Available online at www.sciencedirect.com

ScienceDirect

Journal of Consumer Psychology 26, 3 (2016) 315 – 324

Research Article

A clearer spotlight on spotlight: Understanding, conducting and reporting☆

Aradhna Krishna

Ross School of Business, University of Michigan, 701 Tappan St., Ann Arbor, MI 48109-1234,USA

Accepted by Amna Kirmani, Editor

Received 6 April 2016; accepted 8 April 2016
Available online 28 April 2016

Abstract

There has been a remarkable increase in the use of spotlight analysis to examine any interactive effect between an independent variable and a continuous moderator. Most of the spotlight analyses have been conducted at one standard deviation above and below the mean value of the moderator, even when alternate methods are more appropriate. Additionally, many spotlight analyses are not conducted correctly. More importantly, results for spotlight analyses are reported in a manner that makes it virtually impossible for mistakes to be detected. This article focuses on "understanding," "conducting," and "reporting" spotlight analyses. By posing questions for the reader, it highlights some common mistakes made when doing spotlight analysis and explains why confusion often arises. Then it provides an easy to understand way to do spotlight analysis for some popular contexts. Alternatives to spotlight analysis are also briefly discussed. Finally, it suggests how to report results for spotlight analysis and for the alternatives. Pointing out recurrent mistakes should prevent perpetuation of misleading practices. Similarly, reporting essential details of the analyses should prevent mistakes from going undetected.

Keywords: Spotlight analysis; Johnson–Neyman technique; Dichotomizing variables

The nature of consumer psychology research is such that we often want to examine the effect of one variable at certain levels of another variable. Frequently, one of these variables is continuous in nature—for instance, demographic variables like age, weight, height; product features like price, fuel efficiency, volume; marketing variables like advertising dollars spent, promotion dollars spent, et cetera. There are also variables that are measured on constructed continuous scales such as self-control, need-for-touch, style of processing, vividness of visual imagery, and self-esteem.

The consumer psychologist frequently wants to study the effect of two variables, one of which is continuous, on a dependent variable. For instance, she may want to study if touching or not a given food ("Touch-food"—yes, no) affects its "Consumption" (the amount of the food that is eaten). She may also want to look at the effect of "self-control" on such "consumption" (see Fig. 1 for a hypothetical Effect of Consumer Self-control and Touching Food on Consumption). If she finds a significant interactive effect between the two variables, it implies that the effect of one variable, Touch-food (the independent variable), is dependent on the values of the other variable, Self-control (the moderator). In this case, she may want to examine the effect of Touch-food at certain levels of the continuous variable, Self-control. What should she do then? The way in which consumer researchers have further explored such interaction effects between a categorical independent variable and a continuous independent variable has varied over time.

Until about a decade ago, it used to be the case that researchers did a median split on the moderator, Self-control, effectively turning the continuous variable into a binary variable with two values—high Self-control and low Self-control. Then they

☆ This article is based on many discussions I have had with my doctoral students and post-docs and participants in my Sensory Marketing Laboratory (www.sensorymarketinglab.com), especially Luca Cian and Ryan Elder. I would also like to thank Nilufer Aydinoglu, Fred Feinberg, Amna Kirmani, Maureen Morrin, Tatiana Sokolova, and three pairs of anonymous reviewers for comments on this article.
E-mail address: aradhna@umich.edu.

http://dx.doi.org/10.1016/j.jcps.2016.04.001
1057-7408/

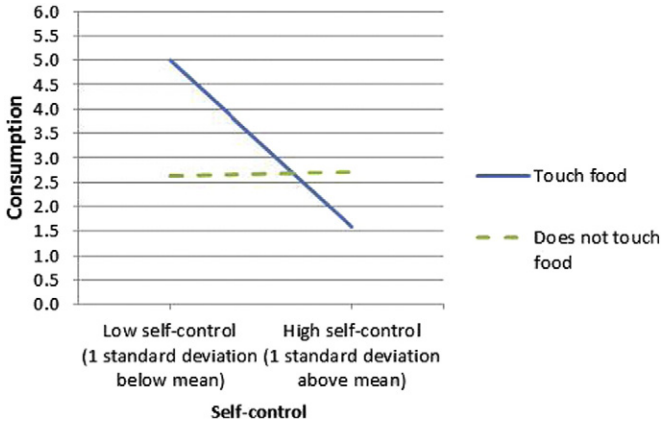

Fig. 1. Hypothetical effect of self-control and touch-food (yes/not) on consumption (self-control at 1 standard deviation above/below the mean).

examined if the effect of the independent variable, Touch-food, depended on the value of the binary moderator, typically using simple effect tests (which were often called contrast tests). Hence, one would analyze the data to see if Touch-food had a significant effect on Consumption within low values of Self-control, and also within high values of Self-control. One reason for this dichotomy of the continuous variable into a high and a low value was researchers' belief that this would ease the explanation of any interactive effect between an independent variable and moderator.

