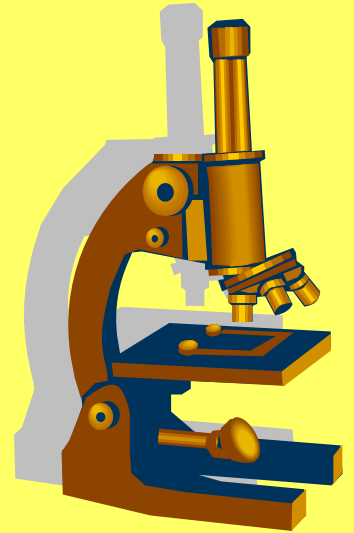


Gender, Science Anxiety, and Science Attitudes: A Multinational Perspective



**Loyola University
Chicago
&
University College
Capital
Copenhagen**



Science Anxiety



A debilitating interaction of emotion--fear, with cognition--science learning.

Science Anxiety (SA) Questionnaire

- 44 questions
 - 22 science related questions
 - 22 non-science related questions
- students were asked how much they were frightened in performing the activities described in the questionnaire.

- Self reported anxiety:

1

2

3

4

5

not at all little fair amount much very much

Science Anxiety Questionnaire Sample Items

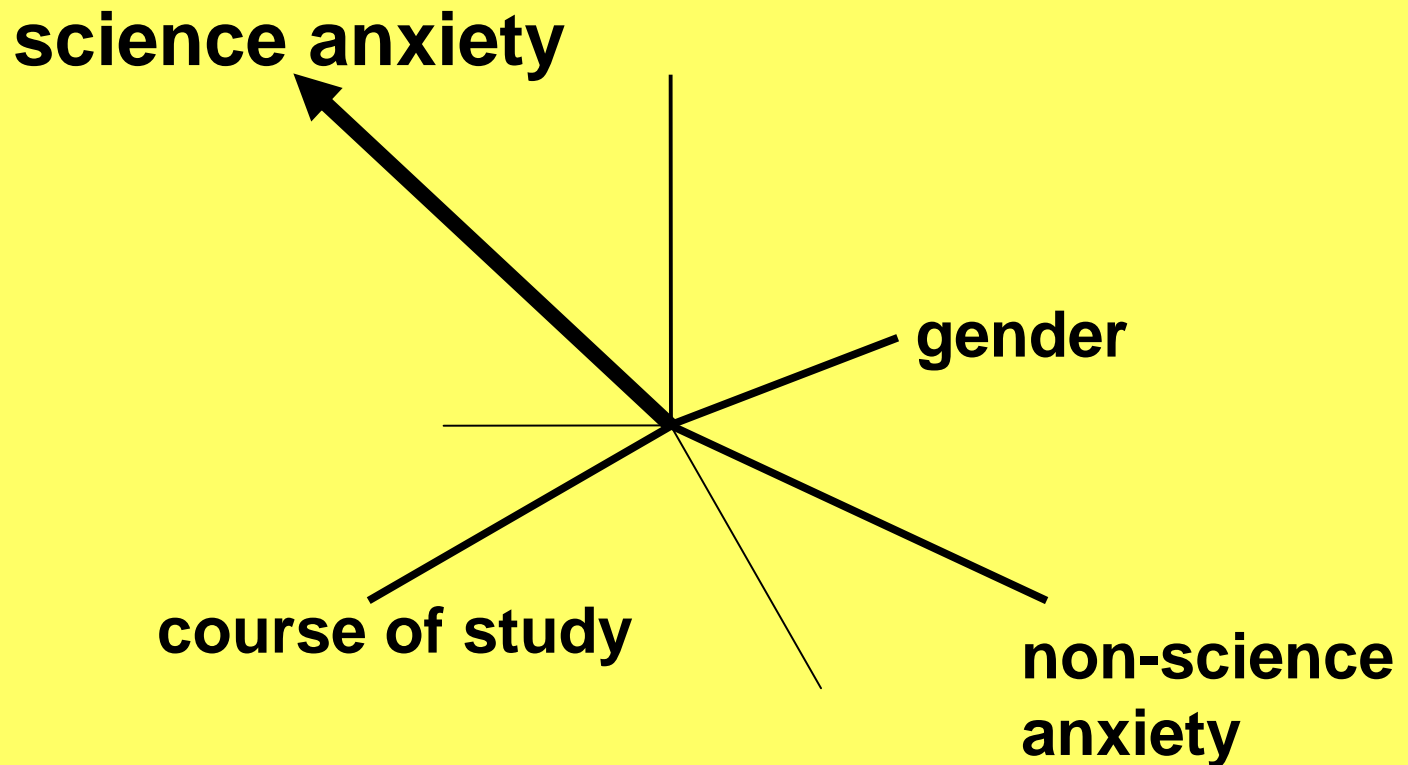
- **Asking a question in a science class.**
- **Asking a question in an English Literature class.**

