*Neuendorf*
**Mediating vs. Moderating Variables**

The classic reference on this topic may be found on the COM 631 web site:
Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.

**Mediator variable** - "In general, a given variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the criterion. Mediators explain how external physical events take on internal psychological significance. Whereas moderator variables specify when certain effects will hold, mediators speak to how or why such effects occur" (Baron & Kenny, 1986, p. 1176).

Practically, this means that if there is a relationship found between X1 and Y, and then when controlling for X2, the relationship between X1 and Y is reduced substantially, sometimes to zero, then X2 is said to be a mediating variable. A separate handout on "Controlling for a Third Variable" explains the various potential outcomes (e.g., full redundancy, partial redundancy, suppression).

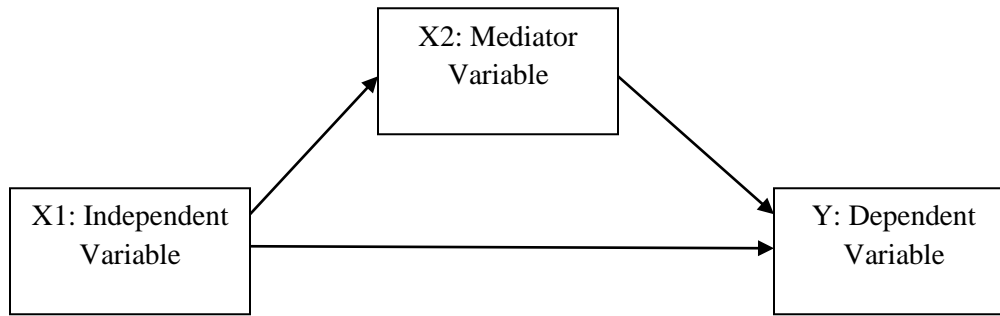The most common way that classic mediation is modeled is:



Figure 1.  Classic mediation

However, given the definition of a mediating variable, the following pattern, sometimes called "mutual dependence," would also qualify:
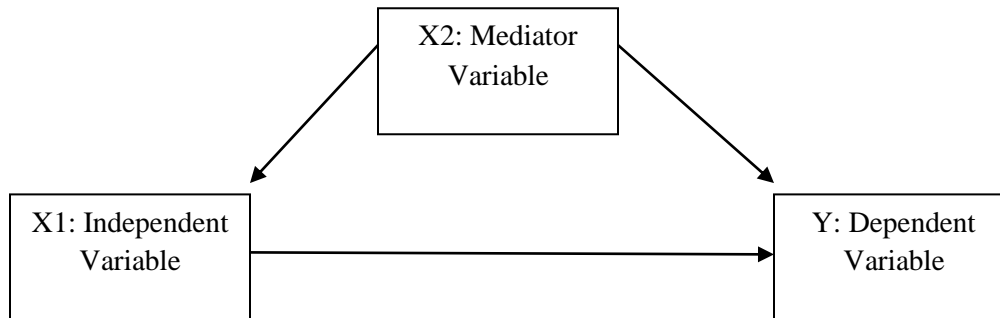


Figure 2. Mutual dependence (A second type of "mediation")

Further, the following model would also qualify as mediation, under the Baron and Kenny definition; this we might call "reverse mediation":
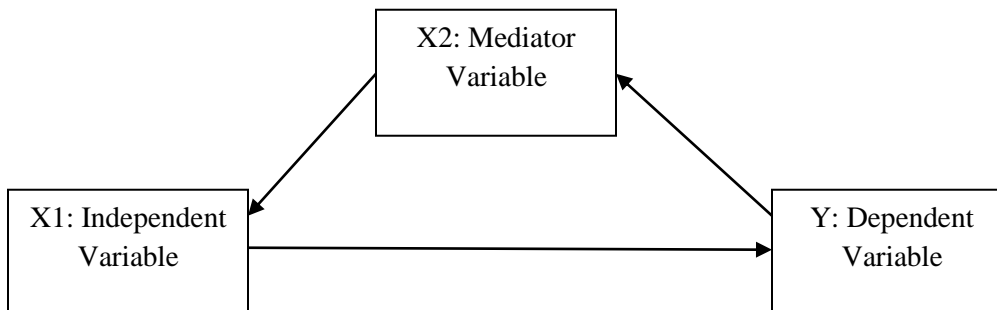


Figure 3. "Reverse mediation"

How can you tell which of the three is true?_____

**Moderator variable** - "In general terms, a moderator is a qualitative (e.g., sex, race, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable. Specifically within a correlational analysis framework, a moderator is a third variable that affects the zero-order correlation between two other variables. ... In the more familiar analysis of variance (ANOVA) terms, a basic moderator effect can be represented as an interaction between a focal independent variable and a factor that specifies the appropriate conditions for its operation" (Baron & Kenny, 1986, p. 1174).

