

IARPA Opportunities in Brain & Behavioral Science Research

Steven Rieber | Program Manager | APS/FABBS Webinar, 16 November 2022



Intelligence Advanced Research Projects Activity

I A R P A

Creating Advantage through Research and Technology

Office of the Director of National Intelligence



IARPA Mission

IARPA envisions and leads *high-risk, high-payoff research* that delivers innovative technology *for future overwhelming intelligence advantage*

- Our problems are **complex** and **multidisciplinary**
- We emphasize **technical excellence** & **technical truth**

- **Bring the best minds to bear on our problems**
 - Full and open competition to the greatest possible extent
 - World-class, term-limited Program Managers
- **Define and execute research programs that:**
 - Have goals that are clear, ambitious, credible and measurable
 - Run from three to five years
 - Publish peer-reviewed results and data, to the greatest possible extent
 - Employ independent and rigorous Test & Evaluation
 - Involve IC partners from start to finish
 - Transition new capabilities to intelligence community partners

- Technical and programmatic excellence are required
- Each program has a clearly defined and measurable end-goal
 - Intermediate milestones to measure progress are also required
 - Every program has a beginning and an end
- This approach, coupled with term-limited PM positions, ensures
 - IARPA does not “institutionalize” programs
 - Fresh ideas and perspectives are always coming in
 - Status quo is always questioned
 - Only the best ideas are pursued, and only the best performers are funded

- Large-scale R&D Efforts

- Multi-year
- Multi-disciplinary
- A single program typically includes several “performer” teams each from multiple institutions (industry and/or academia)
- Contracts, not grants – renewal depends on performance against metrics
- Look for Broad Agency Announcements (BAAs)



IARPA Snapshot



IARPA's research portfolio is diverse, including math, physics, chemistry, biology, microelectronics, neuroscience, linguistics, political science, cognitive psychology, and more.

- 70% of completed research transitions to U.S. Government partners
- 3,000+ journal articles published
- IARPA funded researchers have been awarded the Nobel Prize in Physics for quantum computing research, a MacArthur Fellowship, and a Bell prize
- IARPA serves on National Science and Technology Council (NSTC) committees and actively engages with the White House BRAIN Initiative, National Strategic Computing Initiative, and the NSTC Select Committee on Artificial Intelligence, the NSTC Subcommittee on Quantum Information Science (SCQIS), and NSTC Subcommittee on Economic and Security Implications of Quantum Science (ESIX)

