



How do different problem-solving styles affect gender inclusion in Computer Science courses?

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(with major contributions from Catarina Matos)

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Cognitive diversity
affects how
different people
use the
same software



Individual
characteristics in
how people solve
problems often
cluster by **gender**



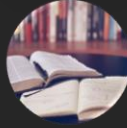
In software systems,
features are more
supportive of
problem-solving
processes followed
by **males**

Gendermag: Evaluating usability with a focus on gender- inclusiveness



Motivation for using the software

Why do you use a new tech, what do you want from it?



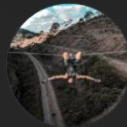
Information processing style

How do you deal with new info to solve problems with tech?



Computer self-efficacy

How much do you trust you'll succeed with new tech?



Attitude towards risk

How willing are you to use unnecessary functionalities for the task at hand?

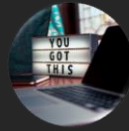


Ways of learning new technology

How do you interact with new technology?

Abi (Abigail/Abishek):

Abi's facet values are those frequently seen in women



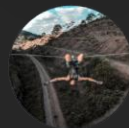
Motivation for using the software
To perform tasks



Information processing style
Comprehensive



Computer self-efficacy
Low



Attitude towards risk
Risk-averse

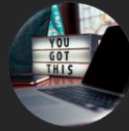


Ways of learning new technology
Process-oriented

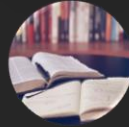


Tim (Timothy/Timara):

Tim's facet values are those frequently seen in men



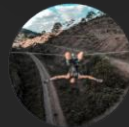
Motivation for using the software
Source of fun



Information processing style
Selective



Computer self-efficacy
High



Attitude towards risk
Risk-tolerant



Ways of learning new technology
Tinkering



Pat (Patricia/Patric):

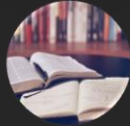
Pat's characteristics fall somewhere in between Abi and Tim



Source: <https://gendermag.org/>



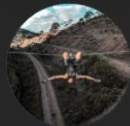
Motivation for using the software
Learn if necessary, stick to familiar if possible



