

The problem of endogeneity

John Antonakis

Faculty of Business and Economics,
University of Lausanne

AOM Meeting
Boston, 2019

The “typical” management study

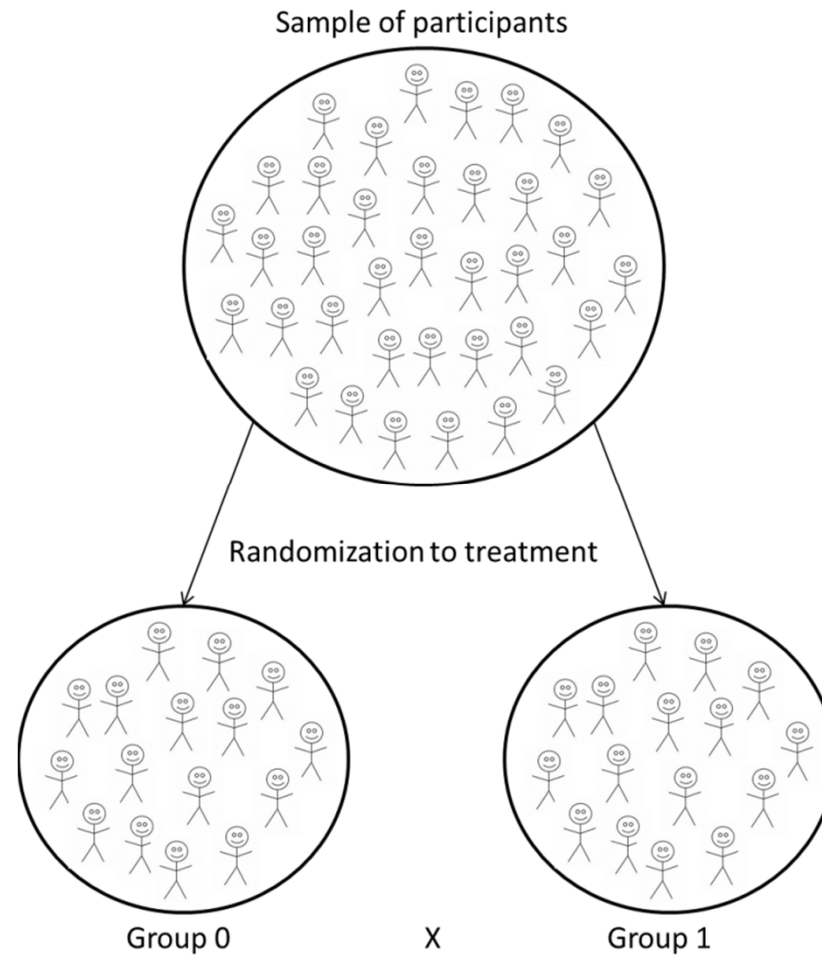
Measure some attitude, behavior, style, choice (x), at some level of analysis and model that as a cause of y . If x is measured and not manipulated (random) it is probably endogenous with respect to y .

Are there un-modeled variables that cause x and y ? E.g.,

- manager-level variables (e.g., ability, personality)
- subordinate-level variables (e.g., ability, personality)
- organizational variables (e.g., resources, training, culture)

If so, then then x correlates with e of y .

Remember, why do we assign units randomly to treatment?



By random assignment, we mean that units are assigned by chance to treatment (substantive inference) or control (the counterfactual inference); that is, each subject has an equal probability of being in a particular condition. Random assignment facilitates causal inference because:

- it ensures that there are no confounds
- any threats to internal validity are distributed equally (randomly) across conditions
- the disturbance is orthogonal to group assignment dummy variable

