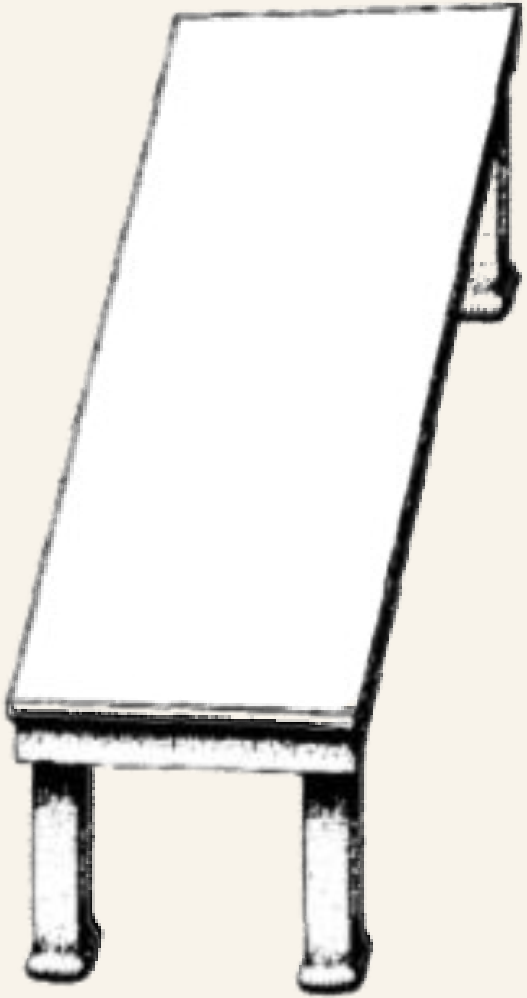
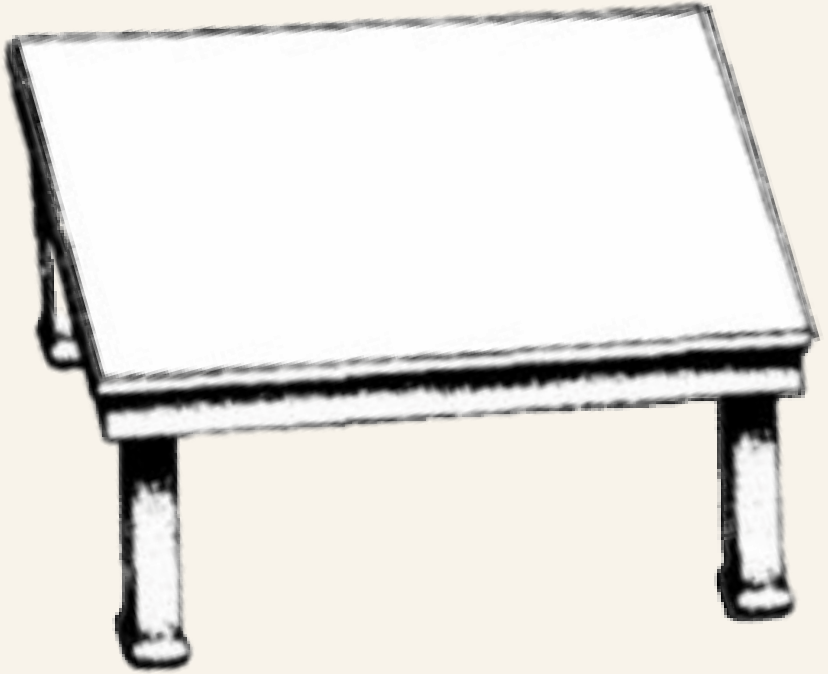
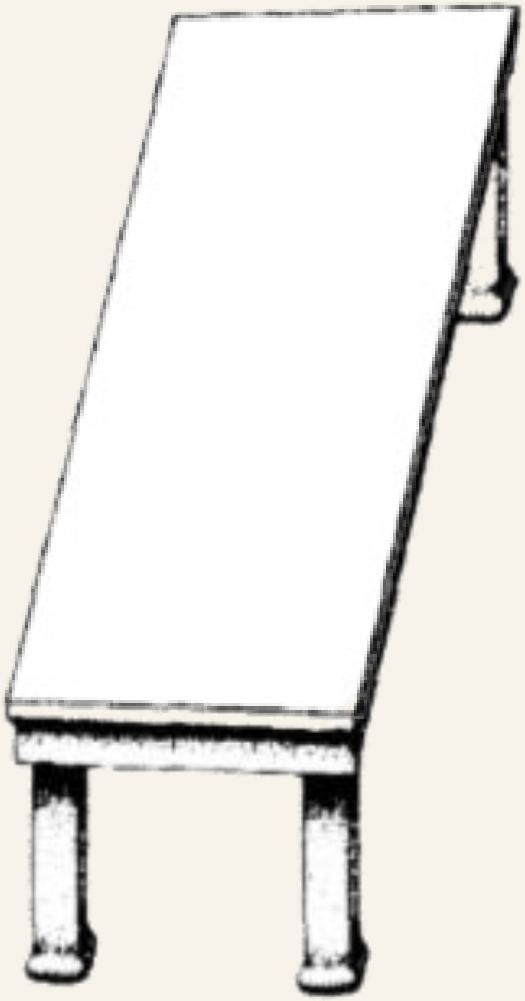
The Effect of Intelligence on Susceptibility to Cognitive Illusions

