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NEWSLETTER

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IN THIS ISSUE

My Guiding Principles for Educating Students for Their Ethical Journey

Alison L. Antes, Ph.D., Northern Kentucky University

As an industrial and organizational psychologist who studies human behavior in organizations, I find ethical behavior among the top concerns for the 21st century. Whether scientific researchers, engineers, business executives, elected officials, academic administrators, or other professionals, there appears to be a consensus—ethical behavior matters and it matters greatly. We balk at serious transgressions that make the headlines, but we also know that less egregious misbehavior is commonplace. Regardless of its severity, misbehavior is significant, as it creates the workplace atmosphere, shapes the collective understanding of acceptable behavior, and may incrementally cultivate more serious actions.

It is easy to substantiate the claim that professional ethical behavior matters and that ethics instruction serves as the central approach for addressing this concern. Thus, the question becomes: As an instructor of ethics, how can I be certain that my course makes a real difference? Certainly, this weighty question deserves further examination. However, from my experiences, whether in RCR seminars, graduate ethics courses, or upper-level

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Potential Impact of Learning Theories on Lifelong Learning of RCR

Camille Nebeker, M.S., Ed.D., San Diego State University Research Foundation

Over the past few years, I have worked with students and faculty in several Professional Science Master's (PSM) degree programs to design relevant instruction in professional and research ethics. During the curriculum development process, we field-tested and refined instructional techniques designed to facilitate learning about practices influencing research integrity in science professions outside of the academy (e.g., industry, government, and non-profit economic sectors). While developing the PSM ethics education project, I had the opportunity to study learning theories in conjunction with my doctoral program. My focus was primarily on post-secondary education and adult learning with an interest in how theories and research on learning could inform how we teach responsible conduct of research (RCR). In this article, I do the following:

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undergraduate ethics courses, I have found five principles guide me as an instructor.

Principle 1: Consider Instructor Mindset

Ethics and RCR courses require a unique instructor mindset. Our common model of "professor" as an expert imparting discipline-specific knowledge and procedures holds true to some extent. However, as an ethics instructor, I must also encourage students to think about the topic in a new manner, engage in self-reflection, and develop ethical decision-making skills. As an instructor, I cannot present students with a playbook for their careers; rather, I can only prepare them with the awareness and tools that allow them to navigate career experiences responsibly using sound judgment. Instructor mindset proves critical because it shapes our understanding of the instructor role, influences how we frame the purpose of the course, and informs the design and delivery of course content.

Principle 2: Guide Student Mindset

After considering my own instructor mindset, I think it is important to consider student mindset. Several common beliefs present barriers to learning and must be addressed at the outset. Students may approach an ethics or RCR course as a standard part of the curriculum (or worse, students may view the course as required, but not important). This thinking relates to two mindsets. First is the belief that ethical problems are clear, simple, and "black and white." Second is the belief that one is already fully equipped to handle ethical problems. Students often use the word "common sense."

These mindsets emanate, at least in part, from exposure to sensational examples of professional misconduct. Such examples display severe scenarios of "right and wrong" and neglect more subtle issues that require making judgments among various shades of right and wrong. These mindsets also arise from inherent psychological processes that guide people's thinking about themselves. Consider this example: Are you better than the average driver? Natural self-enhancement tendencies lead people to think they are better than average at most things, including ethical behavior, and self-deception allows individuals to act unethically without awareness (Manley, Russell, & Buckley, 2001; Tenbrunsel & Messick, 2004). Moreover, people hold themselves to high personal standards of conduct and use their values to predict their likely behavior. This thinking creates a barrier to appreciating the personal significance of an ethics course.

I explain and demonstrate natural self-enhancement biases. As a class, we discuss examples of influential, successful professionals whose poor judgment led to out-of-character ethical missteps. Students occasionally struggle to accept the notion that they could make an unethical choice or find themselves in an ethical quagmire. They grapple with cynicism versus realism and recognizing that a realistic view of human nature applies not only to others but to them as well. Sometimes, students visit the vexing question of whether humans are inherently good or bad. When this question arises, I remind students that people embrace good intentions and positive values that indeed paradoxically create a defense against awareness of their own potential fallibility. Their lack of awareness ultimately opens the door for making poor choices. I also humbly remind students that this lesson applies to me as well. Once students accept that a simple, black-and-white mindset does not serve them well regarding ethical behavior, I can prepare them to navigate those complex situations.

Principle 3: Increase Ethical Sensitivity

Throughout my courses, we build breadth of knowledge about the types and nature of ethical issues. To be competent in anticipating, identifying, reasoning through, and addressing ethical concerns, an individual must be sensitive to the ethical dimensions of one's professional work. Students with greater life and professional experience often struggle to break out of black-and-white thinking about what constitutes ethical issues. However, once they are introduced to a broader interpretation of ethical problems, they generate many examples from their own

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experiences. For example, most researchers understand that fabricating data is unethical conduct, but decisions about authorship and treatment of personnel are open to greater nuance.

I introduce the nature of ethical problems, noting that they involve ethical principles (often one in conflict with another), emotion, interpersonal conflict, communication, power and status, and consequences for oneself, one's colleagues, and the organization. To expose students to problems in their field, I consult classifications of ethical conduct (if available), field-specific principles, and guidelines (e.g., Helton-Fauth et al., 2003; Steneck, 2007). However, these frameworks often do not contextualize ethical principles and problems in real-world settings with social relationships and dynamic characters. Thus, case examples, whether real or hypothetical, provide context for demonstrating the challenges of ethical decision making.

