

CAKE-BAKING EXPERIMENT

12. Final Comments

The goal of the experiment is to study the impact of baking time and temperature on the taste of a cake made from a mix, introduced in Section 2. The factors are baking time and temperature. The responses are ratings of the cakes given by selected tasters.

In this experiment, three times and three temperatures are used, so it is a 3x3 factorial experiment, meaning two factors at three levels each. There are nine combinations of the levels of the factors, and because three taste testers evaluate cakes baked at a given combination, there are three replications. Overall, $9 \times 3 = 27$ tasters and cakes are involved in the experiment. To avoid bias, the 27 cakes are baked according to a random allocation of combinations.

The cake-baking experiment is an example of a factorial experiment. The GLM General Factorial Model in SPSS was used to analyze the data. The main effects of time and temperature were found to be statistically not significant. This should not be interpreted to mean that these factors are unimportant. The effects are small for the amount of deviation from the considered levels. Certainly it is possible to think of deviations that would produce stronger effects.

The analysis showed very strong interaction between time and temperature. The profile plots and numerical summaries show that the highest mean rating is achieved with the following combinations of time and temperature: (H, L), (M, M), and (L, H), where L, M, and H denote low, medium, and high level of a factor. Thus it is possible to compensate for a lower time by using a higher temperature and vice versa. The lowest average rating is achieved with the following combinations of time and temperature: (L, L) and (H, H). In other words, a combination of low time and temperature or high time and temperature produces an unsatisfactory cake.