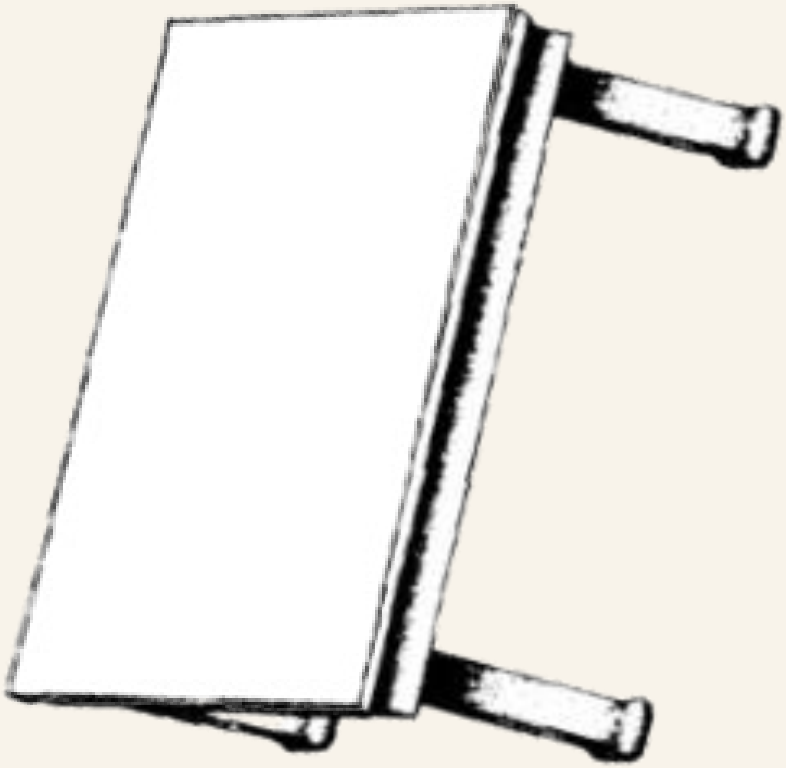
Sophia Abdul, Adelyn Davis, Grace Fine, Elias Kang, Yashasvi Kompella, Isabella McGowan, Aaryan Nagaria, Sharon Park, Anushka Patchigolla, Laksh Patel, Dhiya Selvakumar, Rickey Su, Brooke Valentine