- **Focusing the lens on your camera.**
- **Focusing a microscope.**

- **Memorizing a chart of historical dates.**
- **Memorizing the names of elements in the periodic table.**

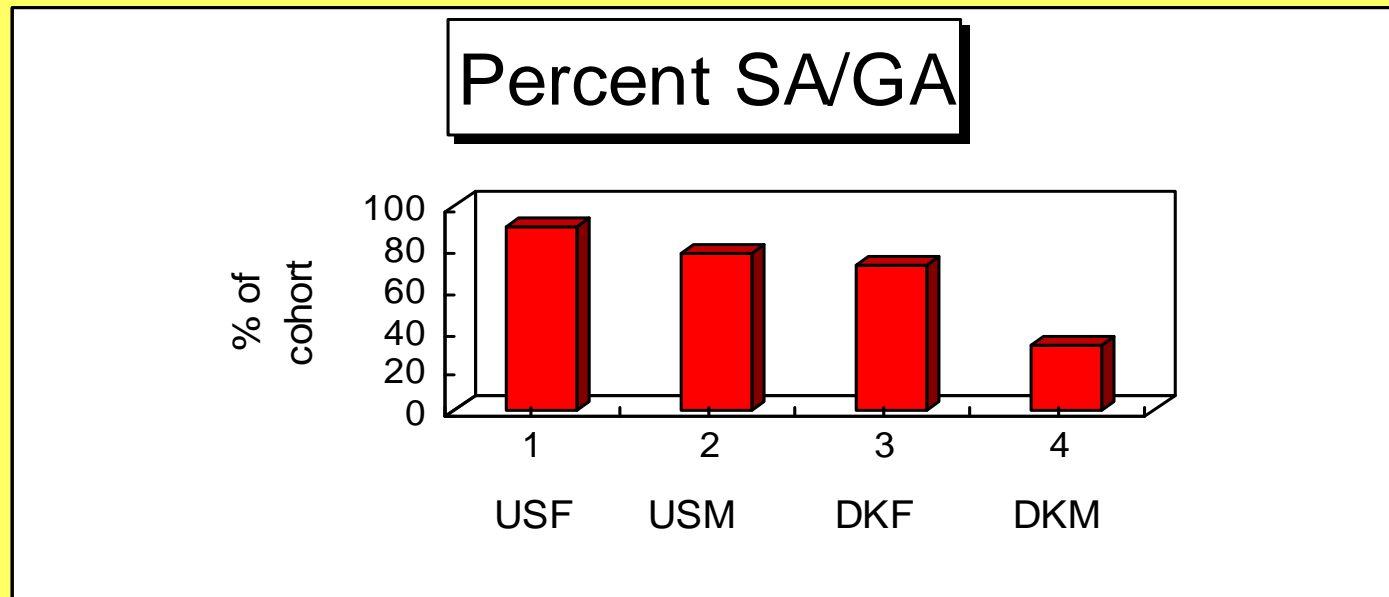
MULTIPLE REGRESSION ANALYSIS

Best predictors of science anxiety are non-science anxiety, gender, course of study.



