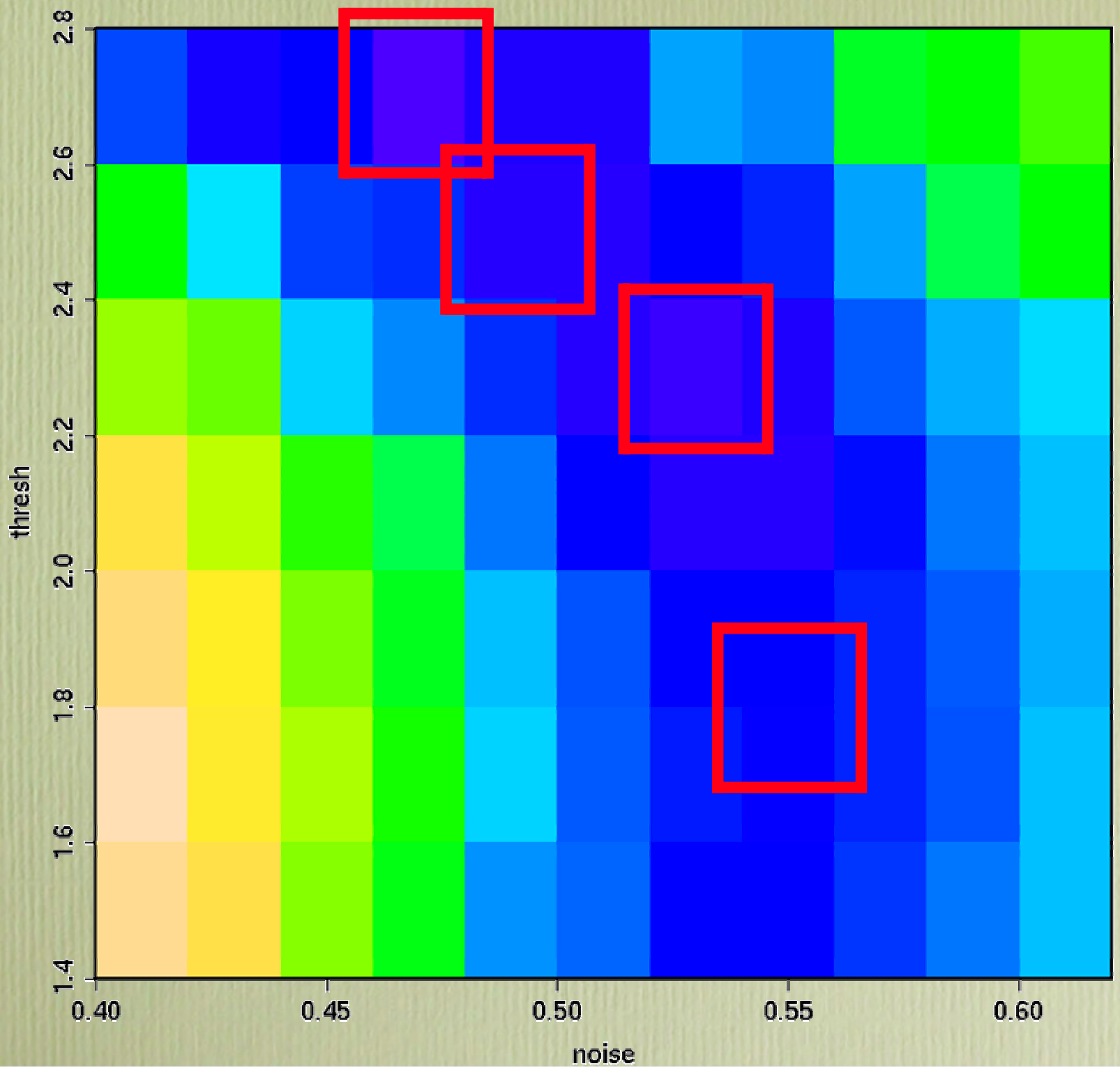
Parameter Estimations

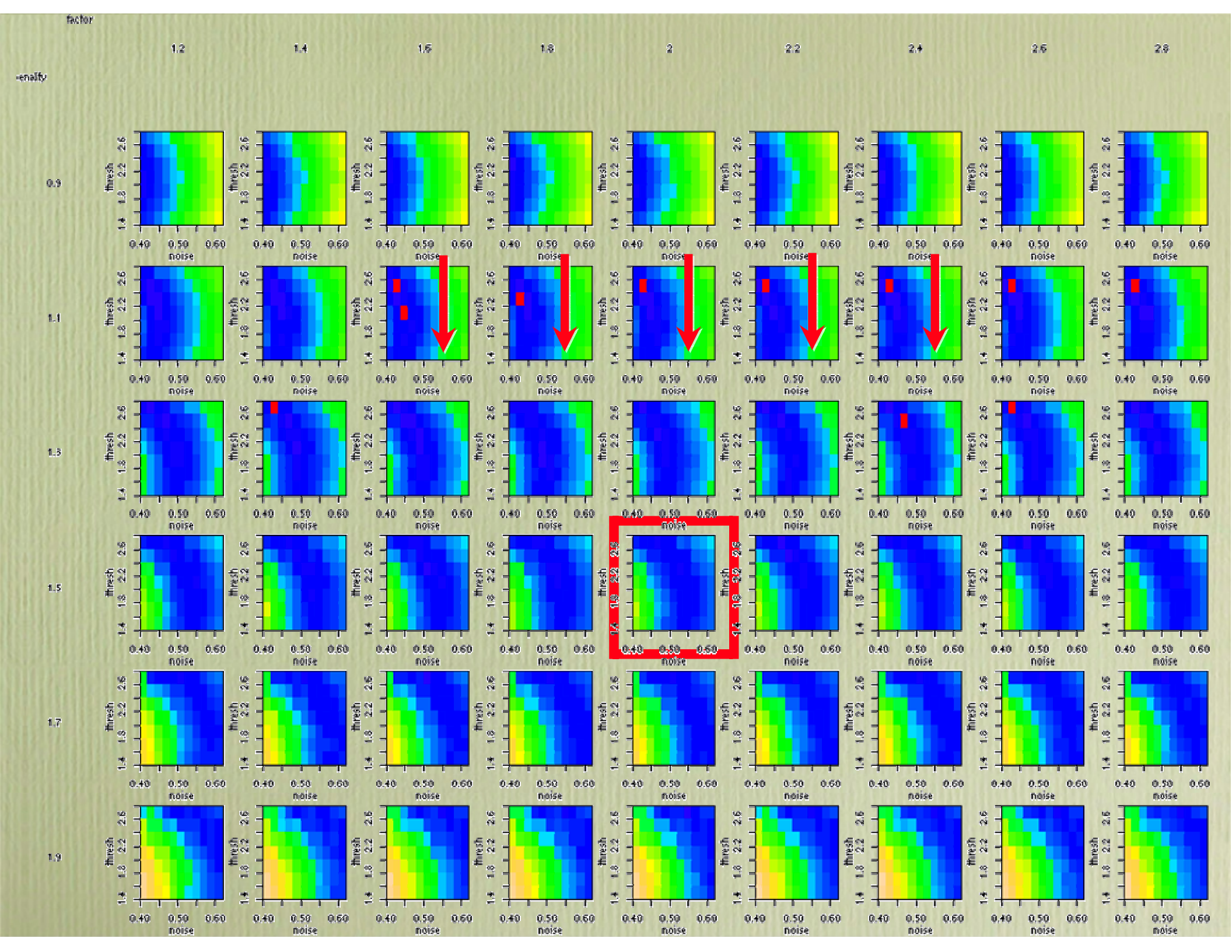
- Four parameters:
- F (latency factor): 2 (set/copied from other model)
- s (noise): 0.55 (estimated)
- P (partial matching penalty): 1.5 (estimated)
- τ (threshold): 1.8 (estimated)


d'
2.5
2.0
1.5
1.0
'98 book
RMSD = 0.13
R^2 = 0.98
'98 book RR1
RMSD = 0.14
R^2 = 0.97
10PS
16PS
16MS
16MW
16PW
40PW
Condition


d'
2.5
2.0
1.5
1.0
'98 book
RMSD = 0.13
R^2 = 0.98
'98 book RR1
RMSD = 0.14
R^2 = 0.97
'98 book RR2
RMSD = 0.16
R^2 = 0.94
10PS
16PS
16MS
16MW
16PW
40PW
Condition

