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## In Defence of “Replication Research”

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### ***Abstract***

***Purpose*** – The purpose of this paper is to address the arguments that underpin the justification for conducting replication research thereby providing a source of reference for future replication research.

***Design/methodology/approach*** – The approach adopted is consistent with discourse analysis involved in investigating theory development and the role of research in evaluating validity of research in the literature of a variety of disciplines.

***Originality/value*** – The paper provides a basis for espousing the validity of replication research for journal publications and for Honours, Masters, and Doctorate dissertations.

***Keywords:*** Replication research; journal publications; dissertations.

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## Discussion

The notion of replication research has been addressed in the literature from the perspective of publication in academic journals. In effect there appears to be a stigma attached to replication research (Easley, Madden & Dunn, 2000) with the majority of highly ranked (top-tier) journals (Neuliep & Crandall, 1990). Hubbard, Vetter and Little (1998) found that over the first, second and third tier of journals in the management discipline had significantly less replication research published compared to the total research papers published over the period 1976 to 1995. Similar disparities have been reported in the advertising (Arndt, 1976), marketing (Hubbard & Armstrong, 1994), and consumer behaviour (Mahoney, 1987) literature.

Research is predominantly about testing theories to determine their validity. Now the most succinct explanation is that theories should explain and predict some specific observable phenomena, and should be capable replication (Rudner, 1966). Hence, replication is fundamental part of the testing of a theory and the various acts of replication serve to protect against errors in empirical results (Hubbard & Vetter, 1996), and replication with extension provides evidence of generalisability as well as building on knowledge (Galtung, 1967; Hubbard & Vetter, 1996; Lindsay & Ehrenberg, 1993). The ability to replicate research findings has been referred to as the hallmark of science (Blaug, 1992) and the key criterion to genuine scientific knowledge (Rosenthal & Rosnow, 1984). See for example the controversy surrounding the creation of cold fusion as a result of replication having failed to reach the same result (Jones & Hansen, 1995). Other examples concerned with the identification of errors are: the research on the minimum wage by Welch (1974) for which the error was identified by Siskind (1977); the research on trends in manufacturing by Adelman (1951) for which the error was identified by Means (1962). An interesting point is the amount of time before the errors were identified and made public, effectively, during the intervening years the original research findings would have been considered valid and may well have been cited to support research that in retrospect would be misleading.

The importance of replication is intrinsically linked to the scientific paradigm and its grounding in empirical research. To paraphrase the Falsification Theory of Popper (1959)<sup>1</sup> *truth is transient and the best one can hope to achieve is to empirically prove that something is not false at a particular point in time, and may we add given the limited knowledge and technology available at that point of time*. Which of course is the reason for the use of the Null Hypothesis the test should be to falsify not confirm, hence the result of testing leads to the null hypothesis being either rejected or accepted – if the null hypothesis is accepted then the theoretical basis is not correct (it is false), alternatively if it is rejected it does not prove that the theoretical basis true it is just not false.<sup>2</sup> With regards to the transient nature of truth the simple example is that in Europe it was considered to be true that all swans were white at least until the discovery of black swans by Dirk Hartog. He happened upon the black swans in a river (the Swan River) in what he referred to as New Holland (now Western Australia). With regards to examples of theories that were held to be true but were eventually proven to be wrong – effluvial theory of static electricity, vibratory theory of heat, humoral theory of medicine, they appeared to explain and predict the observable phenomena but were eventually found to be incorrect.

<sup>1</sup> Karl Popper was an eminent philosopher and mathematician who argued for the application of deductive reasoning. This is based upon Popper's falsification theory which can be traced to his original book "Logik der Forschung", published (1935) and the English translation in 1959 "The Logic of Scientific Discovery".

<sup>2</sup> Empirical research should therefore always be based on testing the null hypothesis to do otherwise in effect indicates a poor understanding of Popper's falsification theory and the relationship it has with deductive reasoning and the principle intent in the Scientific paradigm.

The literature in support of replication research is consistent in arguing that replication in all its forms is essential for the confirmation of research findings. Hubbard and Armstrong (1994) argued that research findings that are not replicated are nothing more than speculative regardless of how statistically significant the results may be. Lindsay and Ehrenberg (1993, 219) went further in their criticism of unreplicated research stating that it was ‘virtually meaningless and useless’. Replication does occur in different forms firstly there is pure-replication and then there is the more diverse replication extension. Pure-replication has been defined as ‘*a duplication of a previously published empirical study that is concerned with assessing whether similar findings can be obtained upon repeating the study*’ (Hubbard & Armstrong, 1994, 236). Note, we use the term “pure-replication” since it is distinctly concerned with replicating the original research. Effectively, it involves a substantial duplication that is chiefly concerned with increasing internal validity – duplicating all facets of the original research to determine whether the results are reproducible (Hubbard, Vetter & Little, 1998). Conversely, the definition of replication with extension is ‘*a duplication of a previously published empirical research project that serves to investigate the generalizability of earlier research findings*’ (Hubbard & Armstrong, 1994, 236). In this situation the primary concern is with increasing external validity or generalisability – this takes the form of modifying aspects of the independent (manipulated) or dependent (measured) variables (Hubbard, Vetter & Little, 1998).