ACUTE ANXIETY: ORIGINAL STUDY

Percent of Science-Anxious Students of Generally-Anxious Samples US & DENMARK

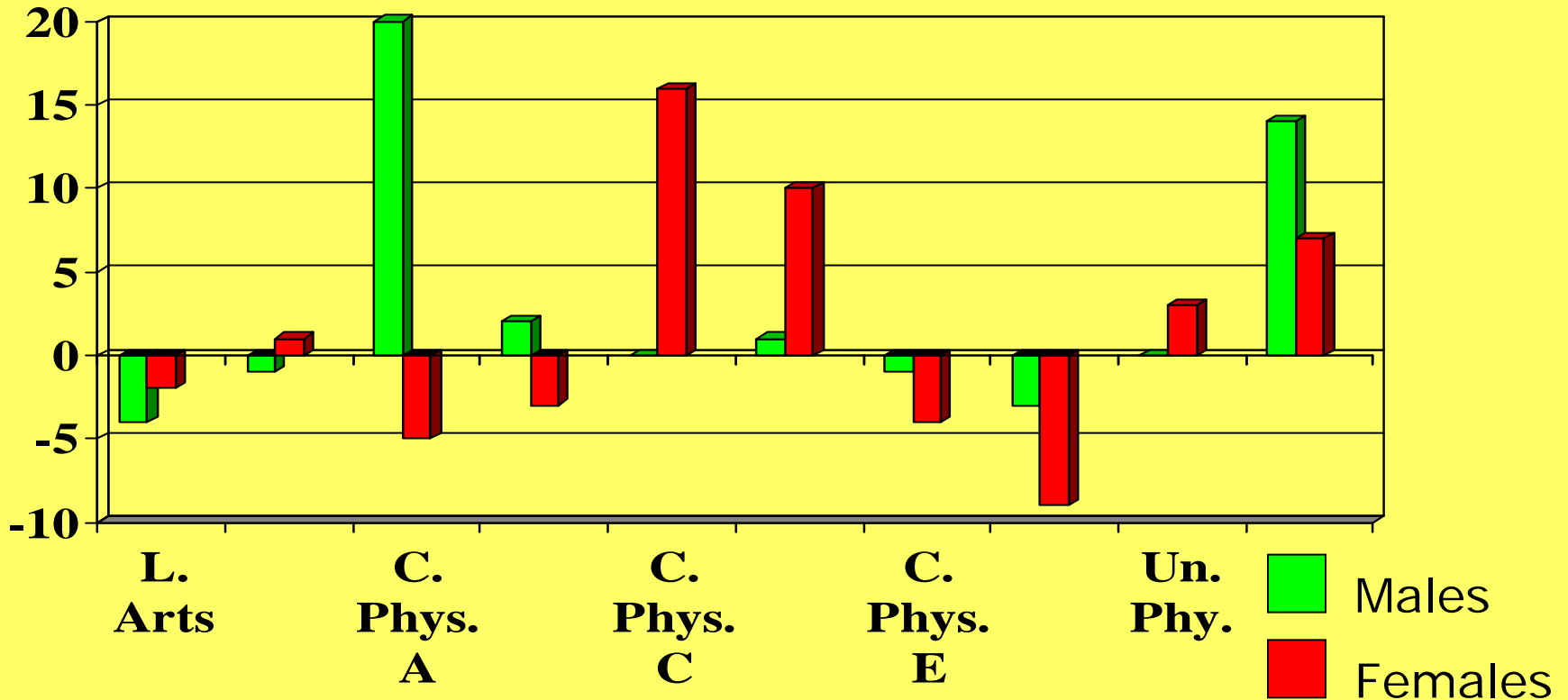


SA: "Science-Anxious"--students answered any of the 22 science questions "much" or "very much".

GA: "Generally-Anxious"--students answered any of the 44 questions "much" or "very much".

