



# The Perceived Awareness of the Research Hypothesis Scale: Assessing the Influence of Demand Characteristics

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## Abstract

The Perceived Awareness of the Research Hypothesis (PARH) scale is a 4-item quantitative self-report method for measuring the potential influence of demand characteristics in research situations. It can be used to help to refute the idea that observed effects are due to demand characteristics. The present article describes the PARH scale and discusses its advantages over other postexperimental feedback measures. Different approaches to analysing PARH data are considered. Finally, a survey of published research that has used the PARH scale shows that it has good internal reliability, and that it tends to show that research participants are not particularly aware of research hypotheses.

*Keywords:* demand characteristics; demand characteristics scale; research methodology; research artefacts; psychology

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Demand characteristics are "the totality of cues which convey an experimental hypothesis to the subject" (Orne, 1962, p. 779). If participants are exposed to these cues and become aware of a study's research hypotheses, then they may respond in a way that they believe will confirm the hypotheses in order to be "good" participants and not "ruin" the research (Orne, 1962; for a review, see Strohmets, 2008). Alternatively, they may attempt to sabotage the study by responding in ways that they believe will disprove the research hypotheses. Finally, they may respond in ways that they believe are socially desirable in the context of the proposed hypotheses. In all three cases, these unnatural responses compromise the ecological validity of the research, meaning that the research results may not generalize to more natural, real-world situations. Although researchers have been aware of this problem for over 50 years, the issue of demand characteristics continues to be a major source of concern (Sharpe & Whelton, 2016).

In the present article, I consider Rubin, Paolini, and Crisp's (2010) Perceived Awareness of the Research Hypothesis (PARH) scale as a method for establishing the extent to which demand characteristics may be influential in research situations.

### **The PARH Scale**

The PARH scale is a 4-item self-report measure that is usually presented near the end of a research study under the heading "Your thoughts about the research." The PARH items and instructions are as follows:

Please indicate how much you agree or disagree with each of the following statements:

1. I knew what the researchers were investigating in this research.
2. I wasn't sure what the researchers were trying to demonstrate in this research.
3. I had a good idea about what the hypotheses were in this research.
4. I was unclear about exactly what the researchers were aiming to prove in this research.

Participants respond to these items on a 7-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (7). Items 2 and 4 are reverse scored during coding, and the item scores are then averaged to form a single overall PARH score. Higher PARH scores indicate that participants believe that they are more aware of the research hypotheses.

### **Advantages**

The PARH scale is a postexperimental feedback scale. However, it has a number of advantages over other postexperimental feedback scales. Some postexperimental feedback measures require research participants to describe the research hypotheses in response to prompts such as "what did you think this research was about?" The problem with this indirect approach is that participants may respond with vague and uninformative answers that reiterate information that the researchers have provided to them previously (e.g., "the research is a psychology study about person perception;" Page, 1973). In an effort to obtain more diagnostic responses, researchers may ask more direct questions such as "did you realise that the research was investigating prejudice against Muslims?" However, these more specific questions have the potential to reveal the research hypotheses to participants and result in false positive responses: Participants may indicate that they were aware of the hypothesis when, in fact, that awareness only occurred *after* reading the feedback questions (e.g., Berkowitz, 1971). The PARH scale strikes a balance between these

two concerns: It asks direct questions about participants' awareness of the research hypotheses, but it does so without revealing what those hypotheses are (e.g., "I had a good idea about what the hypotheses were in this research").

The PARH scale is also innovative in its use of closed-ended items and a quantitative response format. This approach has four advantages. First, it is *quicker and easier for participants* to respond to closed-ended items that assess their understanding of the research hypothesis than it is for them to write about the actual hypotheses in an open-ended response format. In addition, there is likely to be less missing data using the PARH scale compared to an open-ended qualitative approach.

Second, it is *quicker and easier for researchers* to collate, analyse, and interpret the PARH scale's closed-ended quantitative data than it is for them to analyse and interpret the textual responses of the open-ended qualitative method.

Third, the PARH scale taps participants' implicit and intuitive understanding of the research hypotheses by asking about their perceived awareness of the research hypotheses without requiring them to state what the hypotheses are. Consequently, it provides a *more subtle and sensitive measure* than approaches that require participants to provide explicit descriptions of the research hypotheses. It is important to note here that the PARH scale cannot be used to establish whether or not participants are *actually* aware of the research hypotheses. It can only be used to assess the extent to which participants *perceive* that they are aware of the research hypotheses. Nonetheless, this *perceived awareness* may be used to establish the potential association between demand characteristics and observed research results.

