Analysis of Car Fuel Consumption

Messaging:

The fuel efficiency of cars is negatively correlated to the displacement, the horsepower, and the weight. The fuel efficiency improved over the years. MPG might also be affected by historical events.

Narrative Structure:

This is an interactive slide show with 4 scenes: MPG by Power, MPG by Weight, MPG by Displacement, and MPG by Model Year. Each scene is an annotated chart with an annotation on top, a scatter plot with its linear regression on the left, and filters / details on the right. The ordering is linear (from the most important "MPG by Power" to the least important "MPG by Model Year"), as indicated by the row of radio buttons on the top of the page. The interactivity is achieved by filtering and hovering, with explicit instruction and initial values provided. The messaging is achieved by the linear regression red line and by the summary annotation.

Visual Structure:

1. Visual structure: The visual structure is consistent across scenes. It has a row of radio buttons on the top of the page for selecting scenes, and for serving as a semi status bar (users are encouraged to go from left to right and can navigate using the left/right keys on their keyboard but they may also skip to any scene they want). It has a summary above the big scatter plot and filter on the right.
2. Highlighting: The scene selection (MPG by *) is highlighted with bold letters and placed on top, as it is the most important parameter. The correlation (the main message) is highlighted with a linear regression red line.
3. Transition: The transition is minimal and therefore easy. All scenes have the exact same layout, with the only differences being the X-axis and the rendered data on the scatter plot. The data point details are shown on the side to avoid disorientation, rather than in tool tips next to the data points, because they are not part of the main message. Users are encouraged to use axes and filters to look for pattern instead of looking at individual data points.

Scenes:

There are 4 scenes: MPG by Power, MPG by Weight, MPG by Displacement, and MPG by Model Year. They are ordered from the most significant factor (indicated by the steepest slope for the linear regression red line) to the least significant. The

goal is to present the most important rule of thumb first, and the less important information and anomalies later. Note that while I believe this is the most sensible order, I do not have objections to user skipping to a scene that might interest them the most.

Annotations:

Each scene has an annotation above the scatter plot that summarizes the scene. "MPG by Power" and "MPG by Displacement" give users some idea on how to drill down (applying filters to control for variables). "MPG by Model Year" has annotation for a historical event (the oil crisis). The annotations do not change within any scene.

Parameters:

1. The choice of independent variable (horsepower / weight / displacement / model year). This determines the scene and the X-axis of the scatter plot.
2. The filters (cylinder selection, min/max horsepower / weight/ displacement / model year). This determines which data points are selected (the green circles) and the linear regression of the selected data points (the red line).
3. The mouse coordinates. This determines a data point (if any) for which the details are to be shown.

Triggers:

1. Changing the independent variable (horsepower / weight / displacement / model year) would change the scene, which in effect updates the scene summary, the scatter plot, and the linear regression. This option is indicated by the radio buttons on the top of the screen, with the default scene (MPG by Power) pre-selected.
2. Changing the filters (cylinder selection, min/max horsepower/weight/ displacement/model year) would repaint the circles (the selected ones in blue and the unselected ones in grey) and update the linear regression based on the new selection. The option is indicated by the check boxes (for cylinders, all are checked by default) and by the input boxes (for min/max horsepower/ weight/displacement/model year, with default values set to accommodate all data points).
3. Hovering over a circle would display the details of the data point. The option is indicated by the tip below the filters. The tip occupies the same space as the model details, and is displayed when the user does not hover over any data point.