

## Model based graphs: Level-1 residual vs predicted value

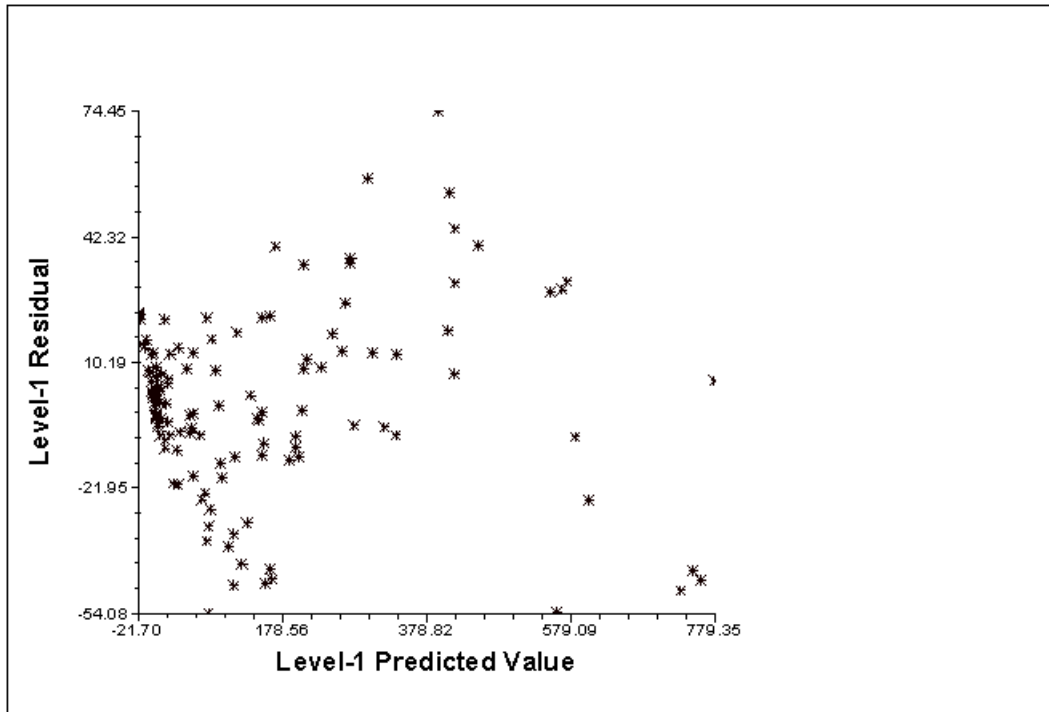
Users can graphically assess the assumptions of constant error variance and linearity and probe for outlying cases by examining a scatter plot of level-1 residuals and predicted values. Using the same data and model of the previous two sections, we now plot the level-1 residual against its predicted value.

After the model is run, select **Graph Equations...Level-1 residual vs predicted value** from the **File** menu, which will give us the following dialog box.

The dialog box is titled "Choose X and Y variables". It has three main sections: X-axis, Y-axis, and Number of groups. The X-axis is set to "Pred. val.", the Y-axis is "VOCAB", and the Number of groups is "First ten groups". There is a "Probability (0 to 1)" field which is empty. Below these is a "Z-focus" section with two dropdown menus: the first is "(not chosen)" and the second is "25th/50th/75th percentiles". The "Type of plot" section has four radio buttons: "Scatter plot", "Line/marker plot", "Line plot" (which is selected), and "Cubic interpolation line". Under "Line plot", there are two sub-radio buttons: "Straight line" (selected) and "Cubic interpolation line". The "Pagination" section has three radio buttons: "All groups on same graph" (selected), "1 graph/group, multiple/page", and "1 graph/group, 1/page". At the bottom right are "Cancel" and "OK" buttons.

Note that the **X-axis variable**, *Pred. val.* and **Y-axis** variable, *Level-1 residuals* have been pre-selected.

Select **All groups (n=22)** in the **Number of groups** to include all the 22 children in the display. Click the selection button for **Scatter plot** in the **Type of plot** section to request a scatter plot of the predicted values by level-1 residuals. Select **All groups on same graph** in the **Pagination** section to display all the residuals pooled across the level-2 units. To examine the residuals for individual children, choose either of the other pagination options. Click **OK**.



The plot suggests that there is a tendency for the residual scatter to get narrower at the smallest predicted values and to get wider around the interval between 150 and 170. The residuals seem to follow a slightly curvilinear trend as well. They may suggest that there is a specification error in the model.

Users can also choose to include a level-2 classification variable when examining the level-1 residuals.