Finally, the PARH scale's quantitative approach allows researchers to undertake *statistical tests of the empirical associations* between participants' perceived awareness of the research hypotheses and the measures that they use to test those hypotheses. I discuss four potential tests in the following section.

### Suggested Data Analyses

Scores from the PARH scale can be used in a four ways to test the possibility that observed research results are influenced by demand characteristics:

**(1) Perform a one sample *t* test on the mean PARH score.** Researchers can perform a one sample *t* test on their sample's mean PARH score in order to test whether it is significantly different from the PARH scale's midpoint of 4.00. If their sample's mean PARH score is significantly below the scale midpoint or not significantly different from this midpoint, then researchers can claim that, in general, their participants reported feeling unclear about the research hypotheses.

**(2) Exclude participants with a high PARH score.** Positive outliers on the PARH scale (e.g., +3.00 standard deviations from the sample's mean PARH score) represent participants who are relatively confident that they are aware of the research hypotheses. Researchers can perform their statistical analyses with and without these PARH outliers in order to demonstrate that their general pattern of research results is unaffected by these participants' responses.

**(3) Investigate associations between PARH scores and key variables.** Researchers can perform correlation or regression analyses to investigate the associations between PARH scores and independent and/or dependent variable(s). Nonsignificant relationships between PARH scores and variable(s) of interest suggest that participants' reported awareness of the research hypotheses is unrelated to their responses on these variable(s).

**(4) Include PARH scores as a covariate in analyses.** Often the most informative analysis that researchers can undertake is to include mean PARH scores as a covariate in the analyses that demonstrate their key effects. If these key effects persist while controlling for PARH scores, then they are likely to occur over and above the influence of any demand characteristics.

### Usage

The PARH scale is free to use and reproduce for research purposes. No permission is required. However, the scale may not be reproduced for commercial purposes.

Since its introduction in 2010 (Rubin et al., 2010), the PARH scale has been used in 13 published studies. My colleagues and I have used the PARH scale in seven of our published studies (Owuamalam, Rubin, & Issmer, 2016; Meleady, Hopthrow, & Crisp, 2013; Rubin, 2011; Rubin & Paolini, 2014; Rubin, Paolini, & Crisp, 2010, 2011, 2013). Several independent researchers have also used the PARH scale in six further studies published in journals such as the *Journal of Experimental Social Psychology*, *Personality and Individual Differences*, and the *British Journal of Health Psychology* (Fuchs, Schreier, van Osselaer, 2015; Milner, Wagner, & Crouch, 2016; Prior & Sargent-Cox, 2014; Poon & Chen, 2014; Stautz, Frings, Albery, Moss, & Marteau, 2016; Su, 2014). These studies have included participants who have been recruited from Australia, the Netherlands, the UK, and the USA. Finally, several researchers have recommended the use of the PARH scale (Allen & Smith, 2012; Ata, Thompson, & Small, 2013; Morrison, Madden, Odum, Friedel, & Twohig, 2014).

### Internal Reliability

The 13 research studies cited above provide a total of 15 tests of the PARH scale's internal reliability. Based on this data, the Cronbach's alpha for the PARH scale items ranges from a minimum of .76 (Milner et al., 2016, Experiment 2) to a maximum of .93 (Wang et al., 2016, Study 2). The mean Cronbach alpha is .84, which is above the conventional threshold value of .70.

### Mean and Standard Deviation

The 13 research studies cited above provide 12 mean and standard deviation values for the PARH scale. Means range from a minimum of 2.91 (Rubin et al., 2010, Study 1) to a maximum of 4.23 (Milner et al., 2016, Experiment 2). The average mean value is 3.38 ( $SD = .40$ ), which is below the scale midpoint of 4.0. This mean value suggests that, on average, participants in the studies discussed above tended to disagree that they were aware of the research hypotheses.

The studies provided 11 standard deviation values that ranged from a minimum of 1.15 (Rubin, 2011) to a maximum of 1.62 (Wang et al., 2016, Study 2). The mean standard deviation is 1.34 ( $SD = .13$ ).

### Resources

Please click [here](#) to download a hard copy of the scale for use in paper-and-pencil surveys. Please click [here](#) to download a Qualtrics .qsf file that you can import into the Qualtrics survey software platform. The file contains the PARH scale items that can be copied into Qualtrics surveys.

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