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Do the Ethics of Authorship Matter?: Exploring the Implications of the Office of Research Integrity's Narrow Definition of Research Misconduct

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**DO THE ETHICS OF AUTHORSHIP MATTER?:
EXPLORING THE IMPLICATIONS OF THE OFFICE OF RESEARCH
INTEGRITY'S NARROW DEFINITION OF RESEARCH MISCONDUCT**

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
Professional Communication

by
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December 2011

Accepted by:
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ABSTRACT

Over the past 25 years, federal government entities have become involved in defining and regulating misconduct in scientific research. Consistently, these definitions of research misconduct forbid three key actions—falsification, fabrication, and plagiarism—but do not take into account other professional communication issues, mainly authorship. This lack of acknowledgement and regulation of authorship—particularly from the Office of Research Integrity, the nation’s highest research ethics body—seems to imply and communicate that the ethics of authorship are not important in science. However, this thesis demonstrates, through rhetorical, historical and interview research, that authorship ethics do matter to scientists; in fact, authorship is a leading concern, even if not defined or regulated by federal oversight bodies. The thesis then recommends how authorship ethics can be better acknowledged by federal oversight boards without slipping into positivistic rules and requirements, and includes a recommendation to integrate ethics instruction into science curricula.

DEDICATION

The thesis is dedicated first to my steadfast husband: Your love and unending support carried me through every class, assignment, paper and revision. You never complained, even while I did, even as you made sacrifices so I could complete this degree. We began this journey when our daughter was three months old; she is now an active two-year-old who has become accustomed to spending many happy evenings with Daddy while Mama attends class or needs to write. Thank you for giving me (and her) that time, letting me bounce ideas off of you, share frustrations and triumphs with you, and take this journey with you. We did it!

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Finally, I offer many thanks to my parents, my friends, and my extended family for your patience during this time. I could not give you all the time and attention I would have preferred, but you all gave me the support and blessings that I needed. Thank you all.

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This thesis quite literally would not exist if Dr. Steven B. Katz, R. Roy and Marnie Pearce Professor of Professional Communication, had not taken me on as a research assistant. Knowing me only from the recommendation of a few colleagues, he took a chance on me, and then guided me from interested novice to devout fan of the study of ancient and modern rhetoric, ethics and scientific communication. Questions that he encountered while writing *Writing in the Sciences* planted the seed for our research, but I don't think either of us expected it to grow as it has. He never saw this thesis as just a paper, but instead as the beginning of a scholarly journey together. I am indebted to him for his time, expertise and unending enthusiasm.

Additionally, I would like to thank my interview participants for being not only generous with their time, but also open, thoughtful, and encouraging. Professor Tharon Howard offered constructive ideas as I worked through the beginnings of the project, including encouraging me to add the interviews. My committee members, Dr. Teresa Fishman, Director of the International Center for Academic Integrity, and Associate Professor Scott Mogull, who has experience publishing his own scientific research, were kind and supportive readers who gave me astute advice related to their fields of expertise, and guided me to create a more thorough research project than I ever thought possible.

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CHAPTER ONE

INTRODUCTION

“In science the credit goes to the man who convinces the world, not the man to whom the idea first occurs” (Sir Francis Darwin, *Eugenics Review*, 1914).

In preparing the epitaph for this introduction, I came across a research problem. I had seen this quotation a few times and wanted to use it, so I ran a Google search to find its source. The resulting pages credited the quotation to three different men: Sir Francis Darwin, Sir William Osler and Francis Galton. Most pages cited the first two men, and though I tried to compare the reliability and veracity of the Web pages, I was not able to confirm which person had actually penned the phrase. The irony of not being able to properly give credit for a quotation about gaining credit was thick (and amusing). Thankfully, a research librarian offered the help and trustworthy research I needed. She confirmed that Sir Francis Darwin had written the sentence, and she was able to refer me to the original 1914 text in *Eugenics Review*. Poor Francis Darwin: in trying to make a point about the importance of associating your name with your scientific discovery, his own name had become disassociated with the idea. It would seem that ensuring that scientists are able to effectively communicate their ideas to the world has been an issue for at least a century.

Actually, the perceived split of communication from the “real work” of science dates back thousands of years. From Plato’s assertion that rhetoric (and writing) had no

role in seeking true knowledge to Sprat's call for an end to rhetoric and any eloquence in writing, communication has come to be viewed as something to be dealt with only after knowledge is "discovered." Yet rhetoric and communication scholars, and thankfully many scientists, now seem to understand that communication is vital to the spreading of scientific knowledge and the work of scientists. Most scientists learn about research not by visiting labs or recreating studies, but by reading others' research reports. Scientists spread knowledge about their work in journals, magazines, and Web sites targeted to a wide variety of audiences. They must regularly write grant proposals to fund their research and conference proposals to meet with other scientists; as such, scientists must write regularly in order to be able to keep doing science. In fact, the writing of lab reports, studies and data collection actually creates scientific fact (Latour and Woolgar). Writing is not separate from scientists' work, it is central to it (see Chapter 2 and Foucault; Gross; Halloran and Whitburn; Latour; Latour and Woolgar; Myers; Penrose and Katz).

During the early stages of research for this project, an article appeared in *American Scientist* about an issue integrally related to the concept of a scientist as a writer: authorship ethics (Anderson et al.). The article discusses the effect of scientists' cultural differences on their authorship and communication ethics, like determining the allocation of credit and citing others' work. It opened with a seemingly simple assertion: "Among scientists, authorship is a very big deal—and for good reason" (Anderson et al. 1). The authors stated – with no hedging or citations – that authorship matters. Yet in a

field in which such a statement can be made as if it were obvious, there is strikingly little agreement or consistency regarding authorship and its implications in science.

Questions concerning authorship – and especially authorship ethics – are currently under heated discussion among the scientific community. The scientific associations and the peer-reviewed journals that the associations publish have tackled authorship issues in science with growing frequency. Over the past ten years, articles have been written in major journals in the fields of medicine, engineering, education and more attempting to define authorship guidelines regarding research, funding, partnerships, writing, publication and the peer-review process, as well as draw attention to growing problems regarding these authorship concerns (for some of many examples, see Anderson et al; Pearson; Jones; Wagner). General science and academic publications like *Nature* and *The Chronicle of Higher Education* have recently exposed and discussed cases of questionable research ethics related to authorship issues (Pearson; Zhang; Basken).

These discussions, as well as concerns expressed by scientists in interviews, imply that authorship ethics are of paramount concern to scientists. But are authorship concerns the same as research misconduct? Are they as important? Research misconduct is currently defined and regulated by the Office of Research Integrity (ORI), a branch of the Department of Health and Human Services that serves as the official oversight organization for scientific research. “ORI monitors institutional investigations of research misconduct and facilitates the responsible conduct of research (RCR) through educational, preventive, and regulatory activities” (Office of Research Integrity, “Welcome”), making it the highest ethical office in the United States. ORI’s most recent

(2005) guidelines define “research misconduct” as “fabrication, falsification, or plagiarism, including misrepresentation of credentials, in proposing, performing, or reviewing research, or in reporting research results” (Office of Research Integrity, “Introduction”). Missing from ORI’s definition, last updated in 2007, is any reference to authorship (beyond plagiarism).

In 2005, a seminal research study by Martinson, Anderson and de Vries, published in the widely circulated, interdisciplinary journal *Nature*, implied that research misconduct and authorship ethics were closely intertwined. Their survey of professional scientists found that arguably seven of the top sixteen instances of misconduct most reported by scientists were related to authorship issues. Of these seven commonly reported authorship issues, only one – plagiarism – is included in the current research guidelines issued by the ORI. ORI’s guidelines do not include common (per the Martinson, Anderson and de Vries study) ethical issues concerning authorship like assigning credit, disclosing involvement of others, publishing data repeatedly, or taking cues from funding sources. Why not? If authorship issues are so related to research misconduct, why does the ORI not regulate authorship? Since the ORI – and other governing bodies in science – do not regulate authorship or issue authorship guidelines, what does that say about the importance of authorship ethics? In short, in science, do the ethics of authorship matter?

To attempt to understand whether authorship ethics matter in science, this study will take a three-tiered research approach, combining rhetorical and historical research with personal interviews. First, it will discuss the rhetorical and ethical implications of

the role of the scientist as author, which will provide a foundation to better understand the current responsibilities of scientists as communicators. Then, it will explore the history and the foundation that informed the Office of Research Integrity – as well as other key regulators of American scientists – and their definitions of research misconduct (and whether those definitions address authorship). This history includes a timeline that highlights the key decisions and definitions made regarding research misconduct and authorship issues in scientific research in the past twenty-five years. The research also identifies other key organizations that regulate science and includes their definitions and histories as well. The final result is a timeline and a snapshot of the evolution of key definitions of research misconduct, which both help illuminate the current state of government regulation of scientific ethics.

Next, the thesis will explore how scientists make authorship decisions, and whether authorship should be regulated. This chapter includes interviews with nine actively researching scientists working in a variety of fields. They discuss their methods for making authorship decisions, how they learned about authorship ethics, and their understanding of the roles of government and other oversight boards. These interviews highlight the language, passions and concerns of several scientists regularly grappling with authorship issues. Their ideas, combined with further research, provide the groundwork for a discussion on whether or not the ORI should better define or regulate authorship issues.

Finally, the thesis will make recommendations regarding authorship and ethics education for scientists. If authorship ethics do matter, then it becomes imperative to give

students of science a foundation in ethics and an understanding of their role as communicators in order to produce responsible scientists in the future. The implications for this research, revealing the importance of authorship ethics, should impact not only the scientific community, but researchers in all fields. For as go the science publications, so go the humanities. So if authorship matters in one field, it matters to us all, and impacts how we all communicate our work.

CHAPTER TWO

UNDERSTANDING AUTHORSHIP ETHICS

Scientists as Authors

“A full supply of facts begets a full supply of words” (Cicero 99; III.21.125).

For centuries, writing has been viewed as separate from discovering truth. In the *Phaedrus*, Plato (as Socrates) argues that writing prevents the discovery of Truth, which implies that Truth exists outside of writing, and words can only attempt to convey Truth (and, he would argue, they fail in effectively doing so). Plato believed that the author of a written text is removed from the Truth, is not contributing to the advancement of knowledge, but rather is using a crude method to attempt to portray Truth. Plato’s low opinion of writing influenced Enlightenment-era thought-leaders and the development of modern science. Francis Bacon, considered the father of modern science for his insistence on observation and replication in science, believed that language was misleading and diverted science from true knowledge. John Locke concurred, dubbing language only a conduit for ideas observed in the natural world. In establishing the Royal Society of London, Thomas Sprat called for an end to the use of rhetoric and a return to plain, more mathematical speech. He asserted that “eloquence ought to be banished out of all civil societies” (111), distinctly removing writing, speech and persuasion from a scientist’s encouraged skill set.

Thus, in the centuries from Plato’s dialogues through the positivist movement, writing and rhetoric were viewed as separate from the “real work” of science, in that communication was perceived as something to be dealt with only after knowledge was

“discovered.” In recent history, Latour and Woolgar turned this concept on its head when their extensive study of practicing scientists strongly suggested that the facts scientists “discovered” were actually created by the scientists as they followed the processes (outlined originally by Bacon) that society has determined add legitimacy to their findings (processes which, according to Latour and Woolgar, often take place as writing). Scientific facts, according to Latour and Woolgar, are social constructions, and even the act of fact-creation is based on the creation of meaning from symbols, which in turn is rhetorical. Furthermore, the earlier positivist view of science implied that invention was unnecessary – since facts were there to be discovered, not invented – but the social constructionist idea and movements opened the gateway for invention to join form and style in scientific and technical writing (Miller, “A Humanistic Rationale”). Scientists argue for ways of seeing the world, and argument – in writing or science – is rhetoric.