Principle 4: Develop Ethical Decision-Making Skills

Now, I must consider the cornerstone of ethics and RCR instruction—developing ethical decision-making skills. Decisions, and the reasoning underlying them, are the direct precursors to behavior and represent the point where behavioral change is possible. Students are typically open to learning about decision making, but it can be instructive to present evidence that even the brightest minds rely on judgment shortcuts that lead to decision errors. Moreover, I note that research shows that ethical decision making improves with conscious, critical analysis of situations, potential assumptions, alternatives, and outcomes.

Students are presented with decision-making models and strategies, or tools, which facilitate decision making. I rely on the sensemaking model and strategies developed by Dr. Michael Mumford and his colleagues at the University of Oklahoma (Mumford et al., 2008; Thiel, Bagdasarov, Harkrider, Johnson, & Mumford, 2012; Waples & Antes, 2011). Their model recognizes the complexity of ethical reasoning, and their ethical decision-making strategies explicitly encourage examining one's assumptions, managing emotions, and considering others' perspectives. Moreover, Mumford's research team (of which I am a former member) conducted, and continues, research to validate their model.

Students practice applying decision-making strategies as individuals and in groups. I utilize different methods, such as written cases, video cases, and role plays. Throughout the course, and especially during the decision-making exercises, I encourage students to reflect on their learning. At the highest level of reasoning, students must be mindful and able to think about how they reason, make judgments, and learn. Applying this approach throughout their careers will enable students to continue to learn as they reflect on experiences.

Principle 5: Assess Student Learning

I am reluctant to include assessment as the final principle, as assessment too often is placed at the bottom of instructional plans. Instructors reasonably focus on content, delivery, and learning activities, but assessment must also be a priority. In fact, assessment may be more important in an ethics course than in nearly any other. I remind myself here of student mindsets noted in Principle 2, and I entertain the idea, although uncomfortably, that ethics education may not be the universal cure-all we desire (Antes et al., 2010). Imagine, for instance, an ethics course that reinforces, though unintentionally, the mindsets presented in Principle 2.

Following the framework outlined in these five principles implies that assessment of learning requires much more than just knowledge of course content. Rather, I assess student thinking, reflection, and ability to apply decision-making tools. Assessments must be similar to the nature of real ethical problems; thus, they should be realistic, emotionally evocative, engaging, and challenging. Performance on these assessments is not a matter of right and wrong responses, but instead critical analysis and the ability to support one's reasoning.

In closing, ethics and RCR education may feel like a challenge for instructors. I find myself contemplating the implications of this work for the success of my students'

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- Present a brief summary of the current state of RCR education.
- Summarize findings from educational research on research ethics instruction.
- Introduce what I have learned about the research on human learning.
- Offer ideas on how we can use learning theory to inform the design and assessment of RCR instruction to advance skills in self-directed and lifelong learning.

Although requirements for RCR training have been in place for nearly a quarter century, studies to assess the impact of RCR instruction have shown little evidence of educational effectiveness (Anderson, 2007; Antes et al., 2009; Antes et al., 2010; Powell, Allison, & Kalichman, 2007). The issues of training effectiveness have been attributed to the haphazard evolution of RCR training, characterized by low levels of institutional support, poorly articulated goals, and a lack of coordinated educational initiatives (Kalichman, 2007; Kalichman & Plemmons, 2007; Steneck & Bulger, 2007). Concerns about the progress of RCR training appear to have prompted both the National Institutes of Health (NIH) and the National Science Foundation (NSF) to publish updates to their requirements in 2009. The NIH update included additional guidance on expectations of RCR instruction specific to format, duration, content, and involvement of faculty in training programs associated with trainee funding (NIH, 2009). The NSF update required institutions to have an RCR training plan in place that covered students and postdoctoral trainees supported by NSF (NSF, 2009).

The NIH- and NSF-revised training mandates prompted an increased focus on research ethics education and its effectiveness. In 2008, McGee, Almquist, Keller, and Jacobsen noted the marginal outcomes of RCR education and questioned whether it was due to a "failure in course design, delivery, or other interfering influences on learning" (p. 31).

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careers, the colleagues with whom they work and, ultimately, their professional disciplines. I wonder, for example, whether they are equipped for the possible experience of working with colleagues and superiors who demonstrate poor judgment. By encouraging students to embrace complexities and fostering awareness of the need for ongoing reflection and learning, I hope that I send students into their journey prepared to navigate the "gray areas." I remind myself—and my students—that one course is only the beginning.

References

1. Antes, A. L., Wang, X., Mumford, M. D., Brown, R. P., Connelly, S., & Devenport, L. D. (2010). Evaluating the effects that existing instruction on responsible conduct of research has on ethical decision making. *Academic Medicine, 85*, 519–526.
2. Helton-Fauth, W., Gaddis, B., Scott, G., Mumford, M. D., Devenport, L., Connelly, S., & Brown, R. P. (2003). A new approach to assessing ethical conduct in scientific work. *Accountability in Research: Policies & Quality Assurance, 10*, 205–228.
3. Manley, G. G., Russell, C. J., & Buckley, M. R. (2001). Self-enhancing in perceptions of behaving unethically. *Journal of Education for Business, 77*, 21–27.
4. Mumford, M. D., Connelly, S., Brown, R. P., Murphy, S. T., Hill, J. H., Antes, A. L., Waples, E. P., & Devenport, L. D. (2008). Sensemaking approach to ethics training for scientists: Preliminary evidence of training effectiveness. *Ethics and Behavior, 18*, 315–339.
5. Steneck, N. H. (2007). *ORI introduction to the responsible conduct of research*. Washington, DC: U.S. Government Printing Office.
6. Tenbrunsel, A. E., & Messick, D. M. (2004). Ethical fading: The role of self-deception in unethical behavior. *Social Justice Research*, 17, 223–236.
7. Thiel, C., Bagdasarov, Z., Harkrider, L., Johnson, J., & Mumford, M. D. (2012). Leader ethical decision-making in organizations: Strategies for sensemaking. *Journal of Business Ethics*, 107, 49–64.
8. Waples, E. P., & Antes, A. L. (2011). Sensemaking: A fresh framework for ethics education in management. In C. Wankel & A. Stachowicz-Stanusch (Eds.), *Management Education for Integrity: Ethically Educating Tomorrow's Business Leaders* (pp. 15–47). Bingley, England: Emerald.

