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Opinion: Methodology matters

My favourite article title is that of Poulton's 1977 paper in the *British Journal of Psychology*: *Quantitative subjective assessments are almost always biased, sometimes completely misleading*. At first this may seem an overly pessimistic view, but Poulton is probably correct. An illusionist such as Derren Brown purposefully manipulates people so that they give a certain response: In psychophysical experiments we may also be manipulating responses, albeit unintentionally.

It is difficult, if not impossible, to avoid bias in a subjective evaluation but what you can do is be aware of the potential for bias and take precautions. A common protocol is to compare two light settings and state which is the preferred or better according to a given evaluation factor. Consider that the two settings are presented simultaneously as adjacent left-hand and right-hand scenes, and that the observer states the left-hand side to be preferred. There are many reasons why the observer might tend to give this response regardless of the light settings, and physical properties of the apparatus might lead to unintended perceptual or physical differences. Thus, the 'left' response may be an unfair evaluation. A simple solution to position bias is to counterbalance position, swap the left and right-hand scenes for an equal number of trials. Simple, perhaps, but a surprisingly large number of studies fail to do so.

Rarely, if ever, have I seen discussion of the number of points used in the response scales of a questionnaire and there is some evidence that it matters. UK university students are asked annually to evaluate their learning experience using a series of 5-point response scales. It appears that the middle category, the neutral position in the bipolar response scales, is summated as a negative opinion when the responses are analysed, despite that not being evident on the questionnaire. Does such grouping lead to an underestimate of satisfaction with teaching quality? Poulton might suggest using instead a 4-point response, omitting the neutral category to demand in essence a forced-choice response, a fairer approach since that is how the data are analysed.

Rating scales are frequently used to evaluate discomfort glare, for which the commonly used de Boer scale asks for a rating from 1 to 9. In some studies the lowest possible magnitude descriptor (9) is labelled as "*just noticeable*". With this label it is not possible for observers to indicate that glare was not apparent, they are forced to indicate that glare was at least noticeable. Has this led to an over-estimate of the prevalence of discomfort?

The main message of the recent CIE Technical Report 212:2014: *Guidance towards Best Practice in Psychophysical Procedures Used when Measuring Relative Spatial Brightness* is to randomise and counterbalance wherever possible and to include null condition trials. It is not complete, some of the ideas may be incorrect, but if disagreement prompts discussion of methodology then it will be serving a good purpose because methodology matters.

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