Other studies further supported the holistic role of scientists as rhetoricians. Scientists must use rhetorical appeals in order to persuade audiences that the studies they have conducted accurately reflect the “facts” they claim to have discovered, illustrated or supported. Gross illustrates the importance of these appeals when he dissects the style and order of scientific papers, which reflect the inductive nature of science and make scientific findings sound more conclusive and inevitable than perhaps they truly are. Myers’s studies illustrate that an author’s ethos greatly influences how findings are perceived and accepted by the scientific community, and that the words used by the scientist/author affect whether or not a study will even be published. Myers argued that there are several rhetorical devices at play in constructing, producing, convincing others

of and defending knowledge claims. His studies bring to the forefront scientists' need to be rhetoricians – having to be persuasive and write well in order to contribute to the field of knowledge. It would seem, then, that it is not about the quality of the study but rather the way it is presented that adds to our understanding of the world. Thus, to be effective, the scientist must be a persuasive author.

These studies are illustrative of the power of the author in scientific research as they reflect the role the scientist plays as a communicator and as a persuader – not just as a researcher. Modern research has shown that the scientific paper is not a rhetorically null report of a study, but rather a carefully constructed piece of persuasion that leads to socially constructed facts. As Dobrin argues, because “scientific writing makes a truth claim” (101), it influences and changes discourse, thus it must be persuasive, and thus it is rhetorical. The scientist, who once tried to be transparent, is now the author, who has the power to create fact, to add to our understanding of the world, through his or her use of rhetoric.

Ethics of Authorship

If we acknowledge the scientist as an author, then it follows that the scientist is also shouldered with the power and responsibilities associated with authorship. As Carolyn Miller argues, we must understand “practical rhetoric as a matter of conduct rather than of production, as a matter of arguing in a prudent way toward the good of the community rather than of constructing texts” (“What’s Practical” 23). As part of the scientific community, scientists must write not only good science (Miller’s term *techne*,

or “knowing-how”) but also science writing for the good of a greater community (Miller’s term *phronesis*, or “knowing-that”). As authors, scientists must balance the power of creating fact with the responsibility of serving a greater community. As Slack, Miller and Doak contend about technical writers, but which also applies to science writers:

“The consequences of extending authorship to technical communicators are significant. With the recognition that the communicator articulates and rearticulates meaning comes the responsibility for that rearticulation. No contribution is really transparent; it is only rendered transparent in relations of power. So, just as the power of technical communicators is recognized (as they are empowered), so too must they be held responsible.” (31)

If science writers can articulate meaning and manage power, as argued by Slack, Miller and Doak, then it follows that they need to be knowledgeable about rhetoric and ethics in order to manage and be responsible for that power.

Steven B. Katz articulated the importance of ethical communication in analyzing biotechnology, corporate, and risk management communications (“Biotechnology”; “Ethic of Expediency”; “Low-Level Radioactive” with Miller). In these genres, if the author does not properly take into account the audience, the situation, and the appropriate style, grave consequences could result, ranging from a panicked public to protests to government debacles to mass deaths. Poor communication, argues Katz, is not from bad writing (as in, poor grammar), but is rather “the result of rhetorical choices of organization, style, and/or diction that are ultimately based on unconscious and often

flawed assumptions about the role of language, values, and emotion in communication and decision-making” (Katz, “Language and Persuasion” 93). Instead of taking into account crucial ethical considerations regarding the audience and the role of language interpretation, too often, risk management and biotechnology communicators rely on the dated information-theory model of communication, in which a sender (in this case, an expert believed to hold all the facts and power) encodes a message, sends it to a receiver, and hopes noise does not interfere (Katz, “Biotechnology”). The effectiveness of writing based on an ethic of expediency, which relies only on the information-theory model of relations between humans, leaves bare a host of issues concerning what is good for the community (*phronesis*), and the need for a communicator to understand both the means and ends of communication (Katz, “Ethic of Expediency”). Katz thus calls for biotechnology communicators to take into account human creativity in communication, the ambiguity of language, and the role of style in creating meaning; and thus, he effectively implies that communicators – even in scientific fields – have an ethical responsibility to understand rhetoric. To achieve a greater understanding of rhetoric and ethics, one must better understand specifically how issues of communication ethics directly affect scientists. Specifically, communication ethics are likely important to scientists because they affect credit and credibility, which are essential for the continued production of science.

The Importance of Credit/Credibility

Because the credit one earns for research and publication is vital to a scientist's ability to contribute to the discourse community, it would follow that authorship is a major issue in science. As Drummon Rennie, deputy editor of the *Journal of the American Medical Association (JAMA)* remarked, "Credit more than anything drives science" (qtd. in Pearson 591). Known as "the coin of the realm" (Wilcox 216; App. E, 3, 101), credit affects scientists' careers, ranging from earning tenure and promotions to receiving funding and resources to gaining influence and power (Wilcox; Latour and Woolgar). Latour and Woolgar discuss credit as not just the rewards a scientist can receive, like job promotions and tenure, but also the credibility it allows in the field. As a scientist is deemed credible by his or her peers (often via a history of publications, which must be continually made in order to keep credibility), that scientist is awarded his or her own lab to oversee, funded research assistants and – most importantly – can more easily make fact-claims that contribute to science. Latour and Woolgar, as well as Myers in his study following two biologists trying to publish research papers, have pointed out that *who* makes a factual claim in science is as important (if not more so) than what the claim is. Credibility – which determines the ability to even "be allowed to" (via gatekeepers like journal reviewers or grant readers) contribute to the social construction of fact – is awarded to scientists who have already proven themselves as trustworthy and capable to their peers via publications. (For further discussion the importance of authorship and links to credit, see Chapter 4).

The issue of ethics arises, though, in that the allocation of credit can be a difficult and usually unregulated process. With so much at stake regarding credit, scientists are faced with needing to receive authorship credit for the work they have accomplished, while also considering the contributions and careers of their fellow researchers. The key issue, though, is that there are few defined rules regarding the definition of an author (who should get credit) nor the order in which those authors should be credited (who contributed the most) (Jones; Louis et al.). When rules do exist, they tend to be discipline-specific, not overarching for scientists in general (Geelhoed et al.; Jones). This can create an ethical dilemma at the time of publication.

“The central problem is that there are no set rules for assigning credit.... [The] differences in expectation [among disciplines] create fertile ground for disputes. And many say that the number and ferocity of such clashes is rising with the number of collaborative projects, which often have multiple authors spanning disciplines and national borders. (Pearson 591-592).

As this research will explore further, the complicating factors influencing authorship – including credit, status, reputation and more – seem to illustrate the need for the issue to be better defined and regulated. While the Pearson quotation above states that there are “no set rules for assigning credit,” various groups do have influence over scientists’ authorship decisions – including government agencies, journal editors, funding institutions and professional societies (see fig. 3.1). These rules, however, seem inconsistent or irrelevant to practicing scientists, who rarely research authorship rules and guidelines, even while admitting the issue is very important (see interviews in Chapter 4).

Authorship Ethics vs. Research Ethics

In the textbook *Writing in the Sciences*, Penrose and Katz contend that the same values that science requires for ethical research – “honesty, skepticism, fairness, collegiality, and openness” – apply directly to authorship as well (62). As such, they seamlessly combine communication ethics with research ethics: one cannot research ethically without also communicating ethically. However, scientific agencies seem to hark back to the positivistic view that it is possible to separate communication from knowledge, or authorship ethics from research ethics. In this environment, how, then, do the ethics of authorship fit in with or relate to the ethics of proper scientific research? To today’s practicing scientists, are authorship concerns the same as research concerns? Though plenty of resources exist to educate scientists on basic, ethical research practices, and plenty of regulatory bodies exist to define research misconduct (see Chapter 3), few of these focus on the ethical questions raised when a scientist’s role becomes author, a creator of truth. But these questions are clearly becoming more pressing, especially as science requires larger research teams, more communication and converging cultures – what Louis et al. term “the increasing complexity of science” (89) – and those responsible for reviewing, editing and publishing scientific research are scrambling to answer them.

Over the past ten years, articles have appeared in scientific journals from various fields and disciplines attempting to answer questions regarding authorship and publication ethics. Discussions of communication ethics in many of the articles has centered on publication ethics and authorship. Authorship and publication issues

mentioned in the literature include discussions of credit allocation, data fabrication, self-plagiarism (also known as redundant publication), cultural differences in authorship decisions, roles of journal editors, and best practices for author order (Anderson et al.; Jones; Louis et al.; Pearson). Of all these discussions, one authorship issue in particular – the allocation of credit – appears in almost all discussions regarding publication ethics and concerns, which makes sense considering the importance that credit plays in furthering science. These discussions help cement the idea that publication ethics are “forms of research misconduct that can undermine the scientific literature” (Wager et al. 348). One research piece in particular effectively argued the idea that authorship concerns are not only troublesome, but are in fact a form of research misconduct.

In 2005, Martinson, Anderson and de Vries’s survey in the widely circulated journal *Nature* shed light not only on the various types of ethical dilemmas in research beyond simple research misconduct, but how many of them related to authorship. In Martinson, Anderson and de Vries’s survey, 33% of scientists self-reported that they had participated in one of the top ten instances of research misconduct. Arguable, six of those ten types of misconduct involve communication, including issues about assigning credit and not including research that contradicts one’s study (see table 2.1). Of the sixteen total instances of misconduct reported by scientists, seven were related to communication. Martinson, Anderson and de Vries’s survey helped galvanize the discussion that communication ethics in themselves were and are an important aspect of research and publication in science (for one example, see Penrose and Katz, Ch. 3). Yet two years after

Table 2.1 Percentage of Scientists Who Say that They Engaged in the Behavior Listed within the Previous Three Years (n=3,247)

Top ten behaviors	All	Mid-Career	Early Career
1. Falsifying or 'cooking' research data	0.3	0.2	0.5
2. Ignoring major aspects of human-subject requirements	0.3	0.3	0.4
3. Not properly disclosing involvement in firms whose products are based on one's own research	0.3	0.4	0.3
4. Relationships with students, research subjects or clients that may be interpreted as questionable	1.4	1.3	1.4
5. Using another's ideas without obtaining permission or giving due credit	1.4	1.7	1
6. Unauthorized use of confidential information in connection with one's own research	1.7	2.4	0.8 ***
7. Failing to present data that contradict one's own previous research	6	6.5	5.3
8. Circumventing certain minor aspects of human-subject requirements	7.6	9	6.0 **
9. Overlooking others' use of flawed data or questionable interpretation of data	12.5	12.2	12.8
10. Changing the design, methodology or results of a study in response to pressure from a funding source	15.5	20.6	9.5 ***
Other behaviors			
11. Publishing the same data or results in two or more publications	4.7	5.9	3.4 **
12. Inappropriately assigning authorship credit	10	12.3	7.4 ***
13. Withholding details of methodology or results in papers or proposals	10.8	12.4	8.9 **
14. Using inadequate or inappropriate research designs	13.5	14.6	12.2
15. Dropping observations or data points from analyses based on a gut feeling that they were inaccurate	15.3	14.3	16.5
16. Inadequate record keeping related to research projects	27.5	27.7	27.3
Note: significance of χ^2 tests of differences between mid- and early-career scientists as noted by **($P < .01$) and ***($P < .001$).			

Source: Brian C. Martinson, Melissa S. Anderson and Raymond de Vries, "Scientists Behaving Badly," *Nature* 435.9 (2005): 737.

