

Mentoring, IDPs, Research Security, and Generative AI

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MENTORING

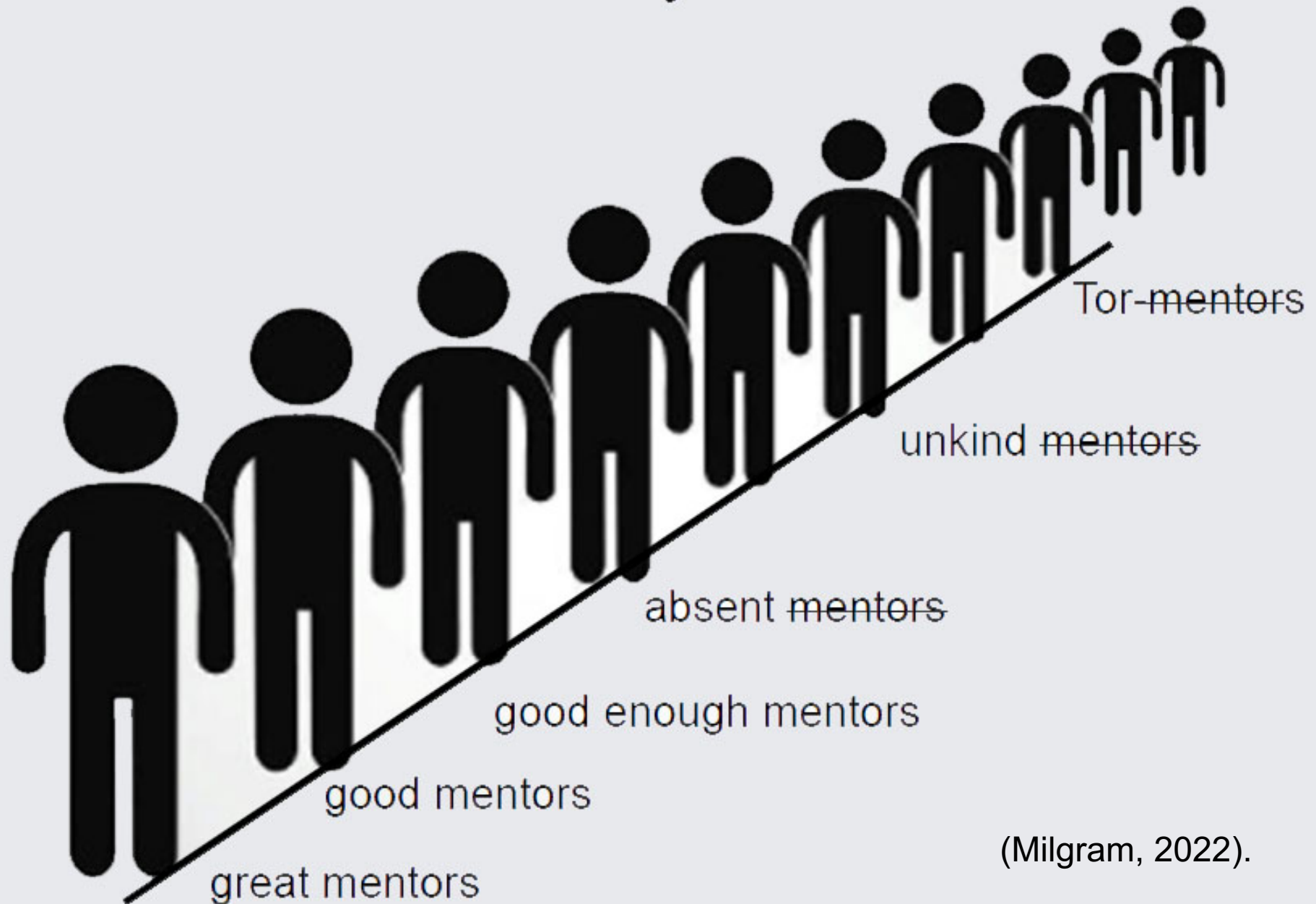
WHAT IS MENTORING?