**Table 1:**  
*Replication Levels*

| <b>Level</b> | <b>Research Design</b>        | <b>Research Focus</b>  | <b>Research Justification</b>   |
|--------------|-------------------------------|--|---|
| <b>1</b>     | <i>Pure-Replication</i>       | <i>Duplication of a previously published research study.</i>   | <ul style="list-style-type: none"> <li>• <i>To assess whether similar findings can be obtained upon repeating the research study;</i></li> <li>• <i>To assess internal validity;</i></li> <li>• <i>To test for possible errors or omissions.</i></li> </ul> |
| <b>2</b>     | <b>Replication extensions</b> | <i>Modified duplication of a previously published research study:</i> <ul style="list-style-type: none"> <li>• <i>Different subjects, population, sample;</i></li> <li>• <i>Different statistical test applied;</i></li> <li>• <i>Different time periods;</i></li> <li>• <i>Different instruments;</i></li> <li>• <i>Different geographical areas;</i></li> <li>• <i>Etc.</i></li> </ul> | <ul style="list-style-type: none"> <li>• <i>To investigate the generalizability of earlier research findings’;</i></li> <li>• <i>To assess external validity;</i></li> <li>• <i>To build on the theoretical model/framework.</i></li> </ul>                 |

Taking this notion of justification to the next level, it is in the interest of all researchers to be acquainted with the relevant contributions that the different types of replication can make. When confronted with the need to provide an explanation or statement about proposed research which is based upon a form of replication it would seem advantageous to provide clarification. To provide some guidance for the clarification a researcher would likely have to be specific on the issues and Table 2 is intended to provide a basic check list to assist in this endeavour.

**Table 2:**  
*Replication Check List*

| <i>Type of Replication</i>                       | <i>Contribution Justification</i> |                         |                          |                            |  |
|--|-----------------------------------|-------------------------|--------------------------|----------------------------|--|
|  | <i>Internal Validity</i>          | <i>Audit for Errors</i> | <i>External Validity</i> | <i>Theory Modification</i> | <i>Knowledge Advancement (Development)</i> |
| <i>Pure-Replication</i>                          | ✓                                 | ✓                       |                          |                            |  |
| <b>Manipulations:</b>                            |                                   |                         |                          |                            |  |
| <i>Add Moderating Variables</i>                  |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Add Intervening Variables</i>                 |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Add New Dependent Variable(s)</i>             |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Add New Independent Variable(s)</i>           |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Different Statistical Tests</i>               |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Different Time Frame</i>                      |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Different Instrument(s)</i>                   |                                   |                         | ✓                        | ✓                          | ✓  |
| <b>Different Demographics:</b>                   |                                   |                         |                          |                            |  |
| <i>Subjects Age</i>                              |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Subjects Sex Gender</i>                       |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Subjects Education</i>                        |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Subjects Intelligence</i>                     |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Subjects Knowledge Familiarity with topic</i> |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Geographical area (country or region)</i>     |                                   |                         | ✓                        | ✓                          | ✓  |
| <i>Sample Size</i>                               |                                   |                         | ✓                        | ✓                          | ✓  |
|  |                                   |                         |                          |                            |  |

There are two distinct types of science for which replication research is applicable. Natural science which is concerned with naturally occurring phenomena, where the focus is on non-random events (Harre & Secord, 1973). By contrast, social science is concerned with phenomena that is not naturally occurring but rather socially constructed and the research seeks to explain actions mediated by meanings (Harre & Secord, 1973). Gergen (1978) put it more succinctly, in that social science pertains to human behaviour and natural science does not. The difference between natural science and social science does not make the need for replication any less valuable or relevant.

One other point that needs to be addressed is that replication tends to be discussed from the perspective of quantitative or empirical research with the assumption that statistical testing is used to arrive at the findings. Interestingly, a means for evaluating replication results using statistical analysis to establish the effect size of replication research is meta-analysis which provides a quantitative assessment (Glass, 1976; Brinberg & Jaccard, 1986; Easley, Madden & Dunn, 2000). Meta-analysis is not in its self a replication but rather a means for evaluating replication. In the domain of quantitative empirical research meta-analysis is a far more obvious choice for the evaluation as compared to the alternative of a qualitative literature review.

This notion of replication being more consistent with quantitative research than qualitative research is rather misleading. Although replication may be more difficult in some forms of qualitative research it no less important to have the findings checked and validated as it plays such a vital role in justifying the theoretical basis and supports the development of the body of knowledge in the particular field of study.

Examples exist in the literature of various disciplines calling for greater use and publication of replication research. For example, **Advertising** (Reid, Soley & Winner, 1981; Madden, Easley & Dunn, 1995).; **Business and Economics** (Kane, 1984; Fuess Jr, 1996; Evanschitzky, Baumgarth, Hubbard & Armstrong, 2007).; **Information Systems** (Kettinger & Lee, 1999; Berthon, Pitt, Ewing & Carr, 2002).; **Management** (Singh, Ang & Leong, 2003; Tsang & Kwan, 1999; Mezas & Regnier, 2007); **Nursing** (Connelly, 1986; Beck, 1994).; **Psychology** (Smith, 1970; Campbell & Jackson, 1979; Amir & Sharon, 1990; Lamal, 1990; Thompson, 1994; Bonett, 2012); **Political Science** (Herrnson, 1995); **Other** (Muma, 1993). Subsequently, any argument for replication research should also include reference to published papers in the specific discipline and this would further benefit by showing its consistency with other disciplines thus providing a wide-ranging justification for the replication research.

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