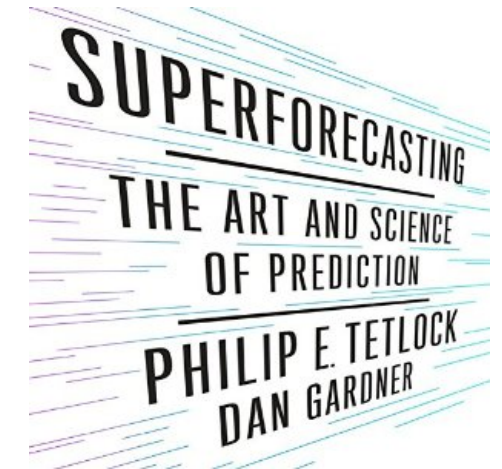
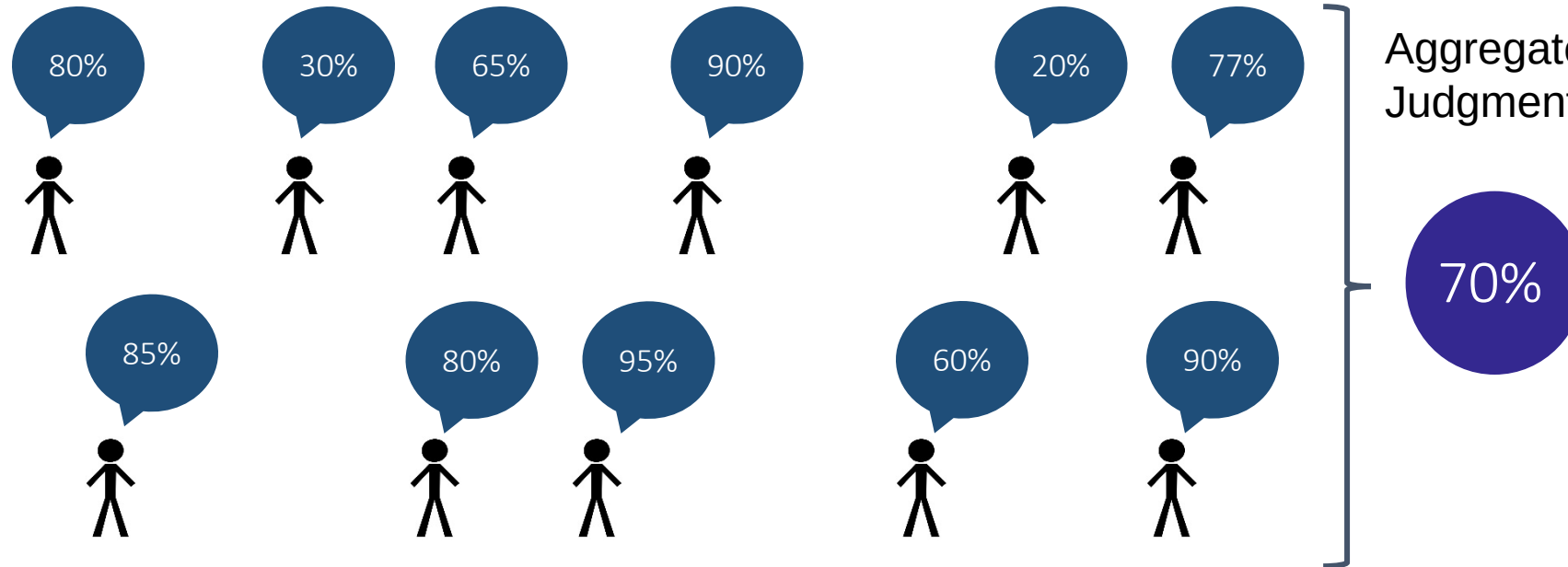
- Aggregative Contingent Estimation (ACE)
- Crowdsourcing Evidence, Argumentation, Thinking and Evaluation (CREATE)
- Strengthening Human Adaptive Reasoning and Problem-Solving (SHARP)
- Integrated Cognitive-Neuroscience Architectures for Understanding Sensemaking (ICArUS)
- Machine Intelligence from Cortical Networks (MICrONS)
- Knowledge Representation in Neural Systems (KRNS)

Aggregative Contingent Estimation (ACE)

Will Countries X and Y go to war by 31 December 2022?