- Mentoring is a “**personal** and **reciprocal** relationship in which a more experienced (usually older) faculty member acts as a guide, role model, teacher, and sponsor of a less experienced (usually younger) student or faculty member. A mentor provides the mentee with **knowledge, advice, counsel, challenge, and support** in the mentee’s pursuit of becoming a full member of a particular profession.” (Johnson, 2016, p. 23).
- Mentorship is a **professional**, working **alliance** in which individuals work together over time to support the **personal** and **professional growth, development, and success** of the relational partners through the provision of **career and psychosocial support.**” NASEM. (2019). The Science of Effective Mentorship in STEMM. Washinton D.C.:The National Academies Press, p. 8.

RESEARCH ON MENTORING

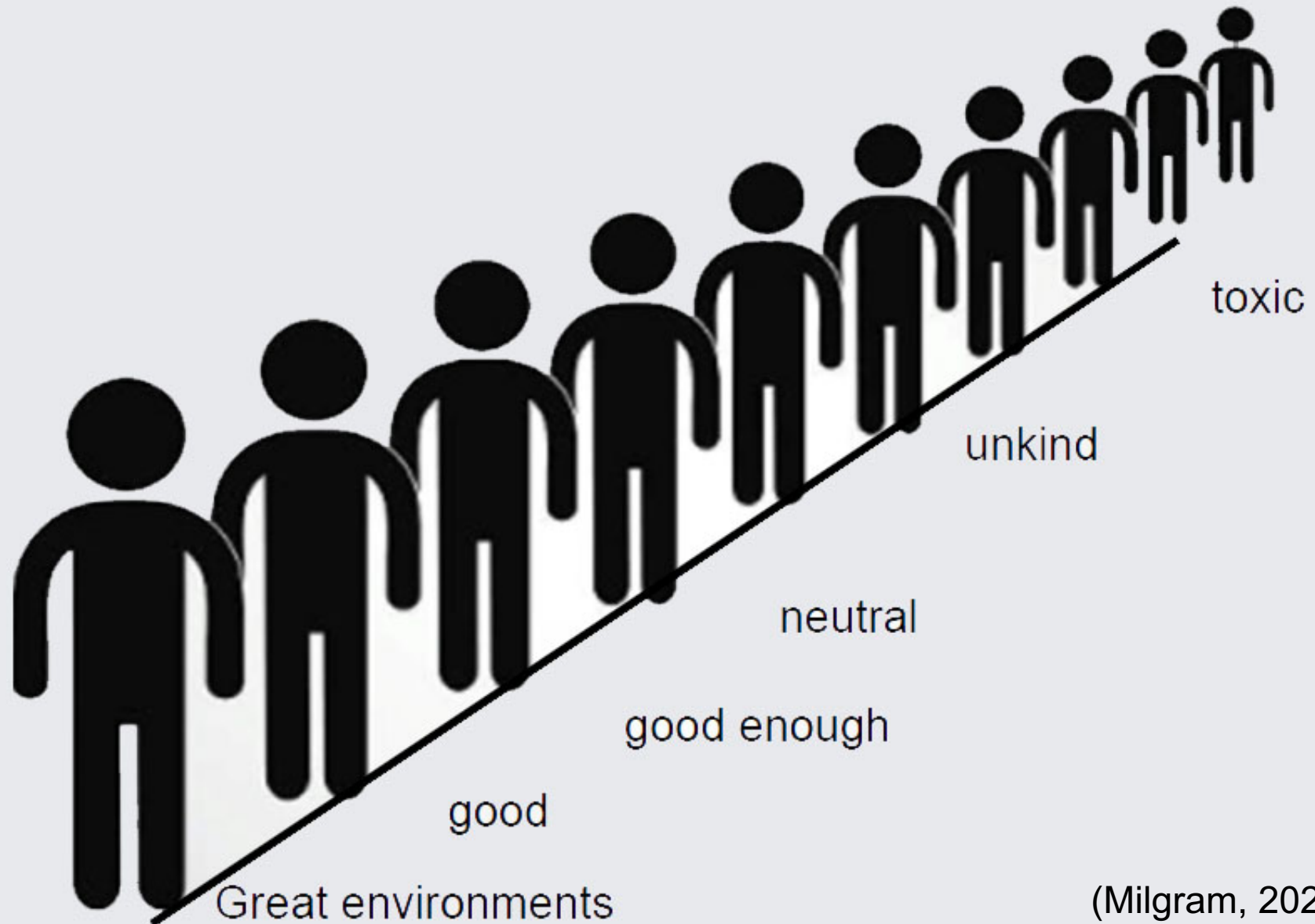
- Positive effect on academic achievements, retention, degree attainment, career success, satisfactions, and commitment. (NASEM, 2019).
- Outcomes: persistence, completion, diversity, publications, grants, successful professionals.
- Mentoring and leadership are synonymous.
- Mentors are not born, they are made.
- Good mentoring habits can be learned, but we have to be willing to let go of bad habits we have picked up through our experiences.
- And we have to dedicate ourselves to the study of becoming an outstanding mentor, not just a outstanding researcher