Information processing style
Towards Comprehensive, in bursts



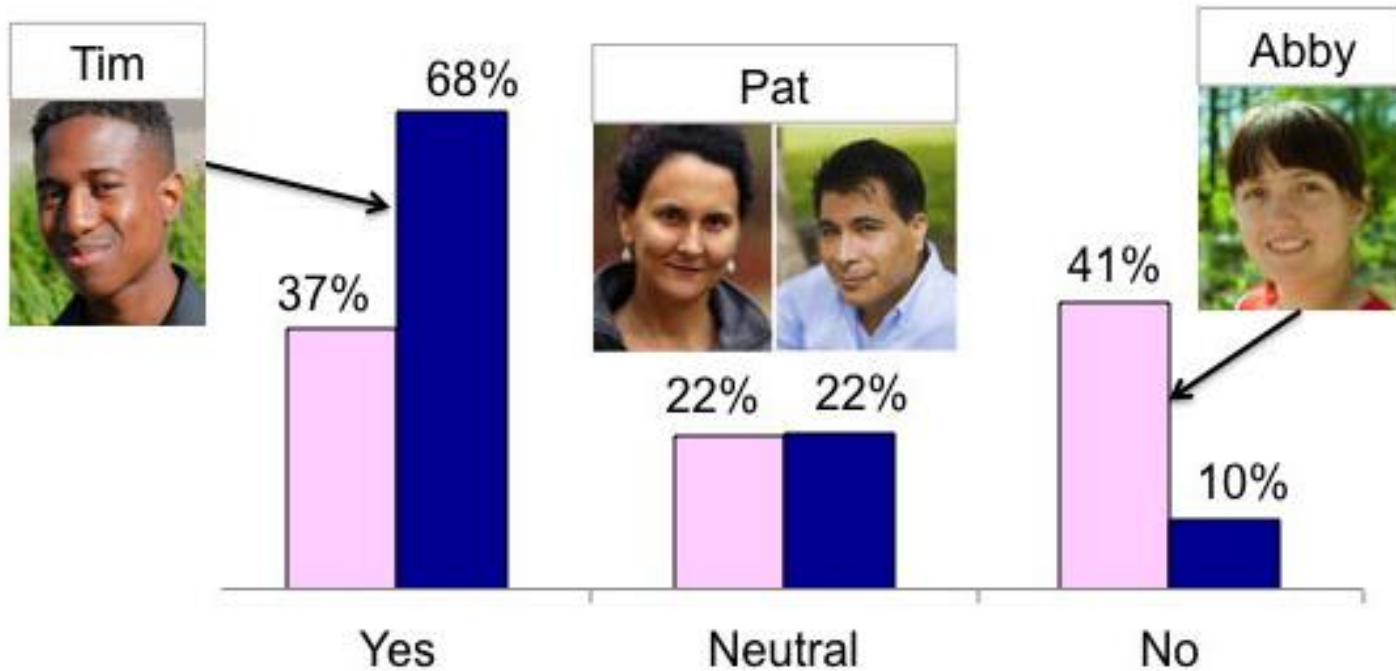
Computer self-efficacy
Medium



Attitude towards risk
Risk-averse



Ways of learning new technology
Purposeful tinkering



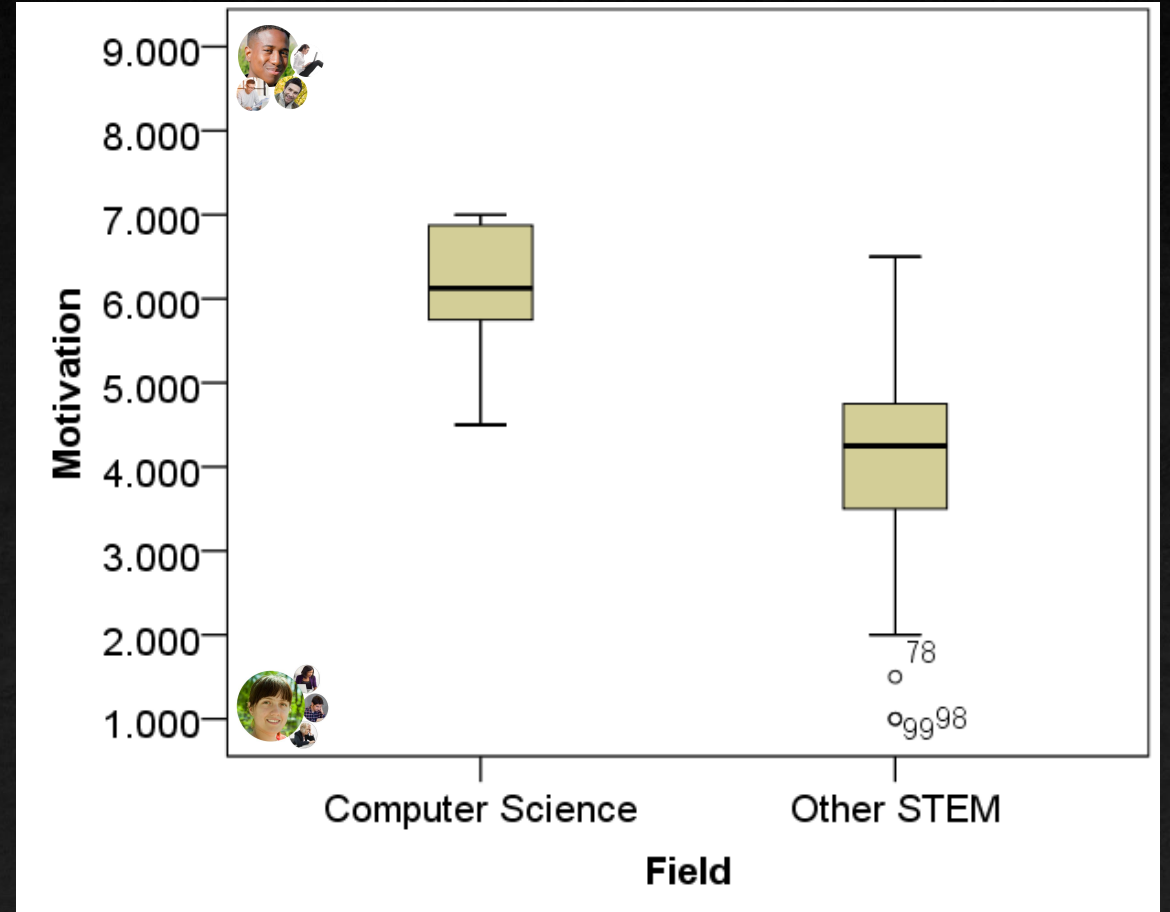
How motivated are people to explore next-generation technology?



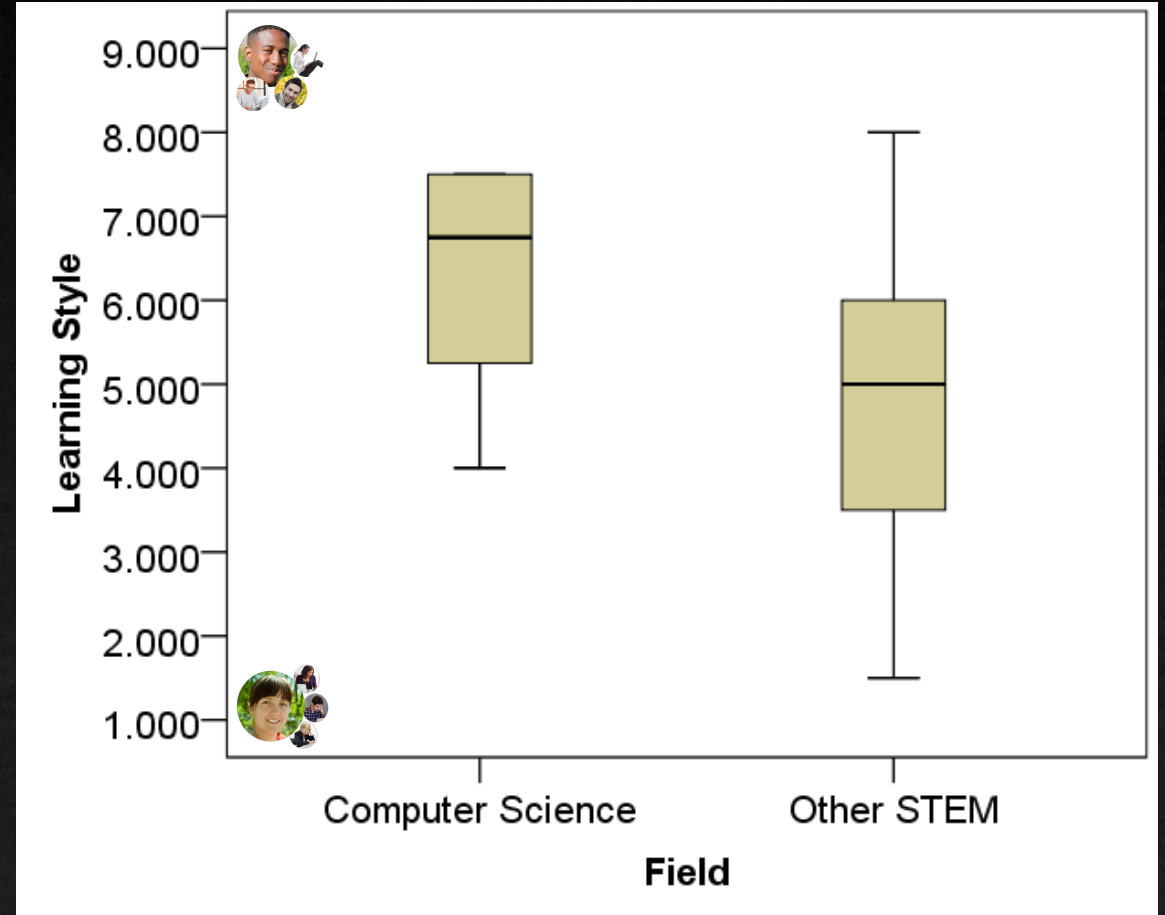
Are women who enroll in computer science courses different from other STEM degrees, with respect to their preferred problem-solving styles?

Considering only
1st year female students...