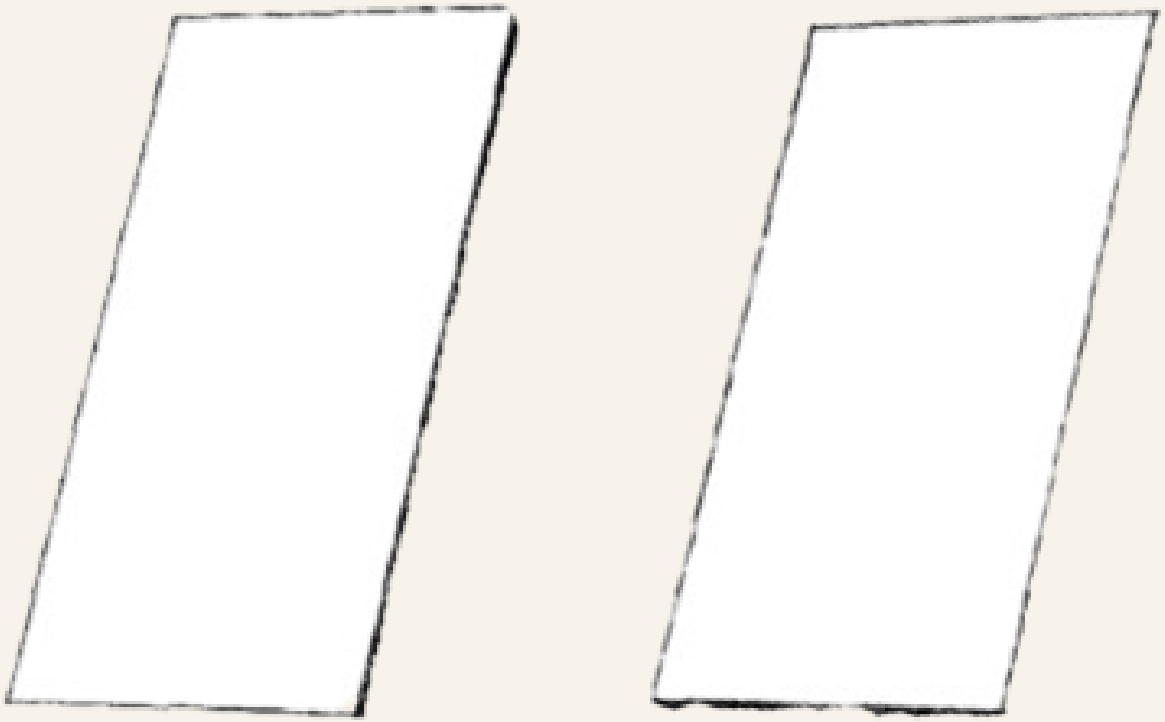
Advisor: Patrick Dolan
Assistant: Natalie Bailey











Cognition & Intelligence



Intelligence

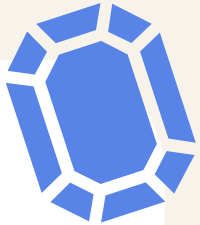
Fluid



- ➔ Peaks in early stages of life
- ➔ Developing new knowledge based on limited information

