Some Implications of an Alternative Definition of the Multiple Comparisons Problem

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Abstract

An approach to multiple comparisons defines the error control objective as assuring with given probability that k or fewer out of N specified linear combinations of p means
are significant when an overall null hypothesis is true, or that k or fewer confidence interval statements are incorrect. The case fc = 0 is basically the Scheffe (1953) method
except for the consideration of a specified set of N linear combinations rather than all
possible linear combinations. A theoretical result is obtained under normal theory and
we assume an infinite number of linear combinations with normalized coefficients, that
is the sum of squares is unity, uniformly distributed over the unit p-sphere. For a finite
number N of specified linear combinations the problem is reformulated in a way which
in principle would allow computation of the exact distributions required to provide critical values. In general, the computations required are so complex that they are impractical, but a Monte Carlo approach is straightforward.