CS women significantly more motivated than colleagues from other STEM

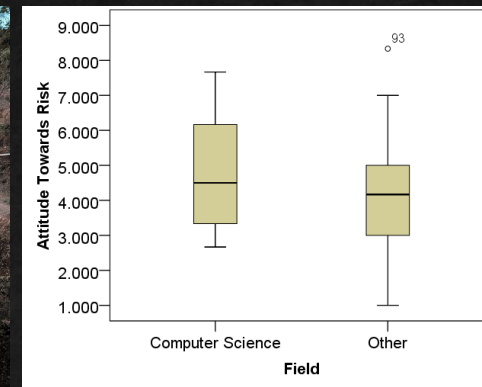
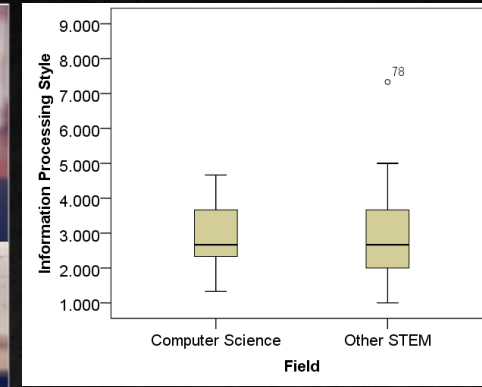
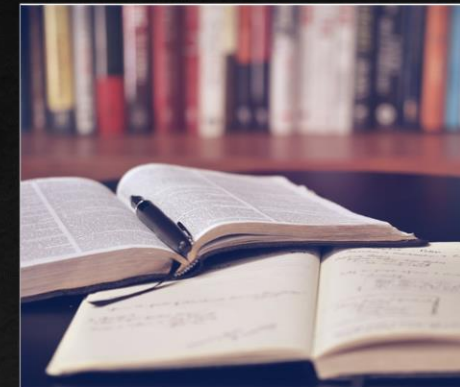
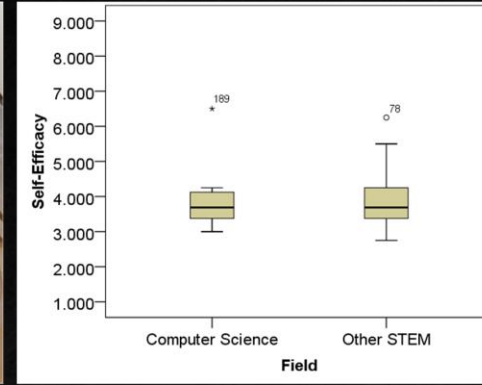


CS women more adept of tinkering than colleagues from other STEM

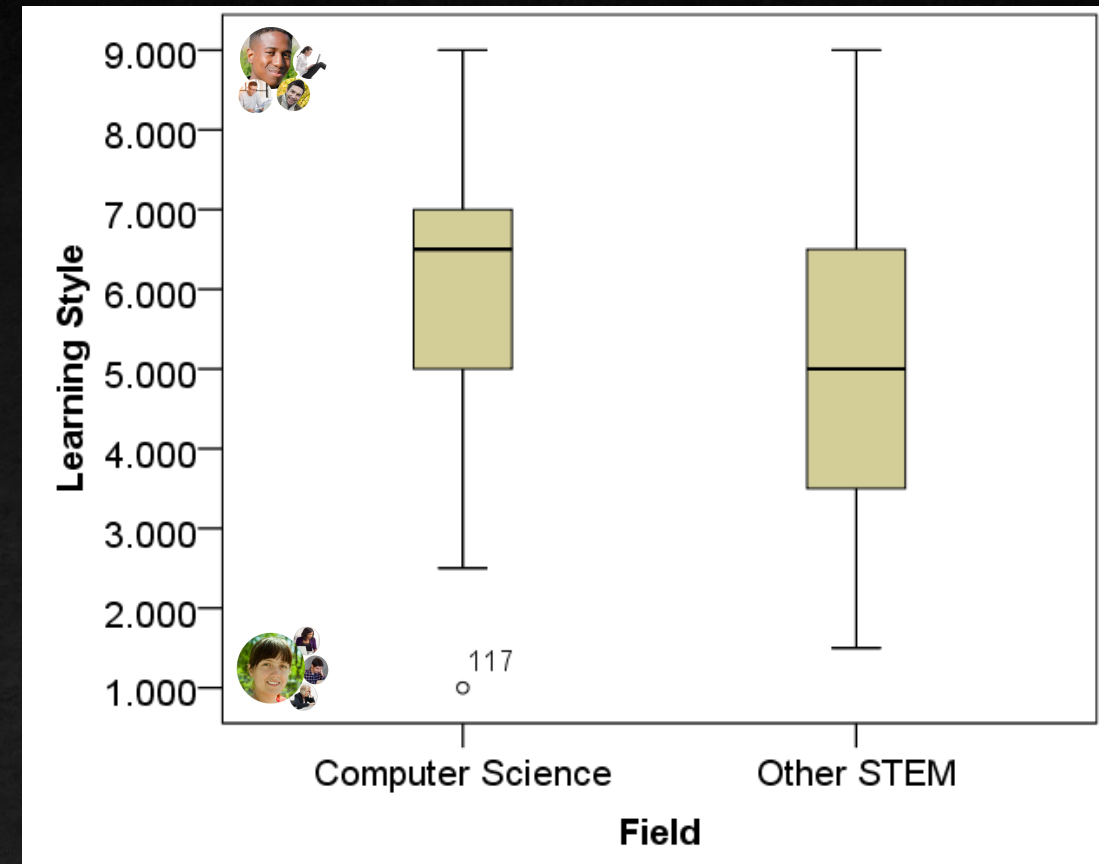
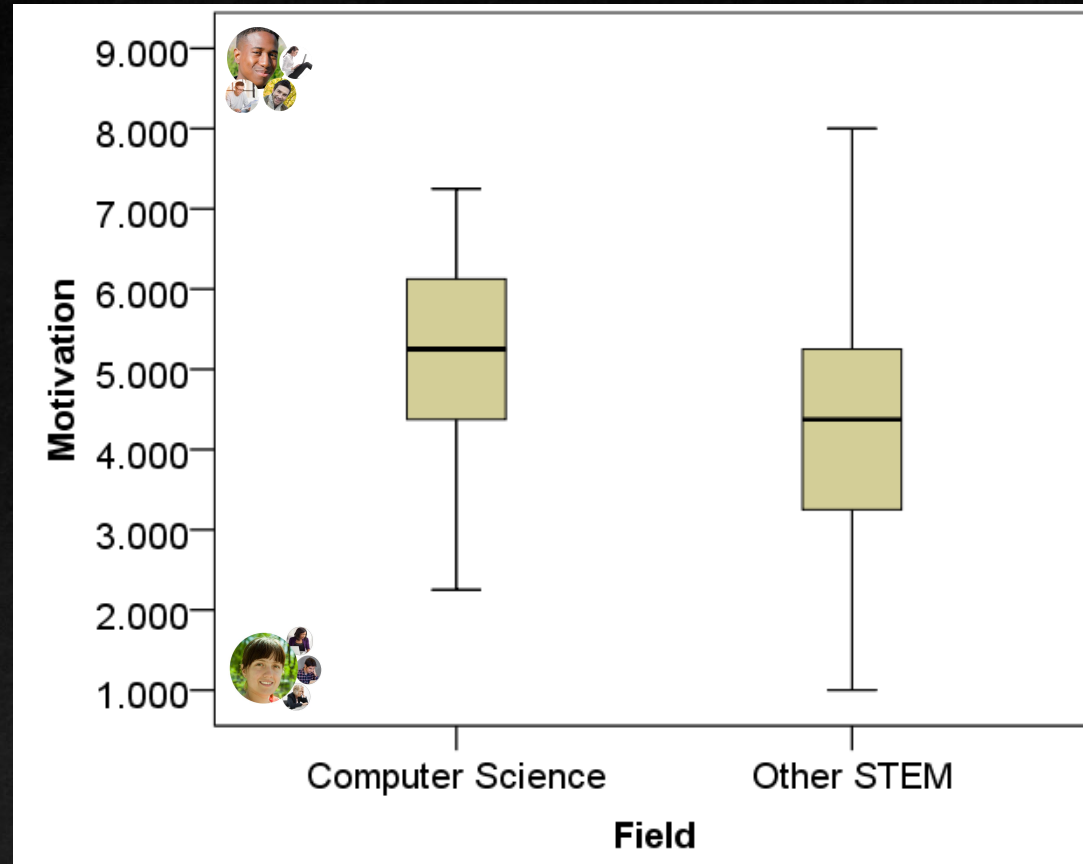