Martinson, Anderson and de Vries's study was published, the Office of Research Integrity restated their definition of research misconduct as "fabrication, falsification, or plagiarism [FFP], including misrepresentation of credentials, in proposing, performing, or reviewing research, or in reporting research results" (Office of Research Integrity, "Introduction"), which does not take into account any authorship concerns beyond plagiarism. They seem to have ignored Martinson, Anderson and de Vries's survey and much of the other published research about the link between authorship and research misconduct. It is therefore important to understand how the ORI arrived at such a definition and why they, and other regulating bodies, are refraining from defining and regulating authorship ethics.

CHAPTER 3

RESEARCH MISCONDUCT AND THE INCLUSION/EXCLUSION OF AUTHORSHIP ETHICS

“Promoting research integrity is important for preserving the trust within the research community and the public. Without integrity, progress can be thwarted easily and public health could be at risk.” (Scheetz 323)

Authorship ethics, it would seem, are not only essential to the practice of science, they are inseparable from research ethics. But even the concept of research ethics is not always clear cut. To try to understand the role of authorship ethics within (or essential to, or peripheral to) research misconduct, we must first understand what constitutes research misconduct and which groups control and regulate research misconduct. A summary of the history and development of definitions of research misconduct can be found in the Timeline (Appendix A). A chart illustrating the evolution of definitions of research misconduct and listing each definition in full can be found in table 3.1.

Table 3.1 Definitions of Research Misconduct in Government Agencies

Date	Organization	Definition of Research Misconduct	Of Note
July 1987	National Science Foundation (NSF)	"(1) fabrication, falsification, plagiarism, or other serious deviation from accepted practices in proposing, carrying out, or reporting results from activities funded by NSF; or (2) retaliation of any kind against a person who reported or provided information about suspected or alleged misconduct and who has not acted in bad faith" (Fischer).	"Deviating from accepted practice" potentially prosecutes scientists using radical new approaches.
1989	Public Health Services (PHS)	"Fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research" (Schechter and Schwartz).	"Other practices" is vague wording. Potentially prosecutes scientists using radical new approaches.
1992	National Academies of Sciences and Engineering	In <i>Responsible Science: Ensuring the Integrity of the Research Process</i> : "Misconduct in science is defined as fabrication, falsification, or plagiarism, in proposing, performing, or reporting research. Misconduct in science	FFP only

	and the Institute of Medicine	does not include errors of judgment; errors in the recording, selection, or analysis of data; differences in opinions involving the interpretation of data; or misconduct unrelated to the research process. Fabrication is making up data or results, falsification is changing data or results, and plagiarism is using the ideas or words of another person without giving appropriate credit." (27)	
1995	Commission on Research Integrity (aka The Ryan Commission)	<p>"Research misconduct is significant misbehavior that improperly appropriates the intellectual property or contributions of others, that intentionally impedes the progress of research, or that risks corrupting the scientific record or compromising the integrity of scientific practices. Such behaviors are unethical and unacceptable in proposing, conducting, or reporting research, or in reviewing the proposals or research reports of others.</p> <p>Examples of research misconduct include but are not limited to the following:</p> <p>Misappropriation: An investigator or reviewer shall not intentionally or recklessly</p> <ol style="list-style-type: none"> a. plagiarize, which shall be understood to mean the presentation of the documented words or ideas of another as his or her own, without attribution appropriate for the medium of presentation; or b. make use of any information in breach of any duty of confidentiality associated with the review of any manuscript or grant application. <p>Interference: An investigator or reviewer shall not intentionally and without authorization take or sequester or materially damage any research-related property of another, including without limitation the apparatus, reagents, biological materials, writings, data, hardware, software, or any other substance or device used or produced in the conduct of research.</p> <p>Misrepresentation: An investigator or reviewer shall not with intent to deceive, or in reckless disregard for the truth,</p> <ol style="list-style-type: none"> a. state or present a material or significant falsehood; or b. omit a fact so that what is stated or presented as a whole states or presents a material or significant falsehood." (15-17) 	Much of this recommendation was not taken by the Department of Health and Human Services. The DHHS referenced this recommendation when developing the definition below.
Oct. 1999 (accepted); Dec. 2000 (published)	Department of Health and Human Services' Office of Research Integrity (ORI) and Office of Science and Technology Policy (OSTP)	"Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. ... Fabrication is making up data or results and recording or reporting them. Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record...Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit. Research misconduct does not include honest error or differences of opinion." (Ferguson)	Back to FFP (despite recommendations above)
April 2001	National Science Foundation	"Research misconduct means fabrication, falsification, or plagiarism in proposing or performing research funded by NSF, reviewing research proposals submitted to NSF, or in	Revised from 1987, but still mainly FFP. Also includes phrase

	(NSF) & Office of Inspector General	<p>reporting research results funded by NSF.</p> <p>(1) Fabrication means making up data or results and recording or reporting them.</p> <p>(2) Falsification means manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.</p> <p>(3) Plagiarism means the appropriation of another person's ideas, processes, results or words without giving appropriate credit....</p> <p>Research misconduct does not include honest error or differences of opinion. (237)</p> <p>A finding of research misconduct requires that—</p> <p>(1) There be a significant departure from accepted practices of the relevant research community; and</p> <p>(2) The research misconduct be committed intentionally, or knowingly, or recklessly; and</p> <p>(3) The allegation be proven by a preponderance evidence." (238)</p>	<p>potentially implying importance of community to self-regulate: "significant departure from accepted practices of the relevant research community."</p>
May 2005	Office of Research Integrity (ORI) for PHS	<p>"Research misconduct means fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.</p> <p>(a) Fabrication is making up data or results and recording or reporting them.</p> <p>(b) Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.</p> <p>(c) Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.</p> <p>(d) Research misconduct does not include honest error or differences of opinion." (U.S. Dept. of Health and Human Services)</p>	<p><u>Definition of Research Misconduct, Sec. 93.103</u></p> <p>"Although most commentators supported the new definition of research misconduct, there were a number of comments recommending changes, including that: (1) The definition should be based on deception; (2) the definition of falsification is inadequate because it does not cover the nonexperimental manipulation of human or animal subjects with the goal of influencing research results, or bias in the coding of qualitative data; (3) the definition of plagiarism should expressly exclude authorship and credit disputes; and (4) the definition of</p>

			<p>misconduct should be expanded to include negligent and intentional mistreatment of animals.</p> <p>As explained in the preamble of the NPRM, the proposed definition of research misconduct, which is included in this final rule without change, includes OSTP's description of "fabrication, falsification, and plagiarism." That description is clear and sufficiently concrete to provide the basis for reasonable determinations of whether research misconduct has occurred and whether the misconduct was intentional, knowing, or reckless. Given the careful consideration that has been given to this definition and the value of a uniform government-wide definition, we are adopting the definition as it was proposed." (U.S. Dept. of Health and Human Services)</p>
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Research misconduct has only recently been formally defined and regulated in the United States on the federal level. Several government agencies and departmental committees have been developed in the past 30 years, and often later combined, to regulate the work of scientists. Major government funding agencies that oversee research

include the National Institutes of Health (NIH, part of the U.S. Department of Health and Human Services) and the National Science Foundation (NSF), which set research guidelines for scientists and institutions that apply for their grants. The top-most government services agency that regulates research is the Office of Research Integrity (ORI), which is housed within the U.S. Department of Health and Human Services. The ORI developed when two branches of the Public Health Service (PHS), the Office of Scientific Integrity (housed in the National Institute of Health) and the Office of Scientific Integrity Review (housed in Office of the Assistant Secretary for Health) consolidated in May 1992 (ORI, “About ORI – History”). Other organizations at the federal level also help educate scientists on research misconduct, including: the National Academies’ Committee on Science, Engineering and Public Policy (which publishes the booklet *On Being a Scientist: Responsible Conduct in Research*); the National Academies of Science and Engineering; the Institute of Medicine; the National Academies’ Panel on Scientific Responsibility and the Conduct of Research; and the Office of the Inspector General, which operates within the NSF (Committee on Science Engineering and Public Policy; Martinson, Anderson and de Vries).

These organizations and the research-misconduct focused committees within them have been formed as research misconduct has become a bigger issue, one that needed defining and regulating. Research misconduct became a public issue in 1981 during Congressional hearings that were held in response to some high profile cases of unethical research (Office of Research Integrity “About ORI – History”; Jones; Schechter and Schwartz). The hearings led to the passage of the Health Research Extension Act in 1985.

This act required regulations regarding research fraud to be investigated and reported by federal government science agencies (ORI, “About ORI – History”), which in turn led to 1) the NIH publishing research guidelines – mainly concerning funding, responsibilities and conflicts of interest – which were published in 1986 and codified in 1989 (ORI, “About ORI – History”), and 2) the NSF formally defining research misconduct in 1987 (Fischer). The NSF’s original definition of research misconduct was:

(1) fabrication, falsification, plagiarism, or other serious deviation from accepted practices in proposing, carrying out, or reporting results from activities funded by NSF; or

(2) retaliation of any kind against a person who reported or provided information about suspected or alleged misconduct and who has not acted in bad faith.

(Fischer)

In 1989, the Public Health Service published a similar definition, which focused still on fabrication, falsification and plagiarism, but removed the retaliation segment and stressed the concept of deviating from the scientific community (Schechter and Schwartz).

Definitions of research misconduct by the National Academies of Sciences and Engineering with the Institute of Medicine, and the Department of Health and Human Services’ two subgroups, the Office of Research Integrity and the Office of Science and Technology Policy (OSTP), have each published definitions of research misconduct that, like all the previously published ones, stress and define the three main tenants of fabrication, falsification and plagiarism (Panel on Scientific Responsibility; Ferguson).

During the past 30 years, the definitions of research misconduct have gone through some subtle changes, but nothing drastic. Let's briefly trace that history, which is summarized in table 3.1 and further expanded in the timeline in Appendix A. In 1991, the NSF revised their 1987 definition, and then revised it again in 2002 in conjunction with the Office of the Inspector General. This most recent iteration offers detailed definitions of fabrication, falsification and plagiarism and provides guidelines for determining if an action meets their standards of research misconduct (Office of Inspector General). The ORI published a definition in 2000 with the OSTP, then revised this definition in 2005 for the PHS, though the revision is a near carbon-copy of the original. Throughout the past three decades and across all the federal agencies, all the definitions of research misconduct include at their core the three words "fabrication, falsification, plagiarism." In fact, few of the definitions include anything beyond these three forbidden actions or brief descriptions of what the three terms mean.

In 1995, the Commission on Research Integrity, also known as the Ryan Commission, was formed to make recommendations to the Secretary of Health and Human Services, the House Committee on Commerce, and the Senate Committee on Labor and Human Resources about the definition of research misconduct and to address incidences of retaliation against whistleblowers who had reported misconduct (Commission on Research Integrity). The Commission recommended a new definition of research misconduct that went well beyond the "fabrication, falsification, plagiarism" definition that was currently in place. The Ryan Commission defined research misconduct as:

...significant misbehavior that improperly appropriates the intellectual property or contributions of others, that intentionally impedes the progress of research, or that risks corrupting the scientific record¹ or compromising the integrity of scientific practices. (Commission on Research Integrity 15)

The definition goes on to include examples of misconduct in the categories of misappropriation (plagiarism or a breach of confidentiality), interference (disrupting the work of another scientist) and misrepresentation (lying or withholding information) (Commission on Research Integrity). The Ryan Commission's recommended definition of research misconduct puts authorship issues – intellectual property and intellectual contribution – at the forefront of the definition, and includes further examples related to authorship ethics, including plagiarism, confidentiality, misrepresentation of the truth, and the alteration of facts in written reports. Clearly, the Ryan Commission felt that authorship ethics were central to research misconduct, yet their definition was not accepted in full by the then-Secretary of Health and Human Services, Donna Shalala, who instead implemented a definition of research misconduct proposed by the National Science and Technology Council (ORI, "About ORI – History"). The DHHS's new Federal Research Misconduct Policy, published in December 2000, again defined research misconduct "as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results" (Ferguson, n.p.). The Policy makes clear the DHHS's choice to not include authorship issues, despite the Ryan Commission's recommendations; in fact, the Policy included an acknowledgement of the

¹ "The record encompasses any documentation or presentation of research, oral or written, published or unpublished" (Commission on Research Integrity 15, note 20).

omission in its FAQs: “Are authorship disputes covered by this policy? Authorship disputes are not covered by this policy unless they involve plagiarism” (Ferguson n.p.).