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Results of RCR educational research suggest instructional methods may be a contributing factor in disappointing student-learning outcomes (Anderson, 2007; Antes et al., 2009). In my review of the literature on RCR instructional effectiveness, the majority of courses evaluated used lecture and discussion to convey relevant material with some integration of interactive methods (e.g., small-group discussion, collaborative case analysis, and simulations through role play) (Antes et al., 2009; DeBruin et al., 2007). Research ethics educators have endorsed the use of active learning techniques to promote discussion, questioning, and development of problem-solving skills (Kalichman, 2007), and the literature is growing with descriptions of interactive, experiential, and inquiry-based learning strategies applied to teaching RCR (for examples, see: Atkinson, 2008; Barry, Borenstein, & Butera 2012; Brummel, Gunsalus, Anderson, & Loui , 2010; Jones et al., 2010; Teixeira-Poit, Cameron, & Schulman, 2011).While not a common practice, the literature includes a few examples in which theories of learning are connected to teaching about professional and research ethics (e.g., Jones et al., 2010; McGee et al., 2008; and Keefer, 2012). One might argue that without consideration of the principles of learning during the design of RCR instruction, additional requirements for format, length, content, and faculty engagement are unlikely to improve training outcomes.

An understanding of how people learn can inform those teaching RCR to purposefully connect learning objectives with instructional strategies to accomplish specific goals. For example, an instructional objective originally stated by the Office of Research Integrity (ORI) included a goal to "Develop positive attitudes toward lifelong learning in matters involving RCR" (Steneck & Bulger, 2007, pp. 831–832). If a positive regard for conducting research responsibly and skills for lifelong learning are a goal of RCR training, how might they be developed with students and trainees? Given a goal of RCR training may be to help students develop skills needed to address the challenging ethical dimensions of the research environment, the idea of advancing students' ability to be self-directed in their learning is ideal. Theories that support development of self-directed and lifelong learning skills are often tied to the humanist and social constructivist ideologies advanced by the work of scholars like Candy, Dewey, Knowles, Lave, Piaget, and Vygotsky (Merriam, Caffarella, & Baumgartner, 2007). Vygotsky (1978) is credited with influencing social constructivism through his beliefs that learning is socially mediated through interactions with others. He believed that knowledge is created when individuals engage in conversations and share in development of meaning and understanding. Vygotsky's theory is one of several that support active learning methods and that recognize the sociocultural influences of learning, which may complement training in RCR. Instructional strategies using a social constructivist approach encourage the learner to make meaning from experience and contextualize knowledge within a social setting or with members of a group who share common interests (Lave & Wenger, 1991; Vygotsky, 1978). When a teacher applies constructivist methods in the classroom, the teacher's role shifts from that of one who teaches content, the traditional model, to that of a facilitator who helps the student understand its meaning. This approach is referred to as "student centered and/or learner centered" and can involve experiential learning, reflective practice, and opportunities to contextualize knowledge to enhance transfer of learning to practice (Merriam et al., 2007). The research on learning has advanced to the point where discipline-based educational researchers (DBERs) are now able to document the effectiveness of learner-centered instructional strategies when applied to science disciplines, with favorable results (Singer, Nielsen, & Schweingruber, 2012). While DBERs have focused primarily on undergraduate science, technology, engineering, and math (STEM) disciplines, the principles of learning and methods for conducting educational research can be applied to RCR education.

Sifting through the literature on learning theory can be somewhat overwhelming, given the numerous approaches and perspectives (e.g., behaviorism, humanism, and constructivism) and abundance of

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theoretical positions associated with each approach. The good news is that the National Academies Press published a report in 2000, entitled *How People Learn: Brain, Mind, Experience and School*, which emphasized the importance of "learning with understanding" and connected the science of learning to instructional practices that assist learners in becoming "self-sustaining, lifelong learners" (Bransford, Brown, & Cocking, 2000, p. 5). In this publication, Bransford et al. (2000) synthesized over 30 years of scientific research on learning influenced by research in social sciences, neuroscience, and areas of psychology with an emphasis on ways to improve understanding. The authors argue for educators to rethink course content, the teaching and learning process, and assessment of understanding in order to enhance transfer of learning. The framework identifies four interrelated principles thought to "improve significantly the ability to become active learners who seek to understand complex subject matter and are better prepared to transfer what they have learned to new problems and settings" (Bransford et al., 2000, p. 13). While the How People Learn (HPL) framework was intended to guide development of K-12 education, the principles can easily be adapted to designing RCR education and/or assessing existing curricula for alignment. The following is a brief synopsis of the four overlapping principles noted by Bransford et al. (2000) in the HPL framework, along with thoughts on how to adapt the model to RCR instruction.