Mentors/Bosses Play a Role.....



(Milgram, 2022).

But Are Not the Sole Factor



(Milgram, 2022).

BUILDING A MENTORING TEAM

- No one person can often fill all roles.
 - Coach, sponsor, connector, advocate (Chopra, et al., 2019).
 - Mentoring constellation (Johnson, 2016).
 - “Rock stars” and navigators

STATISTICS ABOUT GRADUATE STUDENTS

- Graduate students are **more than six times as likely to experience depression and anxiety as compared to the general population...**(Evans, et al., 2018).
- The pandemic has magnified this (Gewin, 2021).

MENTOR THE WHOLE PERSON

- Body
 - Mind
 - Spirit
 - Relationship
 - Professional
-
- Help mentees understand work/life harmony and how small investments of time daily in each area can accumulate

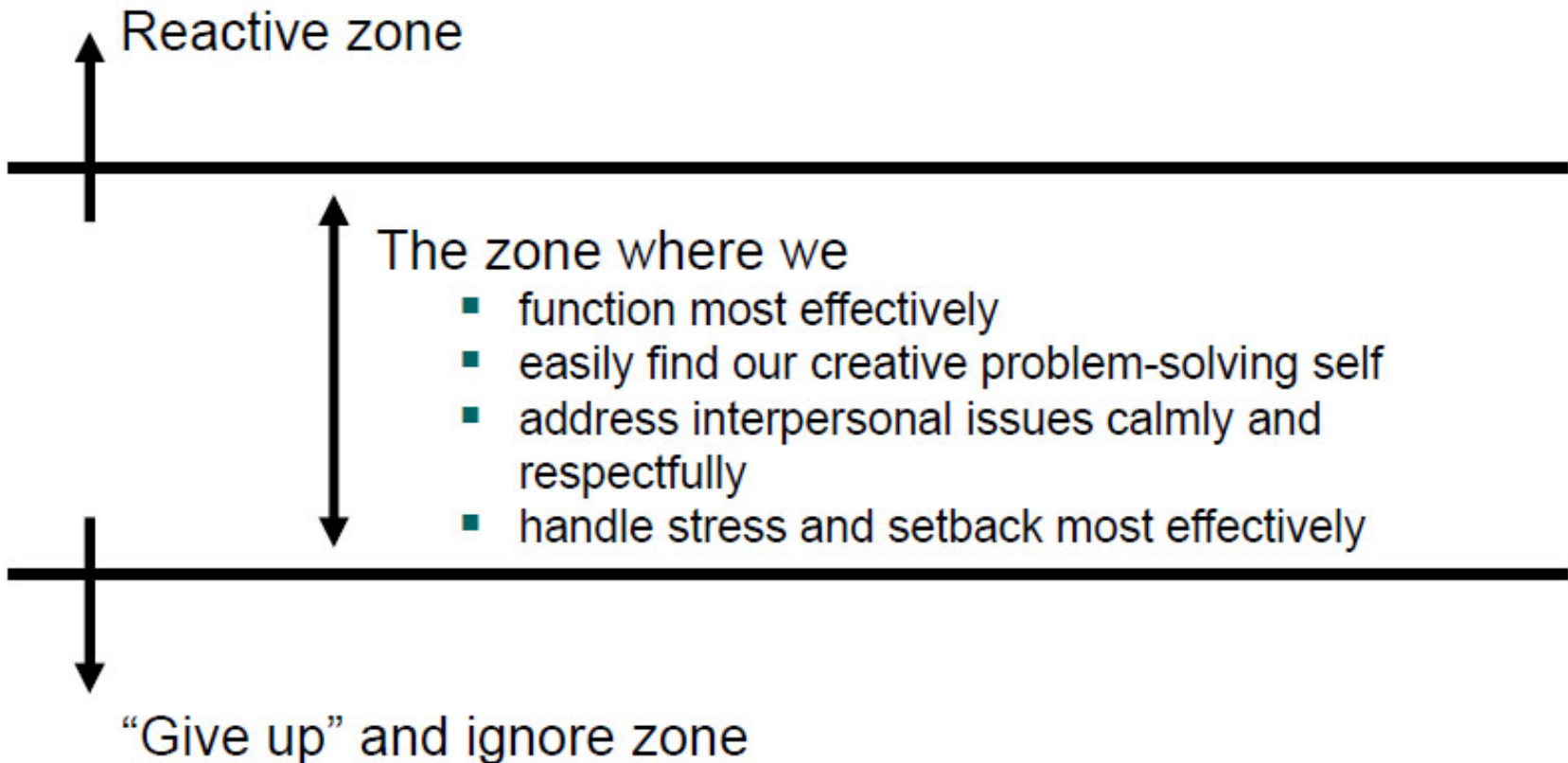
THE TROUGH OF HAPPINESS

HAPPINESS RELATIVE TO AGE U.S.



SOURCE: CAROL GRAHM & MILENA NICOLOVA, THE BROOKINGS INSTITUTION 2014.

WINDOW OF TOLERANCE



(Seigel, 1999 in Milgram, 2022).

TRAINING IS INTERRELATED



(Milgram, 2022).

FOSTER RELATIONSHIP & DEVELOPMENT

- Individualized Development Plans (IDPs)
 - Understanding yourself (know thy self)
 - Plotting a trajectory
- Mentoring Statements
- Mentoring Agreement/Contract /Lab Compacts

RECOGNIZING MENTORING MALPRACTICE

- **Co-opt/Hijack/Misappropriate**
 - Ideas, projects, grants, publications, intellectual property, connections, credit
- **Overload/Divert/Oppress**
 - Busy work, menial tasks, unrelated assignments
- **Oversharing/Impropriety/Indiscretion**
 - Personal life, controversial opinions/topics, biases, family, flirting/coquetry
- **Uncommitted/Unsupportive**
 - No time, uncaring, unencouraging, unreliable, avoidant, unhelpful
- **Toxicity**
 - Berates, curses, belittles, sabotages, cruel, disgruntled, bullying

(Adapted from Chopra et al., 2016).

“MENTORING UP”

- Maintaining effective communication
- Aligning expectations
- Assessing understanding
- Addressing equity and inclusion (*and power*)
- Fostering independence
- Promoting professional development
- Ethics

(Lee, et al., 2015).