Clearly, then, the governmental regulation and funding agencies choose only to regulate and define the singular issue of plagiarism as an authorship concern related to research misconduct, leaving out other nuances of authorship ethics. Furthermore, Martinson, Anderson and de Vries’s survey, which exposed how many reports of research misconduct were related to authorship, was administered in 2002 and published in 2005, and concluded: “Our findings suggest that US scientists engage in a range of behaviours extending far beyond falsification, fabrication and plagiarism” (737). Yet ORI’s definition was updated in 2005 (theoretically in time to have read the Martinson, Anderson and de Vries’ report) with no inclusion of authorship issues or any expansion beyond the three tenants. The actions seem obvious: the ORI, the nation’s highest oversight body on research ethics, chooses not to regulate or define issues concerning authorship as being part of research misconduct. But why?

The Power and Influence of the ORI

Before further analyzing what the ORI does not regulate, we need to understand what they do regulate and their process of review and punishment. The ORI “oversees and directs Public Health Service (PHS) research integrity activities” (“About ORI”). The PHS is comprised of 10 agencies, including the National Institute for Health, the Food and Drug Administration and the Centers for Disease Control and Prevention (“About ORI”). PHS provides billions of dollars in funding to support research at federal

and non-government (e.g. universities, hospitals, research institutions) agencies (“About ORI”). The ORI oversees the integrity of research at the institutions they fund by:

- developing policies, procedures and regulations related to the detection, investigation, and prevention of research misconduct and the responsible conduct of research;
- reviewing and monitoring research misconduct investigations conducted by applicant and awardee institutions, intramural research programs, and the Office of Inspector General in the Department of Health and Human Services (HHS);
- recommending research misconduct findings and administrative actions to the Assistant Secretary for Health for decision, subject to appeal;
- assisting the Office of the General Counsel (OGC) to present cases before the HHS Departmental Appeals Board;
- providing technical assistance to institutions that respond to allegations of research misconduct;
- implementing activities and programs to teach the responsible conduct of research, promote research integrity, prevent research misconduct, and improve the handling of allegations of research misconduct;
- conducting policy analyses, evaluations and research to build the knowledge base in research misconduct, research integrity, and prevention and to improve HHS research integrity policies and procedures;

- administering programs for: maintaining institutional assurances, responding to allegations of retaliation against whistleblowers, approving intramural and extramural policies and procedures, and responding to Freedom of Information Act and Privacy Act requests. (ORI, “About ORI”)

As such, ORI serves as the nation’s highest regulation body for research misconduct in science.

When an allegation of misconduct takes place at an institution receiving PHS funds, the incident is reviewed on the institutional level but overseen by the ORI. See Appendix B for a summary of the process that is taken when an allegation of misconduct occurs. The ORI must be notified before an investigation begins and of the final outcome (ORI “Sample Policy”). ORI becomes more immediately involved if the case exhibits: a possible health hazard to humans or animals; a need to protect federal funds or resources; a need to protect those involved in the allegation; an alleged incident that might be reported publicly prematurely or should be reported to the public promptly; research needs to be halted; or a crime might have been committed (ORI “Sample Policy”).

If, after an investigation, it is found by the institution (and agreed upon by ORI) that a respondent committed research misconduct, then the Public Health Services and the Department of Health and Human Services can administer significant actions, including:

- debarment from eligibility to receive Federal funds for grants and contracts,

- prohibition from service on PHS advisory committees, peer review committees, or as consultants,
- certification of information sources by respondent that is forwarded by institution,
- certification of data by institution,
- imposition of supervision on the respondent by the institution,
- submission of a correction of a published article by respondent, and
- submission of a retraction of a published articles by respondent. (ORI, “Handling Misconduct”)

In other words, findings of research misconduct by the ORI can result in scientists losing funds, equality with their peers, seniority and respect of their universities. In short, scientists stand to lose that key important factor needed to practice science: credibility.

One could argue that due to its overarching range and its ability to essentially ban a scientist from research, the ORI thus serves as the most over-arching body influencing practicing scientists. Scientists’ actions are regulated by a variety of different agencies and influencers, as seen in figure 3.1, with the ORI serving as the largest, but perhaps most removed. The figure illustrates, using a solid line, how ORI actually oversees (by administering investigations and prescribing punishment) the funding sources that oversee the institutions. The dotted line implies how, as the nation’s largest oversight body, their rules symbolically influence all aspects of a scientists’ career, even when their punishment is not a threat (in other words, ORI cannot specifically administer punishment on a journal or society, unless the case is turned over to the institution where

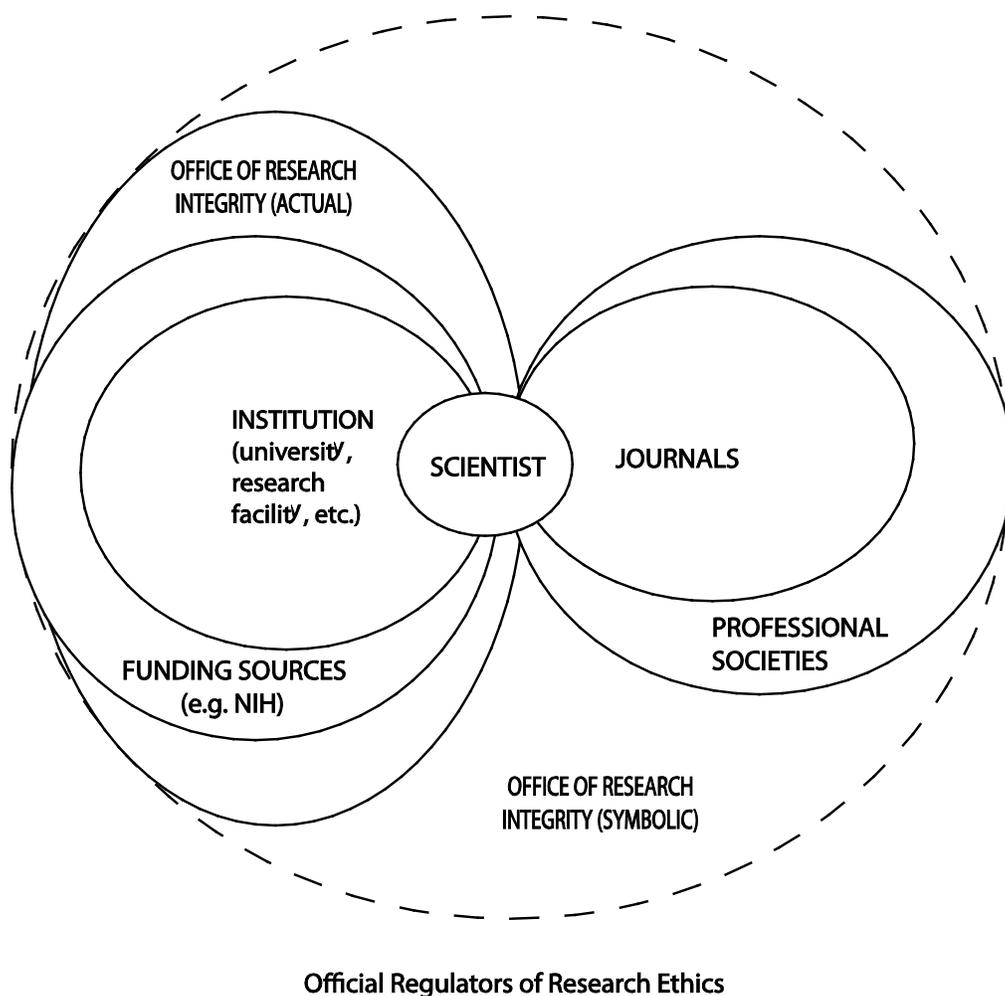


Figure 3.1 Official Regulators of Research Ethics

the scientist worked). The figure also makes clear how the regulators of scientists most related to publication and authorship – journals and professional societies – are not within the realm of the ORI’s actual influence. Journals and societies have thus had to fill the void of the lack of authorship oversight by the ORI by creating their own guidelines for authorship ethics (for more information, see the section below about journals and

editors, as well as Appendix A, which lists regulations and definitions issued by the International Council of Medical Journal Editors and the Council of Science Editors.) It seems irresponsible, or at least incongruent, that ORI, the symbolic overseer of ethical research in the United States, has chosen not regulate an issue of great importance to some of the major influencers of scientists.

Why ORI Does Not Regulate Authorship

In March 1999, Mary Scheetz of the Office of Research Integrity's Division of Policy and Education wrote an article for the *Croatian Medical Journal*² explaining the role of ORI in regulating research misconduct and outlining why the ORI and the PHS do not get involved in authorship disputes. According to Scheetz, the ORI places the bulk of regulation for misconduct – including issues of authorship – on the institutions conducting research. The ORI first determines that institutions have regulations in place to monitor misconduct and conduct investigations. “Because institutions have the primary responsibility for responding to allegations of scientific misconduct, the ORI role in most investigations is usually that of reviewing the institution’s investigative report” (Scheetz 322). “Because institutions are the recipients of the Public Health Service funds, ORI considers it the institutions’ responsibility to manage the funds they receive and mediate disputes that may arise over authorship controversies” (Scheetz 324).

² Though *Science Magazine* claims the *Croatian Medical Journal* has “a respectable impact factor of 1.45” and “has garnered international respect for its quality standards” (Tatalovic, n.pag.), it seems odd (and perhaps telling?) that a foreign publication was the location of a paper regarding U.S. research misconduct standards.

Scheetz argues that the ORI cannot be directly involved in authorship disputes because so many of them are not related to scientific misconduct – in other words, per ORI’s definition, these disputes are not plagiarism:

ORI receives many allegations that do not meet the Public Health Service definition of scientific misconduct. Misunderstandings about the Public Health Service definition have contributed to plagiarism allegations that are later determined to be authorship disputes. Authorship disputes comprised approximately 22% of the 166 allegations in 1997, and 27% of the 112 allegations that ORI received in 1998. Typically, a complainant submits an allegation of scientific misconduct believing it to be one of plagiarism; however, upon review ORI often determines that the alleged misconduct is better characterized as an authorship dispute, rather than plagiarism. One reason for this confusion may be that ORI’s interpretation of plagiarism under the Public Health Service definition of scientific misconduct has a more narrow scope than the term plagiarism as used more casually in the non-regulatory context. (Scheetz 323).

Scheetz cites a previously published definition of plagiarism by the ORI³, which clearly delineates plagiarism from other authorship or disputes. She then admits,

...many of the ‘plagiarism’ allegations submitted to the ORI are found to be authorship or credit disputes between collaborators or former collaborators.