1. Learning Centered

The HPL "learner-centered" principle focuses on including formative assessment to identify student preconceptions. Applied to RCR instruction, a goal is to learn about the student's prior experiences with responsible and ethical research practices. The instructional techniques used to gather this information might involve asking students to reflect on and write about their experiences in the research settings specific to the topics being discussed (e.g., authorship data management, and publication). For example, instructors might ask students to discuss their understanding of and experience in how authorship is determined in their research group or ask them to explore experiences in collaborative research relationships. These are ways to introduce opportunities to discuss perceptions of responsible and ethical research practices and gain an understanding of students' current conceptions. Assessing how instruction correlates with the learner perspective would focus on the extent to which the students have opportunities to consider their prior experiences, discuss preconceptions of RCR topics, and examine misconceptions. McGee et al. (2008) have studied the influence of trainee prior experiences on learning RCR and confirm the importance of exploring preconceptions to enhance learning.

2. Knowledge Centered

Applied to RCR instruction, students need to understand:

a. what is taught (e.g., conflict of interest, data management, and publication practices);

b. why it is taught (e.g., understanding of conventions, regulations, and expectations); and

c. what competencies are desired (e.g., ability to find resources and ability to identify and manage ethical dilemmas).

The knowledge dimension of the HPL framework focuses on learning with understanding and speaks to depth of knowledge, level of expertise needed, and how competence is determined. In addition to depth, the instructor must have the requisite expertise to assist students in understanding and contextualizing the information. Assessing instruction would include evaluating the accuracy of factual knowledge used to teach the various RCR topics and the extent to which RCR topics most relevant to the discipline are the focus of instruction. Applying this principle would involve prioritizing relevant topics by discipline and incorporating problem solving and simulations to assist students in learning core content and understanding its application to practice. The Delphi Consensus Panel Report (Dubois & Dueker, 2009) addresses recommendations on RCR goals, core content, and tailoring of RCR training programs to meet the needs of students and trainees.

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3. Assessment Centered

Within the HPL framework, use of formative assessment is emphasized as an ongoing process for making what is known visible to both student and instructor. Formative assessment is accomplished through teaching strategies that encourage reflection, self-questioning, and open discussion about how students are thinking about what they are learning. An emphasis is placed on how information is contextualized rather than memorized. The application of meta-cognitive strategies that promote sense making is emphasized and can be incorporated through teaching methods that involve the use of tools like concept maps, checklists, and/or rubrics to guide the learning process. In addition to helping the instructor know whether the instructional content is understood, another benefit of formative assessment is that students are able to practice strategies for becoming more self-directed and autonomous in their learning—an important factor in developing lifelong learners. Keefer's (2012) article on the importance of formative assessment in ethics education provides several examples of formative assessment applied to professional ethics education.

4. Community Centered

The community perspective of the HPL framework emphasizes the influence of various stakeholders in the learning process and the importance of creating a culture in which collaborative problem solving and questioning of practices is valued and encouraged. The goal is to connect learning contextually to enhance transfer of what is being learned to practice in the field. Instruction that includes simulations of the research environment (e.g., role play and case studies) or brings in the community perspectives through guest speakers may be ways to facilitate transfer of the information to practice. Ideally, RCR training takes place not only in a seminar or classroom, but also in the actual research setting as a routine aspect of mentoring.

In summary, designing new RCR training and/or evaluating existing curricula for alignment with these principles of learning will be useful for educators to consider as we think about how to improve educational outcomes. I recently applied the HPL framework to the Professional and Research Ethics Practicum (PREP) designed for the PSM degree programs to assess alignment of instruction with the four perspectives (learner, knowledge, assessment, and community). While the practicum included strategies to actively engage students in the learning process (e.g., reflective writing, collaborative projects, group discussion, case analysis, case construction, and peer review), applying the HPL framework was a valuable exercise and informed curricular revisions to improve areas of formative assessment that will be pilot tested this spring. As an educator, I found value in developing an understanding of learning theory and considering the research on learning to guide RCR instructional design. I also have increased confidence that we are connecting our learning objectives with instructional strategies to accomplish specific goals. One of the goals is to assist students and trainees in becoming lifelong learners of RCR. Provided RCR instruction evolves to encompass strategies grounded in the research on learning, we are likely to see positive change in training outcomes.

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References

1. Anderson, M. (2007). Collective openness and other recommendations for the promotion of research integrity. *Science and Engineering Ethics 13*(4), 387–394. doi: 10.1007/s11948-007-9047-0.

2. Antes, A. L., Murphy, S. T., Waples, E. P., Mumford, M. D., Brown, R. P., Connelly, S., & Devenport, L. D. (2009). A meta-analysis of ethics instruction effectiveness in the sciences. *Ethics and Behavior 19*(5), 379–402.

3. Antes, A. L., Wang, X., Mumford, M. D., Brown, R. P., Connelly, S., & Devenport, L. D. (2010). Evaluating the effects that existing instruction on responsible conduct of research

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has on ethical decision making. *Academic Medicine 85*(3), 519–526.

4. Atkinson, T. N. (2008). Using creative writing techniques to enhance the case study method in research integrity and ethics courses. *Journal of Academic Ethics, 6*(1), 33–50. doi: 10.1007/s10805-007-9053-5.

5. Berry, R. M., Borenstein, J., & Butera, R. J. (2012). Contentious problems in bioscience and biotechnology: A pilot study of an approach to ethics education. *Science and Engineering Ethics*. doi: 10.1007/s11948-012-9359-6.

6. Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How people learn: Brain, mind, experience, and school (expanded ed.)*. Washington, DC: National Academies Press.

7. Brummel, B. J., Gunsalus, C. K., Anderson, K. L., & Loui, M. C. (2010). Development of role-play scenarios for teaching responsible conduct of research. *Science and Engineering Ethics*, 16, 573–589.