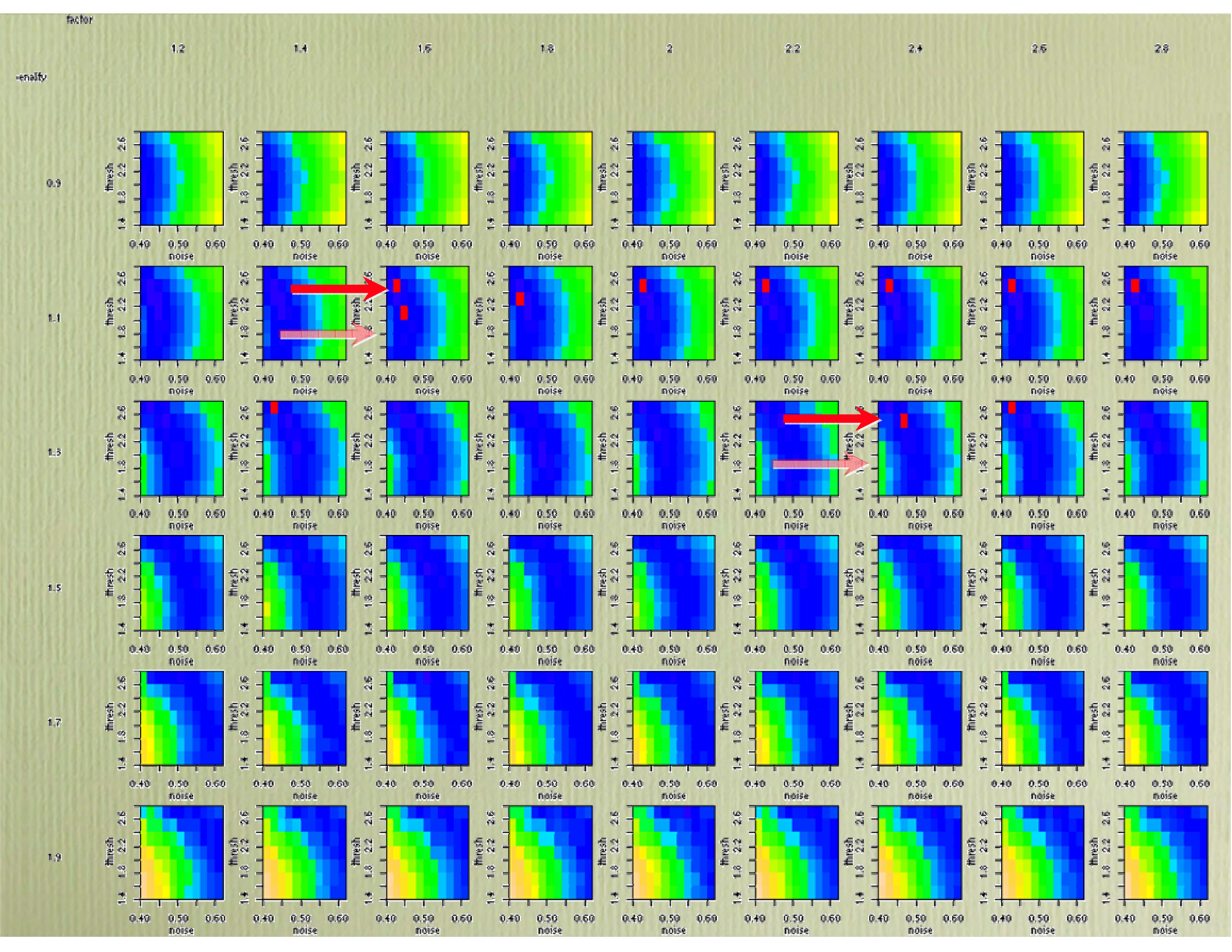
F:2
P:1.5



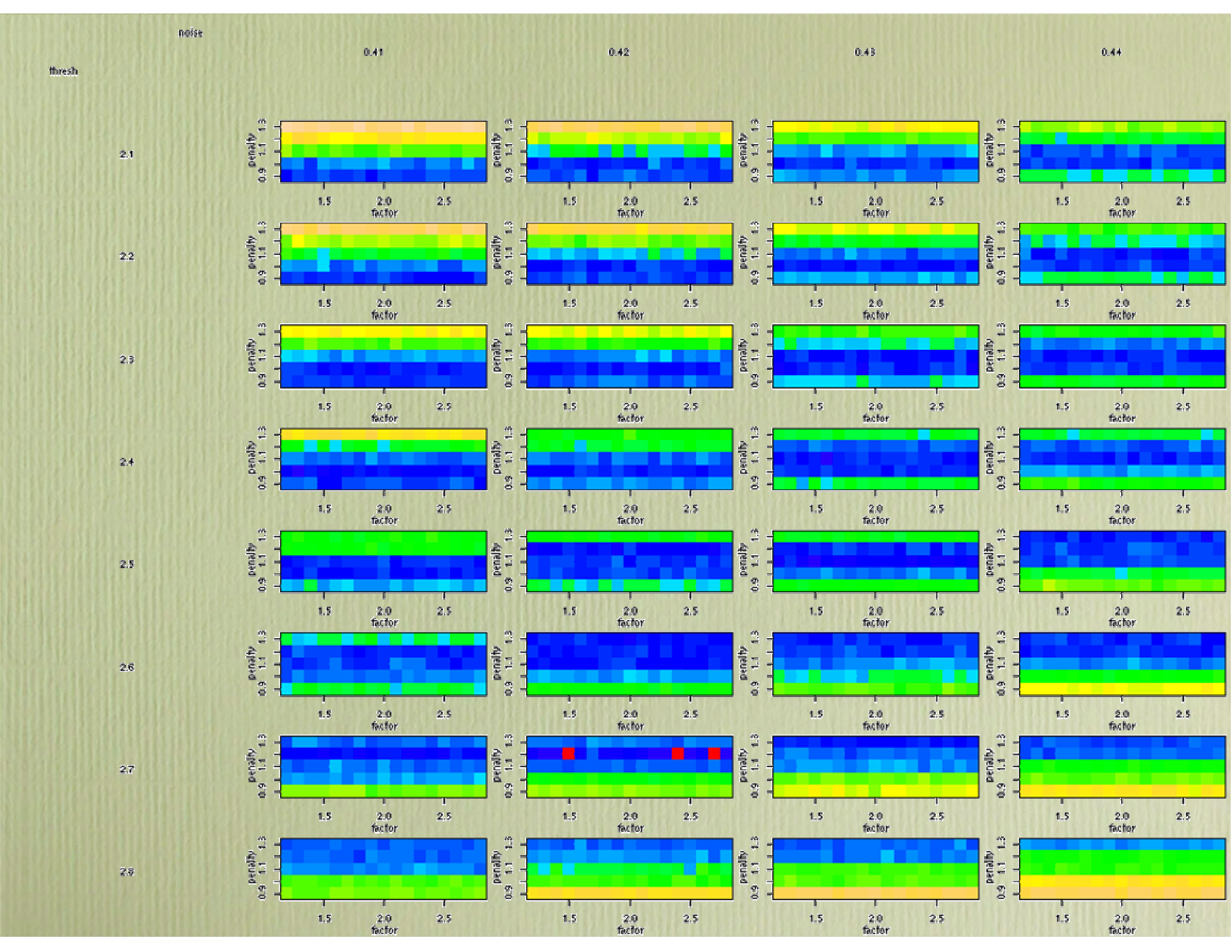

factor
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
penalty
0.9
1.1
1.3
1.5
1.7
1.9
thresh
noise
0.40
0.50
0.60
1.4
1.8
2.2
2.6