³ “As a general working definition, ‘ORI considers plagiarism to include both the theft or misappropriation of intellectual property and the substantial unattributed textual copying of another’s work. It does not include authorship or credit disputes. The theft or misappropriation of intellectual property includes the unauthorized use of ideas or unique methods obtained by a privileged communication, such as a grant or manuscript review.’” (Scheetz 324, citing “ORI Provides Working Definition of Plagiarism.” *ORI Newsletter* 1994;3(1):3)

Examples of such disputes include: misappropriation of collaborators' ideas, disagreements over who should be an author, or the order of authorship. Other nuances of this issue include questions of whether consent must be obtained in order for a collaborator to publish independently from his or her research team and whether a member of a research team can publish conflicting analyses.

(Scheetz 324)

In this section of the article, she seems to acknowledge the myriad complicated issues involved in authorship ethics, yet holds fast that these problems are beyond the scope of the ORI. Scheetz is basically admitting that the issue of authorship is too cumbersome and difficult for the ORI to consider every case. Instead, the ORI hopes to educate and provide outreach support so that institutions and research organizations can better instruct their scientists (Scheetz). A metaphor that suits this power struggle is the U.S. federal government calling for the states to regulate an issue (like, gay marriage or the death penalty), believing it is both beyond the federal government's scope and beneath them to be bothered with. ORI regulates the institutions; the institutions must regulate their member scientists; thus ORI is passing the buck to a more hands-on regulator.

But between the federal government and the states, or in this case between the government agencies and the labs and universities they fund, lies a major player determining the research careers and rules scientists follow: the academic journals. Their role in defining and regulating research misconduct and authorship ethics on a case-by-case basis provides guidelines beyond the scope of institutions but below the level of the government.

Role of Journals and Journal Editors

During the early 1980s and through the decades that followed, while federal oversight boards continued to publish definitions of research misconduct that did not include authorship issues beyond plagiarism, the editors of scientific and medical journals began publishing their own rules concerning authorship ethics. In 1985, several journal editors began issuing statements and guidelines regarding authorship, including the International Committee of Medical Journal Editors (ICMJE). The ICMJE is a group of editors of various international medical journals and their related associations who meet solely for the purpose of establishing general publishing guidelines for all of their journals (ICMJE, “About the ICMJE”). Their published, formal authorship guideline is arguably the seminal one in science publication (Jones).

“The ICMJE criteria have been adopted by hundreds of biomedical journals throughout the world and have also been the basis for authorship criteria developed by a number of U.S. medical schools, several scientific societies (e.g., the Association of University Radiologists and the Society for Neuroscience), and two countries.” (Jones 244)

Under the Web site listing of their Uniform Requirements for Manuscripts Submitted to Biomedical Journals, Ethical Considerations category, the ICMJE includes statements and rules on a variety of authorship-related issues including allocation of credit, conflicts of interest, privacy and more (ICMJE, “Uniform Requirements”). The ICMJE guidelines also include a section on Publishing and Editorial Issues. Interestingly, this section is separate from the Ethical Considerations section, though many of the topics listed as

Publishing and Editorial Issues are directly related to authorship ethics. Publishing and Editorial Issues discussed and regulated by the ICMJE include obligations to publish negative studies, overlapping publications by authors, working with the media, and other concerns (ICMJE, “Uniform Requirements”).

Since no federal policy exists to tell scientists how to ethically allocate credit, the ICMJE’s guidelines serve as one of the only – if not the only – set of rules regarding authorship that apply equally to various disciplines and journals. Scientists can reference these Uniform Requirements to attempt to navigate the complicated waters of authorship and credit when they are working toward a publication in the biomedical field (how often scientists actually read or understand these requirements is unclear). Last updated in April 2010 (ICMJE, “Uniform Requirements...Ethical”), the Uniform Requirements have

... been adopted in one iteration or another by several hundred biomedical journals throughout the world. The ICMJE authorship criteria insist that authors must assume responsibility, as well as accept credit, for publications that bear their name. The first criterion [in 1985] originally stressed the necessity for an author to make substantial intellectual contributions to the research being reported. The ICMJE revised this criterion in June 2000 to allow “acquisition of data” as an alternative to the previously required intellectual contributions. The second and third criteria require that authors must take part in drafting or critically revising the manuscript, and they must approve the final version.” (Jones 246)

The outlined differences regarding which efforts should result in authorship credit is a hot-button issue in authorship ethics that will be discussed more in Chapter 4.

The Guidelines published by the ICMJE certainly have not settled the issue of authorship disputes or put to rest other authorship-related ethical issues in science. In fact, a study published in *Academic Medicine* showed that chairmen of departments of medicine did not change their authorship habits from 1979 – 1990, despite publications of guidelines by the ICMJE and many journals (Shulkin, Goin and Rennie, cited in Jones). It would seem, then, that the journals are not controlling the process of how authorship is determined, nor adequately educating their authors. This may be because the editors are not all fully invested in the idea of authorship ethics. In interviewing 231 editors of science and health care journals, Wager et al. found that editors are not very concerned about problems in publication ethics, as they believe that misconduct rarely occurs. Interestingly, Wager et al.'s survey was published four years after Martinson, Anderson and de Vries's survey that exposed how often incidences of research misconduct actually occur, and how many of those instances are related to publication and authorship concerns. Thus, the editors seem to have their heads in the sand if they believe that misconduct is not occurring. This is a shame, since editors have one of the most hands-on roles in educating and informing scientists as they make authorship decisions.

As Chapter 4 will explore further, scientists often look to journals when making authorship decisions. The journals may not have the power to regulate authorship via the type of sanctions that ORI can pass down, but they do have the advantage of working directly with scientists, as scientists are immediately concerned with how to get published in a journal and will therefore often read and follow that journal's authorship rules (see Chapter 4 for interview discussions on this research process). It seems that the ability to

write rules, regulate and enforce rules, educate about the process and actually work in-hand with scientists as they make authorship decisions lies in the hands of various groups and agencies, not in one particular organization (see Figure 3.1). Authorship decisions, though important, seem to be based on scattered resources and influencers.

CHAPTER 4

SHOULD AUTHORSHIP BE REGULATED?

Interview Process

In an environment of limited and unclear regulation, inconsistent or nonexistent rules, and varied influences, how do scientists make authorship decisions? Beyond theory and rules, are the ethics of authorship actually important to practicing scientists? To expand my research and gain insight from scientists directly, I interviewed scientists about their understandings of research misconduct and authorship ethics. I spoke with nine practicing scientists at a land-grant research institution in the Southeast. I selected scientists who have published in peer-reviewed journals or at conferences, who are tenured (or on track to be tenured) by a university, and who are now performing research with the intention of continuing to publish results. I used convenience sampling, selecting scientists who fit this description at the same university where I study. I began with a pilot study of three scientists who were personal acquaintances or with whom I had some connection. I emailed the three potential participants and they all agreed to meet with me.

After my pilot study, I chose to expand my research. I used snowball sampling to find additional participants, asking members of my pilot study to recommend other scientists who may be interested in talking with me. Of the list of suggested scientists, many were from the same department, and I wanted to avoid speaking with scientists from the same disciplines in order to avoid skewing the data in line with the approach or methods one specific discipline may use in the research and publication process. I therefore randomly selected one participant from each suggested department and then, if

that person could not meet with me, I emailed another recommended name from that department (if more than one name was suggested). This process added four participants to my study.

Finally, I used purposive sampling (Koerber and McMichael), selecting several scientists listed on the university's various science departments' Web sites, and focusing on departments that were not yet represented by my participants. I employed this sampling technique because I wanted to ensure that my interviewees were from a variety of research fields, which I felt was important to understand how different disciplines may view authorship ethics and misconduct. About eighty percent of these selected scientists accepted my email invitation to participate in the research. This added two additional participants to the study, bringing the total to nine. For more information about the academic titles, qualifications, and research and publication history of the nine participants, please see the first five-to-seven questions of each interview transcript in Appendix E.

At the start of each interview meeting, each participant was asked to review and sign an IRB-approved consent form (see Appendix C), which informed them that I would be recording the interview, but that their identities will be protected and will not be associated with the interview answers in any way. I felt this confidentiality was important in order to allow the scientists to feel as comfortable as possible about sharing personal information about ethical situations they may have encountered.

Once I had selected my participants, I met with them for semi-structured interviews. I asked a series of prepared questions, asking them to share demographic

information, their knowledge of research misconduct, their understanding of the role of communication in science, their knowledge of formal definitions of misconduct, and the importance of authorship and their role as authors. I also prompted them to share personal stories related to authorship and allowed for open-ended story-sharing and information at the end of each interview (see Appendix D for the list of interview questions). I transcribed the interviews verbatim (see Appendix E) and analyzed them for similar responses, key phrases and overall themes.

While I believe I followed appropriate qualitative research techniques, I recognize the limitations of my interviews. First, I had a strong selection bias: one can assume that scientists willing to speak with me about authorship ethics likely have not participated in unethical authorship situations. Next, I was interviewing at a tier-one research institution; arguably, only well respected scientists in their field (those who have not been found guilty of authorship disputes or unethical actions) would receive tenure at such an organization, and they would not earn funding to continue their research if they had earned poor reputations. Finally, the use of snowball sampling ensured that participants recommended other scientists whom they knew would be interested in my research. In fact, during my interviews, I learned that some of my participants had done some of their own research on authorship issues and communication ethics in science.

All that said, my interviews were incredibly informative. While not generalizable to represent all scientists, these interviews provided me with the personal stories, vocabulary, and empathy to add color and support to my research. The struggles scientists experience in understanding their roles as authors and the rules, regulations and

complicated issues surrounding authorship truly came to life through the real words of scientists tackling these problems. The rest of this thesis will interweave responses from these interviews to illustrate my other research, and to help personalize the discussion of how much authorship ethics matter to some scientists.

Scientists as Authors and Ethical Researchers

I interviewed scientists from the fields of biochemistry, bioengineering, chemistry, computer science, developmental biology, entomology, parasitology, and plant ecology. They were prolific researchers and writers: all had been publishing peer-reviewed research (in journals and at conferences) for 8 to 30 years, with an average of 14.4 years. Eight of the nine have co-authored all or almost all of their research publications with other scientists (and the other had worked with coauthors occasionally).

When asked if authorship is an important issue to them, all nine participants replied that it was. Many immediately made links between the role of authorship and the effect that publications have on a scientist's career and future research. "Have you heard the term 'publish or perish?'" asked one. "So yeah, [authorship is] important. It affects tenure, promotion considerations. It affects your reputation in the field. All that stuff" (App. E, 1, 81). Another scientist remarked, "Yeah it is [important], because authorship is credit, it's the coin of the realm basically" (App. E, 3, 101). Though many of them had not experienced or been involved with unethical authorship practices, all of them had at least one story about problems that had arisen among other scientists regarding authorship issues. Many of them provided detailed stories about the struggles that they or

others had gone through to decide on authorship order, allocate credit fairly and appropriately, communicate with journal reviewers, and understand author requirements in other labs and countries. They were all open and animated when discussing the seemingly large and important role that authorship issues played in their daily lives.