MENTORING REFERENCES

- Chopra, V., Edelson, D.P., Saint, S. (2016). Mentorship malpractice. *JAMA*, 315(14):1453-1454. doi:10.1001/jama.2015.18884.
- Chopra, V., Vaughn, V. M., & Saint, S. (2019). *The Mentoring Guide: Helping Mentors and Mentees Succeed*. Ann Arbor, MI: Michigan Publishing.
- Evans, T.M., Bira, L., Gastelum, J.B., Weiss, L.T., & Vanderford, N. (2018). Evidence for a mental health crisis in graduate educations. *Nature Biotechnology*, 36, 282-284.
- Johnson, W. B (2016). *On being a mentor*. New York, NY: Routledge.
- Gewin, V. (2021). Pandemic burnout is rampant in academic. *Nature*, 591, 489-491.
- Lee, S.P., McGee, R., Pfund, C., & Branchaw, J. (2015). "Mentoring Up": Learning to Manage Your Mentoring Relationships. In *The Mentoring Continuum: From Graduate School through Tenure*, Syracuse University Press. See <https://press.syr.edu/supressbooks/418/mentoring-continuum-the/>
- Milgram, S. L. (2022). *Supporting Mentoring and Positive Research Climates* (2022). BTAA RCR Conference, Mentoring Up.
- NASEM. (2019). *The Science of Effective Mentorship in STEMM*. Washington D.C.: The National Academies Press.
- Siegel, D., J. (1999) *The Developing Mind*. New York: Guilford.
- Rath, Tom, & Conchie, B. (2008). *Strengths-Based Leadership: Great Leaders, Teams, and Why People Follow*. New York: Gallup Press.
- Stanier, M. B. (2016). *The Coaching Habit: Say Less, Ask More & Change the Way You Lead Forever*. Toronto: Box of Crayons Press.

INDIVIDUALIZED DEVELOPMENT PLANS (IDP)

INDIVIDUALIZED DEVELOPMENT PLANS

- What are they?
 - Outlines career goals...a developmental "action" plan
 - Knowing one's self
 - Setting a trajectory
 - Education
 - Scholarship
 - For communication/expectations
- Sources
 - [IDP Science Careers AAAS](#)
 - [Imagine PhD](#) for Humanities
 - [IDP American Psychological Association](#)

KNOW THY SELF

- Personality
 - Myers-Briggs Type Indicator (MBTI)
 - DiSC (<https://www.discprofile.com/>)
 - StrengthsFinder (Rath & Conchie, 2008)
 - Clifton StrengthsFinder (Gallup)
 - “Development Accelerator”
- Connation
 - Kolbe A Index (<https://www.kolbe.com/>)
- Organizational
 - Competing Values Framework (<https://www.toolshero.com/>)

RESEARCH SECURITY (UNDUE FOREIGN INFLUENCE)

WHAT IS IT?

- Undue Foreign Influence
 - Use of the academic research enterprise to compromise US economic competitiveness and national security
- Bipartisan issue with roots all the way back to the early 2000s
 - America Competes (HR 4521)/US Innovation & Competition Act (S 1260)
 - CHIPS+Science
 - National Security Presidential Memorandum-33

LISA AGUIRRE, OFFICE OF NATIONAL SECURITY

“While not pervasive, some foreign government actors target top scientific and technical expertise sectors...foreign actors seek to exploit government, private-sector, and academic development efforts in order to advance their own national interests while providing sponsorship to a variety of non-traditional activities to steal and co-opt U.S. research; specifically, targeting bio-technology companies and university research centers. Nontraditional collectors can include...researchers who have been recruited by foreign talent recruitment programs, cyber hackers, and...students who have been co-opted or coerced into spying for foreign governments and their intelligence services.”

