

Does Major Matter?

A Look at what Motivates
Engineering Students in Different Majors

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Are Students of Different Engineering Majors Motivated by Similar Factors?

- Prior work has shown differences between men and women
 - mentor influence
 - intrinsic behavioral
 - *attracted to different majors*
- Prompted investigation into different majors

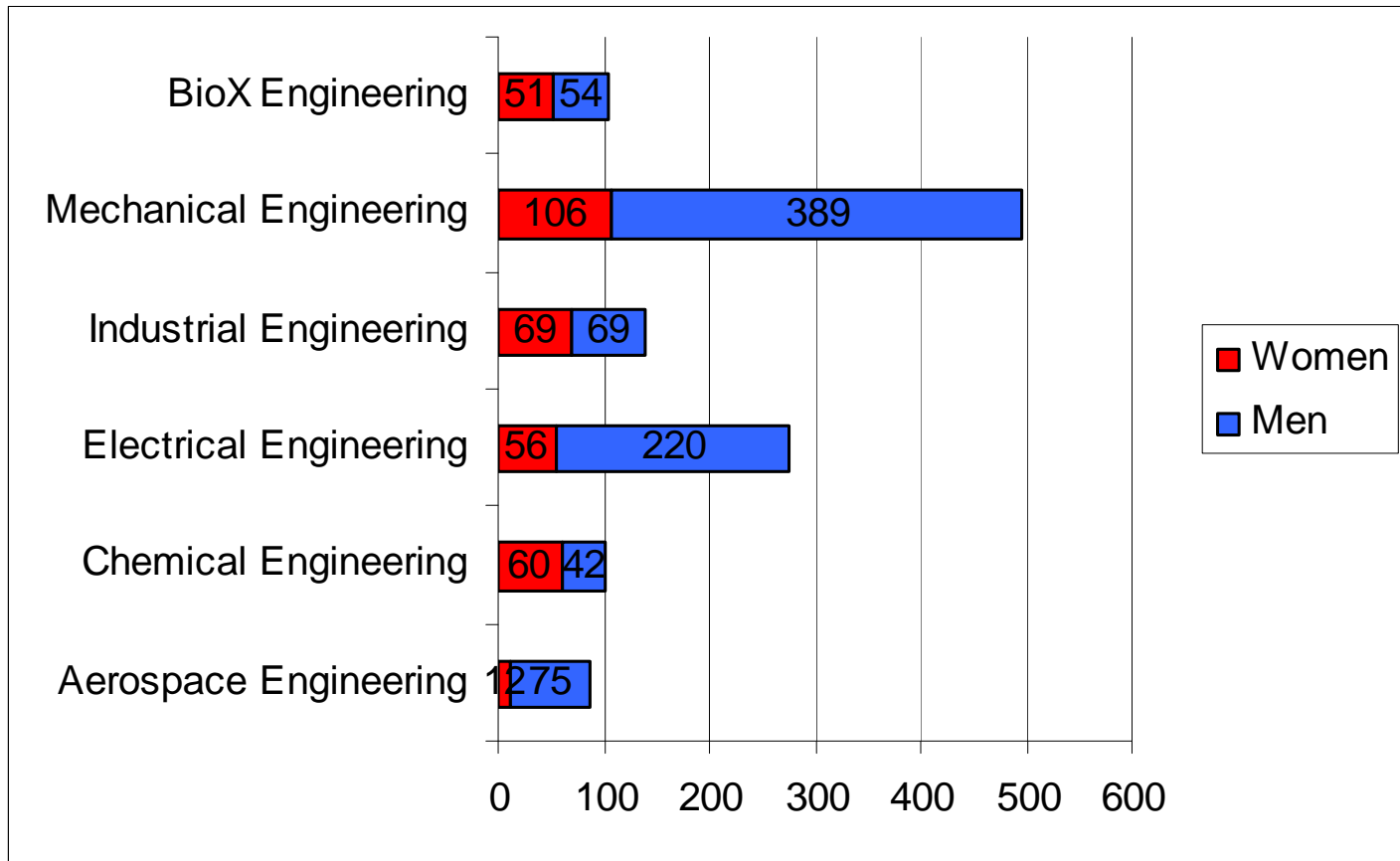
Academic Pathways of People Learning Engineering Survey (APPLES)