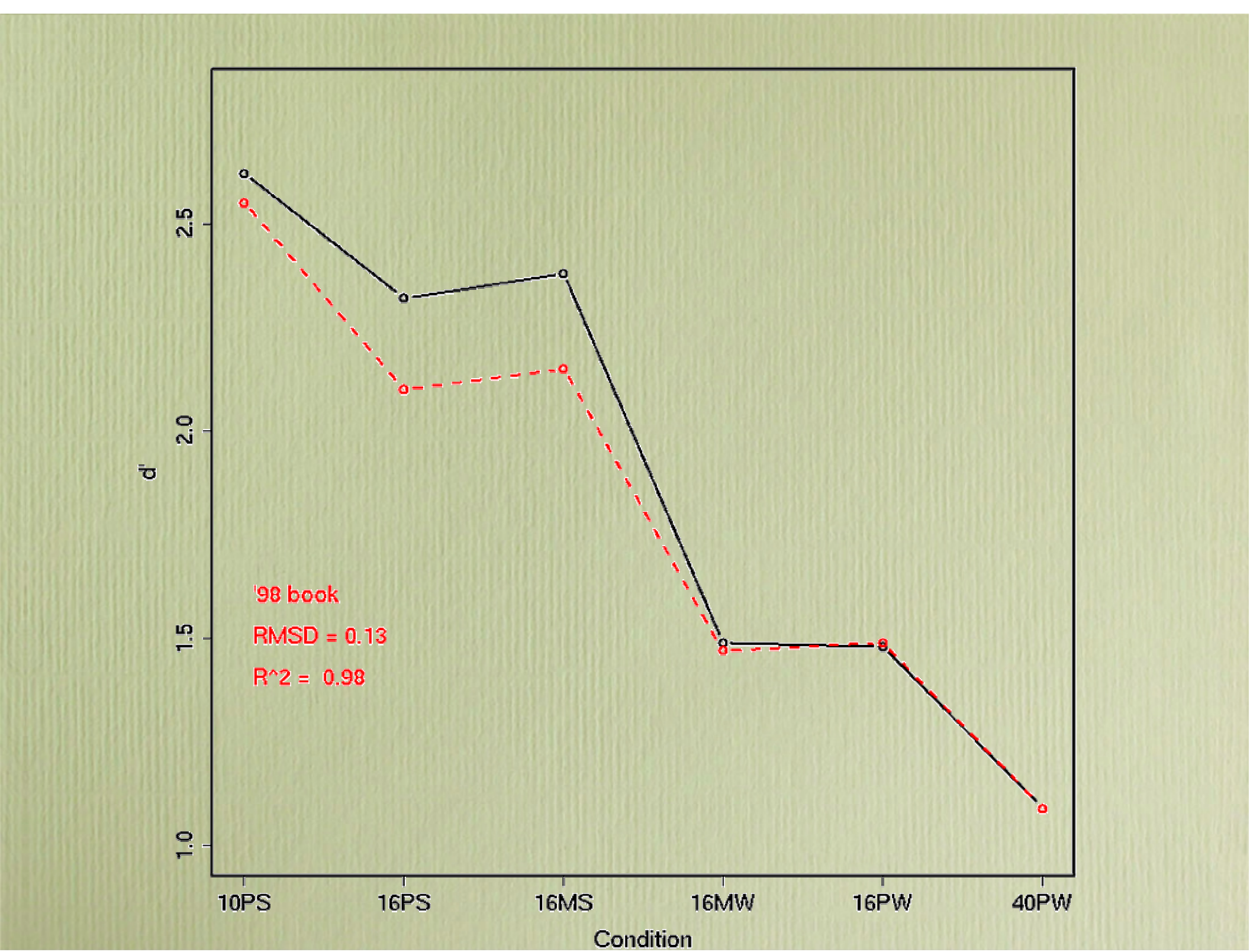
penalty
factor
0.9
1.1
1.3
1.5
1.7
1.9
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
thresh
noise
1.4
1.8
2.2
2.6
0.40
0.50
0.60