8. DeBruin, D. A., Scholder, S. L., Kahn, J., Mastroianni, A. C., Marshall, M. F., Lantos, J., & Sugarman, J. (2007). Educational approaches to the responsible conduct of research: An exploratory study. *Academic Medicine 82*(1), 32–39.

9. DuBois, J. M., & Dueker, J. (2009). Teaching and assessing the responsible conduct of research: A Delphi Consensus Panel Report. *Journal of Research Administration, 40*(1), 49–70.

10. Jones, N. L., Peiffer, A. M., Lambros, A., Guthold, M., Johnson, A. D., Tytell, M. Eldridge, J. C. (2010). Developing a problem-based learning (PBL) curriculum for professionalism and scientific integrity training for biomedical graduate students. *Journal of Medical Ethics, 36*(10), 614–619. doi:10.1136/jme.2009.035220.

11. Kalichman, M. W. (2007). Responding to challenges in educating for the responsible conduct of research. *Academic Medicine, 82*(9), 870–875.

12. Kalichman, M. W., & Plemmons, D. K. (2007). Reported goals for responsible conduct of research courses. *Academic Medicine, 82*(9), 846–852.

13. Keefer, M. W. (2012). The importance of formative assessment and curricular alignment in professional ethics education: Some practical tools. *CORE Issues in Professional and Research Ethics, 1 (Paper 2)*.

14. Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, England: Cambridge University Press.

15. McGee, R., Almquist, J., Keller, J. L., & Jacobsen, S. J. (2008). Teaching and learning responsible research conduct: Influences of prior experiences on acceptance of new ideas. *Accountability in Research, 15*, 30–62. doi: 10.1080/08989620701783758.

16. Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide*. San Francisco: Wiley.

17. National Institutes of Health. (2009). Update on the requirement for instruction in the responsible conduct of research. NOT-OD-10-019 ed: "NIH Guide for Grants and Contracts."

18. National Science Foundation. (2009, August 20). Responsible conduct of research. *Federal Register, 74*(160), 42126-42128. Retrieved February 17, 2013, from *http://edocket.access.gpo.gov/2009/ E9-19930.htm*

19. Powell, S. T., Allison, M. A., & Kalichman, M. W. (2007). Effectiveness of a responsible conduct of research course: A preliminary study. *Science and Engineering Ethics, 13*(2), 249–264. doi: 10.1007/s11948-007-9012-y.

20. Singer, S. R., Nielsen, N. R., & Schweingruber, H. A. (Eds.). (2012). *Discipline-based education research: Understanding and improving learning in undergraduate science and engineering*. Washington, DC: National Academies Press.

21. Steneck, N. H., & Bulger, R. E. (2007). The history, purpose, and future of instruction in the responsible conduct of research. *Academic Medicine, 82*(9), 829–834.

22. Teixeira-Poit, S. M., Cameron, A. E., & Schulman, M. D. (2011). Experiential learning and research ethics: Enhancing knowledge through action. *Teaching Sociology, 39*(3), doi: 10.1177/0092055X11407346.

23. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

"The teacher who is indeed wise does not bid you to enter the house of his wisdom but rather leads you to the threshold of your mind."

Kahlil Gibran

(1883-1931)

Case Summaries

Paul J. Muchowski, Ph.D.
The J. David Gladstone Institutes

Based on the report of an investigation conducted by The J. David Gladstone Institutes (Gladstone) and additional analysis conducted by ORI in its oversight review, ORI found that Dr. Paul J. Muchowski, former Senior Investigator, Gladstone Institute of Neurological Disease, Gladstone, engaged in research misconduct in research supported by National Institute of Neurological Diseases and Stroke (NINDS), National Institutes of Health (NIH), grant R01 NS054753-06A1.

ORI found that the Respondent engaged in research misconduct by falsifying and fabricating data that was included in one (1) funded NIH grant R01 NS054753-06A1 and two (2) submitted NIH grant applications R01 NS054753-06 and R01 NS047237-06.

Specifically, ORI finds that the Respondent knowingly and intentionally

- falsely reported research experiments when the results did not exist at the time the grant applications were submitted.
- Specifically, in Figures 19-21 and related text of grant application R01 NS047237-06, the Respondent claimed he had successfully transduced human neuroblastoma SH-SY5Y cells expressing α-synuclein (αSyn) with lentiviruses containing small hairpin RNAs (shRNAs) that targeted *Cog6*, *Stx7*, *Vps52*, or *Vps33a*. The Respondent reported lentiviral expressed *Cog6* significantly exacerbated α-Syn toxicity in SH-SY5Y cells, when only plasmid shRNAs were generated and utilized at the time the grant application was submitted.
- in Figure 5 and the accompanying text of grant R01 NS054753-06A1, the Respondent described the insertion of toxic and inert mutant huntingtin (htt) fragments into maltose binding protein-Htt-Cerulean constructs with a nonpathogenic (25Q) or pathogenic (46Q) polyQ repeat, with and without Cerulean. The modified proteins were claimed to have been purified, when the constructs had not been made at the time the grant was submitted.
- in Figures 5 and 6 and the accompanying text of grant R01 NS054753-06A1, the Respondent claimed to have cloned toxic and inert mutant htt fragments into lentiviral constructs and generated lentiviruses, when the constructs were not made.
- in Figure 6 and related text in grant R01 NS054753-06A1, the Respondent claimed to have tested immunoblots of lysates from primary neurons with an antibody against mutant htt, which demonstrated that levels of htt expression in transduced cells were roughly equivalent to levels in normal neurons, when the experiment was not conducted.
- falsified Figure 3 of grant application R01 NS054753-06 by labeling the Western blot images for the expression of mutant htt in lentiviral-transduced primary neurons as 'Cortex' (left panel) and 'Striatum' (right panel), when the results were actually from the microglial cell lines N9 and BV2, respectively.