No significant differences in self-efficacy, information processing style and attitude toward risk

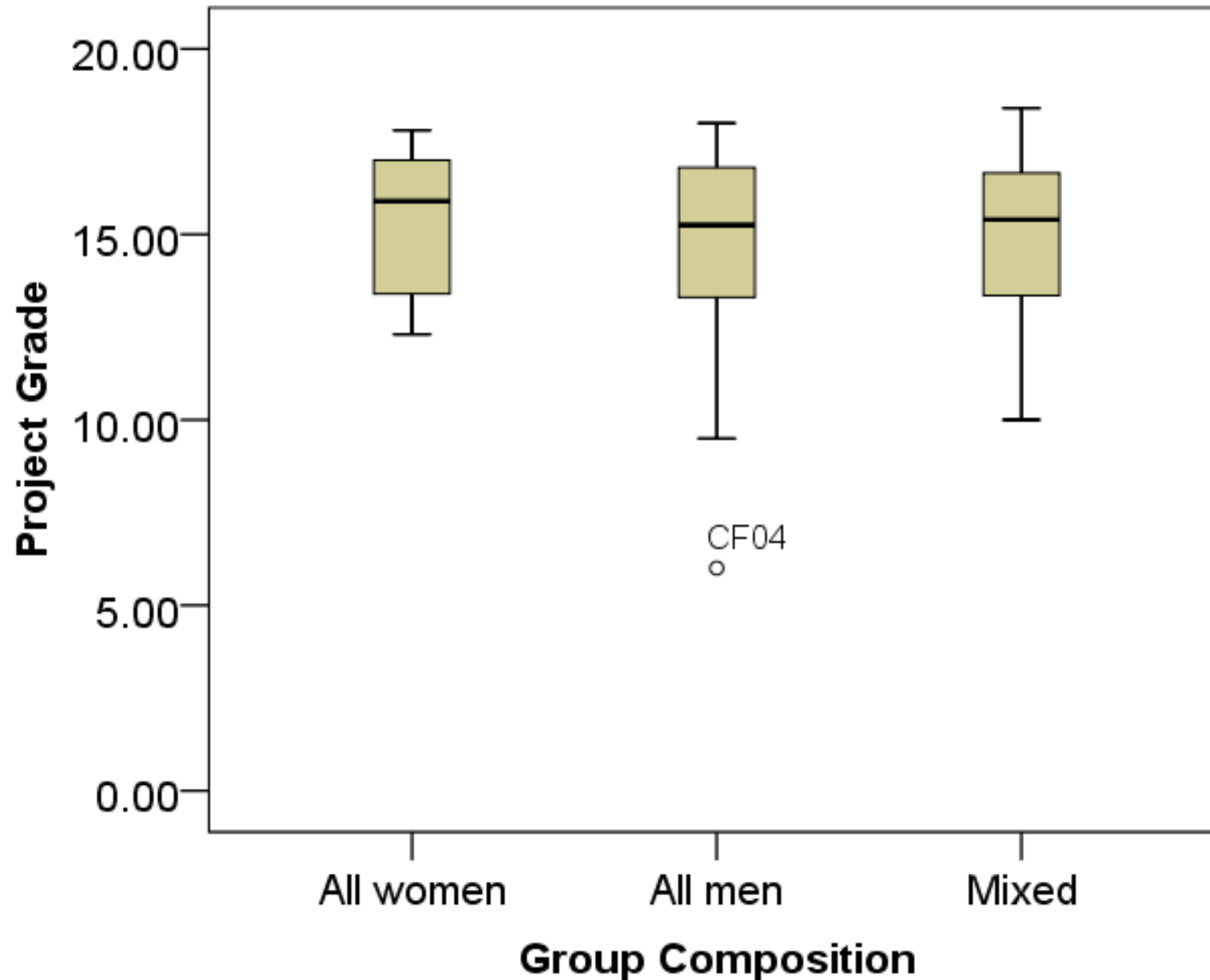


Same tendencies, smaller effect sizes, when considering all female students





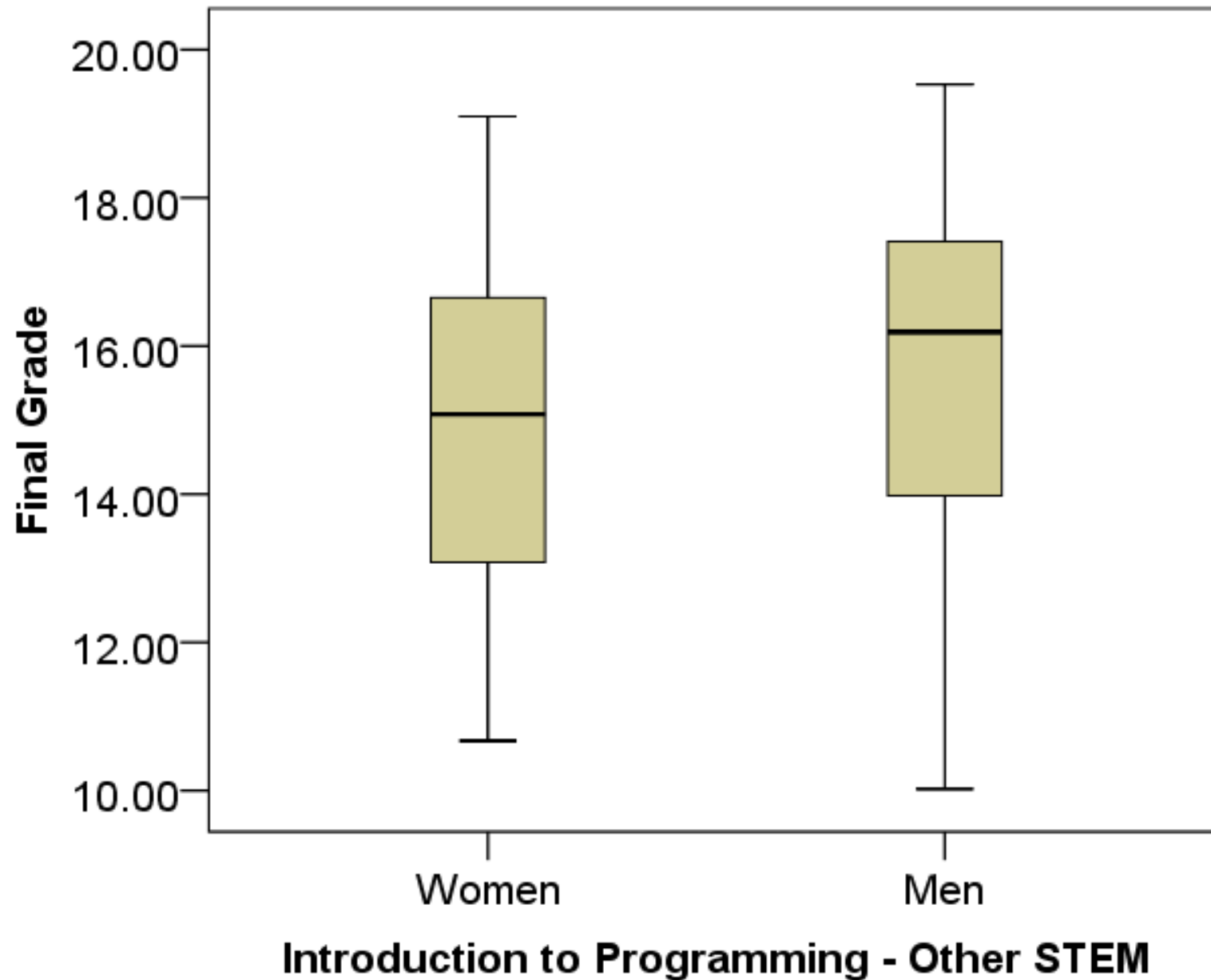