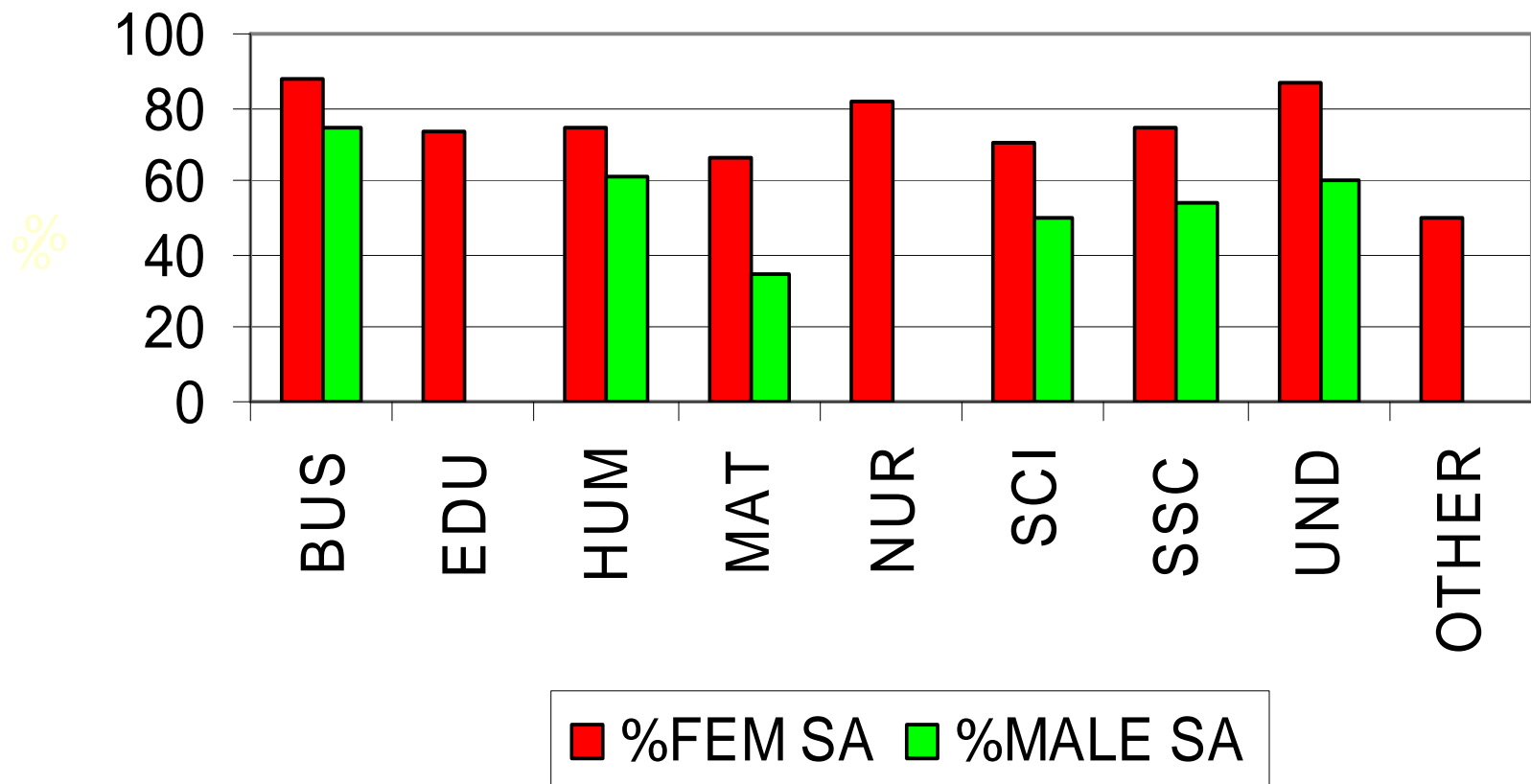
Changes in Acute Science Anxiety in a Semester of Physics (US)

% SA/GA: Positive values are
reductions in science anxiety



Acute Science Anxiety in Science and Non-science Students (US)

% SA/GA students by gender and course of study



DANISH GYMNASIUM REFORM

Physics required for all.

- Pre-reform students of both genders were more science-anxious than post-reform students.
- No gender differences in science anxiety among pre- or post-reform students.
- The level of science anxiety among both pre- and post-reform students was higher than in the 1990's studies.

Further Observations

US students' results are the same as Danish students': no gender differences in SA/GA.

SA/GA masks separate SA and GA values, which appear to exhibit some gender differences and changes over time. Further study needed.

Attitudes Toward Science



“Attitudes Towards Science” Questionnaire

Science is a “level playing-field” in which men and women have equal status and opportunity.

(“Traditional” view)

Science reflects the social and political values, philosophical assumptions, and intellectual norms of the culture in which it is practiced.

(“Moderate constructivist” view.)

Science is by its nature hostile to women.

(“Radical constructivist” view)


QUESTIONNAIRES--LOYOLA ATTITUDES TOWARD SCIENCE:

Women scored significantly higher than men on “Inherent Bias of Science Against Women.”

Men scored significantly higher than women on “Negativity of Science Toward the Individual.”

ATTITUDES AND ANXIETY REGRESSION ANALYSIS

(A) For **males**,

Subjective construction of knowledge anxiety.  **science**

Science opposed to humanity anxiety.  **science**

(B) For **females**,

Science opposed to humanity, not just women science anxiety. 

INTERVIEWS:SELECTED QUESTIONS

What causes of *anxiety* in science can you identify?

Why do you think *gender* differences exist in subject choices?

Some people have suggested that *science is inherently hostile* and biased toward women. How do you feel about this particular viewpoint?

Some people have suggested that there are no facts and that science is simply *constructed from the personal opinions of scientists*. How do you feel about this particular viewpoint?

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

None of the responses associated with gender.

Course of study in each national group sometimes associated with responses.

Students were almost all “moderate constructivists,” acknowledging biases and hostilities in scientific practice but not in the nature of science.

The starkest distinction was between the two all-female US groups: education students and science teachers, who disagreed on the possible validity of creationism/intelligent design.

No obvious connection between discussions of science anxiety and science attitudes.

Analyzing attitudes/anxiety/gender/nationality
questionnaire data

New study: written interviews of Danish
gymnasium and university teachers and
successor groups of CPS teachers who are
students in the Teaching Scholars' Program.