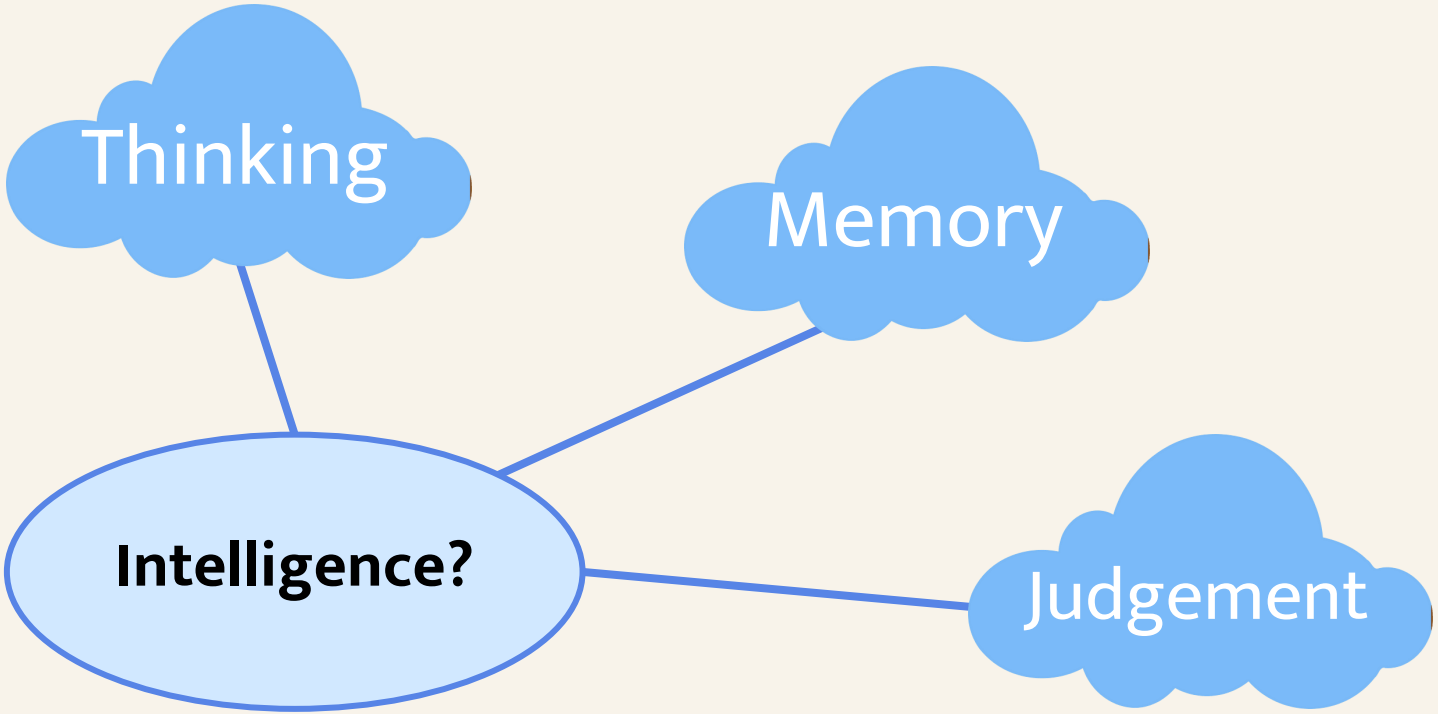
Vs.

Crystallized



- ➔ Grows in later stages of life
- ➔ Prior accumulated knowledge
- ➔ ex. Vocabulary

Cognitive Illusions

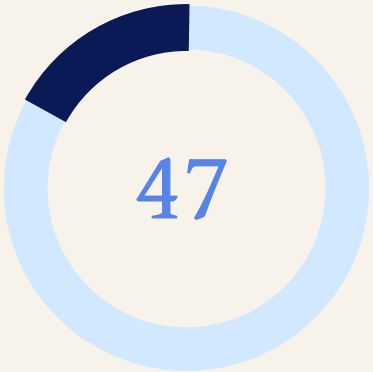


Methodology

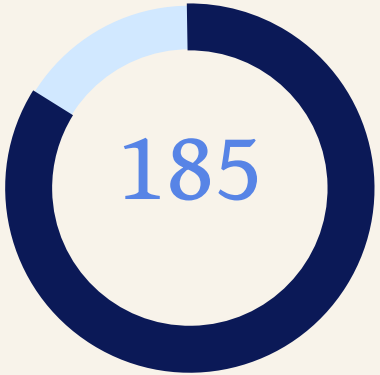
Participants



Total Participants



GSS Scholars



Online Participants

Materials

Scholars:

qualtrics XM



Online Participants:

connect™

Procedure

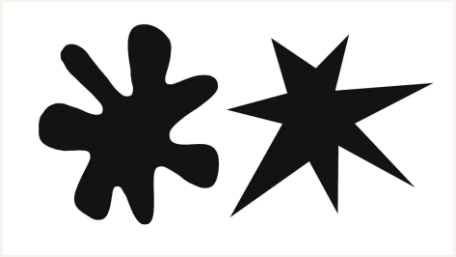
- Proctored by team member
- Slight variation in questions for each participant







personality

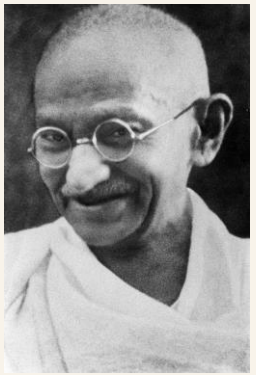


Coin Toss





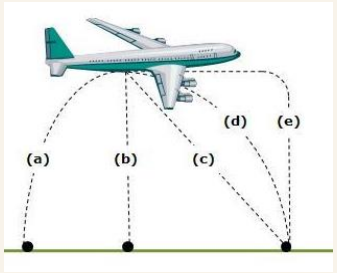
"A certain town is served by two hospitals"



"Below is a list of skills..."

"Pick your favorite word..."









"Linda is 31 years old, single, outspoken and very bright"

How many animals of each kind did Moses take on the Ark?

How many animals of each kind did ~~Moses~~ take on the Ark?

Moses Illusion

The Tendency to Overlook Obvious Errors



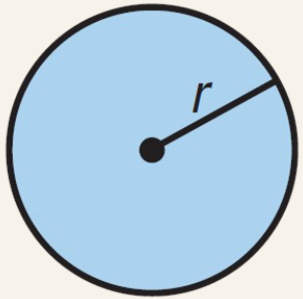


What shape has a **circumference** of πr^2?

radius r

$C = 2\pi r$

$A = \pi r^2$



What is the name of the man in the red suit who rides a sleigh and delivers **birthday** presents in December?



Scholars vs. Online Participants

	% Answer Circle
Online	**36**
Scholars	

	% Answer Santa
Online	
Scholars	

Scholars vs. Online Participants

	% Answer Circle
Online	**36**
Scholars	**54**

	% Answer Santa
Online	
Scholars	

Scholars vs. Online Participants

	% Answer Circle
Online	**36**
Scholars	**54**

	% Answer Santa
Online	**51**
Scholars	

Scholars vs. Online Participants

	% Answer Circle
Online	**36**
Scholars	**54**

	% Answer Santa
Online	**51**
Scholars	**100**



DRM
False Memory

Self Made / Illusion Based Memory

Nurse
Sick
Lawyer
Medicine
Health
Hospital
Dentist
Physician
Ill
Patient
Office
Stethoscope
Surgeon
Clinic
Cure

Doctor : Critical Lure

Online

% of list correctly recalled:

28%

Scholars

% of list correctly recalled:

41%

Online

% that said doctor:

34%

Scholars

% that said doctor:

45%

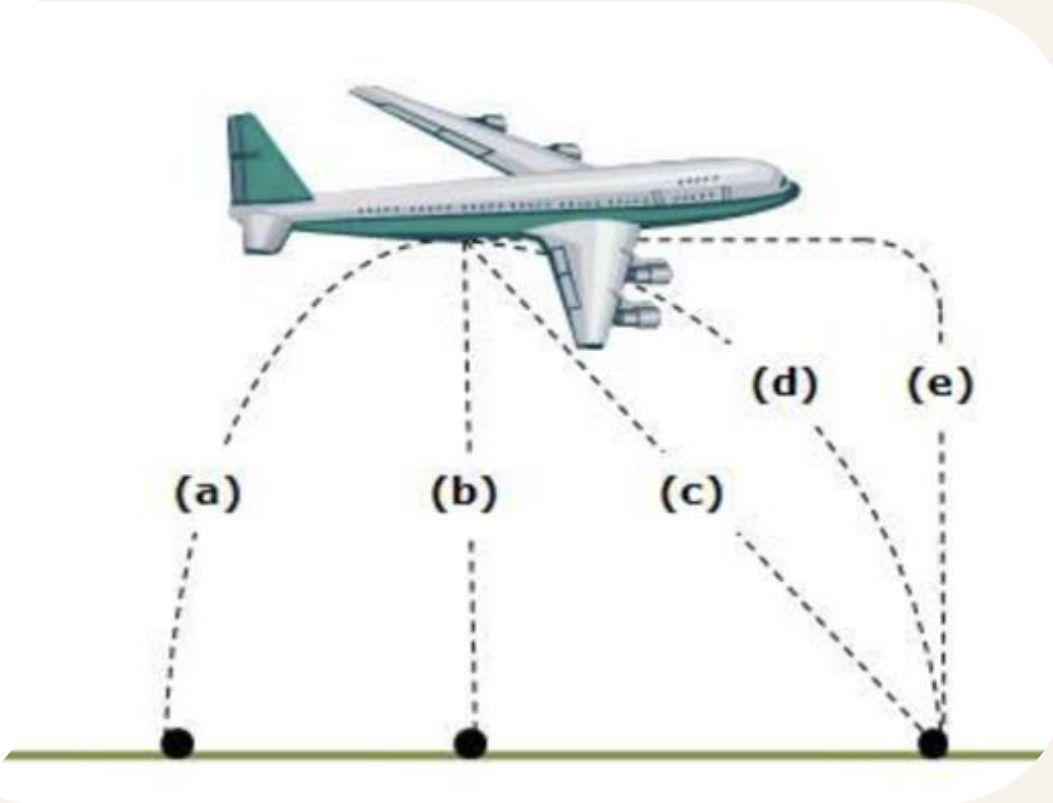


Intuitive Physics

Misconceptions in Perceptual Physics Predictions

Intuitive Physics

In the diagram, the plane is flying horizontally to the right at a constant altitude and a constant speed. If a ball is dropped from the indicated point of origin, which path do you think the ball will follow once dropped from the plane? Select the letter that corresponds to your answer.



Results

	Online	Scholars
Correct (D)	22%	55%
Fallacy (B)	21%	28%
Other Incorrect	57%	17%

Online
Performance by Subject Preference

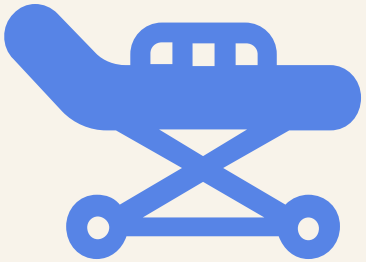
	Physics	Other
Correct (D)	31%	18%

Scholars
Performance by Subject Preference

	Physics	Other
Correct (D)	81%	42%

Hospital Births

The Illusion of Small Sample Sizes



Hospital Births

"A certain town is served by two hospitals. In the larger hospital about 45 babies are born each day, and in the smaller hospital about 15 babies are born each day. As you know, about 50% of all babies are boys. However, the exact percentage varies from day to day. Sometimes it may be higher than 50%, sometimes lower. For a period of one year, each hospital recorded the days on which more than 60% of the babies born were boys. **Which hospital do you think recorded more such days?**

a. The larger hospital

b. The smaller hospital

c. About the same (that is, within 5% of each other)

Online

% that chose “smaller” (**correct**):

22%

Scholars

% that chose “smaller” (**correct**):

60%

Coin Toss



Misconceptions Regarding Event Independence

Coin Toss

Imagine a person tossing a fair coin six times in a row. In every toss, the outcome can be head (H) or tail (T). Which of the following specific series is most likely?

