**From:** Dieter Lukas [<mailto:dieter.lukas@gmail.com>]   
**Sent:** Monday, December 18, 2017 11:28 AM  
**To:** Born, Richard T.  
**Cc:** Alecia Carter; Croft, Alyssa S - (alyssac); Sandstrom, Gillian  
**Subject:** Re: Fwd: sex-question bias

Dear Prof Born,  
  
Thank you for your helpful feedback on our study! We received a few similar comments on this particular aspect reported in our preprint, but the simulation included here is helpful to visualize how the effect arises.  
  
We have now started to look further into this effect. In particular, we have run additional analyses excluding the observation for the first question and testing whether the gender of the first person to ask a question is associated with the gender composition among all subsequent questions. These additional analyses suggest that there is still a signal, though it is of course reduced because of the sorting bias you mention. We will revise this in our manuscript prior to publication. We also realize that there might not be a direct causal link between the gender of the first person to ask a question and the gender of people asking the following questions (we tried to avoid any reference to causality in our manuscript), and that instead this could be due to other factors making men more likely to ask a question and thereby also to ask the first question (the "shift to the left" you mention).   
  
With best wishes,  
Dieter

---------- Forwarded message ---------  
From: Born, Richard T. <[richard\_born@hms.harvard.edu](mailto:richard_born@hms.harvard.edu)>  
Date: Fri, 15 Dec 2017 at 00:04

Dear Dr. Carter,

I happened upon a blog post by Duncan Green referring to an article in The Economist about your work (“Women’s visibility in academic seminars: women ask fewer questions than men”). The post showed a figure (attached) of two histograms illustrating a rather dramatic difference in question-asking sex bias as a function of the sex of the first questioner.

I was concerned by the fact that you are stratifying the data based, in part, on the thing you are measuring, which could introduce what I will refer to as “sorting bias.” The sorting bias arises from the fact that you guarantee the presence of at least one male question in seminars assigned to the man-asking-first-question category; similarly for women. For seminars in which relatively few questions are asked, this selection criterion could result in a sizeable bias. In the limit of one-question seminars, all of the man-first question seminars would score a -100 and all of the woman-first would score +100.  I ran some simulations that suggest that seminars containing fewer than 4 or 5 questions could produce an effect of the size you observed based purely on this sorting bias. I will attach a second figure showing some of the simulation results, and I’d be happy to share the MATLAB code with you.

Each histogram shows the effect size (difference in means) for 1000 simulations using the number of questions per seminar indicated in the title. For comparison, the vertical black line shows the actual effect size you obtained; the dashed lines show the 95% confidence interval from the t-distribution.

I note also that the sorting bias necessarily pushes the two distributions apart symmetrically about 0. That is, the man-first-question distribution should be shifted to the left by about the same amount as the woman-first-question is shifted to the right. This is clearly not the case in the data figure, but this could be accounted for rather simply by an overall tendency for men to ask more questions (i.e. regardless of who asks the 1st question), which would shift both distributions to the left. The main point is that the sorting bias would affect the contrast of interest (sex of 1st question asker) and the size of its effect depends critically on the total number of questions asked.

Please feel free to contact me if any of this is unclear.

Sincerely,

Rick

Richard T. Born, MD

Professor of Neurobiology

Harvard Medical School