- One of several modes of data collection in [Academic Pathways Study](#), a branch of the NSF-funded Center for the Advancement of Engineering Education
- 50 questions
 - about 10 minutes to complete online.
- **Who:** Over 4000 undergraduate participants
- **Where:** 21 U.S. institutions
- **When:** Spring of 2008 (*before the economic downturn*)
- **Incentive:** Participants were paid \$4
- For more info ... <http://applesurvey.org>

The Majors

- Mechanical Engineering
- Electrical Engineering
- Chemical Engineering
- Aerospace Engineering
- Industrial Engineering
- BioX Engineering

Number of Participants in Subset



- Juniors and seniors grouped together
- Analyzed women and men separately

Types of Motivation

- Intrinsic
 - Behavioral, 0.72, *I like to build stuff*
 - Psychological, 0.75, *I think engineering is interesting*
- Post Graduation
 - Social Good, 0.77, *Engineering skills can be used for the good of society*
 - Financial, 0.81, *Engineers are well paid*
- People
 - Mentor, 0.77, *A faculty member has encouraged or inspired me to study engineering*
 - Parental, 0.83, *My parents want me to be an engineer*

Intrinsic Behavioral Motivation

	Mechanical	Industrial
Men	91.7	72.6
Women	82.5	55.3

Red double-headed arrows indicate significant differences between Men and Women in the Mechanical field (91.7 vs 82.5) and between Men and Women in the Industrial field (72.6 vs 55.3).

Major and Gender Differences

- Some groups identify as their own group



Indicates significant difference at $p < 0.001$

Intrinsic Behavioral Motivation

	Mechanical	Industrial
Men	91.7	72.6
Women	82.5	55.3

	Mechanical	Electrical
Men	91.7	86.5
Women	82.5	86.1

Gender Similarity

- Men MEs are more like Men EEs
- Women MEs are more like Women EEs



Indicates significant difference at $p < 0.001$

Intrinsic Behavioral Motivation

	Mechanical	Industrial
Men	91.7	72.6
Women	82.5	55.3

Red double-headed arrows indicate comparisons between Men and Women in Mechanical (91.7 vs 82.5) and Industrial (72.6 vs 55.3) fields.

	Mechanical	Electrical
Men	91.7	86.5
Women	82.5	86.1

Red double-headed arrows indicate comparisons between Men and Women in Mechanical (91.7 vs 82.5).

	Chemical	Electrical
Men	75.4	86.5
Women	63.9	86.1

Red double-headed arrows indicate comparisons between Men and Women in Chemical (75.4 vs 63.9) and Electrical (86.5 vs 86.1) fields.

Major Similarity

- Women ChemEs are more like Men ChemEs
- Women EEs are more like Men EEs

Intrinsic Behavioral Motivation

	Mechanical	Industrial
Men	91.7	72.6
Women	82.5	55.3

Red double-headed arrows indicate comparisons between Men and Women in Mechanical (91.7 vs 82.5) and Industrial (72.6 vs 55.3) fields.