A) H T H H T T
B) H H H H H H



Coin Toss

	Online	Scholars
HTHHTT	75%	53%
Equal	4%	47%

Conjunction Fallacy



Using Stereotypes Instead of Logic in Probability

The Linda Problem

"Linda is 31 years old, single, outspoken and very bright. At university she studied philosophy. As a student she was deeply concerned with issues of discrimination and social justice and also participated in anti-nuclear demonstrations."

Rank *each of the following three statements from* ***most to least likely***.

Linda is a **bank teller**.

Linda is **active in the feminist movement**.

Linda is active in the feminist movement **and** is a bank teller."

“Linda is active in the feminist movement **and** is a bank teller.”

Online Participants	Scholars
27%	???
50/185 correctly ranked the conjunction statement last	

“Linda is active in the feminist movement **and** is a bank teller.”

Online Participants	Scholars
27%	9%
50/185 correctly ranked the conjunction statement last	4/46 correctly ranked the conjunction statement last

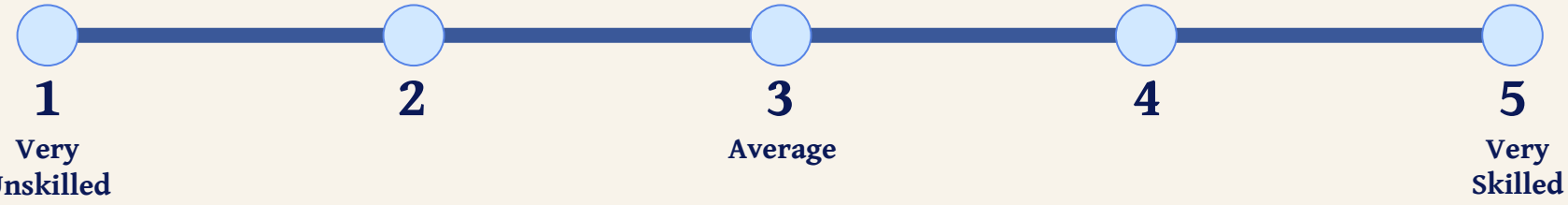


Illusory Superiority

The Tendency to Overestimate Our Own Abilities

Illusory Superiority

"Below is a list of skills that might be relevant for a NJ Governor's School Scholar. Using the rating scale below, rate your skill on each item, in comparison to the average NJ Governor's School Scholar. Use the drop down list to select your ratings for each item."



Illusory Superiority

“Ability to understand issues”

“Ability to work independently”

“Ability to work with a research team”

“Compassion for other people”

“Creativity”

“Critical thinking”

“Discussion participation”

“Knowledge about science”

“Leadership”

“Motivation to achieve”

“Communication”

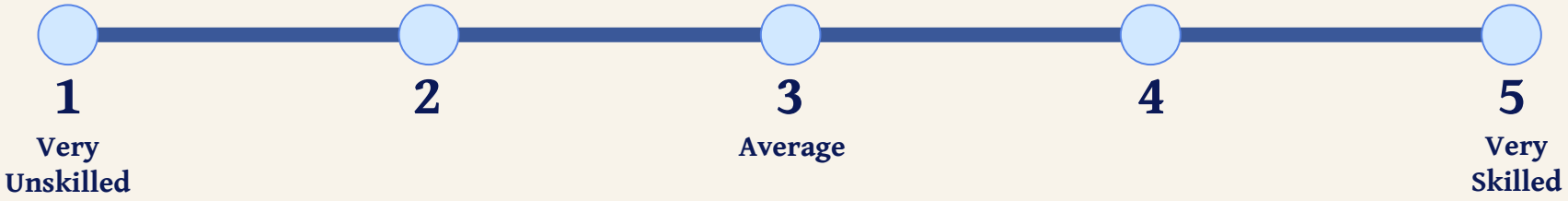
“Skills in mathematics”