Individual Judgments

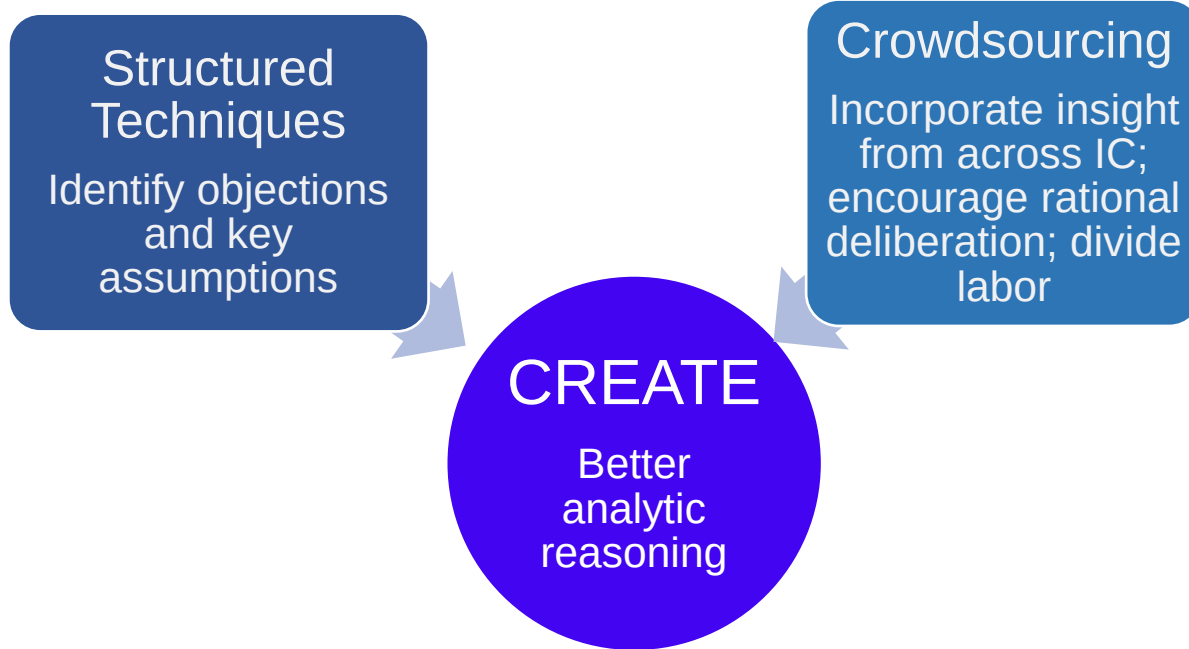
Aggregate Judgment



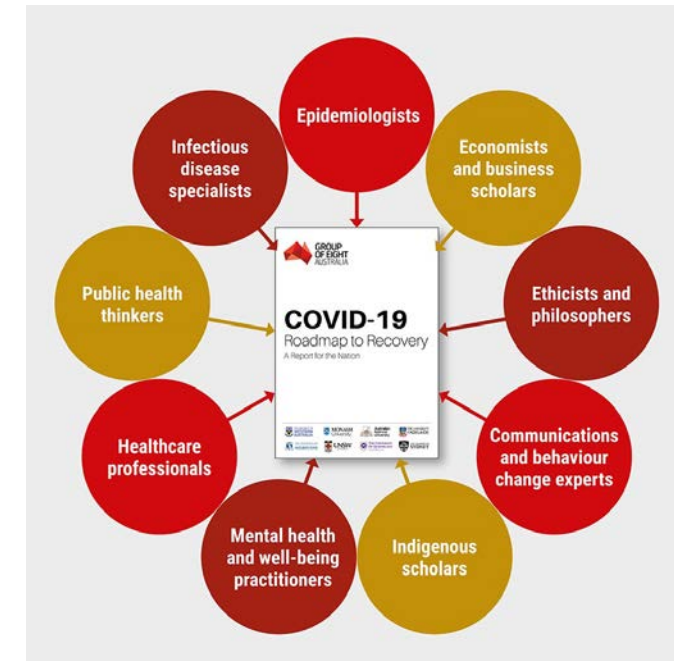
FORECASTING
**What Research Tells Us
About Making Accurate
Predictions**
by Walter Frick
FEBRUARY 2013



