Data Analytic Trends in Behavioral and Cognitive Neuroscience Journals

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INTRODUCTION

The purpose of the present study was to analyze and compare current trends and data analytic reporting practices in behavioral neuroscience and cognitive neuroscience academic journals. Previous research has been conducted to analyze data analytic reporting trends in other fields of research but reporting practices have not been compared in cognitive and behavioral neuroscience journals. The present study will report on the current data analytic trends within behavioral neuroscience and cognitive neuroscience and offer a comparison between the trends.

METHOD

Inclusionary and exclusionary criteria. The sample in the present study included behavioral and cognitive neuroscience articles published in 2018. The sample was collected from journals that were identified using the Scientific Journal Rankings in the field of behavioral and cognitive neuroscience. Journals were identified using the 1-year impact factor for the year of 2017 in the database. In order to include a wide range of journals, two journals were randomly selected for each quartile ranking. The journals analyzed in behavioral neuroscience included Frontiers in Behavioral Neuroscience, Behavioral Neuroscience, Journal of Neuropsychology, Behavioral and Brain Functions, Neuroscience Psychology and Economy, Clinical Psychopharmacology Neuroscience, Sleep Disorders, and Journal of Comparative Physiology. The journals analyzed in cognitive neuroscience included Developmental Cognitive Neuroscience, Journal of Cognitive Neuroscience, Frontiers in Integrative Neuroscience, Cognitive Neuropsychology, Cognitive Neurodynamics, Cognitive Processing, Brain Impairment, and Activitas Nervosa Superior. No exclusion criteria were utilized in the present study; all articles published in 2018 were included. This yielded 797 articles.

Coding procedure. Articles were first classified as one of the following: empirical/quantitative, editorial or introduction, book or test review, commentary, theory or review article, simulation study, or qualitative study. Articles identified as empirical/quantitative articles were further assessed in the study. The additional variables that were assessed in these articles included whether hypotheses were stated, if data was preregistered, number of experiments, total sample size, if power analyses were conducted, whether missing data was reported, whether effect sizes were reported, the nature of p-values reported (exact or dichotomous), total number of tables and figures, and total number of statistical analyses conducted.

RESULTS

The primary interest of the present study was to report on the current trends and data analytic reporting practices across behavioral versus cognitive neuroscience journals. A total of 563 (70.6%) articles were coded as empirical/quantitative and were further assessed in the study. Correlations assessing differences in behavioral and cognitive neuroscience journals yielded significant differences in whether hypotheses were stated, whether data was preregistered, whether power analyses were conducted, reporting of missing data, reporting of effect sizes, total number of figures, number of t-tests, number of multiple regressions, number of logistic regressions, and number of Mann-Whitney tests (see Table 1 for correlations).

Within behavioral neuroscience, there was significantly more reporting of the following variables: preregistered data (2.2% more), power analyses conducted (7.4%), logistic regressions conducted (5.3%), and Mann-Whitney tests conducted (8.5%). Within cognitive neuroscience, the following variables were reported on significantly more: stated hypotheses (7.1% more), reports of missing data (44.5%), reports of effect size (20.8%), total number of figures (10.9%), total number of t-tests (2.6%), and total number of multiple regressions (6.8%).

Table 1
Correlations

Behavioral versus Cognitive Neuroscience	
Hypotheses stated	-0.106*
Data preregistered	0.144**
Power analyses	0.182**
Missing data	-0.152**
Effect size reported	-0.264**
Number of figures	-0.306**
T-tests reported	-0.098*
Multiple regressions	-0.096*
Logistic regressions	0.132**
Mann-Whitney tests	0.098*

** Correlation is significant at the 0.05 level*
*** Correlation is significant at the 0.01 level*

DISCUSSION

Content analyses are valuable across all research fields as they assess common trends across a variety of topic areas, including data analytic reporting practices that were assessed in the present study. Content analyses provide insight to future researchers by providing knowledge on what has been conducted in the field prior to them conducting a research study. Without content analyses, research fields would be unable to assess their strengths and weaknesses, factors essential to their growth and development as a field. For the fields of cognitive and behavioral neuroscience, none of the variables assessed in the present study had been compared across fields in previous research. Therefore, the present study provides new knowledge that the field of cognitive neuroscience can use as a part of its growth and development.

In both behavioral and cognitive neuroscience, researchers come from a variety of different fields and techniques. It is imperative for researchers to be knowledgeable on what the common reporting practices and trends are in their given field. Additionally, with knowledge on common reporting practices and trends, researchers can report on studies that are consistent with the ranking of a particular journal. This gives implications to researchers on where to send their highest quality research and provides insight on the reporting methods that are present in higher ranked, more prestigious journals.

A concern of this study involved the significant differences between reporting practices the fields. While behavioral neuroscience and cognitive neuroscience are separate fields, they are subfields of the overarching field neuroscience. The results show there is no clear standard for reporting and the two subfields report rather differently.

A practical application of this data may be to teach different statistical methods in the subfields' graduate program. Behavioral neuroscience used more logistic regressions and Mann-Whitney U-tests whereas cognitive neuroscience exhibited a more frequent use of t-tests and multiple regressions. This data could be used to tailor graduate programs specifically to the subfields being studied. This research provides implications for future research and an understanding of the statistical analyses conducted in both fields. These results can guide future research that can assess additional factors related to how research is conducted similarly and differently between the two fields.

REFERENCES
Available upon request.