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INTRODUCTION & THEORETICAL GROUNDING

Issues Facing Responsible Conduct of Research (RCR)

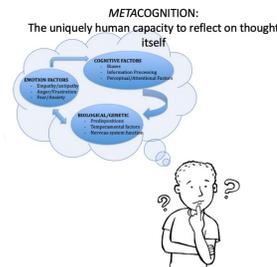
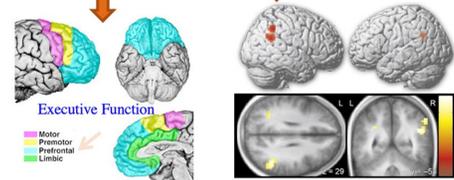
- Knowledge of regulations and threats of sanctions are not enough to prevent unethical and illegal behavior (Górski, & Rhoades, 2000; Pupovac et al., 2017; Rath et al., 2014; Turner et al., 2022).
- Research misconduct may contribute to the current crisis in the erosion of public trust in science

Critical Connections That Are Missing in RCR Education

- Deeper *intrapersonal engagement* and understanding of psychological principles underlying “Hot Cognition” (decision-making under stress)
 - *Heuristic Reasoning* – Cognitive short cuts
 - *Cognitive Biases* – Confirmation bias, self-serving bias, risk assessment errors, etc.
- NEEDS TO BE COMBINED WITH:**
- Experiential, metacognitive ethics training.
 - Direct experience of ethical reasoning that pulls for hot cognition within training
 - Make the process explicit: Guided evaluation of decision-making
 - Psychological Inoculation: Resilience in the face of future ethical challenges.

Areas critical to Metacognitive Function: (Mental state inferencing)

- Right Temporal-Parietal Junction (rTPJ)
- Medial Prefrontal Cortex (PRC)



Why is this a problem?

- Diminished capacity to see *holistically* (i.e. the big picture)
- Impairment of learning (among children and adults!)

INITIAL EMPIRICAL INVESTIGATIONS: PROOF OF CONCEPT

Nemeroff, Thompson & Hickey, 2018 - Framing, Perspective and Hot Cognition: A preliminary exploration of the experiential case scenario as a tool for a training advanced issue spotting in protocol review

Research Goal: Explore “hot cognition” in a highly realistic case scenario with ethics and compliance professionals (IRBs and RIOs). Groups were informed they needed to discuss and rule on a high-risk drug trial protocol.

Creation of the Fictional *Experiential Ethics Scenario*

- Artificially introducing time and information constraints
- Generating professional *realism* into the protocol materials and supplementary Documents.

Results: Evidence of Heuristic Reasoning and Bias

- After learning of a fatal adverse event, participants insisted the event was not as predictable/preventable compared to non-naïve controls.
- Biased Risk-Benefit evaluation: Hindsight bias.

THE METACOGNITIVE ETHICS CURRICULUM

Based on our research findings and through collaboration with ethicists and specialists within STEM research we developed an *Experiential Metacognitive Ethics* decision-making training. The process is collaborative and interactive.

- 1 Institutional (External) Engagement:** Key Informant Interviews within an organization:
 - What are the ethical issues at your institution?
 - How are key issues perceived differently among stakeholders?

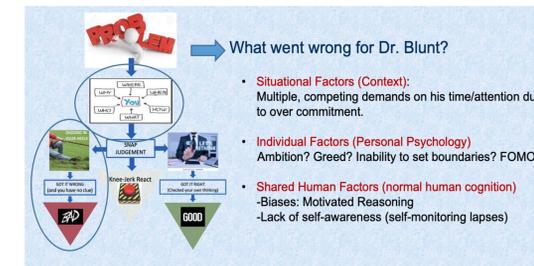


Case Scenarios that engage people at an institutional, interdisciplinary level - research ethics dilemmas that pull for themes of hot cognition.



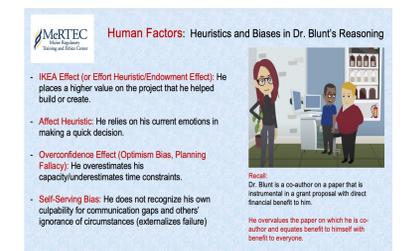
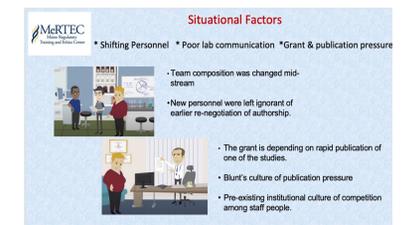
These can be created as brief, multi-day workshops or semester long courses.

Example Case Scenario: A lab plagiarism case with intentional role ambiguities, communication gaps and conflicting interpretations of intellectual property.



Intrapersonal Engagement (Internal): Participants initially learn of, and judge, what appears to be a clear plagiarism case, but as details unfold, discover their own metacognitive lapses.

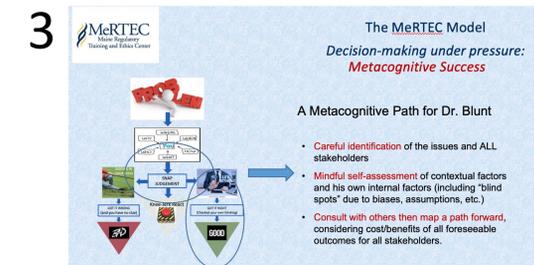
- 2 Workshop Discussion:** Group analysis of critical features of the MeRTEC Model to identify areas of hot cognition that suppressed characters’ metacognitive reasoning.



WHERE WE GO FROM HERE: DEVELOP & SHARE

We hope to develop and refine this integrative model for STEM ethics education in order to respond to pressing recommendations in the field to bridge metacognitive engagement gaps:

- Incorporate fundamental mechanisms in human psychology, both interpersonal and intrapersonal that support metacognition.
- Incorporate high impact practices involving direct experience in ethical decision-making, and mastery of challenges in a ‘psychological inoculation’ paradigm.
- Approach metacognitive ethics as a developmental process by fostering students’ growing awareness of processes within their own ethical reasoning that are inherently fallible.
- Build a community of ethics educators and researchers to help establish breadth of content and application.



Integrative Engagement: MeRTEC Tool for Decision-Making Under Stress for Metacognitive Success* This culminating step within a course or workshop integrates individual (intrapersonal) metacognitive engagement with institution-level engagement (interpersonal)