In the presence of endogeneity the estimate is inconsistent

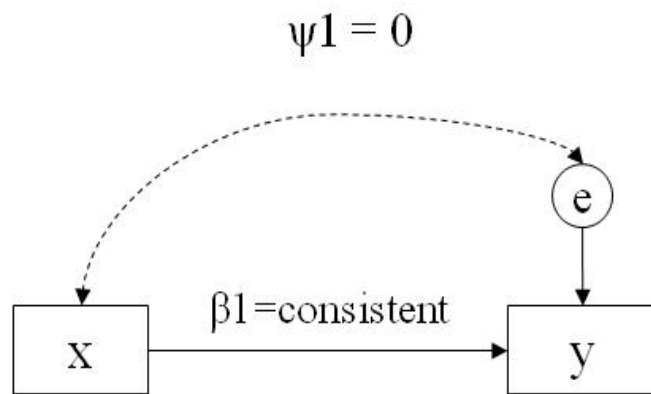


Figure 1A

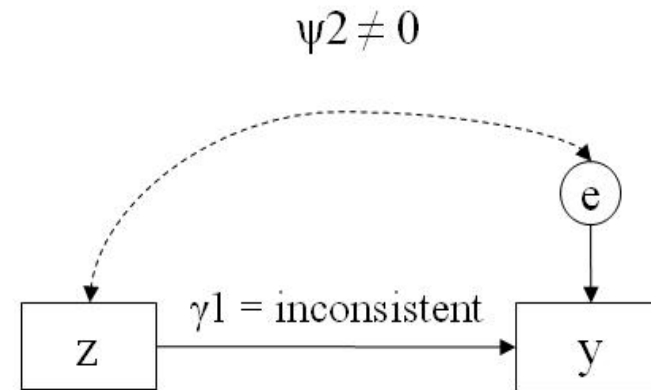


Figure 1B

If z is not randomized or purged from endogeneity, it will correlate with “ e ”; the estimate might thus be higher, lower, or of a different sign from true estimate (Antonakis et al., 2010).

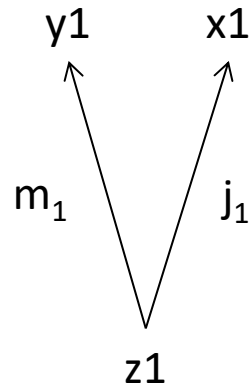
A typical management design using temporal ordering!

- Measure x at Time 1
- Measure y at Time 2 (could be an objective measure)
- (maybe include a mediator too in between x and y)
- Regress y on x

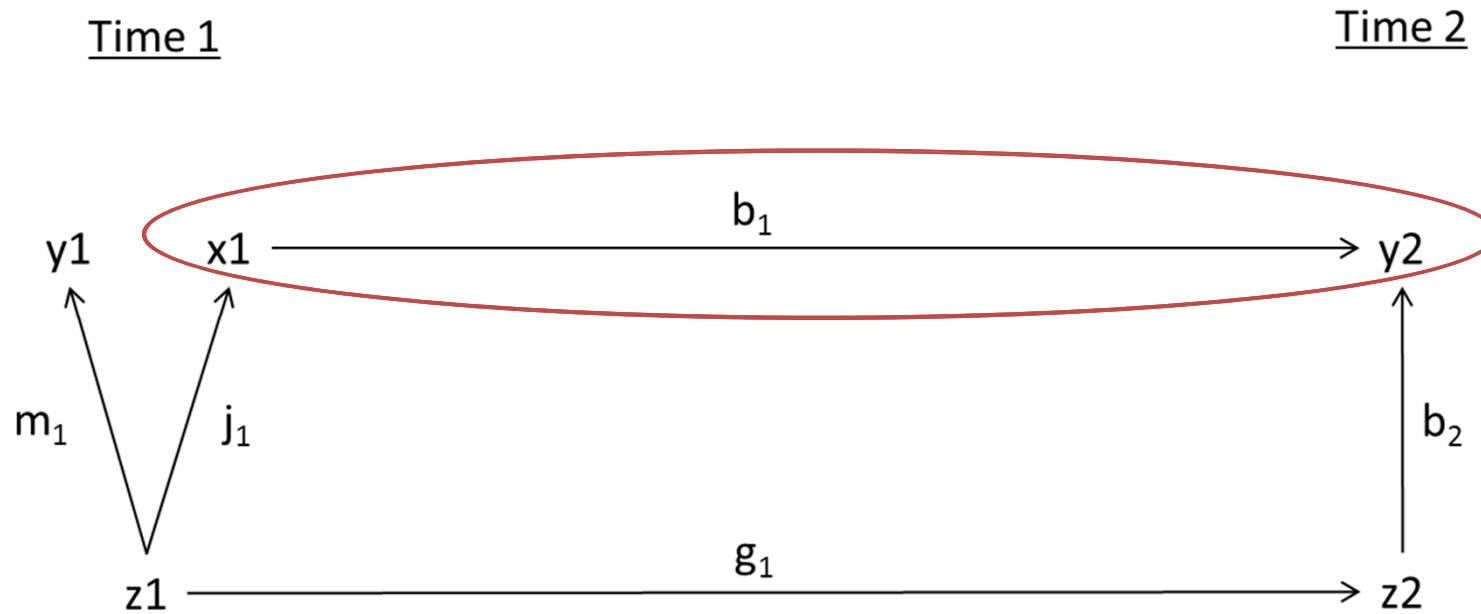
The above is still problematic if x is not exogenous; this design is the tranquilizing drug of naiveté.