To what extent are these problem-solving styles correlated with academic success?



No significant differences on group project performance

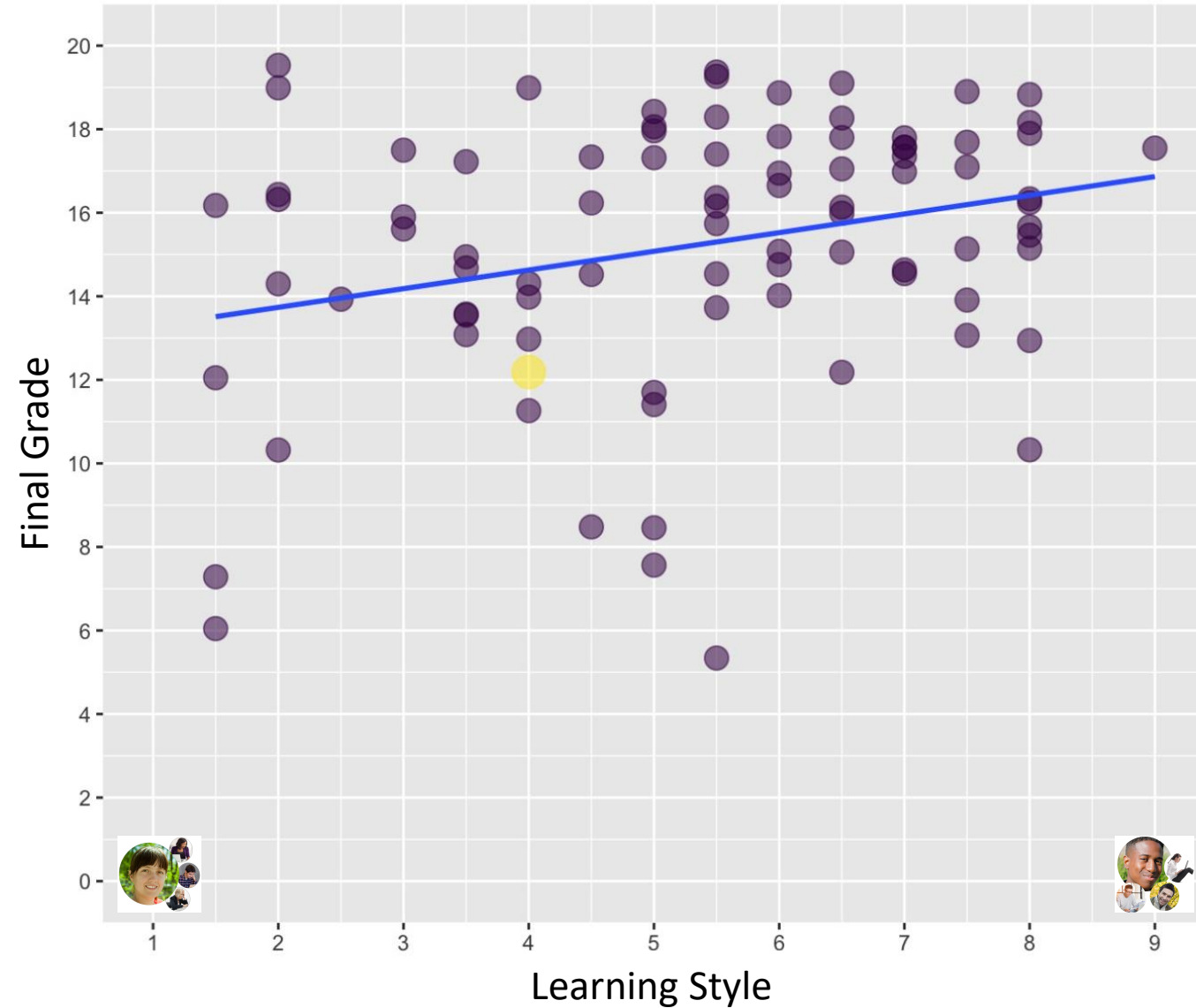
Introduction to Programming for other STEM courses