Dr. Muchowski has entered into a Voluntary Settlement Agreement and has voluntarily agreed for a period of two (2) years, beginning on December 10, 2012:

(1) to have his research supervised; Respondent agreed that prior to the submission of an application for PHS support for a research project on which his participation is proposed and prior to his participation in any capacity on PHS-supported research, Respondent shall ensure that a plan for supervision of his duties is submitted to ORI for approval; the supervision plan must be designed to ensure the scientific integrity of his research contribution; he agreed that he shall not participate in any PHS-supported research until such a supervision plan is submitted to and approved by ORI; Respondent agreed to maintain responsibility for compliance with the agreed upon supervision plan; and

(2) to exclude himself voluntarily from serving in any advisory capacity to PHS including, but not limited to, service on any PHS advisory committee, board, and/or peer review committee, or as a consultant.

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Case Summaries *(continued)*

Rao M. Adibhatla, Ph.D.
University of Wisconsin

Based on the report of an investigation conducted by the University of Wisconsin (UW) and additional analysis conducted by ORI in its oversight review, ORI found that Dr. Rao M. Adibhatla, Assistant Professor, Department of Neurological Surgery, UW, engaged in research misconduct by falsifying results in two publications supported by National Institute of Neurological Diseases and Stroke (NINDS), National Institutes of Health (NIH), grant R01 NS042008 and in three unfunded applications that Dr. Adibhatla submitted to NINDS, NIH, as R01 NS042008-05, -05A1, and -05A2. The questioned papers are:

1. Adibhatla, R.M., Hatcher, J.F., Larsen E.C. *et al*. "CDP-choline Significantly Restores Phoshatidylcholine Levels by Differentially Affecting Phospholipase A_2 and CTP:Phosphocholine Cytidylyltransferase after Stroke." *J. Biol. Chem*. 281:6718-6725, 2006 (hereafter referred to as the "*JBC* paper"), as the $sPLA_2$-IIA, CCTα, and PLD2 data in Figures 1B, 2A, and 3A, respectively
2. Adibhatla, R.M., & Hatcher, J.F. "Secretory phospholipase A2 IIA is Up-regulated by TNF-α and IL-1α/β after Transient Focal Cerebral Ischemia in Rat." *Brain Research* 1134:199-205, 2007 (hereafter referred to as the "*Brain Research* paper"), as the $sPLA_2$-IIA data in Figures 2A and 2C.

ORI found that Respondent committed research misconduct by falsifying Western blot images as well as quantitative and statistical data obtained from purported scans of the films. The research studied the effect of cerebral ischemia on phospholipid homeostasis in an experimental animal model (SHR rat) of stroke during the course of reperfusion of the ischemic cortex. The falsified Western blot images and derivative quantitative data describe changes in levels of $sPLA_2$-IIAA, CCTα, and of PLD2 during reperfusion in the ischemic cortex.

Specifically, the Respondent:

- falsified the Western blot data demonstrating $sPLA_2$ expression in a time course after ischemia in Figure 1B of the *JBC* paper and Figure 2A and 2C of the *Brain Research* paper by rearranging the bands such that the labels do not accurately portray what is in the lanes. He perpetuated the falsification by presenting the quantification of the single falsified Western blot in a bar graph as the average of five (5) replicate Western blots. The result in the paper cannot be substantiated by the actual experiments.
- falsified the Western blot data demonstrating CCTα expression in a time course assay after ischemia in Figure 2A of the *JBC* paper by rearranging the bands such that the labels do not accurately portray what is in the lanes. He perpetuated the falsification by presenting the quantification of the single falsified Western blot in a bar graph as the average of four (4) replicate Western blots and the six (6) hour time point was further falsified to make the results look better. The result in the paper cannot be substantiated by the actual experiments.
- falsified the quantification of a Western blot demonstrating PLD2 expression in a time course after ischemia in Figure 3A of the *JBC* paper by claiming a bar graph quantifying a single Western blot is the average of four Western blots.
- submitted the same falsified Western blot images and bar graph data in three unfunded grant applications: NS042008-05, NS042008-05A1, and NS042008-05A2. Specifically:
  – the falsified $sPLA_2$-IIA data were submitted as Figures 3, 8, and 12 in the respective NS042008-05, -05A1, and -05A2 applications
  – the falsified CCTα data appeared as Figures 10, 15, and 16 in the respective -05, -05A1, and -05A2 applications
  – the falsified PLD2 bar graph data and associated statistical claims appeared as Figures 8 and 13 in the -05 and -05A1 applications, respectively.

Dr. Adibhatla has entered into a Voluntary Exclusion Agreement and has voluntarily agreed:

(1) to exclude himself voluntarily for a period of two (2) years from

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the effective date of the Agreement from any contracting or subcontracting with any agency of the United States Government and from eligibility or involvement in nonprocurement programs of the United States pursuant to HHS' Implementation (2 C.F.R. part 376 *et seq*.) of OMB Guidelines to Agencies on Governmentwide Debarment and Suspension, 2 C.F.R., Part 180 (collectively the "Debarment Regulations");

(2) to exclude himself voluntarily from serving in any advisory capacity to PHS including, but not limited to, service on any PHS advisory committee, board, and/or peer review committee, or as a consultant for a period of three (3) years beginning on December 18, 2012; and

(3) to request retraction of the following papers:

- *J. Biol. Chem*. 281:6718-6725, 2006
- *Brain Research* 1134:199-205, 2007.