The scientists also all made connections between authorship and research misconduct. I asked each to define research misconduct, and *every one* of them mentioned some form of authorship ethics in their definition – like plagiarism, giving credit, describing the research process honestly, and avoiding bias when interpreting data. Some of the responses to my question, “How would you personally define research misconduct?” included (in the scientists’ own words):

So there’s a couple of things I would define as research misconduct. Definitely, since we were talking about papers, if you don’t either give someone credit or credit is due – if they aren’t listed as an author even though they did work that deserved to be an author. Plagiarism is a big one. Like not citing something. And then fudging or lying about your data. (App. E., 2, 88)

So there’s misconduct in kind of being dishonest about your research results. You know, misrepresenting results kind of claiming that certain things weren’t true, your results that aren’t true or kind of bending the truth a little bit more than you should be. There are some difficult issues of misconduct involving projects in which you have multiple investigators you know, not assigning appropriate credit or authorship issues, things like that. There’s probably misconduct in funding. You know spending funding on things that it’s not supposed to be spent on. So

there's all sorts of issues with, with kind of academic misconduct you could probably get into. (App. E., 6, 127)

Taking work that is not yours that you have not primarily produced and selling it as your own. Not giving people acknowledgement for ideas.... Citing people for, from where you get the main, the major ideas that show up in your...publication. (App. E, 7, 138)

Boil it down: lying, cheating, stealing. (App. E, 8, 151)

Though one scientist admitted that misconduct is “a really hard topic” (App. E., 9, 165), and many of them struggled a bit to give me a clear definition, another quickly summed up research misconduct as, “Anything that knowingly deviates from honesty: from not presenting results that might contradict their study, to falsifying results of the study in anything and everything in between” (App. E, 4, 110). Several of them defined misconduct using the term “dishonesty” or other synonyms; applying it not just to the performance of research but also how it is presented. To these scientists, authorship ethics *are* research ethics – they are not separable.

How Scientists Make Authorship Decisions

“Authorship sits at the intersection between collective effort and individual ambition” (Anderson et al. 7).

The interview participants regularly mentioned two key issues within authorship ethics: the process of determining who should be given authorship credit, and in what order to list authors on a paper. These two challenges were cited to cause conflict, stress,

career problems, and reputation and credibility issues. For example, in Interview 2, the scientist knew of a professor who had been fired from a revered university for not giving proper credit to his students. Another scientist discussed the process of determining author order:

...There is some sort of negotiation and problems arise when that negotiation doesn't take place or if science, you know, goes funny ways and sometimes the person that is third author ends up generating most of the data for the paper then there must be a re-assessment of author order and that can cause a lot of tensions.... So that [choice of author order] is probably the twitchiest area. (App. E, 3, 102)

I asked all the participants to describe any processes they use – or think should be used – to determine who should get credit as an author, and in what order those authors should be listed on the research publication. First, it should be noted that the different academic disciplines within science approach authorship order differently. In most scientific fields, according to my interviews, some disciplines give the most prestige to the first author, while others perceive the last listed name as the most prestigious. In computer science, authors are listed alphabetically – regardless of their amount of contribution – so issues regarding order are rare, but they do appear when researchers work with other disciplines that list authors differently (App E, 1; App. E, 6).

Considerations that the scientists I interviewed make when determining authorship credit include: intellectual contribution (as one scientist noted, “whatever that means” (App. E, 8, 156), the actual performance of the work/data collection, seniority in the lab,

production of data, and contribution to the writing of the final paper. I was told by most of the scientists that not all authors on a paper need to actually write the paper, but they should all have read and had the opportunity to review and edit the final paper. Most implied to me that it was unethical to give authorship credit to a senior scientist who has not at all been involved in the research, though they admitted that these “gift authorships” occur often, especially when given to lab owners.

The participants did not all have the same methods for determining authorship, so it seemed to me that the process of selecting and ordering authors was not clearly defined. Thus, I asked the participants if they had read or consulted authorship guidelines of any kind. Six of the nine had done some kind of research on authorship guidelines; three had not. Of the six that had read guidelines, all of them looked to the individual journals where they planned to submit their papers to read that journal’s particular rules. One scientist admitted that guidelines are vague, and he did not fully understand how they work, even within his rather small field of study. Interestingly, it seems that the awarding of authorship, an issue that causes problems and is incredibly important to these scientists, is not clearly understood or universally defined.

Several published studies have attempted to pinpoint the process of how scientists make authorship decisions, both practically and ethically (Louis et al. and Geelhoed et al. provide extensive literature reviews on the subject of authorship guidelines). Geelhoed et al. found that scientists who had formal authorship guidelines to follow – in this case, from the American Psychological Association – expressed satisfaction with the process they followed and decisions they made. However, Louis et al. interviewed twenty-eight

tenured scientists who had funding from the National Institutes of Health about how they make authorship decisions during the research process, and they found that scientists usually do not follow formal guidelines. Instead, scientists rely on personal “rules of thumb” in each particular case. In general, the scientists followed three core guidelines in making authorship decisions: fairness (rewards should be proportional to contributions), reciprocity (contributions should match benefits), and sponsorship (senior scientists should assist the careers of junior colleagues) (Louis et al.). Louis et al.’s results match my interview findings: scientists seem to rely to their own personal ethic when making authorship decision, without seeking out formal rules or guidelines.

Furthermore, scientists do not seem to be learning how to make ethical authorship decisions during their education. Verdán et al.’s study implies that even when students are taught research ethics in the classroom, they learn specifics like how to handle data appropriately, but seem to not be taught “scientific norms and the nature of science” (Verdán et al. 118). When asked where they learned the definitions of research misconduct and ethical communication in science, only one of the nine scientists I interviewed mentioned their undergraduate or graduate classes. Three spoke of personal ethics gained from their backgrounds or childhoods, and five spoke of mentors and advisers who led by example. Examples of responses to my questions regarding where they learned ethical research practices or how to communicate ethically in science included:

It was experience, and I guess it's one of those things you pick up at school or grad school or whatever from good professors that teach you the right thing.

(App. E, 1, 81)

...They didn't teach me much about kind of ethics and academic you know, how to properly conduct academic work. They didn't teach me much about that as a graduate student. So it's kind of you learn by kind of keeping your eyes open and listening to what you know, other people have told you about their experiences and you kind of learn by example. (App. E, 6, 128)

I think as a 2-year-old I was taught what was right and wrong. And I had good parents. I just don't see how it's any different than the way someone in a normal civilization, you know, civilized society behaves. You tell the truth you know.

It's, to me it's, there really is not a distinction between everyday life and research in a way.... I think [my education about communicating ethically] includes, and this sounds really ridiculous, but includes my upbringing, right? But I do think having mentors who are clearly straight shooters, you know, that don't participate or even tolerate any sort of misleading behavior. (App. E., 8, 152)

There is nothing formally written down about the rules. So most of this comes from my mentor, starting...as an undergraduate student and moving all the way through personal training.... I had different mentors, but every single one of them has ... stated very much the same thing. (App. E, 9, 165)

Using personal ethics to regulate authorship decisions, which seems to be the most common source of scientists' decisions, presents several problems, especially as the

scope of science and scientific collaboration has expanded. American, professional scientists are struggling with authorship ethics, so adding additional components, like power-struggles of subordinates and mentors, cultural differences, and expanding technological capabilities, only further complicates the issue. Multi-national research teams have reported problems in authorship omission, undeserved authorship credit, different understandings of order, and different interpretations of plagiarism (Anderson et al.), which can lead to problems ranging from personal affronts to losses of credibility and funding. Also, one of my interviewees mentioned that, in her experience, students from some countries (particularly Asian cultures) will never speak out against professors who run labs, even if the professors make unethical decisions, because those cultures value respect for seniority so highly (App. E, 9). The Anderson et al. article discusses how other cultures interpret plagiarism differently, and often do not understand American standards against directly copying text. Furthermore, conflicts presented by mentorship – in which the mentor may be responsible for teaching ethics, but may also have the power to take advantage of students working under him or her by taking credit for their work, came up several times in my interviews. Scheetz, in discussing the ORI’s role and recommendations regarding authorship issues, acknowledged the complicated mentor/mentee relationship and how it can affect authorship ethics:

“[Authorship] disputes often involve persons in some form of training who challenge the mentor over the ownership of research ideas which results in arguments over authorship priority and status. Although these situations are not considered by ORI to fall under the Public Health Service definition of scientific

misconduct, their existence highlights the lack of generally accepted standards regarding the mentor/trainee relationship in the research training environment.

(Scheetz 324)

Finally, as technology makes online publication more accessible and the sharing of ideas more instantaneous, concepts of plagiarism, intellectual property, the drive to publish quickly, shared resources and more affect how research is produced and published. These issues – of culture, power and technology – open a host of discussions that are beyond the scope of this thesis, but which deserve future analysis. In short, authorship ethics will only become more complicated as the practice of science becomes more complex.

Should ORI Regulate Authorship?

In light of the important role that authorship ethics play in the practice of science, it almost seems obvious that organizations on the local and federal level should be publishing rules and regulating authorship issues. But the solution – and its implications – may be more complicated than simply writing more rules. Who should write them? Who should regulate them? How would they be regulated? And will scientists even heed these new rules?

Just who should be responsible for regulating authorship ethics has been discussed and advised in various publications. Several of my interviewees rest the responsibility of authorship ethics on the researchers themselves to sort out. Many of my interviewees advised that authorship should be discussed and decided within the research

team – both early in the decision to work together as well as throughout the process – as the best way to avoid authorship problems. The ORI makes a similar recommendation:

...It is highly advisable to address authorship issues prior to writing the initial draft of a manuscript, or even prior to initiating a collaborative research effort. This should promote a clearer understanding among co-authors about their authorship responsibilities and thereby reduce the possibility of future conflicts. (Scheetz 324)

(It is worth noting that the ORI itself called on scientists to make decisions among themselves, not to look to printed rules or regulations). However, Anderson et al. admit that discussion, even among those with a vested interest in quality research, may not be enough, and they instead look to the journal editors and other publications to offer regulation:

It is clear, though, that discussions alone will not clear away all authorship problems. Several resources provide additional guidance. Collaborators should consult the policies of the journals to which they plan to submit their work. International guidance is available through the Council of Science Editors, the Committee on Publication Ethics and the International Committee on Medical Journal Editors' Uniform Requirements for Manuscripts Submitted to Biomedical Journals. The *Singapore Statement*, released in conjunction with the Second World Conference on Research Integrity in 2010, provides a succinct statement that responsible authorship is a duty of researchers worldwide. Scientists can join AuthorAID, a free, international research community that supports researchers

from developing countries with services such as networking and mentorship.

(Anderson et al. 7)

Anne Hudson Jones also explored the idea of using journal editors as the key source for regulating misconduct, but concluded, “Editors’ establishing guidelines for authorship and disseminating them widely may be necessary but are not sufficient to change practice and solve some of the most persistent problems of scientific authorship” (248). She then calls for the professional scientific societies to better regulate scientific misconduct among their members. Finally, Linda J. Wilcox, writing to the medical establishment, echoed ORI’s current stance, calling for academic departments and institutions, including Ombuds offices, to regulate authorship.

Clearly, the scientific community does not have a single answer to avoid problems or better regulate authorship ethics. Even the ORI admits, “Some researchers are not aware of the expectations and standards of the journals, professional societies, or even their own institutions” (Scheetz 324). In light of this ignorance, shouldn’t the ORI, the nation’s highest ethical body, step in to provide regulation? If, by their own admission, journals, societies and universities cannot be trusted to teach and regulate authorship ethics, then shouldn’t the ORI take control?

The first concern of relying on the ORI to define and regulate authorship ethics is that the ORI may not have the perceived authority to make a difference. Of my interview participants, only five of the nine knew that a federal body like the ORI existed to regulate research misconduct. Not one of them knew the ORI’s definition of research misconduct. One participant said that the idea of research misconduct “just goes unsaid”

(App. E, 1, 81), and another frankly commented: “I wouldn’t say I was consciously aware [that ORI publishes a definition of research misconduct], I’m aware that they must have, but they have no impact on my research or how I communicate my research whatsoever” (App. E, 5, 166). Her implication, which was shared by other participants, was that scientists look to themselves for their own rules and regulations, not to governing bodies. As one interviewee said, “There is a lab culture, so every lab I was in there was a culture that valued truth and doing it the right way” (App. E, 3, 100). Two other interviewees remarked that scientists have to operate under the assumption that everyone else is following ethical guidelines. “If we’re not all being objective,” which was one interviewee’s definition of ethical conduct, “then it sort of all crumbles” (App. E, 5, 121). This supports Penrose and Katz’s statement, “Ultimately the whole enterprise of science depends on collegiality and trust” (62).