Practically, this means that X2 makes a difference in terms of how and when X1 has an impact on Y. A moderator variable is one that changes the strength and/or direction of a direct relationship. Moderation is generally tested by looking for an interaction between X1 and X2 in the prediction of Y. The term moderation, however, implies that we care which variable is the independent variable, and which is the moderator. The term interaction implies that we do not.

There is less agreement in the literature on how to display moderation in a model. Here is my favorite:
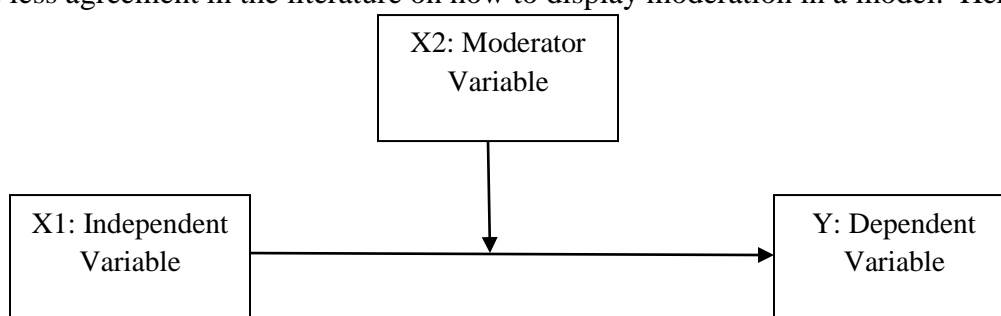


Figure 4. Moderation (theoretic model)

When thinking about testing moderation through the inclusion of an interaction term in multiple regression and similar techniques, a somewhat different model would be appropriate:
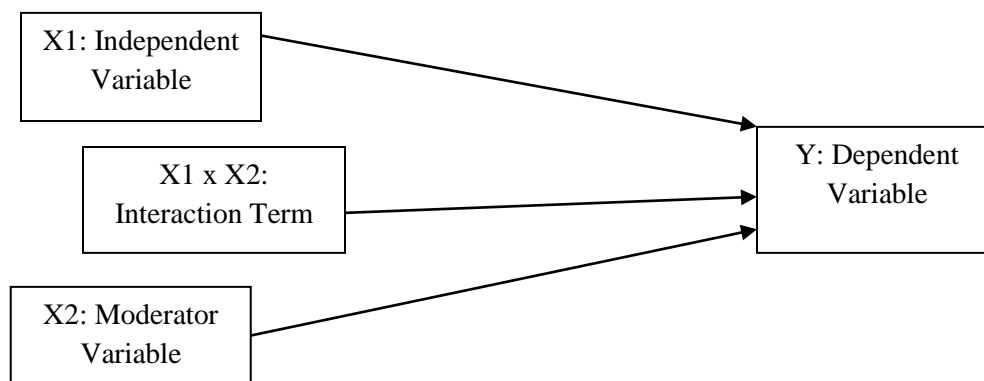


Figure 5. Moderation (with interaction term indicated)

Interaction terms are common in the analysis of variance (ANOVA) family of statistics, and can also be specified, as noted in Figure 5 above, in multiple regression and logistic regression. (NOTE: The independent variables should be *centered* before being multiplied together to create the interaction term. A variable is centered by subtracting the variable's mean for all cases on that variable.) The type of interaction can vary, but the multiple regression procedure will not indicate the nature of a significant interaction. In all cases of significant interactions, if plotting the results as shown below, the graphed lines will be non-parallel in some way.

Some examples of interactions:

**Figure 3. Significant Interaction for Personal/Mainstream American Value Difference #4: Heritage**
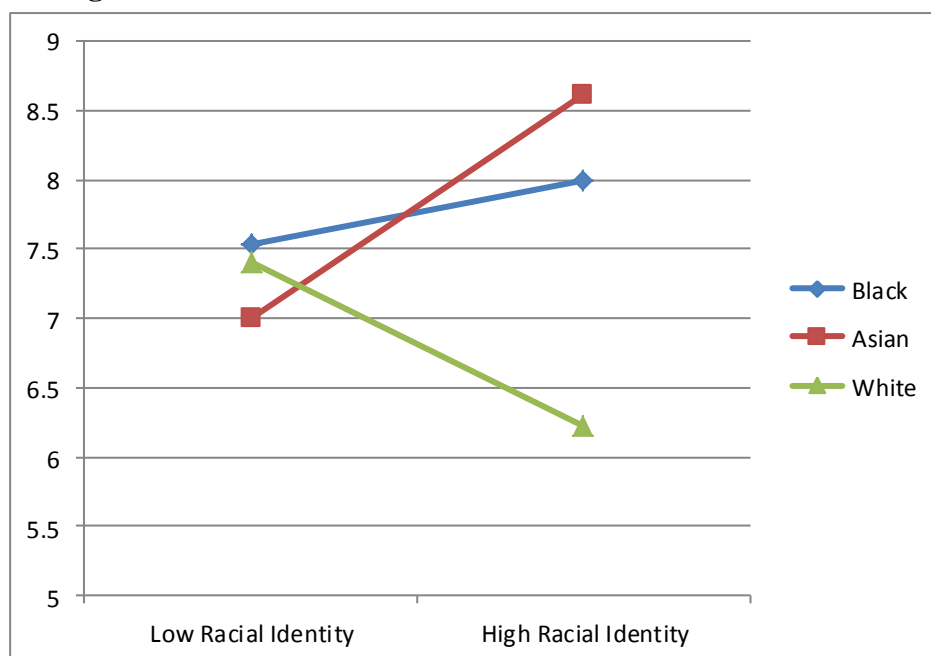


Interaction Example 1.

SOURCE: Fujioka, Y., & Neuendorf, K. A. (2015). Media, racial identity, and mainstream American values. *Howard Journal of Communications*, *26*, 352-380.
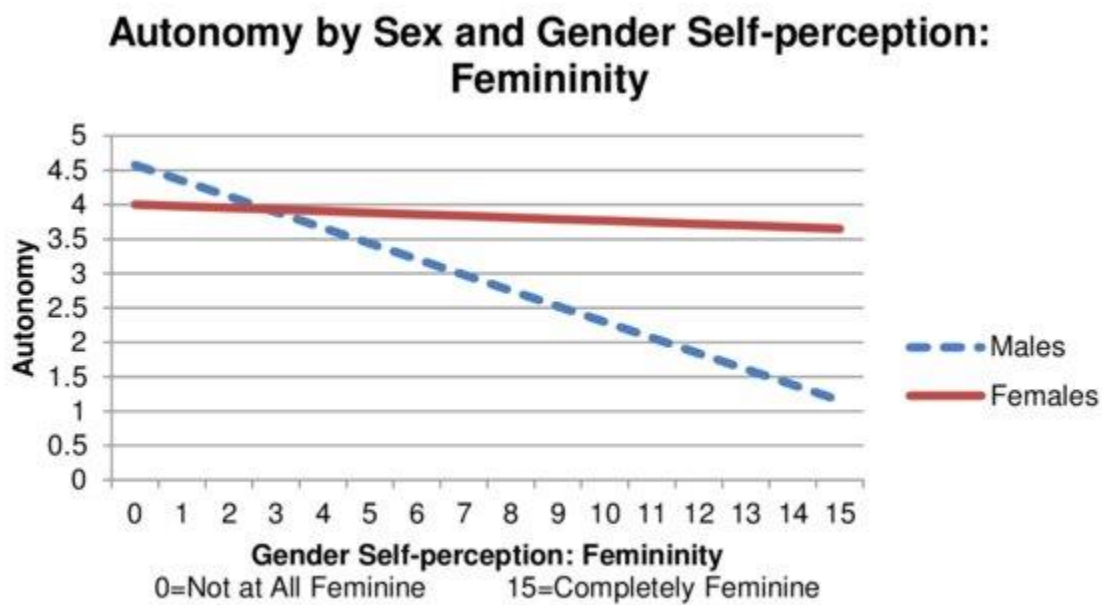
## Autonomy by Sex and Gender Self-perception: Femininity



Figure 4.4: Predicted Autonomy by Sex and Gender (GSPS2) †Interaction significant p <0.10
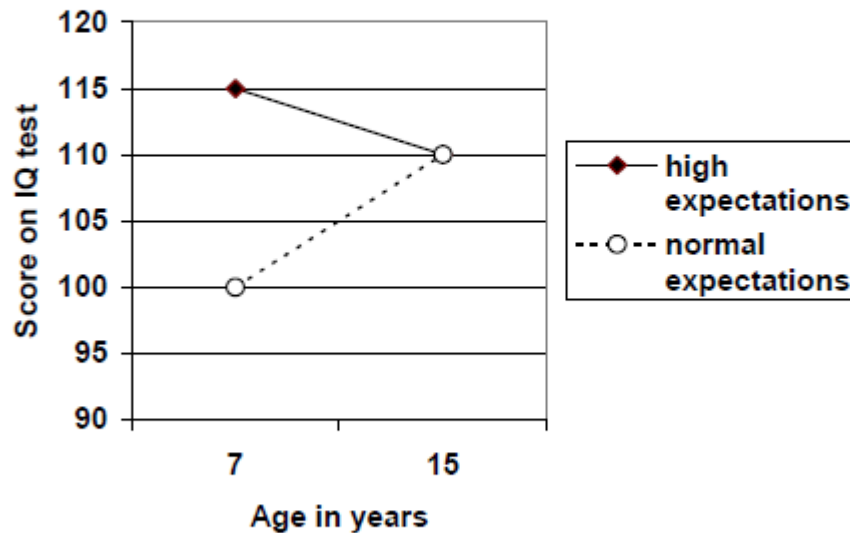
Interaction Example 2.
SOURCE: www.researchgate.net