“Statistics”

“Reading comprehension”

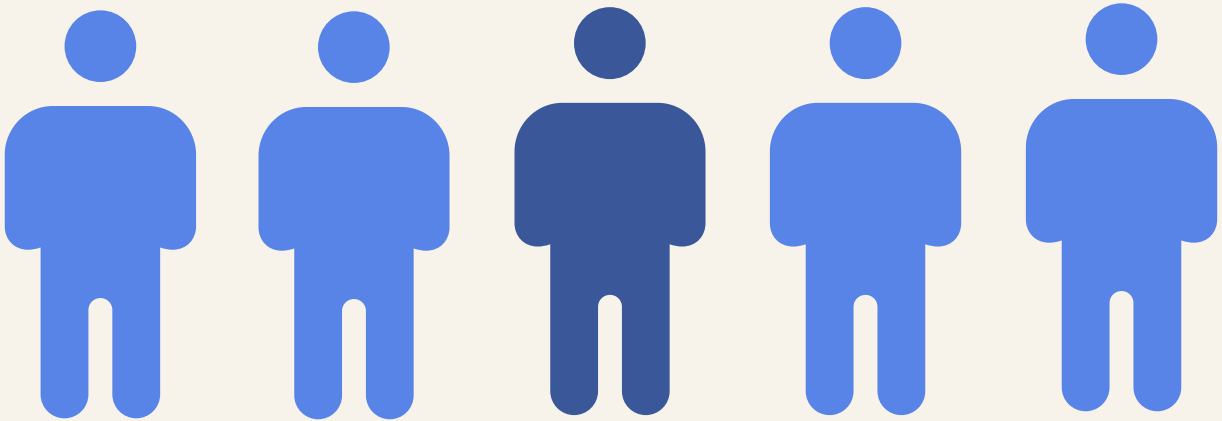
Illusory Superiority

	Online	Scholars
Average Total Rating	3.43	3.86



Forer Effect

Seeing Personal Meaning in Generic Statements



You have a need for other people to like and admire you, and yet you tend to be critical of yourself. While you have some personality weaknesses, you are able to compensate for them with your strengths. You have considerable unused capacity that you have not turned to your advantage. Disciplined and self-controlled on the outside, you tend to be worrisome and insecure on the inside. At times you have serious doubts as to whether you have made the right decision or done the right thing. You prefer a certain amount of change and variety and become dissatisfied when hemmed in by restrictions and limitations. You also pride yourself as an independent thinker; and do not accept others' statements without satisfactory proof. But you have found it unwise to be too frank in revealing yourself to others. At times you are extroverted, affable, and sociable, while at other times you are introverted, wary, and reserved. Some of your aspirations may seem unrealistic but you have a strong motivation and drive.

	Online	Scholars
Avg. Accuracy Rating	3.7	

	Online	Scholars
Avg. Accuracy Rating	3.7	4.2

Discussion



Memory



Decision Making



Self-Perception

Were scholars more or less susceptible to the cognitive illusions tested?

Memory - More Susceptible

Skimming/
Skim reading

- Learning benefits
  - Effective studying
- Internet Era
  - Hyperlinks
  - Artificial Intelligence

Decision Making - Mixed Results

Less susceptible

- Physics
- Hospital Births

More susceptible

- Conjunction Fallacy

Self Perception - More Susceptible

Illusory Superiority Effect

- Intelligence and character

Forer Effect

- Personality plasticity

Limitations

01 

Time

02 

Prior Knowledge

Conclusion



More susceptible to tasks with that invoked automatic thinking



Less susceptible to reasoning, problem solving, coordinating between sensory inputs

Acknowledgments

Alumni and Parents of Alumni

Questions?

CREDITS: This presentation template was created by **Slidesgo**, and includes icons by **Flaticon**, and infographics & images by **Freepik**

Future research

Areas of Interest

Timed comprehension

Age