NOVEMBER 26, 2013
WHEN LESS CONFIDENCE LEADS TO BETTER RESULTS



COVID-19 Roadmap to Recovery

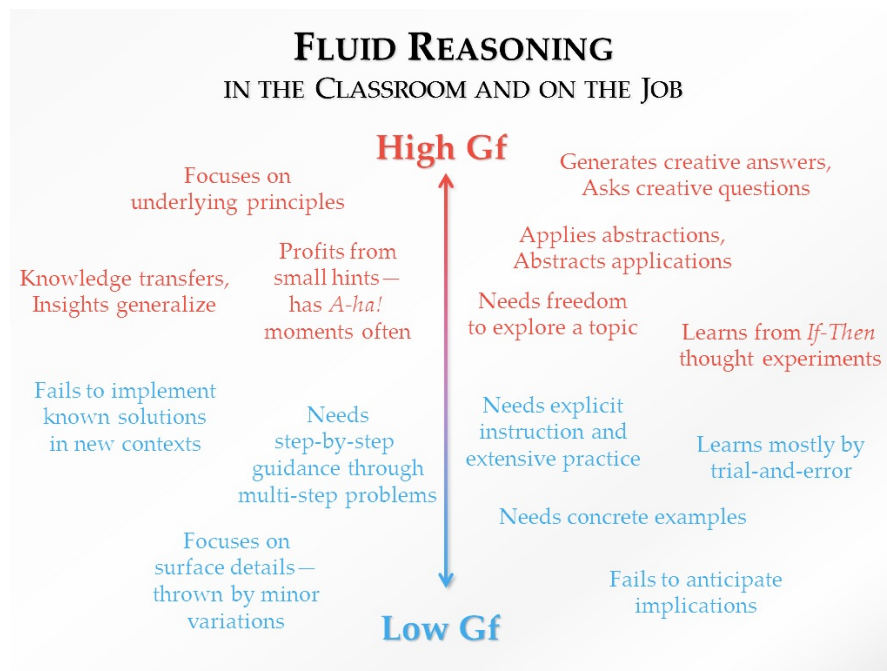


Australia's Group of Eight (Go8) Universities used CREATE technology to prepare recommendations on COVID for the Australian Government

Program Goal

Improve logical reasoning (fluid intelligence) in high-performing individuals to enable enhanced problem solving in complex, real world environments

Motivation



Approach

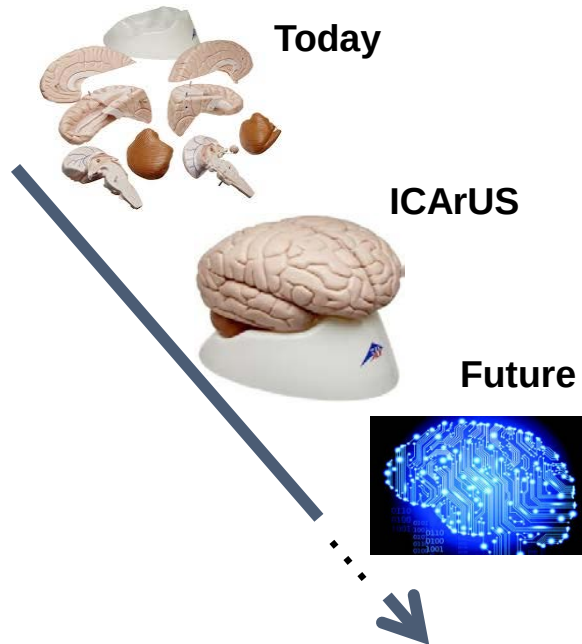


- Develop and test safe interventions (incl. cognitive training, transcranial stimulation, mindfulness, nutritional supplements, and high-intensity training) in thousands of high-performing adults
- Compare interventions using a rigorous battery of tests
- Tailor treatments for individual differences to improve effectiveness

Program Goal

Develop validated computational models of human sense-making

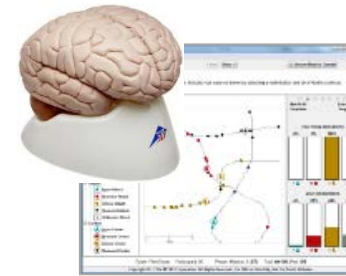
Motivation



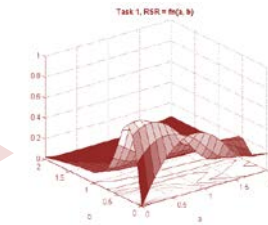
Approach

Computational brain **model** of human sensemaking with common **cognitive biases**

