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Key Passage(s) Context

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Smart RG (1964). The importance of negative results in psychological research. Canadian Psychologist 5:225-232.

Key passages

THE CANADIAN PSYCHOLOGIST
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THE IMPORTANCE OF NEGATIVE RESULTS IN PSYCHOLOGICAL RESEARCH

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The purposes of this study were to determine the proportion of papers which contain negative results (results which fail to reject the null hypothesis), and whether there is some selection in the papers published such that negative results are unlikely to be published. An examination of current psychological journals indicated that studies with negative results constitute about 9 per cent of the total volume of published papers. However, data from several unpublished sources indicate that negative results are less likely to be published. The reasons for their neglect — chiefly author selection and the greater editorial scrutiny they get — were presented. The practical, statistical and heuristic value of negative results was also discussed.

L'Importance des résultats négatifs dans la recherche psychologique.

Les intentions de cette étude étaient de déterminer la proportion des études qui contiennent les résultats négatifs (les résultats qui manquent de rejeter l'hypothèse nulle), et s'il y a un choix dans les papiers publiés de sorte que les résultats négatifs ne seront pas probablement publiés. Un examen des journaux psychologiques courants indiquait que les études aux résultats négatifs constituent neuf pour cent environ du volume total des papiers publiés. Cependant, les données trouvées dans beaucoup de sources inédites indiquent qu'il est moins probable que l'on publie les résultats négatifs. Les raisons pour cette négligence — principalement, le choix de l'auteur et la vérification d'éditeur plus extensive qu'ils reçoivent — étaient présentées. La valeur pratique, statistique et théorique des résultats négatifs était discutée aussi.

TABLE I

THE PROPORTION OF NEGATIVE AND POSITIVE RESULTS IN PSYCHOLOGICAL RESEARCH JOURNALS

Percentages are shown in brackets

(Journals of)	Number of Papers Using Statistical Tests	Number with Positive Results	Number with Negative Results
Experimental Psychology (1962, Vol. 63)	90	83 (92.3)	7 (7.7)
Comparative and Physiological (1962, Nos. 1, 2, 3)	66	61 (92.4)	5 (7.6)
Clinical Psychology (1961)	88	81 (91.4)	7 (8.6)
Social Psychology (1962)	65	57 (87.7)	8 (12.3)
APA Annual Meeting (1962)	83	66 (79.5)	17 (20.5)
Dissertation Abstracts (1962)	86	60 (69.8)	26 (30.2)

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The finding that a particular mountain contains no gold fails to move prospectors and speculators whereas news of a strike quickens all of their pulses. In scientific undertakings, however, the failure to find the gold of positive results has important implications. Unless the scientist is aware of *all* experimental tests performed for a certain hypothesis then a rational decision as to warrantability of the hypothesis cannot be reached. If the reader becomes aware only of studies supporting the hypothesis and others failing to support it are unavailable to him then his decision as to its validity will often be wrong. Sterling (1959) has pointed out the statistical questions raised by lack of reported negative results and the difficulty which ensues for statistical inference if the type of outcome determines whether a paper is published. As Sterling (1959) has stated, this problem is especially important in psychology, where replications are rarely performed and even more rarely reported in the journals [5] (Sterling, 1959; Lubin, 1957).

The importance of negative results does not rest solely on their necessity for statistical decisions, particularly in view of the finding that their reported frequency is not significantly lower than expected on statistical bases. It can be argued that they serve several equally essential functions. Negative results are not "negative" in any absolute sense where statistical tests are made, and for every negative result there is a probability that the null hypothesis was wrongly accepted. It may also be that more is learned from an experiment with negative results than from one with positive results. For example, a negative result with $P. < .98$ allows us to accept the null hypotheses with greater confidence than the .05 level commonly used for rejecting null hypotheses.

Negative results are also not completely "negative" in the sense that they give no information. At the very least, they indicate that if an experiment is performed in a particular way then we learn nothing positive about the variables under consideration. In many such studies slight procedural variations, a different population, or varied statistical analyses might have led to more positive results. Cohen (1963), for example, has examined a series of articles in the abnormal-social area of psychology and determined the power to detect small, medium, and large effects of each statistical test used. He found that very few such tests, given the sample sizes used, could reject a null hypothesis when the effect was small, and only 50% could reject it when the effect was moderate. Only when a large effect existed could most (80%) of the studies reject the null hypothesis. This suggests that the sample sizes used in this type of research are far too small and that "much research is resulting in spuriously negative results" (Cohen, 1963, p. 153). Cohen has further suggested that "a generation of researchers could be profitably employed in repeating interesting studies which originally used inadequate sample sizes". As shown above, it is precisely those studies which are unpublished because of their negative results which probably would justify repetition. However, these are the studies least likely to be replicated because of being lost to the scientific community.

Results which favour the null hypothesis also have several further roles in science. Ostensibly, the purpose of any science is to describe functional laws relating the variables within its purview. But this also implies that something is known of the variables which are unimportant and of the instances in which a particular law does *not* hold. If this information exists but is not generally known because unpublished then our knowledge about that law is still circumscribed.

The reporting of negative results, provided they are based on well designed experiments with adequate sample sizes, can also serve as a warning to researchers that a particular area or approach is unfruitful. If such reports are unavailable then the possibility of further negative results is established. Without an awareness of the negative results in his area, the researcher is unable, except by accident, to make any improvements which might lead to positive results. As has been stated, one can retard science only by *not* reporting findings or "by otherwise obstructing the publication of scientific results. Erroneous statements, so long as they are openly published, do not indefinitely impede the progress of science, for they are ultimately corrected by new observations and interpretations" (AAAS Committee on Science in the Promotion of Human Welfare, 1963). This argument provides a further basis for the belief that withholding negative results from publication has a retrogressive effect on scientific development.