

Size of Effect Relative to Variability in Six Sets of Reaction-Time Data

Experiment	Mean	Variance	SD	Effect	Effect/SD
1	222	610	25	51	2.04
2 (na=2)	354	2600	51	51	1.00
2 (na=8)	449	1300	36	155	4.30
3	458	5700	75	190	2.53
4	648	25800	161	323	2.01
5 (Gilden)	649	77500	278	215	0.77

Notes

- (1) The Unit is *msec* for the Mean, SD, and Effect; the unit is *msec*² for the Variance.
- (2) Data on the first five lines of the table are drawn from Tables 26.2 and 26.3 in Roberts, S. & Sternberg, S. (1993) The meaning of additive reaction-time effects: Tests of three alternatives. In D. E. Meyer & S. Kornblum (Eds.) *Attention and Performance XIV: Synergies in Experimental Psychology, Artificial Intelligence, and Cognitive Neuroscience*. Cambridge, MA : M.I.T. Press. Pp. 611-653. Values are means over subjects; for calculation details, see Roberts & Sternberg (1993).
- (3) Data on the last line of the table are based on Figure 1 of Gilden, D. L. (2001) Cognitive emissions of 1/f noise, *Psychological Review*, 108, 33-56. (Values were read from the graphs.)
- (4) SDs on the last line are based on the assumption that the length of the "error bars" in Gilden's Fig. 1B represent twice the SD.¹
- (5) Experiments 1 - 4 are 2 × 2 factorial experiments in which the two effects on the means are (approximately) additive. The "effect" in the table for these experiments is the sum of the two main effects, which, assuming perfect additivity, is the difference between the largest and the smallest of the four means. For the Gilden experiment, the "effect" is the difference between the largest and smallest mean (orientations 180 and 0 degrees, respectively) shown in his Fig. 1A.
- (6) Details of the five experiments:
- Exp. 1: Flash detection, variable foreperiod, lever pull, *N* = 6. (Backus & Sternberg, 1988).
- Exp. 2: Vocal naming of numerals (Sternberg, 1969, Exp. 5). "na" means number of alternative stimulus-response pairs. *N* = 5.
- Exp. 3: Binary choice, classification of numerals, lever pull, *N* = 12. (Sternberg, 1967).
- Exp. 4: Overlapping tasks, two-choice button press, *N* = 22 (McCann & Johnston, 1989).
- Exp. 5 (Gilden): Two-choice judgments of whether rotated letters are normal versus reflected, probably button press, *N* = 6 (Gilden, 2001).

1. My estimates of Gilden's means (from left to right in the figure) are 570, 607, 714, 785, 640, and 580 *msec*. The variance of these six values is 7113 *msec*². My estimates of the corresponding SDs are 248, 253, 300, 345, 275, and 235, respectively; the within-condition variance, shown under "Variance", is the mean of the squares of these values. The overall variance should thus be close to 77500 + 7113. 7113 is 8.4% of this total, close to the claimed 10%.