

**Multiple confidence procedures
for comparing three treatments including a placebo and a control**

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We consider the problem of comparing three treatments simultaneously. For example, agricultural pesticide experiments always include: (a) a new test treatment, (b) no pesticide application (a placebo treatment), and (c) the established standard treatment (a control treatment). The purpose of the experiment is to select one of the following decisions:

- (1) The new treatment is superior to the control.
- (2) The new treatment is equivalent to the control.
- (3) The new treatment is inferior to the control, but still efficacious against the placebo.
- (4) The new treatment is completely futile (not better than the placebo).

This set of decisions forms a partition of the parameter space. Then we can apply the multiple confidence procedure proposed by Takeuchi in 1973. This procedure is based on a partition of the parameter space, and it is closely related to the recent development of the partitioning principle in multiple comparison procedures.

By applying the multiple confidence procedure, we can simultaneously investigate (1) superiority, (2) equivalence, and (3) efficacy against a placebo maintaining the confidence probability at a desired level.

References

- [1] Takeuchi, K. (1973). *Studies in some aspects of theoretical foundations of statistical data analysis*, Tokyo: Toyo Keizai Shinpo-sha (in Japanese).