Testimony to Health, Education Labor & Pensions Full Committee, April 22, 2021

TRANSPARENCY, HONESTY & OPENNESS

The American research culture is intentional in its strong commitment to openness. Yet maintaining that open research culture also requires being clear-eyed that certain governments seek to exploit our openness and disrupt the integrity of our research. Such threats require the Federal government, in collaboration with the research community, to take protective actions to mitigate research integrity risks without compromising the values that distinguish the U.S. research enterprise: openness, transparency, honesty, equity, fair competition, objectivity, and democratic participation.

White House Office of Science and Technology Policy

MODES OF INFLUENCE*

- **Reward** is offering of material or social goods in exchange for desired behavior
- **Deception** is providing incomplete, incorrect information on an application, proposal, or publication for the purpose of hiding or directing attention away from some activity
- **Coercion** is the threat of harm or disadvantage for the purpose of enforcing compliance with a demand;
- **Theft** is the taking of a physical object or protected idea without permission of the owner

FOUR MAIN ISSUES

1. Peer review violations
2. Failure to disclose substantial foreign resources:
 - a) Foreign employment arrangements (*Conflict of Commitment/Conflict of Interest*)
 - b) Foreign support (money, people, overcommitment)
 - c) Foreign grants
 - d) Talent awards

FOREIGN GOVERNMENT TALENT RECRUITMENT PROGRAM?

1. **Directly or indirectly funded by a foreign government** to recruit science and technology professionals or students regardless of citizenship or national origin
2. May be used to **illicitly acquire technology** to further military modernization or economic goals of a foreign country
3. May encourage participants to **engage in activity** contrary to policies and values via NDA clauses
4. Participation in programs sponsored by China, Russia, Iran or North Korea can prevent someone from receiving certain types of federal funding

FOUR MAIN ISSUES

3. Failure to disclose significant foreign financial conflicts of interest
 - a) Equity in foreign companies
 - b) Foreign patents that leverage US taxpayer funded work
4. Failure to abide by U.S. export control laws and regulations

OUR RESPONSE?

- Awareness – travel, security, IP, collaborations
- Communication – colleagues, students, staff
- Compliance – shifting grant proposal and reporting requirements; COI policy
- Sensitivity – difficult subject; opposes openness and transparency; not an excuse for discrimination, bias or harassment
- Transparency – disclose all support and consulting activities

RS/UFE REFERENCES

- Association of Public & Land Grant University. (2020). *University Actions to Address Concerns about, Security Threats and Undue Foreign Government Influence on Campus.* <https://www.aplu.org/projects-and-initiatives/research-science-and-technology/science-and-security/>.
- Association of American Universities. (2019). *Actions Taken by Universities to Address Growing Concerns about Security Threats and Undue Foreign Influence on Campus.* <https://www.aau.edu/key-issues/actions-taken-universities-address-science-and-security-concerns>.
- Federal Demonstration Partnership. (2021). *Foreign Influence Management – Enhancing the Security and Integrity of America’s Research Enterprise.* <http://thefdp.org/default/meetings/previous-meetings/january-2021/>.
- Huron Consulting Group. (2020). *Fostering International Collaboration While Managing Undue Foreign Influence in Academic Research.* <https://www.huronconsultinggroup.com/insights/international-collaboration-foreign-influence-academic-research>
- JASON. (2019). *Fundamental Research Security.* https://www.nsf.gov/news/news_summ.jsp?cntn_id=299700.

RS/UFE REFERENCES

- National Intelligence Agency. (2021). *2021 Annual Threat Assessment of the U.S. Intelligence Community*. <https://www.dni.gov/index.php/newsroom/reports-publications/reports-publications-2021/item/2204-2021-annual-threat-assessment-of-the-u-s-intelligence-community>
- National Science Foundation. (2020). *Response to the JASON Report 'Fundamental Science and Security'*. https://nsf.gov/news/special_reports/jasonsecurity/NSF_response_JASON.pdf
- National Science & Technology Council. (2021). *Recommended Practices for Strengthening the Security and Integrity of America's Science and Technology Research Enterprise*. <https://trumpwhitehouse.archives.gov/wp-content/uploads/2021/01/NSTC-Research-Security-Best-Practices-Jan2021.pdf>
- MITRE. (2020). *Improper Influence in Federally Funded Fundamental Research*. <https://www.mitre.org/publications/technical-papers/improper-influence-in-federally-funded-fundamental-research>