78 groups of students



Better overall performance by men

Introduction to Programming:
Other STEM (89 women + 97 men)



Tinkerers
have a better
overall
performance



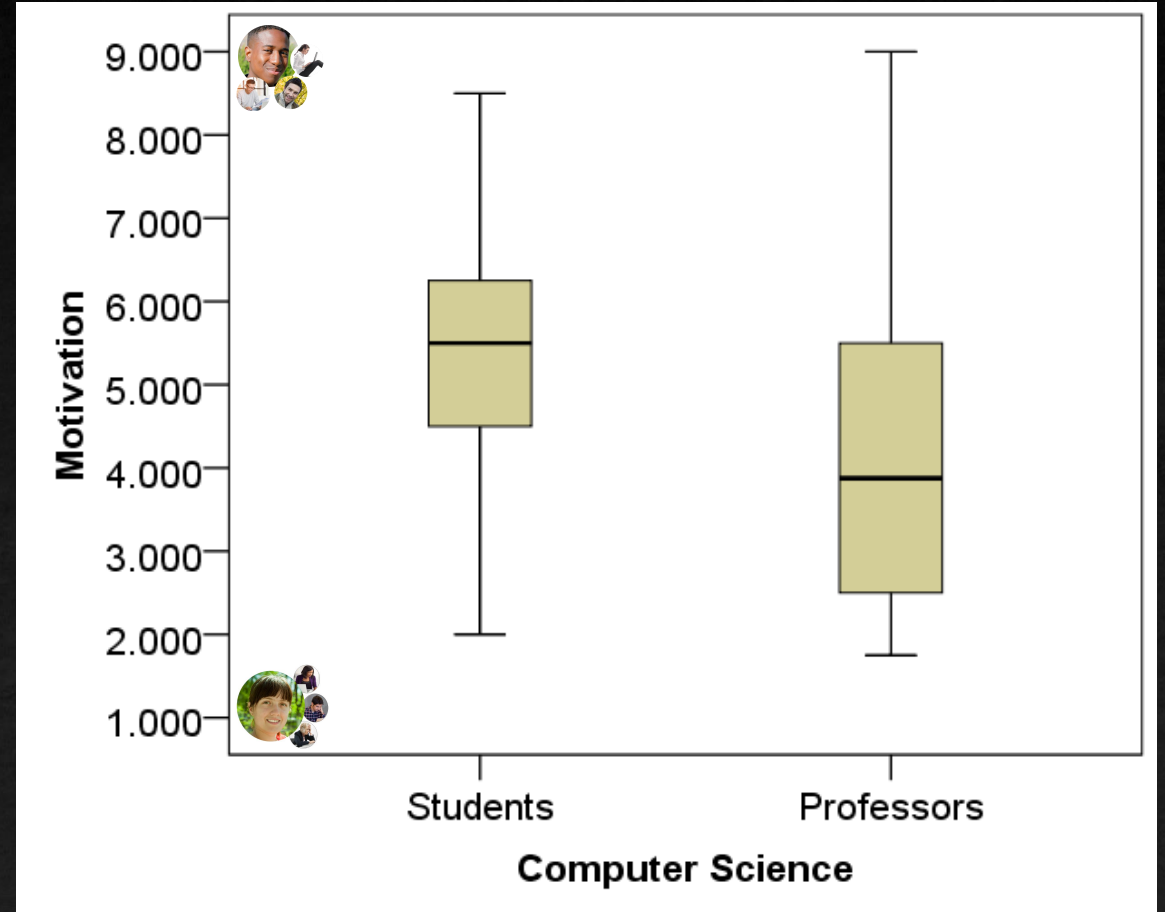
Some Abis
are among
the top-
ranked
students too



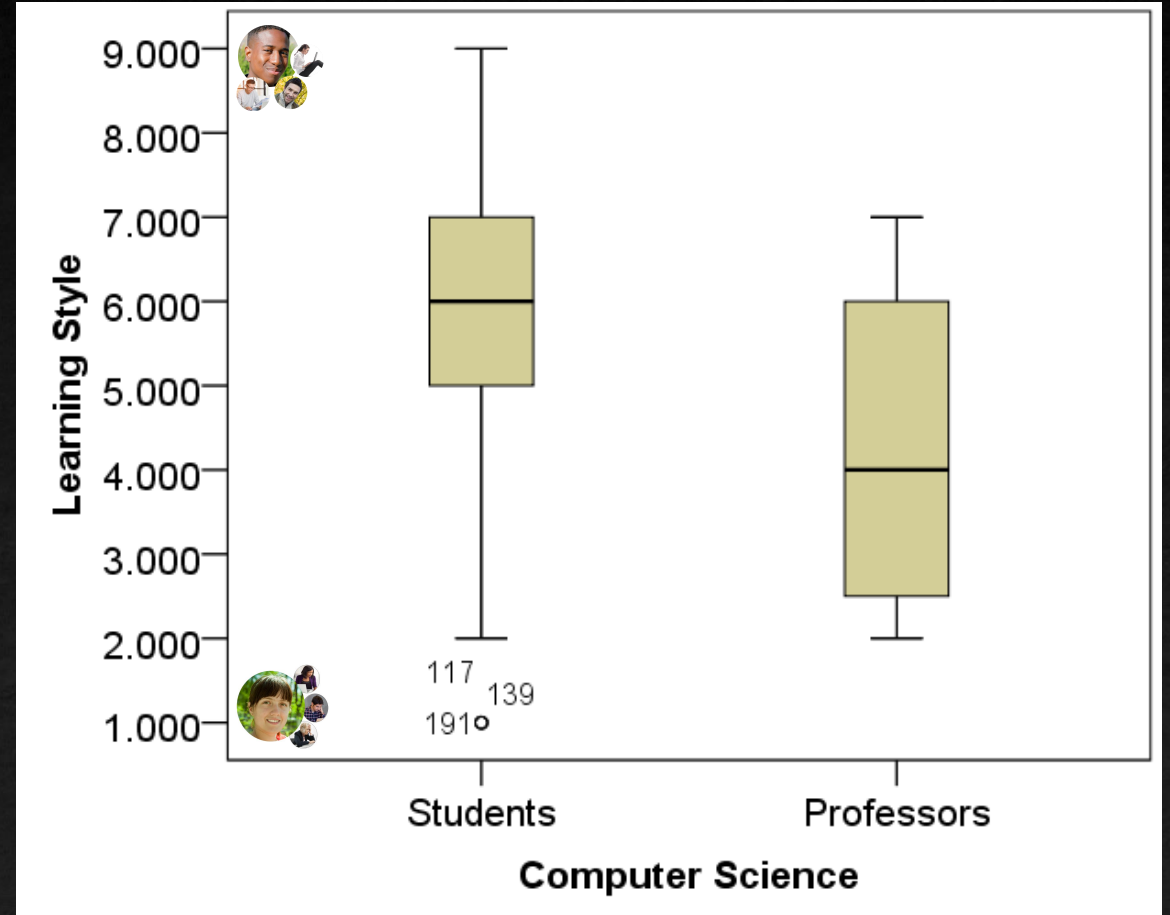
Do professors prefer similar problem-solving styles to those of students, or is there a mismatch?

