

Dai, Miao	16. The parametric approach to interaction (ethanol data)	21-Nov
Liao, Chun-Kai	12. Coplots of Hypervariate Surfaces (pp 282-291)	21-Nov

### Ch 5: Hypervariate Data

Nothing really new in this chapter except Fig 5.2 p 277

Some questions you need to know how to answer:

1. Why are there **not** approximately equal numbers of points in each panel? (compare the trivariate coplot p 185, which does have approx. equal numbers of points in each panel.)
2. How do you look for a two-way interaction? a three-way interaction?
3. How could this be extended to an example with 4 or more predictor variables?

From the e-mail on interactions ...

" Here is a little tidying of the interactions-from-coplots issue that we were discussing in the dying minutes of Friday's class.

First of all, we have discussed at length the reading of interactions from situations like the coplot on p 189 (the NOX vs CR conditioned on ER).

Note how we report that: "There is an interaction between CR and ER in the prediction of NOX" Of course, there is more to describe but lets just get the big picture for now. So we have "read" a two-variable interaction in this case, right?

Note that the coplot on p 189 could have been presented as a single row or a single column. So the matrix look of it is just for compact printing. There is no advantage to presenting it as a matrix as far as the reading goes.

Now go to p 277: The coplot of Ozone vs Solar Radiation conditioned on Temperature and Wind Speed. Here the matrix of plots cannot be strung out as one row or column without destroying the nature of the plot.

Each row is like a p 189 coplot, So is each column. From either rows or columns these we can read two-variable interactions. For example, the column corresponding to the Temperature range 57-76°F (left-hand column) shows that Wind Speed and Solar Radiation do not interact in predicting Ozone, at least not in this range of Temperature. As another example, look at the bottom row (corresponding to Wind Speed in the range 2-9 mph.). From this row we can read that Solar Radiation and Temperature do Interact in determining

Ozone, at least in this range of Wind Speed.

Now the big question: how do you read a three-way interaction from the coplot on p 277? Well, that is easy now since we are really looking for a different interaction from each row, or (equivalently) a different interaction from each column. If we compare the rows (in each row we are looking for the interaction of Solar Radiation and Temperature in predicting Ozone), we can see that the interaction in the top row is much smaller than the interaction in the bottom row. (Remember that the size of the interaction is judged from the change in slope). Therefore, there IS an interaction among Temperature, Wind Speed and Solar Radiation in determining Ozone. Can you also see it by comparing the interaction in each column? It is quite marked actually."

#### Ch 6: Multiway Dot Plots

General principal at work here: when a graph has features that are arbitrarily imposed, consider whether a non-arbitrary assignment would improve the visualization?

e.g. ordering of countries  
ordering of panels  
conditioning on animals or on countries  
transformations of variables (log?)

Use of additive fits to summarize data (and to confirm model by examining residuals).

Another principal: is there useful data available that is not already in the data set?

e.g. spatial position of countries – GIS – see p 319.

End of Cleveland Material!