Bryan William Doreian, Ph.D. Case Western Reserve University

Based on the admission of the Respondent, ORI found that Dr. Bryan William Doreian, former postdoctoral fellow, Department of Dermatology, Case Western Reserve University (CWRU), engaged in research misconduct in research supported by National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH), grant T32 HL07887 and National Institute of Neurological Disorders and Stroke (NINDS), NIH, grant R01 NS052123.

ORI found that the Respondent engaged in research misconduct by falsifying data that were included in:

- Doreian, B.W. "Molecular Regulation of the Exocytic Mode in Adrenal Chromaffin Cells." Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, August 2009; hereafter referred to as the "Dissertation."
- Doreian, B.W., Fulop, T.G., Meklemburg, R.L., Smith, C.B. "Cortical F-actin, the exocytic mode, and neuropeptide release in mouse chromaffin cells is regulated by myristoylated alanine-rich C-kinase substrate and myosin II." *Mol Biol Cell*. 20(13):3142-54, 2009 Jul; hereafter referred to as the "*Mol Biol Cell* paper."
- Doreian, B.W., Rosenjack, J., Galle, P.S., Hansen, M.B., Cathcart, M.K., Silverstein, R.L., McCormick, T.S., Cooper, K.D., Lu, K.Q. "Hyper-inflammation and tissue destruction mediated by PPAR-γ activation of macrophages in IL-6 deficiency." Manuscript prepared for submission to *Nature Medicine*; hereafter referred to as the "*Nature Medicine* manuscript."

As a result of the Respondent's admission, the Respondent will request that the following paper be retracted: *Mol Biol Cell*. 20(13):3142-54, 2009 Jul.

ORI finds that Respondent falsified numerical values in the *Mol Biol Cell* paper, the submitted *Nature Medicine* manuscript, and the Dissertation by altering the number of samples or the experimental results to improve the statistical results. Specifically, ORI finds that Respondent:

1. falsified the quantification of immunofluorescence for the ratio of phosphorylated to unphosphorylated MARCKS protein in response to different stimuli in Figure 2 of the *Mol Biol Cell* paper and in Figure 12 of the Dissertation by falsifying the sample number as n=15
2. falsified the quantification of immunofluorescence for filamentous actin in response to different stimuli in Figure 3 of the *Mol Biol Cell* paper and in Figure 13 of the Dissertation by falsifying the sample number as n=15
3. falsified the quantification for the effect of blebbistatin on catecholamine release as determined by patch clamp analysis in Figure 22 of the Dissertation by stating that 14 cells had been assayed when only 8 cells had been assayed
4. falsified the Pearson's cross-correlation analysis in Figure 7 of the *Mol Biol Cell* paper and in Figure 25 of the Dissertation, used to calculate the degree of spatial correlation between pan-chromogranin A/B (CgA/B) and the endosomal membrane, by stating that 20 or more cells had

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been tested for each condition when only 9-18 cells had been tested for each condition

5. falsified RT-PCR values for iNOS and TNF-alpha expression recorded on spreadsheets and presented in Figures 5e and 5f of the *Nature Medicine* manuscript showing the effect of hyper-inflammatory macrophage generation on tissue destruction, by falsifying the numeric values to fit the hypothesis of the manuscript

6. falsified ELISA graphs for the concentration of TNF-α in the aAB IL-6 mice and their controls in Figure 6j of the *Nature Medicine* manuscript showing the effect of rosiglitazone treatment in the mice, by multiplying the experimental values by 100 to match the magnitude of the values presented in Figures 21, 6h, and 6i of the *Nature Medicine* manuscript

7. falsified the RT-PCR results presented in the *Nature Medicine* manuscript for quantification of iNOS and TNF-α RNA expression by claiming that the results represent the rmean of three identical experiments when the three experiments were normalized differently to yield the desired result. Specifically, false results were presented for peritoneal macrophages treated in vivo with rosiglitazone and/or inhibitors of PPARγ signaling Figures 1g, 1h, and 1i, and for iNOS RNA expresssion in $IL6^{-/-}$ macrophages treated in vitro with either SOCS3 antisense oligonucleotides in Figure 2g or the STAT3 decoy in Figure 2j.

Dr. Doreian has entered into a Voluntary Settlement Agreement and has voluntarily agreed for a period of three (3) years, beginning on January 15, 2013:

(1) to have his research supervised; Respondent agreed that prior to the submission of an application for U.S. Public Health Service (PHS) support for a research project on which his participation is proposed and prior to his participation in any capacity on PHS-supported research, Respondent shall ensure that a plan for supervision of his duties is submitted to ORI for approval; the supervision plan must be designed to ensure the scientific integrity of his research contribution; he agreed that he shall not participate in any PHS-supported research until such a supervision plan is submitted to and approved by ORI; Respondent agreed to maintain responsibility for compliance with the agreed upon supervision plan;

(2) that any institution employing him shall submit, in conjunction with each application for PHS funds, or report, manuscript, or abstract involving PHS-supported research in which Respondent is involved, a certification to ORI that the data provided by Respondent are based on actual experiments or are otherwise legitimately derived and that the data, procedures, and methodology are accurately reported in the application, report, manuscript, or abstract;

(3) to exclude himself voluntarily from serving in any advisory capacity to PHS including, but not limited to, service on any PHS advisory committee, board, and/or peer review committee, or as a consultant; and

(4) to request that the following paper be retracted: *Mol Biol Cell*. 20(13):3142-54, 2009 Jul.

**Adam C. Savine
Washington University in St. Louis**

Based on the report from Washington University in St. Louis (WUSTL) and Respondent's admission, ORI found that Mr. Adam C. Savine, former doctoral student, Department of Psychology, WUSTL, engaged in research misconduct in research supported by National Institute of Mental Health (NIMH), National Institutes of Health (NIH), grant R56 MH066078, National Institute on Drug Abuse (NIDA), NIH, grants F31 DA032152 and R21 DA027821, and National Institute on Aging (NIA), NIH, grant T32 AG00030.