RS/UFE REFERENCES

- Federal Bureau of Investigation. (2020). *PSA: Foreign Government-Sponsored Talent Recruitment Plans, such as China's Talent Plans, Incentivize Economic Espionage and Theft of Trade Secrets*.
<https://ari.hms.harvard.edu/sites/g/files/mcu761/files/assets/June%2023%202020%20White%20House%20OSTP%20Enhancing-the-Security-and-Integrity-of-Americas-Research-Enterprise-June-2020-1.pdf>
- U.S. Government Accountability Office. (2020). *Agencies Need to Enhance Policies to Address Foreign Influence (GAO-21-130)*. <https://www.gao.gov/products/gao-21-130>.
- U.S. Senate Committee on Health, Education Labor & Pensions. (April 21, 2021). *Full Committee Hearing Protecting U.S. Biomedical Research: Efforts to Prevent Undue Foreign Influence*. <https://www.help.senate.gov/hearings/protecting-us-biomedical-research-efforts-to-prevent-undue-foreign-influence>

GENERATIVE AI*

*PARTS OF THIS SECTION CREATED WITH CHAT GPT

GENERATIVE AI

- Subset of artificial intelligence techniques that involve creating and producing new content, such as images, music, text, or even videos, based on patterns and examples from existing data
- Uses machine learning algorithms, particularly generative models to learn the underlying patterns in the data and generate new content that resembles the original dataset.

CHAT GPT

- Statistical models are used to simulate intelligence by predicting word choices based on the corpus of information fed to it (128 billion neural connections)
 - Not a “knowledge” engine; it is a “reasoning” engine
 - “12 year old with the info capability of a PhD student”
 - It’s a reflection of the person using it - interrogator.
 - Intelligence amplification – mirror of the corpus
 - A low resolution version of the part of the human brain responsible for language
 - Does not have a generalized understanding of knowledge
 - It can “reach for knowledge” but wrong 10% of the time (emergent behavior)

FUTURE OF AI

- A knowledge engine will require AI built on top of AI
 - Memory types: semantic, episodic, procedural
- Learned connectivity layer that is intelligent
- Personalized, privatized & local w/unlimited storage
- Corpus composed of a person's life artifacts
- Real-time personal assistants, life coaches and counselors
- Issues
 - Privacy
 - Storage
 - Intellectual property
 - “Ownership”
 - Bias propagation
 - Misinformation
 - Proprietary info becomes part of the collective

FEDERAL PERSPECTIVE

- No ruling or perspective from NSF, NIH or other agencies.
- Many questions about ownership, copyright
- Primary issue is how originality and novelty are defined
 - Plagiarism is passing off words/ideas of another as one's own
 - How do we deal with an algorithm that aids in the creation of words, images, ideas?
 - Is using CGPT any different than the early days of using Google or Yahoo?

SUGGESTIONS ABOUT USING GAI

- Where the expectation is that material is completely original to the author, do not use.
- The legal question of copyright and trademark remains
- When used, be transparent and ethical about use.
 - In methodology – how was AI used and what data sets?
 - Citation – Cite the model/software and version
 - Limitations – acknowledge the limitations and potential bias of the tool
 - Ethical considerations – reflect on ethical implications

HOW TO USE GAI

- Use it to help solve the human bandwidth problem:
 - Use Chat GPT to summarize research articles
 - Use Chat GPT to generate, refine and improve research questions
 - Use Chat GPT to juxtaposed compare difficult topics
- Keep in mind that Chat GPT can be confidently wrong...it makes experts faster and novices more prone to error.
- It is all in the prompt (or superprompt)

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