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SOME CONTRIBUTIONS TO MEASURING AND UNDERSTANDING HETEROGENEITY IN META-ANALYSIS

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Between-studies variance or heterogeneity is present in almost every meta-analysis. Therefore, understanding and accounting for the amount of heterogeneity present in an analysis will provide the researcher with important information about the validity of their claims or potentially generate new hypotheses for future research. Current practice is to report a p-value or a measure known as I^2 before making such a claim about the magnitude of the heterogeneity present in the analysis. This approach has often been shown to be flawed, both through use of p-values and rampant misinterpretation of the results.

In this thesis, we look at several measures for explaining heterogeneity. We reconsider a measure called the Diamond Ratio [4,5], which is the ratio of the width of the random-effects confidence interval over the width of the fixed-effect confidence interval of a meta-analysis. We propose new confidence intervals for this simple visual approach of describing the amount of heterogeneity and provide further discussion on how it can be used to describe heterogeneity [1].

As another measure of heterogeneity, we consider the coefficient of variation (CV) [6] to describe heterogeneity relative to the effect. We discuss transformations of the CV so that it lies on the interval [0, 1] which may be preferred for interpretation. We then propose new confidences for the CV and its transformations which exhibit strong coverage properties, providing improvements over existing intervals for the CV. We show that the use of such measures, together with confidence intervals alongside I^2, provides a more comprehensive look at the amount of heterogeneity in the meta-analysis [3]. We then show that these concepts can extend to the context of meta-regression retaining their strong coverage properties [2]. Finally, we provide a brief informal discussion of the various methods used for describing heterogeneity.

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