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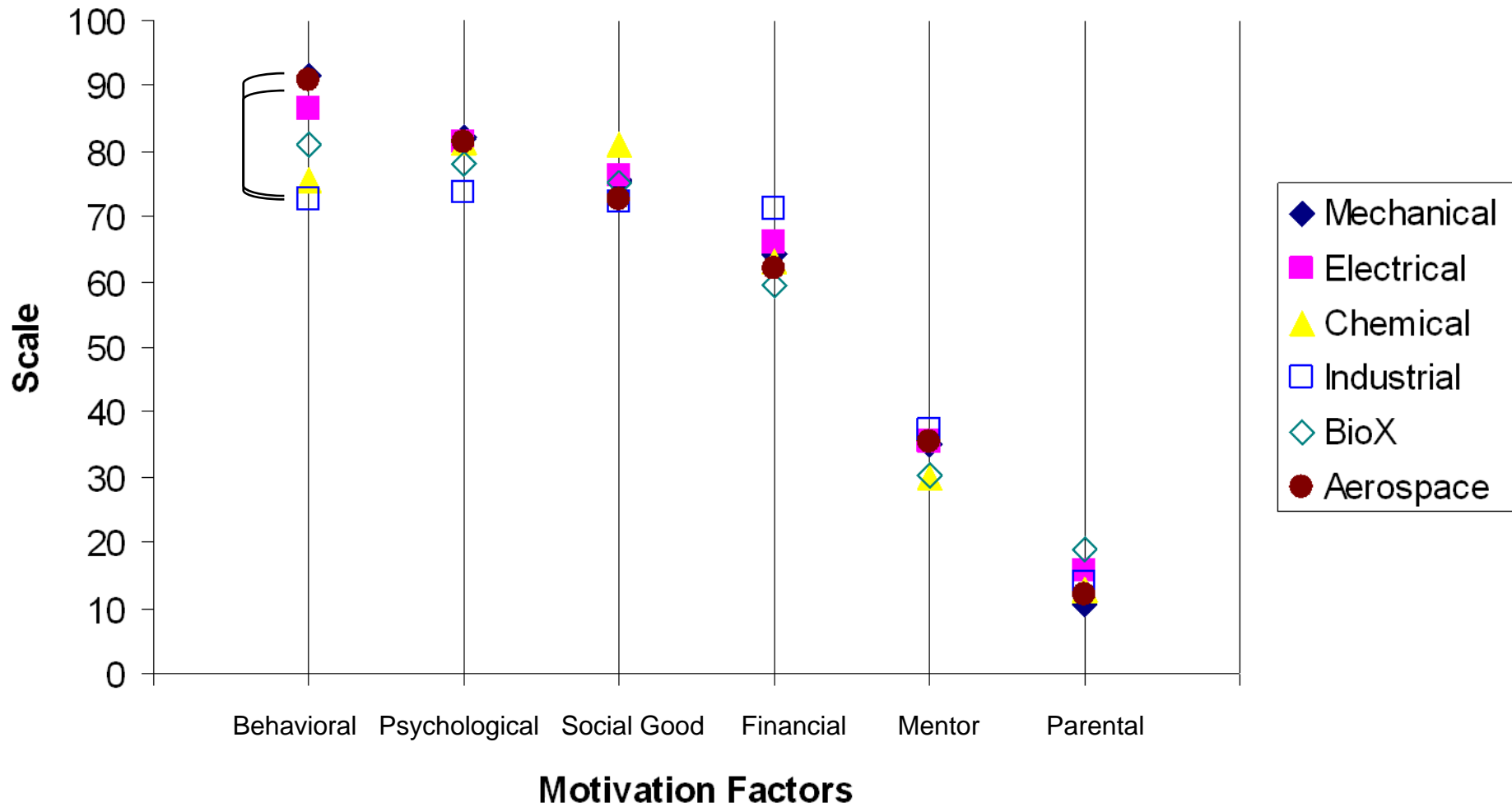
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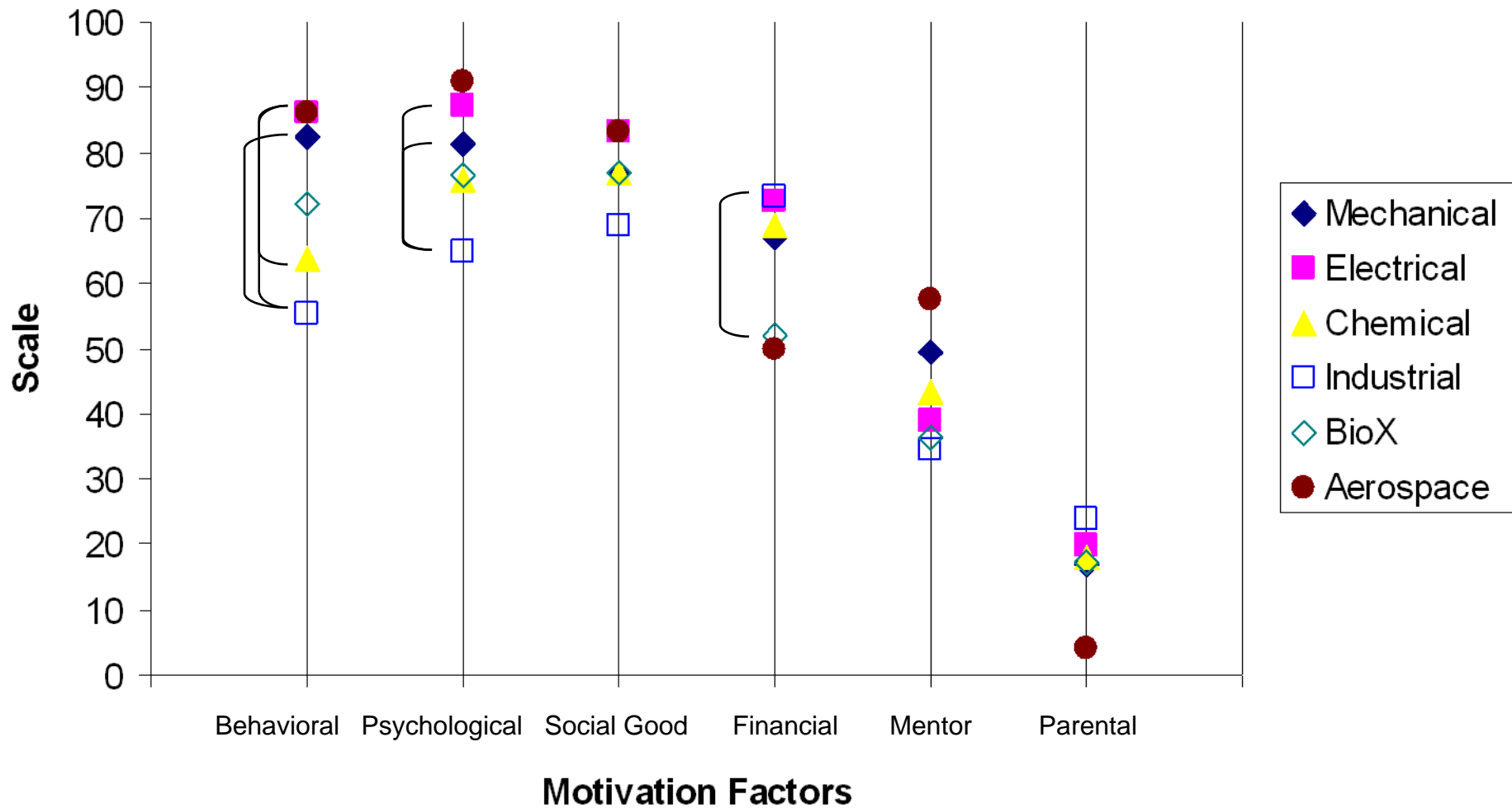
Red double-headed arrows indicate comparisons between Men and Women in Chemical (75.4 vs 63.9) and Electrical (86.5 vs 86.1) fields.

	Chemical	BioX
Men	75.4	81.2
Women	63.9	72.2

Men Motivation by Major



Women Motivation by Major



Does Major Matter?

- It depends...
 - Averaging data for all engineering students may obscure differences between majors and genders.
 - Lumping all potential engineering students together may mean that we are leaving out some key groups.

Future Directions

- Include additional majors
- Look at additional motivational factors

Acknowledgements



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