ORI found that the Respondent engaged in research misconduct by falsifying data that were included in the following three publications and six conference abstracts:

Publications

1. Savine, A.C., & Braver, T.S. "Local and global effects of motivation on cognitive control." *Cogn Affect Behav Neurosci*.

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12(4):692-718, 2012 Dec. (hereafter referred to as *Cogn Affect Behav Neurosci*. 2012)

2. Savine, A.C., McDaniel, M.A., Shelton, J.T., Scullin, M.K. "A characterization of individual differences in prospective memory monitoring using the Complex Ongoing Serial Task." *J Exp Psychol Gen*. 141(2):337-62, 2012 May (hereafter referred to as *J Exp Psychol Gen*. 2012)
3. Savine, A.C., & Braver, T.S. "Motivated cognitive control: Reward incentives modulate preparatory neural activity during task-switching." *J Neurosci*. 30(31):10294-305, 2010 Aug 4 (hereafter referred to as *J Neurosci*. 2010).

Conference Abstracts

1. Savine, A.C., & Braver, T.S. (November 2010) "The contextual and local effects of motivation on cognitive control." Psychonomics Society, St. Louis, MO
2. Savine, A.C., & Braver, T.S. (November 2010) "A model-based characterization of the individual differences in prospective memory monitoring." Psychonomics Society, St. Louis, MO
3. Savine, A.C., & Braver, T.S. (November 2010) "Motivated cognitive control: Reward incentives modulate preparatory neural activity during task-switching." Society for Neuroscience, San Diego, CA
4. Savine, A.C., & Braver, T.S. (June 2010) "Motivated cognitive control: Reward incentives modulate preparatory neural activity during task-switching." Motivation and Cognitive Control Conference, Oxford, England
5. Savine, A.C., & Braver, T.S. (January 2010) "Neural correlates of the motivation/cognitive control interaction: Activation dynamics and Performance prediction during task-switching." Genetic and Experiential Influences on Executive Function, Boulder, CO
6. Savine, A.C., & Braver, T.S. (June 2009) "Incentive Induced Changes in Neural Patterns During Task-Switching." Organization for Human Brain Mapping, San Francisco, CA

As a result of the Respondent's admission, the senior authors will request that the published papers be retracted or corrected.

ORI finds that Respondent falsified data and related text in *Cogn Affect Behav Neurosci*. 2012, J *Exp Psychol Gen*. 2012, *J Neurosci*. 2010, and in six (6) meeting abstracts, by altering the experimental data to improve the statistical results. Specifically, Respondent:

1. falsified data in *Cogn Affect Behav Neurosci*. 2012 to show an unambiguous dissociation between local and global motivational effects. Specifically, Respondent exaggerated (1) the effect of incentive context on response times and error rates in Table 1 and Figures 1 and 3 for experiment 1 and (2) the effect of incentive cue timing on response times and error rates in Table 2 and in Figures 6, 9, and S2 for experiment 2.
2. falsified data in *J Exp Psychol Gen*. 2012 to show that prospective memory is influenced by three dissociable underlying monitoring patterns (attentional focus, secondary memory retrieval, information thresholding), which are stable within individuals over time and are influenced by personality and cognitive differences. Specifically, Respondent modified the data to support the three category model and to show (1) that individuals fitting into each of the three categories exhibited differential patterns of prospective memory performance and ongoing task performance in Tables 1-3; Figures 5-8, and (2) that certain cognitive and personality differences were predictive of distinct monitoring approaches within the three categories in Figure 9.
3. falsified data in *J Neurosci*. 2010 and mislabeled brain images to show that motivational incentives enhance task-switching performance and are associated with activation of reward-related brain regions, behavioral performance, and trial outcomes. Specifically, Respondent modified the data so that he could show a stronger relationship between brain activity and behavior in Table 2 and Figure 4 and used brain images that fit the data rather than the images that cor-

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responded to the actual Talairach coordinates in Figure 3.

Mr. Savine has entered into a Voluntary Settlement Agreement and has voluntarily agreed for a period of three (3) years, beginning on February 22, 2013:

(1) to have his research supervised; Respondent agreed that prior to the submission of an application for U.S. Public Health Service (PHS) support for a research project on which his participation is proposed and prior to his participation in any capacity on PHS-supported research, Respondent shall ensure that a plan for supervision of his duties is submitted to ORI for approval; the supervision plan must be designed to ensure the scientific integrity of his research contribution; he agreed that he shall not participate in any PHS-supported research until such a supervision plan is submitted to and approved by ORI; Respondent agreed to maintain responsibility for compliance with the agreed upon supervision plan;

(2) that any institution employing him shall submit, in conjunction with each application for PHS funds, or report, manuscript, or abstract involving PHS-supported research in which Respondent is involved, a certification to ORI that the data provided by Respondent are based on actual experiments or are otherwise legitimately derived and that the data, procedures, and methodology are accurately reported in the application, report, manuscript, or abstract;

(3) to exclude himself voluntarily from serving in any advisory capacity to PHS including, but not limited to, service on any PHS advisory committee, board, and/or peer review committee, or as a consultant; and

(4) that the senior authors will request that the following papers be retracted or corrected: *Cogn Affect Behav Neurosci*. 2012, *J Exp Psychol Gen*. 2012, and *J Neurosci*. 2010.

ORI thanks the following people for contributing articles to the newsletter:

Alison L. Antes and Camille Nebeker

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