Unfortunately, past literature has shown that analyses based on mean/median splits on the continuous moderator can give both false positive and false negative results (Irwin & McClelland, 2003). Also, dichotomizing the continuous moderator treats responses at very small and very large distances from the split to be the same—thus, 1 versus 7 on a 7-point scale would be treated the same as a response of 3.99 and 4.01 if the split happened at 4. This swallows some of the statistical power from the analysis, reducing the ability to diagnose a significant interaction.

This problem was realized by a number of researchers in the consumer psychology and the broader psychology community and a number of articles on this issue were written. For a recent dialogue on when to dichotomize variables, see Pham (2015); Iacobucci, Posovac, Kardes, Schneider, and Popovich (2015a, 2015b); Rucker, McShane, and Preacher (2015); McClelland, Lynch, Irwin, Spiller, and Fitzsimons (2015). Early discussions on the subject were provided by Jaccard, Turrisi, and Wan (1990); Aiken and West (1991); and Cohen (1983), and followed up by Irwin and McClelland (2001, 2003) and MacCallum, Zhang, Preacher, and Rucker (2002). Jaccard et al. (1990), Aiken and West (1991), and Irwin and McClelland (2001) proposed an alternate approach where one looked at the effect of the independent variable at low and high values of the moderator by mean shifting the data (and not by doing a median split on the data); Irwin and McClelland (2001) called this "pointing a spotlight on the model from different angles". Fitzsimons (2008) subsequently wrote a short editorial based on these longer articles dubbing the proposed alternative approach "spotlight analysis."

Fitzsimons (2008) provided an illustrative spotlight analysis which suggested looking at the effect of the independent variable at one standard deviation above and below the mean value of the moderator. This illustration proved to be very persuasive. Since then, dozens of spotlight analyses have been done, and most of them have been conducted at those two suggested values of the moderator. In the *Journal of Consumer Research*, 1, 4, 3, 12, 10, 18, 24, and 17 papers used a spotlight analysis in 2008, 2009, 2010, 2011, 2012, 2013, 2014, and 2015, respectively. The count for the *Journal of Marketing Research* in the same years is 1, 1, 0, 4, 4, 7, 2, and 2, and for the *Journal of Consumer Psychology*, it is 0, 0, 2, 1, 3, 5, 7, and 10. It appears that it has become *de rigueur* to use spotlight analysis for analyzing an interactive effect.

Unfortunately, three problems have arisen with the current way in which spotlight analysis is being done. First, while Fitzsimons (2008) suggested using spotlight analysis instead of dichotomizing continuous variables, he did not exactly spell out in any easy way how to do it. Jaccard et al. (1990); Aiken and West (1991) and Irwin and McClelland (2001) give more detail but either researchers find their articles hard to comprehend or do not take the effort to understand them. In any event, it appears that researchers have since struggled, often doing the analysis wrong. Thus, there are problems in understanding and conducting spotlight analysis correctly. Second and more disturbing is the fact that the method for reporting spotlight analyses (which often follows Fitzsimons, 2008) makes such errors impossible to detect. Spiller, Fitzsimons, Lynch, and McClelland (2013) report that in volume 48 of the *Journal of Marketing Research* and volume 38 of the *Journal of Consumer Research*, many of the analyses were not optimal and others were simply wrong. Publishing analyses that were incorrect could be prevented by better understanding and reporting of analyses. Lastly, there are other methods for doing spotlight analyses, aside from examining the effect of the moderator at 1 standard deviation above and below the mean, and these are more appropriate in many cases.

The tutorial of Spiller et al. (2013) is a start to focus on the current spotlight analysis problems. The authors concentrate on the third and last of the issues mentioned above—alternative ways of conducting spotlight analyses. The authors' hope is that their tutorial will reduce spotlight analyses being done at one standard deviation above and below the mean, and that focal points and the Johnson–Neyman technique will be used instead in many instances. They clarify how to do spotlight analyses at focal points using several different experimental designs and when to choose the Johnson–Neyman technique (which they term "floodlight analyses") over spotlight analyses.

This article continues the focus on the current problems with spotlight analysis. However, in contrast to Spiller et al. (2013), it lays more emphasis on the first two problems, "understanding and conducting," and "reporting," compared to the third (alternative methods to do spotlight analysis). As such, the article (i) highlights some common incorrect ways in which spotlight analysis is currently done, which also underscores the puzzling nature of spotlight analysis. In order to do this, the article poses several multiple choice questions to the reader. Then it provides the correct solution to these questions and explains why the correct solution is right. The