Researchers repeatedly make the *post-hoc ergo propter hoc* fallacy! Many editors and reviewers ignore this problem!

Suppose the following (at time 1)



Thus, we cannot estimate the effect of $x_1 \rightarrow y_1$ without controlling for z_1 ; z_1 will correlate with itself over time.



The only time b_1 will give you a true estimate of the effect on y is if either j_1 , or unusually, g_1 , or b_2 are zero.

Unaddressed endogeneity is....

- A failsafe way to get desk rejected from some top journals nowadays (e.g., *SMJ*, *JOpsM*, *LQ*)
- Is a rampant problem
 - researchers fail to address at least 66% and up to 90% of design and estimation conditions that make causal claims invalid (Antonakis et al., 2010, *LQ*).
 - 79.73% of *LQ* articles (between 1990-2014) had one or endogeneity threats in testing mediation models (Antonakis et al., 2014, *LQ*)
 - In estimating mediation models, 74% of articles had endogenous predictors and 98% used wrong estimator (i.e., OLS-type instead of instrumental-variable type, Fischer et al., 2017, *JOM*)
 - article estimating multilevel models, only 12.25% of the articles properly dealt with the random effects assumption and exogeneity assumption (Antonakis et al., 2019, *ORM*)
- It will cost you in terms of citations (Antonakis et al., 2014, *LQ*)

There are ways to deal with it

- Isolate x from the disturbance using an appropriate design (x is then “as-if” randomized).
- It takes longer to think of the *right design* (than modeling all omitted causes), but at the end, it pays!

(Antonakis et al., 2010, *LQ*):

- Instrumental variables
- Difference-in-difference models
- Regression discontinuity designs

Take your time; plan the design

- Researchers must do “slower science”; take their time, be creative, and do their homework, instead of spewing out lots of research that is not informative to policy (Antonakis, 2017).
- ...and then go back and re-examine some apparent “knowns” and “received wisdom”, e.g., the Queen Bee phenomenon:



Full length article

The queen bee: A myth? The effect of top-level female leadership on subordinate females

Paulo Roberto Arvate ^a, ^b, ^c, Gisele Walczak Galilea ^d, Isabela Todescat ^e

[Show more](#)

<https://doi.org/10.1016/j.leaqua.2018.03.002>

[Get rights and content](#)

Abstract

We investigate the effect of female leadership on gender differences in public and private organizations. Female leadership impact was constructed using a quasi-experiment involving mayoral elections, and our research used a sample of 8.3 million organizations distributed over 5600 Brazilian municipalities. Our main results show that when municipalities in which a woman was elected leader (treatment group) are compared with municipalities in which a male was elected leader (control group) there was an increase in the number of top and middle female managers in public organizations. Two aspects contribute to the results: time and command/role model. The time effect is important because our results are obtained with reelected women – in their second term – and the command/role model (the queen bee phenomenon is either small, or non-existent) is important because of the institutional characteristics of public organizations: female leaders (mayor) have much asymmetrical power and decision-making discretion, i.e., she chooses the top managers. These top managers then choose middle managers influenced by female leadership (a role model). We obtained no significant results for private organizations. Our work contributes to the literature on leadership by addressing some specific issues: an empirical investigation with a causal effect between the variables (regression-discontinuity design – a non-parametric estimation), the importance of role models, and how the observed effects are time-dependent. Insofar as public organizations are concerned, the evidence from our large-scale study suggests that the queen bee phenomenon may be a myth; instead, of keeping subordinate women at bay, our results show that women leaders who are afforded much managerial discretion behave in a benevolent manner toward subordinate women. The term “Regal Leader” instead of “Queen Bee” is thus a more appropriate characterization of women in top positions of power.

For an intuitive introduction to the problem see my video on YouTube.



Endogeneity: An inconvenient truth (full version), by John Antonakis

You'll get to see what Endogeneity looks like!