Model takes test



Model Results

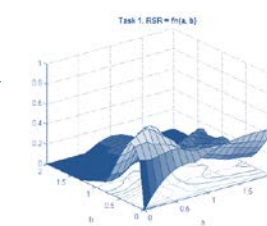


Compare & Validate model

Humans take test



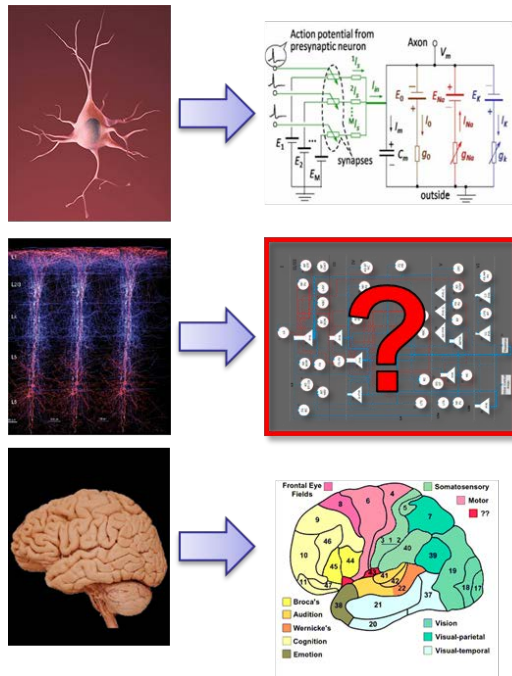
Human Results



Program Goal

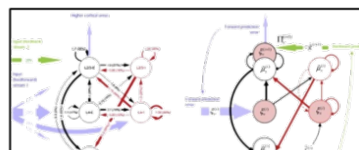
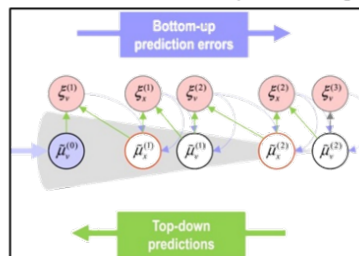
Advance machine learning by combining neuroscience and data science to reveal how the cortex performs computations at the mesoscale

Motivation

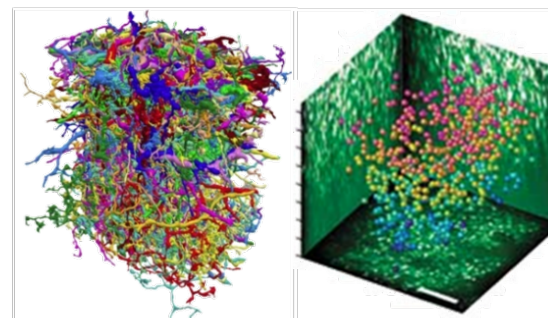


Approach

Algorithmic framework for cortical information processing



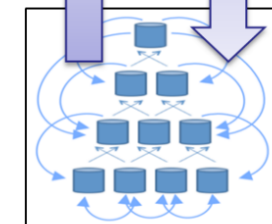
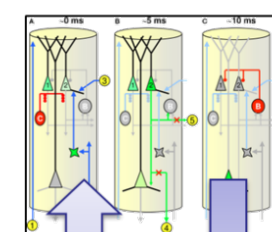
Neurally-plausible implementation of representations, transformations and learning rules of core functions



Directed data collection and analysis



Computational neural models



Machine learning algorithms

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Throughout our website you can learn more about engaging with us on our highly innovative work that is having a positive impact in the Intelligence Community and society in general. Click on any of the below links to learn more.

iarpa.gov | 301-243-1995

dni-iarpa-info@iarpa.gov

- Reach out to our Program Managers.
- Schedule a visit if you are in the DC area or invite us to visit you



Open BAAs

Broad Agency Announcements (BAAs) solicit research proposals for specific programs. Learn more about current BAA opportunities and ways to get involved...



Requests For Information

Requests for Information (RFIs) are designed to gather more information on an idea in an area in which our program managers are not fully informed...



Seedlings

Seedlings are typically 9 – 12 month research efforts that are less than \$1M in cost. They are intended to address highly innovative ideas and concepts within...