

# Raymond B. Cattell

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Raymond Cattell (1905-1998) was one of the most prolific scholars in the fields of personality, intelligence and psychometrics in the twentieth century. His more than 43 books and 500 articles made major contributions to theories of personality and ability and methodological techniques in psychometrics remain among the most cited of all psychologists.

Raymond Bernard Cattell (born: Hilltop, West Bromich, England, March 20, 1905; died Honolulu, Hawaii, February 2, 1998) was one of the most prolific and important psychologists of the twentieth century. With more than 43 books and 500 articles he seemingly could write faster than some could read. His contributions to theories of personality, intelligence and psychometrics were and remain very influential to this day. He and Hans Eysenck were the two major contributors to the scientific study of personality in the mid to late twentieth century. The distinctions he drew between crystallized and fluid intelligence, between state and trait personality, as well as a multitude of psychometric innovations have become embedded in the psychological armamentarium perhaps without recognition.

Cattell started his career as an undergraduate student in chemistry at Kings College, London at age 16. Although achieving a first in chemistry at age 19, having heard lectures by Cyril Burt and Charles Spearman, and perhaps influenced by the horrors of the first world war, the young Cattell decided to pursue graduate training in psychology. His graduate advisor was Charles Spearman, the great psychometrician and intelligence theorist, but he was also influenced by the geneticist and statis-

tician, R.A. Fisher, as well as the psychometrician and educational theorist, Cyril Burt. From Spearman he learned about factor analysis and the study of intelligence, from Fisher, the analysis of variance and experimental design, from Burt, the social and political implications of the study of individual differences. He received his Ph.D. in 1929 from Kings Collge. His career reflected the influence of these three mentors, all of whom were gifted mathematically, for Cattell combined all three approaches and tried to apply a mathematical approach to the study of personality.

Receiving a Ph.D. in the start of the depression, Cattell was a lecturer in psychology at the University of Exeter and then spent five years doing educational and clinical psychology in the child guidance clinic in Leicester before being offered (1937) a one year post-doctoral position with E.L. Thorndike at Columbia. He then spent three years at Clark University where he was the G. Stanley Hall Professor of Genetic (developmental) Psychology before becoming a lecturer at Harvard from 1941-1945. With great relief that he no longer had to teach undergraduates, he became a Research Professor of Psychology at the University of Illinois in 1945 where he stayed until retiring in 1973. He then continued to work in Boulder, Colorado before moving to the University of Hawaii in 1978. He worked there until his death in 1998.

For Cattell, the study of personality was the problem of finding the dimensions of the “personality sphere” (*Description and measurement of personality*, 1946). He did this, not from simple, univariate research, but rather as the result of multidimensional (e.g. factor or component) analyses of the various dimensions of the *data box*. He em-

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Version of March 1, 2014

To appear in Cautin, R. and Lilienfeld, S (Eds) The Encyclopedia of Clinical Psychology. Wiley-Blackwell  
This is the submitted L<sup>A</sup>T<sub>E</sub>X version and might differ from the final published version.

phasized that there were three ways of collecting behavioral observations, observer ratings (L data), questionnaires (Q data), and laboratory type measures (T data). Furthermore, he realized that there were three unique dimensions of observational data: individuals, stimuli, and time (occasions). Thus, it was possible to generalize the normal correlation of tests over persons design (R analysis) to consider how persons correlated over tests (Q analysis), or tests over occasions (P analysis), etc. He subsequently extended the data box's original three dimensions to five by adding background or preceding conditions as well as observers and thus expanded the number of ways data could covary from the six of the original data box to 20 with the enhanced version (*The handbook of multivariate experimental psychology*, 1966). Cattell was attempting to develop not just a comprehensive taxonomy of individual differences but also a taxonomy of how to study individual differences. Those who study affect within subjects or personality changes over time take advantage of the fundamental dimensions in the data box concept.

Extending the work of Spearman and Thurstone on the factor structure of intelligence, Cattell and his student, John Horn, made the distinction between *fluid* ( $g_f$ ) and *crystallized* ( $g_c$ ) intelligence.  $g_f$  is basic speed of processing and working memory,  $g_c$  what one knows and has learned.  $g_f$  tends to increase until one's early twenties and then decay over the lifetime while  $g_c$  gradually increases over the lifetime. Subsequent work integrating  $g_f g_c$  theory with theories of general intelligence ( $g$ ) have become known as the Cattell-Horn-Carroll theory of intelligence.

Although now commonly recognized, the distinction between personality *traits* and *states* reflected Cattell's emphasis upon both stability and change in personality. Changes in state measures were an obvious consequence of introducing the temporal dimension into the data box.

Cattell's contributions to multivariate analysis were many and include his "scree test" for the number of factors, various rotation algorithms, and the Multiple Abstract Variance Analysis (MAVA) which he and others applied to analyze behavior genetic correlations. Many subsequent extensions to these basic ideas were done by colleagues or students of his.

Unfortunately, his tendency to invent neologisms for his dimensions, his inconsistency in the use of

terms across different studies (the names for the three original dimensions of the data box and the ways to study them changed from year to year), made it hard for outsiders to use his systems. Although charming and sympathetic interpersonally with his many students and colleagues, Cattell was argumentative and disdainful in his publications of those who did not rise to his level of mathematical fluency. His dismissive style of treating those who could not understand or would not use his multivariate methods led some to make the mistake of not trying. He was likened to "an explorer on the run" who, while identifying continents and oceans, occasionally reported mythical beings. However, those psychologists who took the time to understand even a small fraction of his work always found the effort worthwhile.

In order to facilitate discussion about and the use of mathematics in psychology, he was very instrumental in founding and was the first president of the Society of Multivariate Experimental Psychology (SMEP). SMEP is a small society (active membership is limited to 65) devoted to the development and application of multivariate models. He was also influential in having SMEP start its journal, *Multivariate Behavioral Research*, and was its founding editor.

Cattell loved to sail and did so until he was almost 90. He was particularly proud of his first book *Under sail through red Devon* which recounted his adventures in a sailing kayak on the coast and rivers of his beloved Devon.

It is impossible to discuss the contributions of Cattell without mentioning the furor over his receiving the American Psychological Foundation Gold Medal Award for Lifetime Achievements in Psychological Science. Although seven past presidents of the APA had recommended him for this well deserved honor, the APA, at the last minute decided to withdraw the presentation having received complaints about some of Cattell's very early papers discussing eugenics. The episode spoke more about the political correctness of the APA than it did about the beliefs of a very creative and productive scholar.

### See also

Correlational Designs; Eugenics; Hans Eysenck; Francis Galton; Intelligence Testing; Charles Spearman

## Further Readings

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