**Line graphs**

Figure 7 provides a graphical representation of the mean IQ scores of the high- and normal-expectation 7-year-old and 15-year-old students. The dependent variable always goes on the y-axis and the two independent variables go along the x-axis and in the legend. Be sure to always label your x and y axes.

*Figure 7.* Effects of age and teacher expectations on IQ scores.



*Interactions.* The less parallel the lines are, the more likely there is to be a significant interaction. In Figure 7, we see that the lines are definitely *not* parallel, so we would expect an interaction.

Interaction Example 3.
SOURCE: psych.hanover.edu

**Figure 2:** *Near-Significant Interaction Predicting Dialogue Recall from Condition and Family Foreign Language Use*
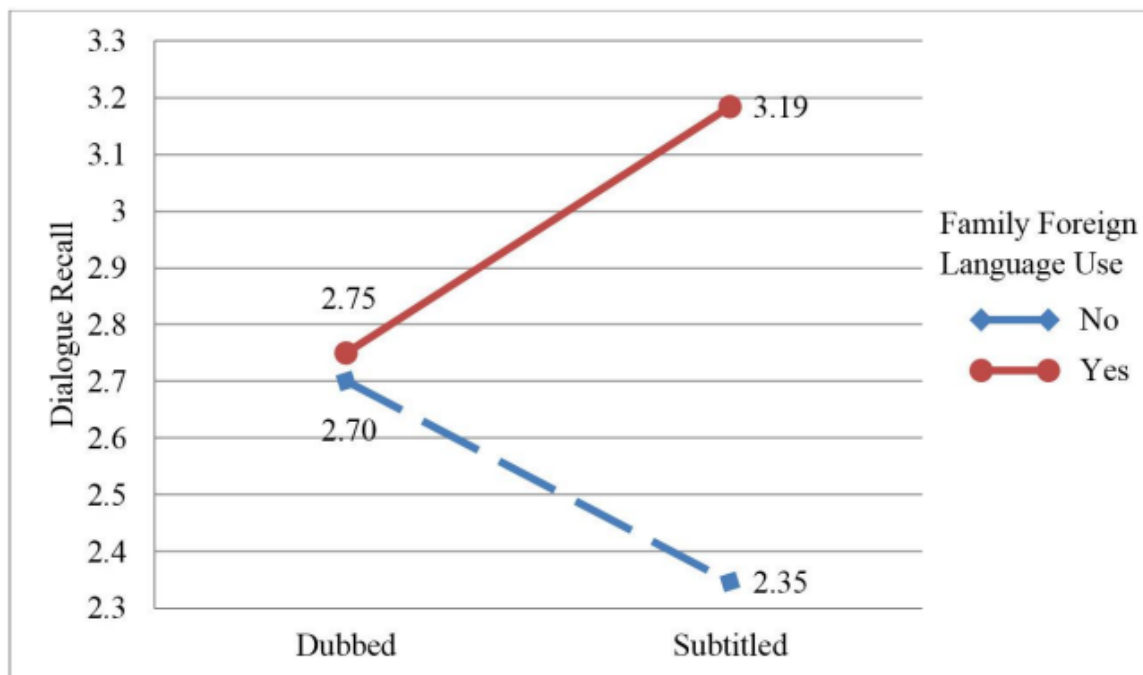


Table 3 shows a significant main effect of foreign film exposure (low, high) on visual recall, such that those with greater foreign film exposure scored higher on visual recall. While this main effect was not a focus of the study's research questions, this finding may be of interest for further investigation.

Interaction Example 4.
SOURCE: Rader, K., Neuendorf, K. A., & Skalski, P. D. (2016). International film and audio-visual translation: Intercultural experience as moderator in audience recall and enjoyment. *Journal of Intercultural Communication*, (42), article 6.

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