Recent Advances in Identifying Inferior Treatments in Clinical Trials and Inferences on Non-Central t-Distributions

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The paper Hayter (2007) "A Combination Multiple Comparisons and Subset Selection Procedure to Identify Treatments Strictly Inferior to the Best," *Journal of Statistical Planning and Inference*, 137, 7, 2115-2126, considers the problem of identifying which treatments are not the best treatment in a one-way layout, which has many important applications in screening trials for new product development. A procedure is proposed that selects a subset of the treatments containing only treatments that are known to be strictly worse than the best treatment or treatments. In addition, simultaneous confidence intervals are obtained which provide upper bounds on how worse each treatment can be compared with the best treatment. In this way the new procedure shares the characteristics of both subset selection procedures and multiple comparison procedures.

The paper Lin and Hayter (2007) "A Stepdown Procedure with Feedback for Identifying Inferiority among Three Treatments" considers the problem of identifying which treatments are strictly inferior to the best treatment or treatments in a balanced one-way layout with three treatments. In this case a stepdown procedure is developed that uses feedback from the first stage to the second stage. This feedback is a new concept for stepdown procedures and it improves the operating characteristics. The fact that the required error properties of the procedure can be maintained with the implementation of feedback is an interesting result of this research, and it has wider implications to other standard stepwise procedures. The advantages accruing from this feedback are demonstrated.

The paper Kim and Hayter (2007) "Efficient Confidence Interval Methodologies for the Noncentrality Parameter of a Noncentral t-Distribution" (to appear in *Communications in Statistics*) considers the problem of constructing a confidence interval for the noncentrality parameter of a noncentral t distribution. This has applications to the signal to noise ratio in regression problems and to the coefficient of variation for normally distributed data. A new procedure is developed that provides shorter confidence intervals than the standard procedure, and a program is available for its implementation. This new procedure will be useful for practitioners, and its development also provides some interesting theoretical results.

The paper Kim and Hayter (2007) "Testing the Equality of the Non-centrality Parameters of Two Noncentral t-Distributions with Identical Degrees of Freedom" addresses a problem which arises from the comparison of two signal-to-noise ratios for simple linear regression models. A test procedure is derived that is guaranteed to maintain type I error while having only minimal amounts of conservativeness, and comparisons are made with several other approaches to this problem based on variance stabilizing transformations. The new procedure derived in this paper is shown to have good properties and will be useful for practitioners.