

# Does Inherent Platonism Predict Strength in Abstract Mathematics? Preliminary Report

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# What is Platonism?

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- ▶ Key aspects of platonism: *Existence*, *Abstractness*, and *Independence* of Mathematical Ontology


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- ▶ Independence
  - ▶ Mathematical objects would still exist in the absence of rational thought or activity

# Opposition to platonism

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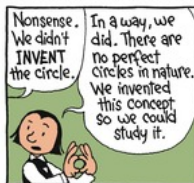
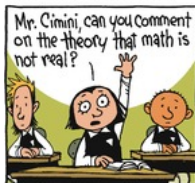
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- ▶ (Philosophical) Nominalism/Fictionalism - denial of existence of abstract objects
- ▶ (Practical) Platonist point of view contains arbitrary artifice that gets in the way of solving real problems

# Invented or discovered?

## BARNEY & CLYDE



# Research Question

Is there a relationship between the degree of one's inherent Platonism and his/her achievement level in advanced mathematics?

# Motivation



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- ▶ Hidden value of the survey: instill an appreciation of the abstract

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- ▶ Demographic data collected: gender and final grade percentage.
- ▶ Degree of platonism assessed by means of a short survey consisting of Likert-scale questions.

# Survey

## Sample Survey questions

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*Negative numbers have always existed, even before people knew what they were, or how to use them.*

Strongly Disagree

Somewhat Disagree

Unsure

Somewhat Agree

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Strongly Disagree       Somewhat Disagree       Unsure       Somewhat Agree       Strongly Agree

*A culture in which there is no name or symbol for the number 0 is certain to be less advanced than our culture.*

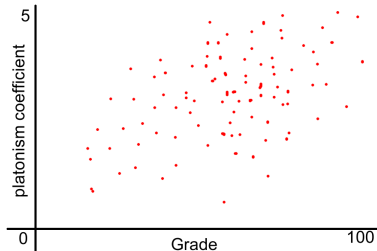
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# Analysis

We expected to be able to show you this:

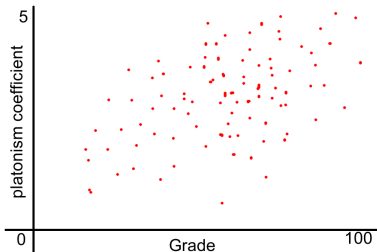
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...and describe the analysis that we did to determine the extent of the correlation.

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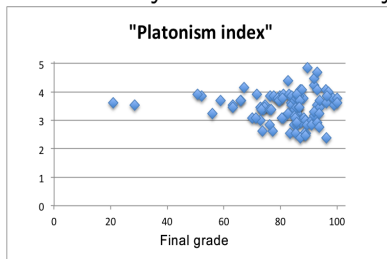
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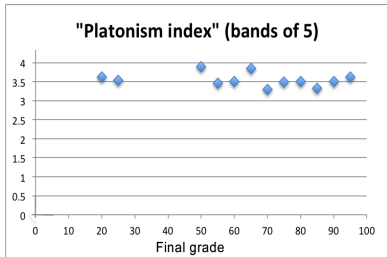
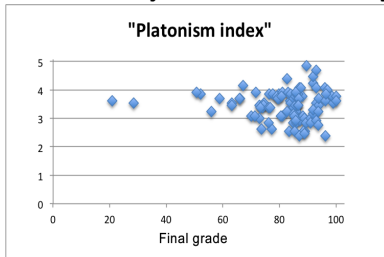
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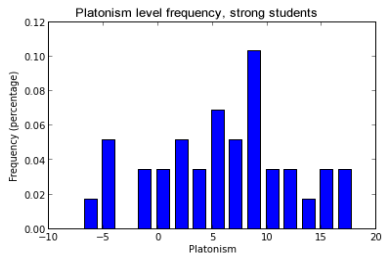
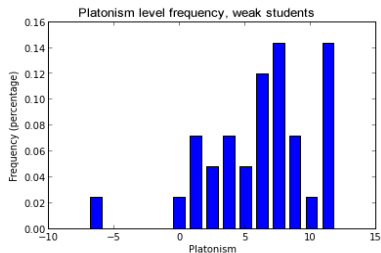


# Correlation - individual questions

- ▶ Individual data for each question was similar
- ▶ No bellwether questions found in the results

# Platonism levels for weaker and stronger students

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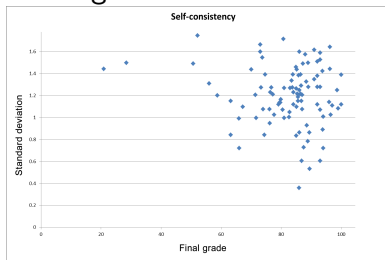
(No statistical significance)

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Examine the extent to which each respondents' answers were self-consistent. As a simple metric of self-consistency, used standard deviation of Likert values (reversing some as needed).

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$$r = -0.144, p = 0.078.$$

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- ▶ Sources of bias from both sides of the sample selection process.
- ▶ Survey data indicates there may be a relationship between mathematical aptitude and the depth with which students were able to think about the questions in the time allotted. Further study warranted.
- ▶ Self-consistency could also be related to interest in paying attention to the survey: we did not collect data on the amount of time students spent reading the questions.

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- ▶ Expanded depth of questionnaire: qualitative analysis of interview data

# Thank you

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