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Demo: Fitting a Model with Interactions

In this example, we again fit a model for Impurity using Fit Model. But this time we add interactions to the model.

Again, we start by adding Impurity as the Y variable.

Then we add the five main effects, our predictors, to the model.

To add a specific interaction term to the model, we select the first term, press the Ctrl key on your keyboard, select the second term, and then click Cross.

You can also select one term under Select Column, select the second term from the Model Effects list, and click Cross.

This adds one interaction at a time. We can repeat this for all interactions that we'd like to include in the model.

If we know that we want to include many interactions, we can take a shortcut.

First, I'll remove all the model effects.

Let's say that we want to fit a model with all the main effects and all the possible interactions.

We select all the predictor variables, and then under Macros, select Factorial to Degree. This adds all main effects and two-way interactions to the model.

If we change the degree to 3, this will also add three-way interactions. We won't do this here.

Note that there are many different options for model specification next to Attributes and Transform, although we won't discuss these options here.

We'll run our model, with main effects and two-way interactions.

The Effect Summary table provides a summary of the significance of the terms in the model. The terms are listed in ascending order of p-value. Note that some of the interactions are significant, but we've also got some nonsignificant terms in the model.

We can select additional options, such as the Summary of Fit table and the Analysis of Variance table, from the top red triangle under Regression Reports.

The Parameter Estimates table shows the coefficients in the model.

The Prediction Profiler, as we have seen, enables us to interact with the model. By changing the values of the predictors, we can easily see the effects of the interaction terms. For example, notice how the line for Reaction Time changes as we change the value of Catalyst Conc.

For a visual summary of all the interactions, we can turn on the interaction plots using the top red triangle under Factor Profiling. Here we see interactions between Temp and Reaction Time and between Catalyst Conc and Reaction Time. We also observe, for example, that Temp is does

not interact with Catalyst Conc, Reactor, or Shift, as these lines are essentially parallel.

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