As mentioned earlier, when these scientists do need to read authorship guidelines (for the few that chose to do so), they visit the Web sites of the journals and funding agencies where they want to publish; most do not look to federal guidelines. Louis et al.’s research also implies that scientists do not look to federal rules when making authorship decisions. Comparing official regulatory bodies to actual reported influencers of ethics (per my nine interview participants and those participating in research like Louis et al.’s) points to a disparity between ORI’s perceived influence over scientists and the factors that actually do influence their decisions. This discrepancy indicates that, at least to these scientists, if ORI listed new authorship guidelines, it likely would not affect scientists’ actions.

Next, ORI has admitted, through the article written by Scheetz, how difficult it would be to regulate authorship issues. They have determined that institutions need to settle authorship disputes, as it is beyond ORI's scope to handle each case (Scheetz). Expanding the definition of research misconduct would only increase the number of cases ORI would be asked to handle, as evidenced now by the number of authorship disputes they have to send back to the institutions to investigate, as they do not meet the definition of research misconduct that ORI regulates – i.e. they are not part of ORI's definition of plagiarism (Scheetz). Scheetz leads us to believe that ORI as it currently stands would not be able to investigate more cases, so should a broader definition be written that would only increase their caseload? Likely, the rules would not be regulated fully, and arguably, rules should not be put in place that cannot be regulated. That said, I will discuss in Chapter 5 how the community of science may be able to work around this conundrum.

CHAPTER 5

CONCLUSION & DISCUSSION

The purpose of this research paper was to answer the question, do authorship ethics matter? Given that authorship issues beyond plagiarism are not defined or regulated by government oversight bodies, one could assume they are not important. But the rhetorical, historical and interview evidence described above has indicated that not only do authorship ethics matter, they are fundamental to the very practice of science. The ethical practice of research is integrally tied to collaboration, writing, peer-review and the shared publication process. Ethical communication, particularly ethical authorship practices, is inseparable from ethical research.

Given that authorship ethics are so important, the question then becomes: what should be done about the lack of regulation (if anything)? The Office of Research Integrity, the federal government entity that oversees the ethical practice of scientific research, has continually published a definition of research misconduct that does not include authorship ethics beyond avoiding plagiarism. The ORI has admitted that authorship issues are pervasive and complicated, and studies like the Martinson, Anderson and de Vries survey have linked authorship issues to research misconduct, yet the ORI has avoided defining or regulating authorship. The ORI asserts that the regulation of authorship lies at the institutional level, while other researchers have suggested that journal editors or scientific societies should lead the way. As these discussions continue, there is still no overarching definition of authorship ethics, nor a

unifying method for awarding and ordering authors, two issues that particularly affect practicing scientists.

Symbolically, though, the ORI should strongly consider making a statement about authorship ethics in order to draw attention to their importance. The ORI's choice for the past two decades to omit authorship ethics from their definition of research misconduct seems to indicate that the issue is not important. As this thesis has shown, though, authorship issues are not only important, but they are fundamental to the production of science and the communication of knowledge. Thus, to grant authorship ethics the import they deserve, the ORI should consider adopting a new definition of research misconduct that goes beyond fabrication, falsification, and plagiarism.

To develop a new, more expansive definition of research misconduct, it may behoove the ORI to return to the Ryan Commission's recommendations for defining research misconduct. The Commission's definition, which focuses on misappropriation, interference, and misrepresentation, seems to encompass a more well rounded concept of research misconduct, one that includes data manipulation as well as communication and publication issues. In fact, this definition better matches what the scientists I interviewed already believe research misconduct entails: that ethics apply not just to the research process, but also to the communication of it; that the credit a scientist earns and grants in publications can promote or destroy careers and reputations; and that stealing from others goes beyond plagiarism to also include how one acknowledges ideas, contributions and effort. A new, more expansive definition from ORI that echoes the Ryan Commission's recommendation would potentially establish, at the highest federal level, the importance

of communication ethics in the practice of scientific research. It would also align the ORI with the beliefs and practices that many scientists currently follow, which could possibly even make the ORI more relevant to practicing scientists.

That said, a new definition would not necessarily require new regulation. ORI's concern about the complications of regulating authorship along with the scientific community's splintered opinions regarding who should oversee scientists implies that further regulation may not solve the issue or even make a difference. While I believe that a new definition of research misconduct needs to be written that includes authorship issues, I acknowledge that a conundrum exists: though a new definition will be in place, it will be understood that the regulation to support that definition cannot really be enforced on the federal level, or perhaps enforced at all. To set a rule insisting that scientists be objective, be fair, and present only the truth harkens back to the positivistic view of science. It takes science back to Plato's false separation of Truth from rhetoric, and to Bacon's insistence on objectivity separate from the senses. But our current understanding of science as a social construction acknowledges the subjective and social nature of fact creation; scientists cannot escape personal interpretation and the effects of collaboration, credibility and the written processes of fact-creation (per Latour and Woolgar). So a new definition of research misconduct, while symbolically important in elevating the role of authorship beyond just plagiarism, in fact goes against our understanding of the practice of science.

In summary, I believe that the ORI should acknowledge that research misconduct encompasses so much more than fabrication, falsification and plagiarism, but I also

realize that this definition likely would not change behavior or result in more regulation. Until ORI has more effect on scientists' actions, listing new rules will likely not change behaviors. That said, it's a step toward the entire scientific community formally acknowledging the role of writing, ethical communication – in short, rhetoric – in the production of science. Thus, I argue for what Foucault would call the “myth of the institution:” as the nation's highest ethical body, ORI can take the symbolic step of acknowledging the vital importance of authorship ethics, but they need not regulate it. Further echoing Foucault, the discourse of science, which may now better understand the importance of authorship ethics, will likely become the institution that regulates itself.

APPENDICES

Appendix A

Timeline of the Evolution of Research Misconduct Regulation and Definitions

KEY

Red = Key definitions of research misconduct

Green = Notes specific to authorship

Yellow highlight = Years that major decisions were made

1981 – Research misconduct became a public issue due to the first Congressional Hearings of the Investigations and Oversight Subcommittee of the House Science and Technology Committee (ORI, “About ORI – History”).

1981, 1985 – According to Anne Hudson Jones, the Darsee and Slutsky cases exposed ramifications of fraudulent data but also about gift authorship. Coauthors took credit for years but then didn’t take ownership when data was found to be faked. This led to many journal editors issuing statements on authorship and/or guidelines, as well as the ICMJE publishing formal authorship guidelines (see second 1985 entry below).

1985 – Congress passes Health Research Extension Act, which required regulations regarding fraud to be researched and reported by government science agencies (ORI, “About ORI – History”)

1985 - “The best known and most influential authorship criteria in the sciences are those established by the International Committee of Medical Journal Editors (ICMJE) in 1985. The ICMJE criteria have been adopted by hundreds of biomedical journals throughout the world and have also been the basis for authorship criteria developed by a number of U.S. medical schools, several scientific societies (e.g., the Association of University Radiologists and the Society for Neuroscience), and two countries.” (Jones 244) (See the ICMJE’s “Uniform Requirements for Manuscripts Submitted to Biomedical Journals.”)

“The [ICMJE’s] ‘Uniform Requirements for Manuscripts Submitted to Biomedical Journals,’ now [in 2003] in an updated fifth edition, has been adopted in one iteration or another by several hundred biomedical journals throughout the world. The ICMJE authorship criteria insist that authors must assume responsibility, as well as accept credit, for publications that bear their name. The first criterion originally stressed the necessity for an author to make substantial intellectual contributions to the research being reported. The ICMJE revised this criterion in June 2000 to allow “acquisition of data” as an alternative to the previously required intellectual contributions. The second and third criteria require that authors must take part in drafting or critically revising the manuscript, and they must approve the final version.” (Jones 246)

1986 – NIH publishes research guidelines.

July 1987 – National Science Foundation defines “misconduct” in science or engineering as:

“(1) fabrication, falsification, plagiarism, or other serious deviation from accepted practices in proposing, carrying out, or reporting results from activities funded by NSF; or
(2) retaliation of any kind against a person who reported or provided information about suspected or alleged misconduct and who has not acted in bad faith”
(Fischer).

This definition was revised in May 1991, but was replaced by the April 2002 definition (see below) (Fischer).

1989 – NIH’s guidelines (which mainly concern funding, responsibilities and conflicts of interests) were codified as 42 CFR Part 50, Subpart A (ORI, “About ORI – History”).

1989 – Public Health Services founds “Office of Scientific Integrity (OSI) within the Office of the Director, NIH, and the Office of Scientific Integrity Review (OSIR) in the Office of the Assistant Secretary for Health (OASH), to handle research misconduct” (“About ORI – History”).

1989 - National Academies’ Committee on Science, Engineering and Public Policy releases first edition of *On Being a Scientist: Responsible Conduct in Research* (Committee on Science, Engineering, and Public Policy).

1989 - A definition of research misconduct “was developed in response to a directive from Congress after several well-publicized cases of scientific misconduct. This definition- ‘fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research’ -applies to all research funded by the Public Health Service, but not to that supported by the National Science Foundation or other federal agencies. Since its adoption, much concern has been raised about the vagueness of the ‘other practices’ phrase” (Schechter and Schwartz).

May 1992 – OSI and OSIR consolidate into ORI (ORI, “About ORI – History”).

1992 – A National Academies of Sciences report links questionable research practices to scientific integrity (Martinson, Anderson, and de Vries 737). The report changed discussion from being about a few ‘bad’ individuals to being about overall “responsible conduct of research” (Martinson, Anderson, and de Vries 738).

1992 - National Academies of Sciences and Engineering and the Institute of Medicine publish *Responsible Science: Ensuring the Integrity of the Research Process*. The opening chapter argues that a lack of definition for what research misconduct is has led to confusion. Thus, the panel offers this definition of scientific misconduct:

Misconduct in science is defined as fabrication, falsification, or plagiarism, in proposing, performing, or reporting research.

Misconduct in science does not include errors of judgment; errors in the recording, selection, or analysis of data; differences in opinions involving the interpretation of data; or misconduct unrelated to the research process.

Fabrication is making up data or results, falsification is changing data or results, and plagiarism is using the ideas or words of another person without giving appropriate credit. (Panel on Scientific Responsibility and the Conduct of Research 27)

In Responsible Science, the chapter on misconduct first covers incidences (much lower than what Martinson, Anderson, and de Vries' study later revealed), then discusses definition(s):

Government Definitions of Misconduct in Science—Ambiguity in Categories

The PHS's misconduct-in-science regulations apply to research sponsored by all PHS agencies, including the National Institutes of Health, the Alcohol, Drug Abuse, and Mental Health Administration, the Centers for Disease Control, the Food and Drug Administration, and the Agency for Health Care Policy and Research. The PHS defines misconduct in science as “**fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research.** It does not include honest error or honest differences in interpretations or judgments of data” (DHHS, 1989a, p. 32447).

The PHS's definition does not further define fabrication, falsification, plagiarism, or other serious deviations from commonly accepted research practices. The ambiguous scope of this last category is a topic of major concern to the research community because of the perception that it could be applied inappropriately in cases of disputed scientific judgment.