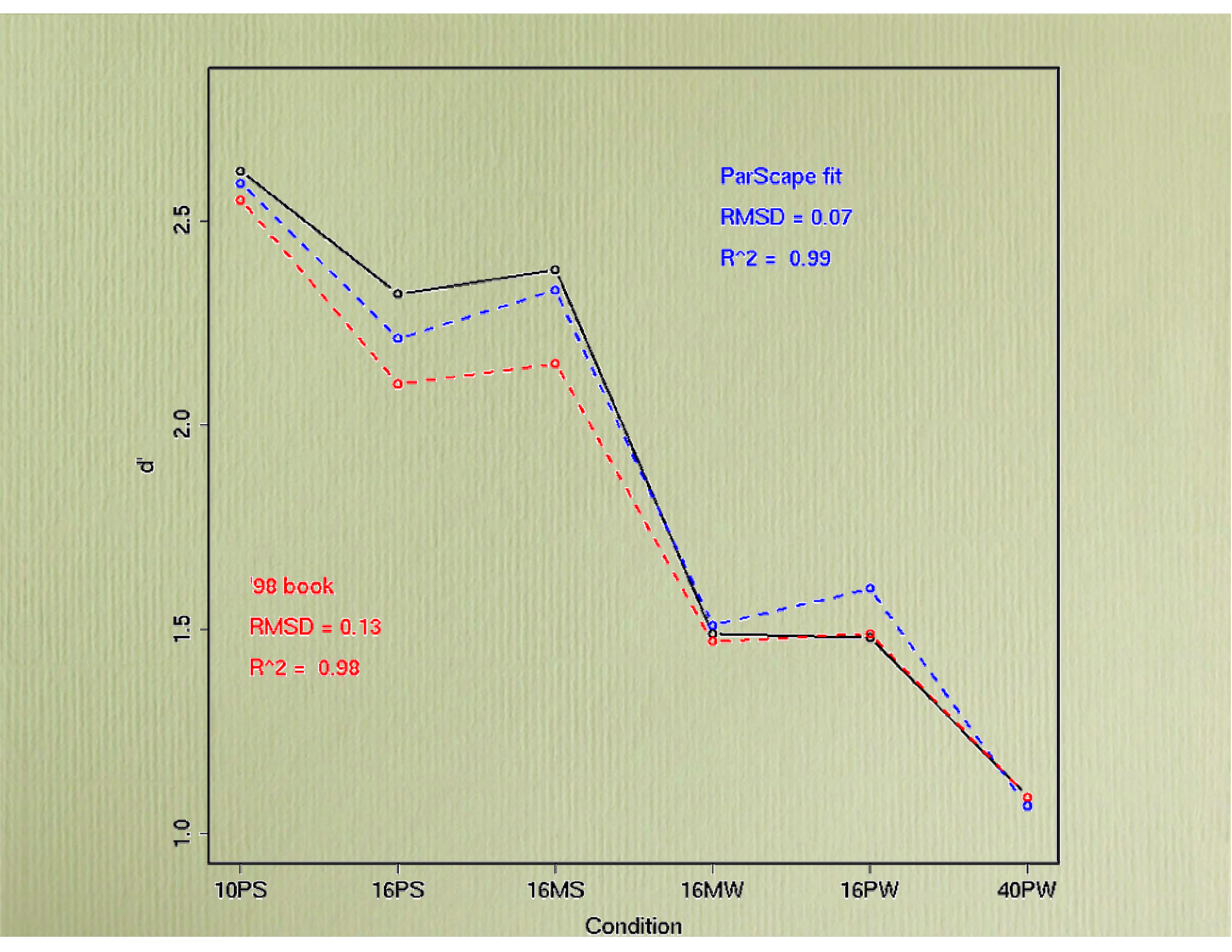
penalty
factor
0.9
1.1
1.3
1.5
1.7
1.9
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
thresh
noise
1.4 1.8 2.2 2.6
0.40 0.50 0.60


factor
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
penalty
0.9
1.1
1.3
1.5
1.7
1.9
thresh
noise

noise
thresh
0.41
0.43
0.45
0.47
0.49
0.51
0.53
0.55
0.57
0.59
0.61
1.5
1.7
1.9
2.1
2.3
2.5
2.7
penalty
factor


noise
0.41
0.42
0.43
0.44
thresh
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
penalty
factor
0.9
1.1
1.3
1.5
2.0
2.5


d'
2.5
2.0
1.5
1.0
'98 book
RMSD = 0.13
R^2 = 0.98
10PS
16PS
16MS
16MW
16PW
40PW
Condition


ParScape fit
RMSD = 0.07
R^2 = 0.99
'98 book
RMSD = 0.13
R^2 = 0.98
d'
2.5
2.0
1.5
1.0
10PS
16PS
16MS
16MW
16PW
40PW
Condition

Recommendations

- Optimizing won't give you more than an idea of what in "what area" the right parameters are
- After optimization, create a parameter landscape
  - I will post the code I used to create this presentation to the ACT-R mailing list (August)
- Then, find the best fit to stun others...
- However, make a note to yourself that his single best fit is just one fit of a "family of fits"