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Conference or Workshop Item

Title: The challenge of the Psychonomic Society Guidelines on statistical issues (2012)

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The Challenge of the Psychonomic Society Guidelines on Statistical Issues (2012)

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The Question: How well are the *New Statistical Guidelines for Journals of the Psychonomic Society* (2012) already met and how much needs to change?

The Guidelines encourage reporting of

- Power analyses
- Confidence intervals (CI)
- Effect sizes (ES)
- Measures of variability e.g.
 - Standard Error (*SE*)
 - Standard Deviation (*SD*)

The Method: Reviewed all empirical papers in Psychonomic Society Journals in 2013 for Power, CI, ES, *SE*, *SD*, *MSE*.

Also recorded statistical tests & potentially misleading bar charts*

* See Newman and Scholl (2012)

Journals & Papers: 463 articles

Attention, Perception & Psychophysics 148
Psychonomic Bulletin & Review 120
Memory & Cognition 99
Cognitive, Affective & Behavioral Neuroscience 60
Learning & Behavior 36

% papers reporting analyses summed across Journals.

Individual journal results in tables below poster.

Power analysis in only 5 %



Some ES reported in 61 %



ES discussed in only 9%



SD reported in only 39 %



CI reported in only 11%



SE reported in only 60 %

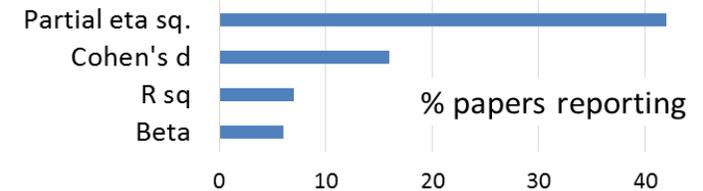


ANOVA with *MSE* 20 %



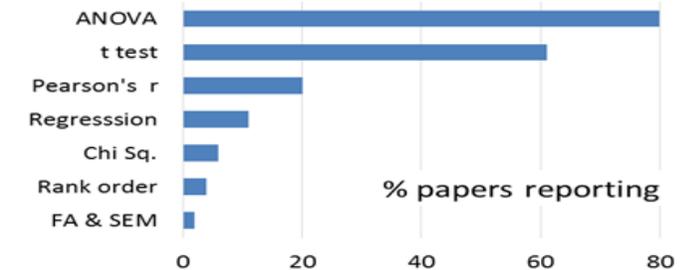
Often data could be more effectively described

Effect size measures reported



Note Lack of population ES measures

Statistical tests reported



Other problems in reporting

- No measure of variability 8%
- η_p^2 mislabelled as η^2 15%
- Bar charts for means* 45%
- Of papers with graphs:
 - Undefined error bars 16%
 - Error bars only above mean 19%

Conclusion: Improvement is needed in statistics reporting to meet the Guidelines.

Table 1.

Percentages of Articles In the Five Psychonomic Society Journals Surveyed and the Overall Percentages for Each Aspect of Statistical Reporting Included in the Survey.

Aspect of statistical reporting	Journals					Overall
	AP&P	PB&R	M&C	CA&BN	L&B	
Power and effect size						
A priori power analysis	5	0	7	8	3	5
Power issue mentioned	7	6	16	27	6	11
Effect sizes reported	57	70	73	48	39	61
Effect sizes discussed	7	10	13	7	3	9
Partial eta squared (% of total papers)	40	48	52	28	19	42
Partial eta squared (% of ANOVA papers)	64	46	37	24	64	52
Partial eta squared labelled as eta squared	17	19	8	12	14	15
Cohen's <i>d</i>	9	18	25	17	6	16
R^2	6	8	7	5	6	7
Beta	3	8	7	10	0	6
Variability						
Confidence intervals reported	12	10	15	7	11	11
Standard errors reported in some form	59	58	61	62	58	60
Standard errors not reported as numbers	44	27	24	33	39	33
Standard deviations reported	33	40	41	55	22	39
<i>MSE</i> reported for ANOVAs	11	22	37	9	24	20
Papers with no report of variability	7	8	14	8	0	8
Statistical tests reported						
ANOVA	85	75	79	77	81	80
<i>t</i> tests	68	57	57	68	53	61
Pearson product moment correlations	14	23	13	50	6	20
Linear & multiple regressions	7	15	12	13	6	11
Chi square	3	8	6	8	6	6
Rank order statistical analyses	3	4	1	10	8	4
Logistic regression	2	3	1	0	0	2
Factor analysis & SEM	2	2	3	2	0	2
Figures representing means						
Means bar chart	45	42	42	57	44	45
Means line graph	36	25	21	18	39	28
Means point graph	1	3	1	0	3	2
Error bars (% of papers with figures representing means)						
Graphs with error bars	92	93	92	96	81	92
<i>SE</i> error bars	67	74	69	70	80	71
CI error bars	13	9	12	12	4	11
<i>SD</i> error bars	2	0	3	9	4	3
Undefined bars	19	17	16	9	12	16
Error bar only above mean	17	14	19	30	40	20

Notes. AP&P = *Attention, Perception & Psychophysics*, 148 papers; PB&R = *Psychonomic Bulletin & Review*, 120 papers; M&C = *Memory & Cognition*, 99 papers; CA&BN = *Cognitive, Affective & Behavioral Neuroscience*, 60 papers; L&B = *Learning & Behavior*, 36 papers.

SEM = Structural equation modelling; *SE* = standard error; CI = confidence interval; *SD* = standard deviation