Survey with
129 CS Students and
16 CS Professors

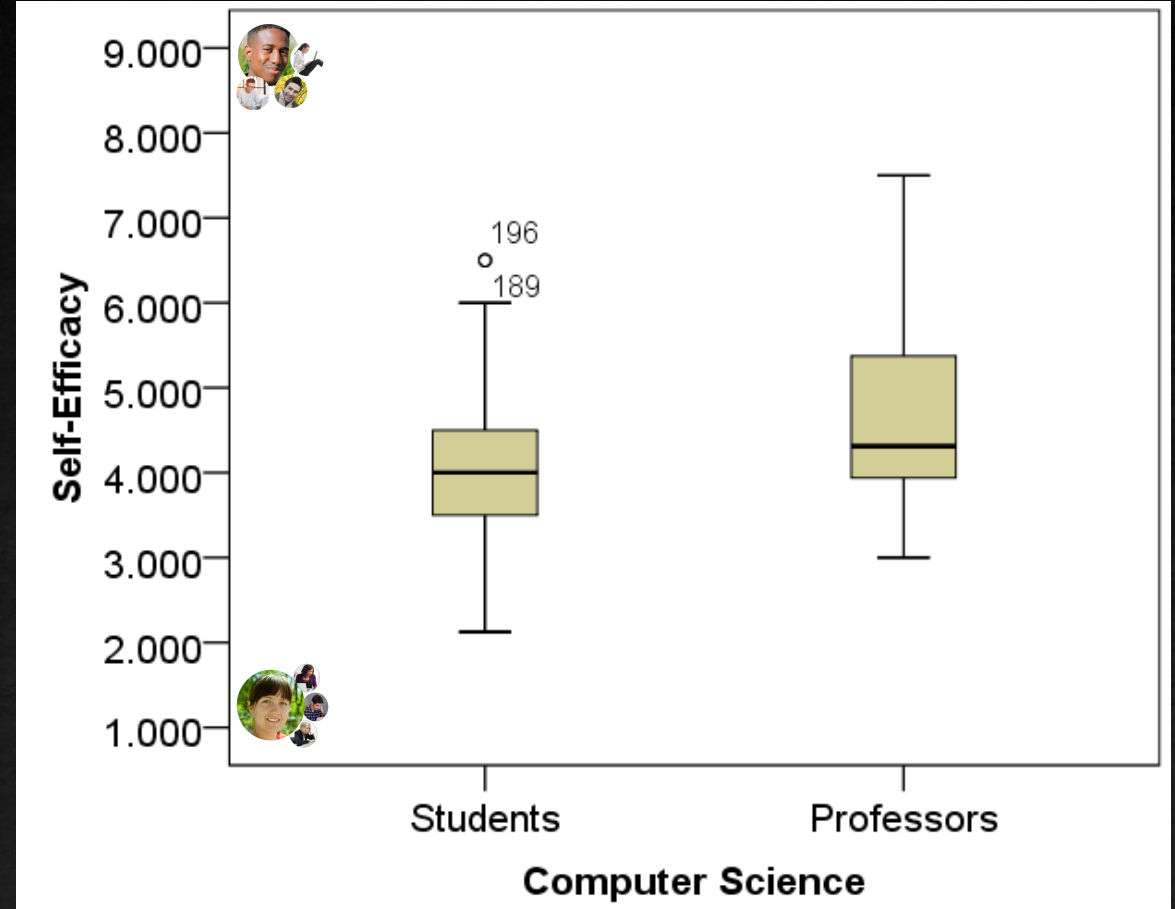
Students more motivated than professors to use new technologies



