

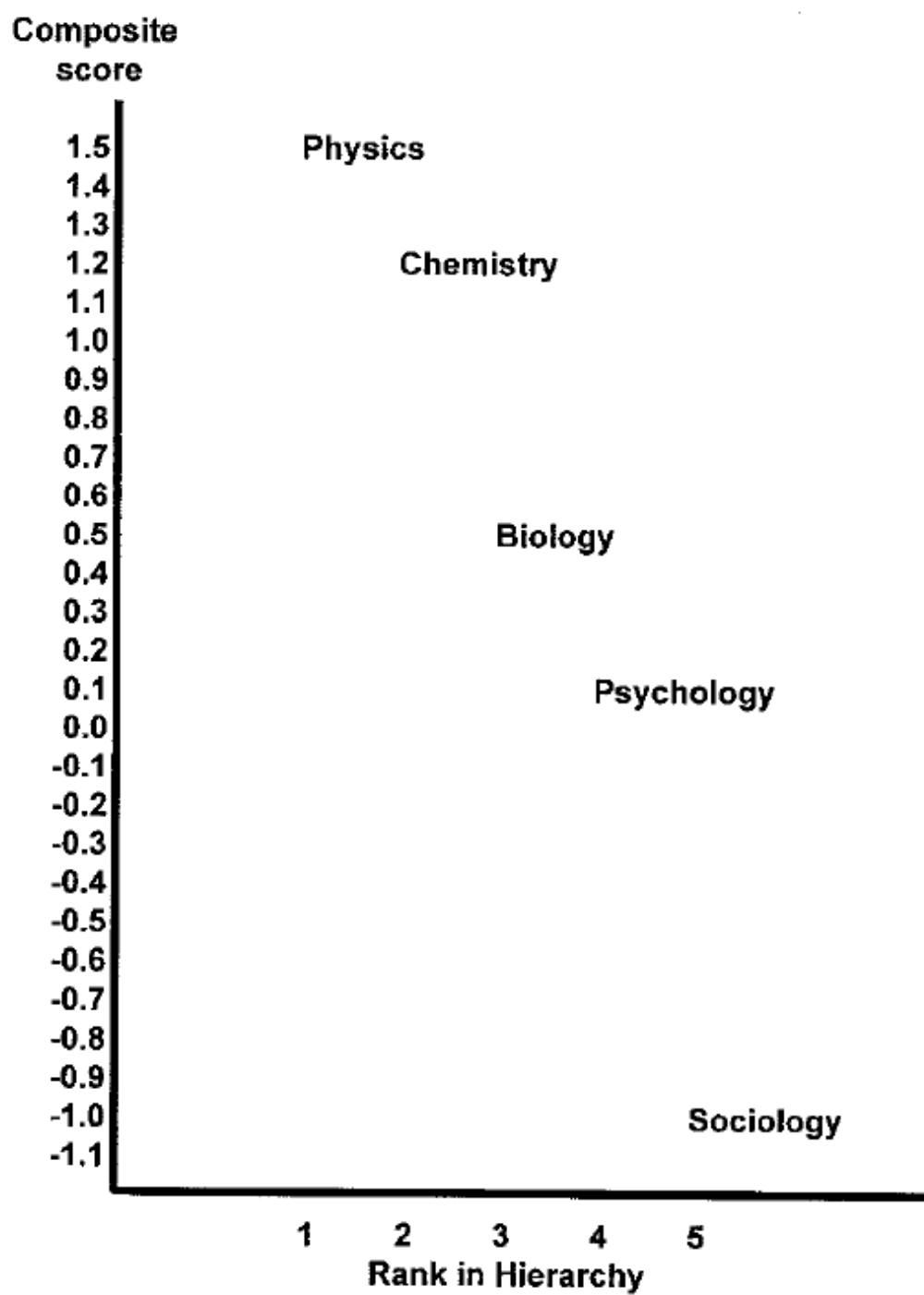
Scientific Genius, Creativity, and Insight

Major Questions

- What is science?
 - What is genius?
 - What is creativity?
 - What is insight?
 - How do these all fit together?
-

What is science?

- Science versus art
 - *Hard* versus *soft* sciences
 - Disciplinary hierarchies: physical, biological, and social sciences, humanities and the arts
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What is genius?

- Superlative intelligence?
 - High IQ? >130? >140? >?
 - But ...
-

"Her answers have been debated in the halls of the CIA and tested in classrooms across the country." —The New York Times

PARADE's

ASK
Marilyn



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THE WORLD'S SMARTEST
WOMAN ANSWERS
AMERICA'S MOST FREQUENTLY
ASKED QUESTIONS

Marilyn vos Savant

What is genius?

- Superlative intelligence?
 - Prodigious performance?
 - Examples
 - Chess champion?
 - Violin virtuoso?
 - Olympic athlete?
 - Mathematical prodigy?
 - e.g. SMPY @ Vanderbilt
 - Terence Tao
-

LIFE AND TIMES OF TERENCE TAO

- **Age 7:** Begins high school
- **9:** Begins university
- **10,11,12:** Competes in the International Mathematical Olympiads winning bronze, silver and gold medals
- **16:** Honours degree from Flinders University
- **17:** Masters degree from Flinders University
- **21:** PhD from Princeton University
- **24:** Professorship at University of California in Los Angeles
- **31:** Fields Medal, the mathematical equivalent of a Nobel prize



What is genius?

- Superlative intelligence?
 - Prodigious performance?
 - Extraordinary achievement?
 - Leadership?
 - Creativity?
-

What is creativity?

- ❑ What are the criteria? Two or three?
 - ❑ How are the criteria assessed?
Qualitative or quantitative?
 - ❑ How are the assessments combined?
Additive or multiplicative?
 - ❑ Who makes the assessments?
Personal or consensual?
-

What is creativity?

- What are the criteria? Two or three?
 - Two criteria
 - Novel or original
 - Useful or valuable
 - Three criteria
 - Original
 - Useful or valuable
 - Surprising or nonobvious
 - Hence, diminished role for domain-specific expertise
-

What is creativity?

- How are the criteria assessed?
Qualitative or quantitative?
 - Qualitative: Yes/No?
 - Quantitative:
 - Interval scale?
 - Hence, tradeoffs
 - Ratio scale?
 - True zero point?
 - Proportion/probability?
-

What is creativity?

- How are the assessments combined?
Additive or multiplicative?
 - Additive:
 - e.g. originality + usefulness?
 - → Compensatory tradeoffs
 - → Normal distribution
 - Multiplicative:
 - e.g., originality X usefulness
 - → Criterion “veto power”
 - → Skewed distribution
-

What is creativity?

- Who makes the assessments?
Personal or consensual?
 - Personal: Little-c creativity
 - Consensual: Big-C Creativity
 - Hence, personal-consensual mismatch
 - Personal > consensual
 - Personal < consensual
 - Personal \approx consensual
 - Latter more common in high-consensus fields such as the hard sciences
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What is insight?

□ Distinctions:

- Algorithmic versus heuristic tasks
 - Reasonable versus unreasonable problems
 - Obvious versus surprising ideas
-

What is insight?

- Processes and procedures:
 - Incubation
 - Divergent thinking
 - Remote association
 - Defocused attention
 - Playful tinkering
-

How do these all fit together?

- The scientific genius is someone who generates Big-C ideas that are consensually original, useful, and surprising
 - The last criterion indicates that the ideas require genuine insight rather than the straightforward application of domain-specific expertise
 - e.g.'s ...
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