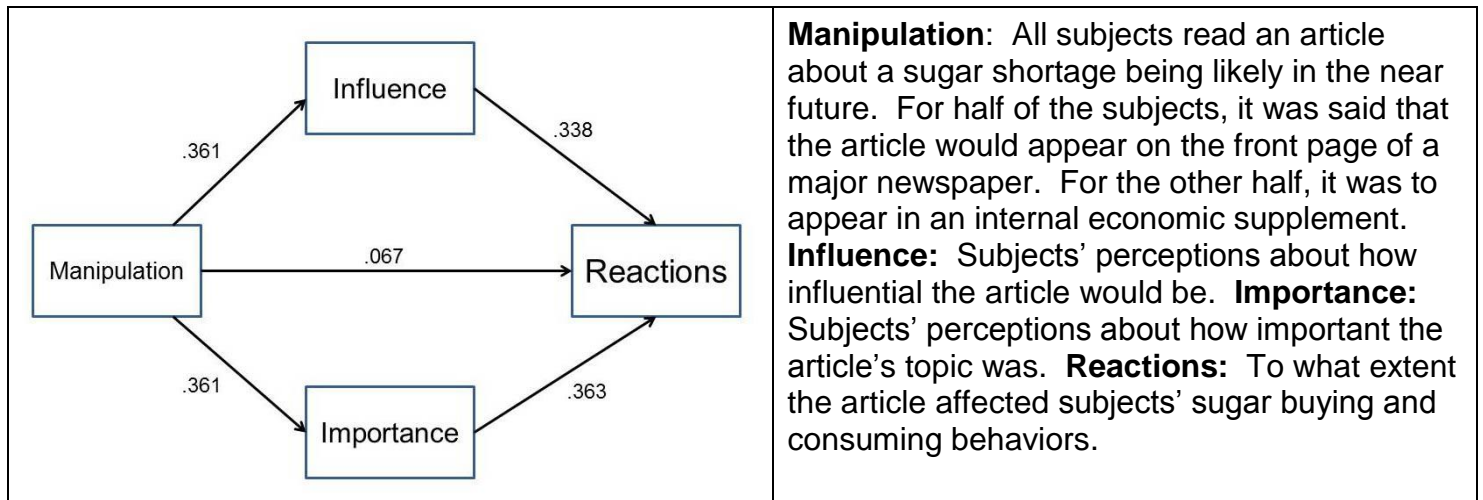


Parallel Multiple Mediation

Consider the model that X has both direct and indirect effects on Y, and there are two or more mediators. The mediators are modeled as not being causally related to one another.

Hayes (2013, pages 130 through 143) illustrates moderated mediation with research conducted by Tal-Or, Cohen, Tsfati, & Gunther (2010). Please obtain and read the article by Tal-Or et al. before you continue with this lesson. Focus on Study 2 in the article.



If you have not done so already, download, from [Process Hayes](#), the data files (hayes2013data.zip) as well as the programs (processv210.zip or more recent release). In folder "pmi" you will find the data for this example, in several formats. I am going to use process.sav, which has variable names, labels, and value labels. Rather than use SPSS for the analysis, I shall use SAS. SAS is able to import *.sav files.

Boot up SAS. Open and run the process.sas macro. Import the protest.sav data. During the process of importation, name the SAS work data set "pmi." Open the program editor (File, New Program) and enter and run this code: "Proc Contents; run;" The output will give you a terse description of the imported data, including variable names and labels.

If there were missing data, we would need deal with that first, creating a data file with no missing data. There are no missing data here. Although not necessary, I prefer to standardize continuous variables, so my next step is to create standardized scores. Do note that I have not standardized the two-level experimental manipulation (protest).

```
proc contents; run;
proc means; run;
data pmi2; set pmi;
  pmiZ=(pmi-5.6016260)/1.3212627;
  importZ=(import-4.2032520)/1.7365849;
  reactionZ=(reaction-3.4837398)/1.5502974; run;
```

Enter and run this code to do the mediation analysis.

```
%process (data=pmi2, vars=cond pmiZ importZ reactionZ,y=reactionZ,x=cond,m=importZ pmiZ,boot=10000,
total=1,normal=1,contrast=1,model=4);
```

Explanation of some of the arguments:

- total = 1 – estimate and test the total effect of X on Y
- normal = 1 – use Sobel test to test the indirect effects (assumes normality)
- contrast = 1 – provide bootstrapped confidence intervals for pairwise comparisons between indirect effects

References

- Tal-Or, N., Cohen, J., Tsfati, Y., & Gunther, A. C. (2010). Testing causal direction in the influence of presumed media influence. *Communication Research*, 37, 801-824.
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford.
- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Retrieved from <http://www.personal.psu.edu/jxb14/M554/articles/process2012.pdf>, January, 2014.
- [Annotated SAS Output](#)
- [Statistical Tests of Models That Include Mediating Variables](#)
- [Comparing Regression Lines From Independent Samples](#).
- [Continuous Moderator Variables](#).
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[Karl L. Wuensch](#), Mayday, 2014.