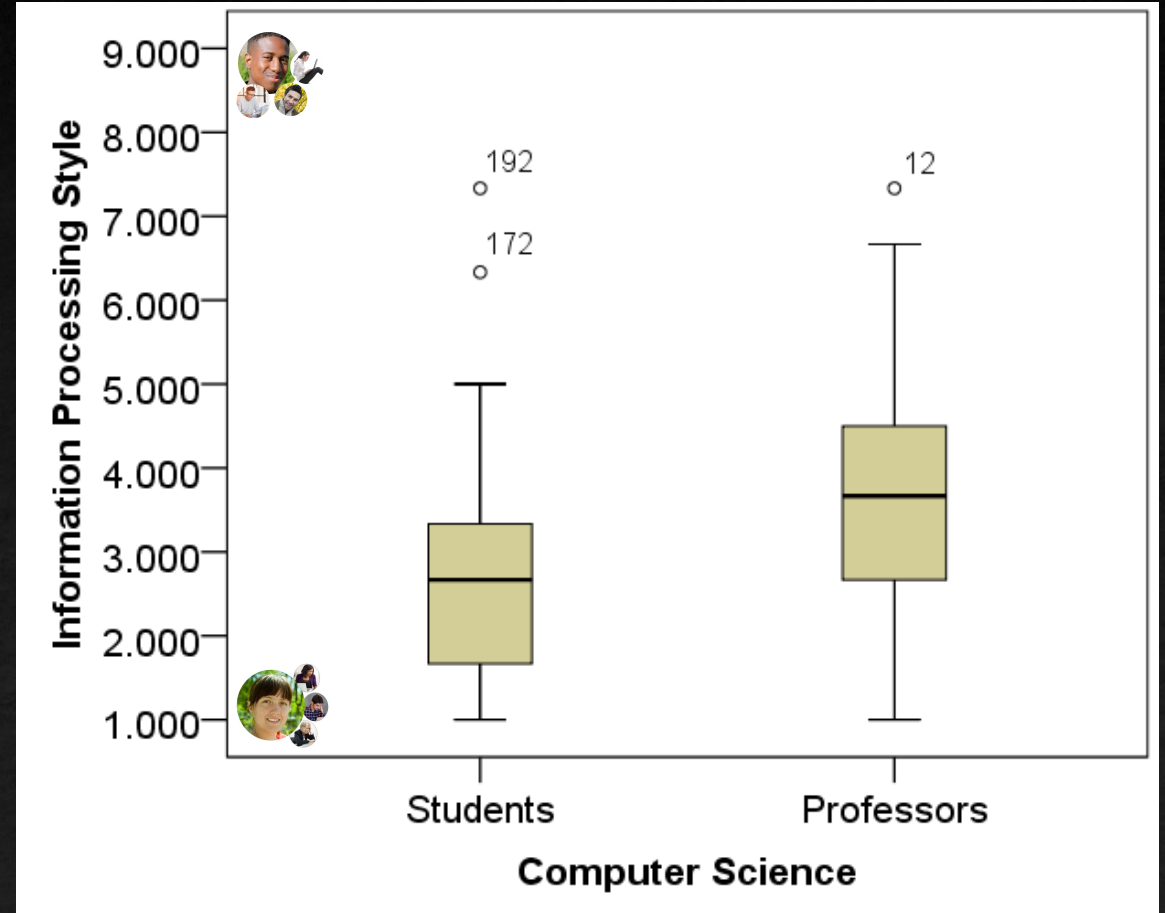
Students have a more tinkering learning style than professors



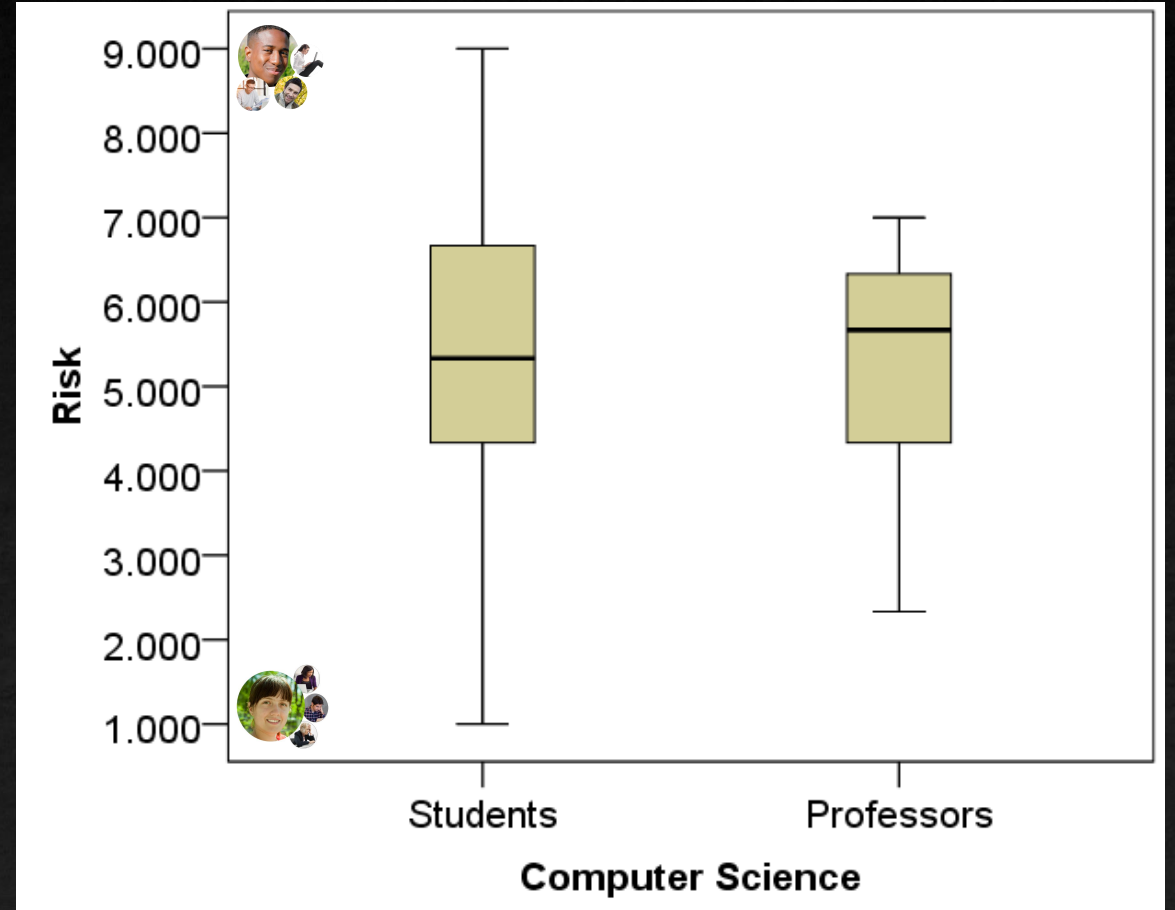
Professors have a higher self-efficacy



Professors are more selective in their information processing style



Fairly similar attitude towards risk





Are we shaping our students to become more like us, with respect to problem-solving styles?

Survey with 16 Computer Science Professors

Self-efficacy



Professors with a **lower self-efficacy** seem to favor learning based on **offline materials** (e.g. books) and **autonomous search** by students.

Learning style



Professors who favor a **process-oriented** learning style, rather than tinkering, seem to favor **solving problems with the participation from students.**

Information processing style



Professors with a more comprehensive information processing style seem to favor Comprehension and Application educational objectives.

Attitude towards risk



Professors with a lower tendency for risk taking seem to favor Evaluation educational objectives.



CATARINA PAULO DE MATOS

Mestrado Integrado em Engenharia Informática

PROMOÇÃO DA INCLUSÃO NO
DESENVOLVIMENTO DE SOFTWARE

ENGENHARIA INFORMÁTICA

Universidade NOVA de Lisboa
Setembro, 2021

We have only scratched the surface

More detailed data available in a MSc
dissertation by Catarina Matos

THINK
ABOUT
THINGS
DIFFERENTLY

Can we leverage this notion of problem-solving styles and make our teaching practices more inclusive?

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