The first annual report of the DHHS's OSIR suggests the types of alleged misconduct in science that might fall within the scope of this category (DHHS, 1991b):

- Misuse by a journal referee of privileged information contained in a manuscript,
- Fabrication of entries or misrepresentation of the publication status of manuscripts referenced in a research bibliography,

- Failure to perform research supported by a PHS grant while stating in progress reports that active progress has been made,
- Improper reporting of the status of subjects in clinical research (e.g., reporting the same subjects as controls in one study and as experimental subjects in another),
- Preparation and publication of a book chapter listing co-authors who were unaware of being named as co-authors,
- Selective reporting of primary data,
- Unauthorized use of data from another investigator's laboratory,
- Engaging in inappropriate authorship practices on a publication and failure to acknowledge that data used in a grant application were developed by another scientist, and
- Inappropriate data analysis and use of faulty statistical methodology.

The panel points out that most of the behaviors described above, such as the fabrication of bibliographic material or falsely reporting research progress, are behaviors that fall within the panel's definition of misconduct in science proposed in Chapter 1.

The NSF's definition (NSF, 1991b) is broader than that used by the PHS and extends to nonresearch activities supported by the agency, such as science education. NSF also includes in its definition of misconduct in science acts of retaliation against any person who provides information about suspected misconduct and who has not acted in bad faith. (85-86)

1993 – National Academies form the Panel on Scientific Responsibility and the Conduct of Research (Martinson, Anderson, and de Vries).

1993 – Study published in *Academic Medicine* showed that **chairmen of departments of medicine did not change their authorship habits from 1979 – 1990, despite publications of guidelines by the ICMJE and many journals** (Shulkin, Goin and Rennie, cited in Jones).

June 1993 – “The process of removing responsibility for handling allegations of research misconduct from the funding agencies was completed when President Clinton signed the NIH Revitalization Act of 1993. This Act established the ORI as an independent entity within HHS and **replaced the term ‘scientific misconduct’ with ‘research misconduct’**” (ORI, “About ORI - History”).

1995 – National Academies’ Committee on Science Engineering and Public Policy release updated second edition of *On Being a Scientist: Responsible Conduct in Research*. “This version incorporates new material from *Responsible Science* and other recent reports” as well as comments from instructors and critiques, and new hypothetical scenarios. (Committee on Science, Engineering, and Public Policy v). This book

addresses (among other issues, but these are the key authorship-related chapters): Conflicts of Interest, Publications and Openness, Allocation of Credit, and Authorship Practices. The book discusses misconduct as follows:

Beyond honest errors and errors caused through negligence are a third category of errors: those that involve deception. **Making up data or results (fabrication), changing or misreporting data or results (falsification), and using the ideas or words of another person without giving appropriate credit (plagiarism)—all strike at the heart of the values on which science is based. These acts of scientific misconduct** not only undermine progress but the entire set of values on which the scientific enterprise rests. Anyone who engages in any of these practices is putting his or her scientific career at risk. Even infractions that may seem minor at the time can end up being severely punished.

The ethical transgressions discussed in earlier sections—such as misallocation of credit or errors arising from negligence—are matters that generally remain internal to the scientific community. Usually they are dealt with locally through the mechanisms of peer review, administrative action, and the system of appointments and evaluations in the research environment. But misconduct in science is unlikely to remain internal to the scientific community. Its consequences are too extreme: it can harm individuals outside of science (as when falsified results become the basis of a medical treatment), it squanders public funds, and it attracts the attention of those who would seek to criticize science. As a result, federal agencies, Congress, the media, and the courts can all get involved.

... In addition to falsification, fabrication, and plagiarism, other ethical transgressions directly associated with research can cause serious harm to individuals and institutions. Examples include cover-ups of misconduct in science, reprisals against whistleblowers, malicious allegations of misconduct in science, and violations of due process in handling complaints of misconduct in science. **Policymakers and scientists have not decided whether such actions should be considered misconduct in science—and therefore subject to the same procedures and sanctions as falsification, fabrication, and plagiarism—or whether they should be investigated and adjudicated through different channels. Regulations adopted by the National Science Foundation and the Public Health Service define misconduct to include "other serious deviations from accepted research practices," in addition to falsification, fabrication, and plagiarism, leaving open the possibility that other actions could be considered misconduct in science.** The problem with such language is that it could allow a scientist to be accused of misconduct for using novel or unorthodox research methods, even though such methods are sometimes

needed to proceed in science. Federal officials respond by saying that this language is needed to prosecute ethical breaches that do not strictly fall into the categories of falsification, fabrication, or plagiarism and that no scientist has been accused of misconduct on the basis of using unorthodox research methods. This area of science policy is still evolving. (Committee on Science, Engineering, and Public Policy 16-18).

Nov. 1995 – Commission on Research Integrity (also known as the Ryan Commission) recommends to Donna Shalala, then-Secretary of Health and Human Services, a new definition of research misconduct (ORI, “About ORI – History”). The report made 33 recommendations, including **this proposed new definition**:

The Commission recommends that the Secretary replace the existing definition of misconduct in science with the definition of research misconduct and definitions of other forms of professional misconduct related to research, to follow. The definition of research misconduct is based on the premise that research misconduct is serious violation of the fundamental principle that scientists be truthful and fair in the conduct of research and the dissemination of its results.

The Federal Government has an interest in professional misconduct involving the use of federal funds in research, as covered by the following definitions:

1. Research Misconduct

Research misconduct is significant misbehavior that improperly appropriates the intellectual property or contributions of others, that intentionally impedes the progress of research, or that risks corrupting the scientific record²⁰ or compromising the integrity of scientific practices. Such behaviors are unethical and unacceptable in proposing, conducting, or reporting research, or in reviewing the proposals or research reports of others.

Examples of research misconduct include but are not limited to the following:

Misappropriation: An investigator or reviewer shall not intentionally or recklessly

- a. plagiarize, which shall be understood to mean the presentation of the documented words or ideas of another as his or her own, without attribution appropriate for the medium of presentation; or
- b. make use of any information in breach of any duty of confidentiality associated with the review of any manuscript or grant application.

Interference: An investigator or reviewer shall not intentionally and without authorization take or sequester or materially damage any research-related property of another, including without limitation the apparatus, reagents, biological materials, writings, data, hardware, software, or any other substance or device used or produced in the conduct of research.

Misrepresentation: An investigator or reviewer shall not with intent to deceive, or in reckless disregard for the truth,

- a. state or present a material or significant falsehood; or
- b. omit a fact so that what is stated or presented as a whole states or presents a material or significant falsehood. (Commission on Research Integrity 15-17)

Oct. 1999 – The Secretary of Health and Human Services implemented some of the Ryan Commission’s recommendations. “The HHS adopted the proposed government-wide definition of research misconduct developed by the National Science and Technology Council that was published in the *Federal Register* on October 13, 1999. The ‘Federal Research Misconduct Policy’ containing the final definition was published in the *Federal Register* on December 6, 2000” (ORI, “About ORI – History”).

Dec. 2000 – The “Federal Research Misconduct Policy” (see Oct. 1999 entry) of ORI is published. It includes a new definition of research misconduct, as well as comments and discussions that led to that definition. Point of note: it reads “**Are authorship disputes covered by this policy? Authorship disputes are not covered by this policy unless they involve plagiarism**” (Ferguson). The new definition was:

I. Research Misconduct Defined

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

\1\ No rights, privileges, benefits or obligations are created or abridged by issuance of this policy alone. The creation or abridgment of rights, privileges, benefits or obligations, if any, shall occur only upon implementation of this policy by the Federal agencies.

\2\ Research, as used herein, includes all basic, applied, and demonstration research in all fields of science, engineering, and mathematics. This includes, but is not limited to, research in economics, education, linguistics, medicine, psychology, social sciences, statistics, and research involving human subjects or animals.

Fabrication is making up data or results and recording or reporting them.

Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.

\3\ The research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronic, progress reports,

abstracts, theses, oral presentations, internal reports, and journal articles.

Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit. Research misconduct does not include honest error or differences of opinion. (Ferguson)

2002 – ORI proposes conducting a survey to “collect empirical evidence of behaviours that can undermine research integrity, but which fall outside the OSTP’s narrow definition of misconduct,” but it was rejected by the Federation of American Societies for Experimental Biology and the Association of American Medical Colleges (Martinson, Anderson and de Vries 737).

March/April 2002 – Office of the Inspector General (within National Science Foundation) defines research misconduct in the NSF regulations (part 689, “Research Misconduct”):

The following definitions apply to this part:

(a) *Research misconduct* means fabrication, falsification, or plagiarism in proposing or performing research funded by NSF, reviewing research proposals submitted to NSF, or in reporting research results funded by NSF.

(1) *Fabrication* means making up data or results and recording or reporting them.

(2) *Falsification* means manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.

(3) *Plagiarism* means the appropriation of another person’s ideas, processes, results or words without giving appropriate credit.

(4) *Research*, for purposes of paragraph

(a) of this section, includes proposals submitted to NSF in all fields of science, engineering, mathematics, and education and results from such proposals.

(b) *Research misconduct* does not include honest error or differences of opinion. (National Science Foundation 237)

...(c) A finding of research misconduct requires that—

(1) There be a significant departure from accepted practices of the relevant research community; and

(2) The research misconduct be committed intentionally, or knowingly, or recklessly; and

(3) The allegation be proven by a preponderance evidence. (National Science Foundation 238)

2002 – The Institute of Medicine issues a report, *Integrity in Scientific Research: Creating an Environment that Promotes Responsible Conduct*, about the environments in which scientists work. They recommend “an institutional (primarily university-level)

approach to promoting responsible research.” Report suggested (but did not empirically state) the importance of the broader scientific environment (funding, agencies, peer-review) in influencing integrity (Martinson, Anderson and de Vries 738)

2002 – Martinson, Anderson and de Vries issue first-ever survey for scientists to self-report misconduct. The study displays the first empirical evidence from scientists of their behaviors. (Martinson, Anderson and de Vries).

2005 – Martinson, Anderson and de Vries’s survey and commentary is published in *Nature*.

May 2005 – ORI publicizes new “Public Health Services Policies on Research Misconduct,” which “removes 42 CFR part 50, subpart A, ‘Responsibilities of Awardee and Applicant Institutions for Dealing With and Reporting Possible Misconduct in Science,’ and replaces it with a new, more comprehensive part 93, ‘Public Health Service Policies on Research Misconduct’” (U.S. Department of Health and Human Services).

A. Definition of Research Misconduct, Sec. 93.103

Although most commentators supported the new definition of research misconduct, there were a number of comments recommending changes, including that: (1) The definition should be based on deception; (2) the definition of falsification is inadequate because it does not cover the nonexperimental manipulation of human or animal subjects with the goal of influencing research results, or bias in the coding of qualitative data; (3) the definition of plagiarism should expressly exclude authorship and credit disputes; and (4) the definition of misconduct should be expanded to include negligent and intentional mistreatment of animals.

As explained in the preamble of the NPRM, the proposed definition of research misconduct, which is included in this final rule without change, includes OSTP's description of “fabrication, falsification, and plagiarism.” That description is clear and sufficiently concrete to provide the basis for reasonable determinations of whether research misconduct has occurred and whether the misconduct was intentional, knowing, or reckless. Given the careful consideration that has been given to this definition and the value of a uniform government-wide definition, we are adopting the definition as it was proposed. We note that the nonexperimental manipulation of human or animal subjects to influence the research results would appear to be a manipulation of research materials or processes within the intentment of the definition of falsification. (U.S. Department of Health and Human Services)

Sec. 93.103 Research misconduct.

Research misconduct means fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

- (a) Fabrication is making up data or results and recording or reporting them.
- (b) Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- (c) Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.
- (d) Research misconduct does not include honest error or differences of opinion. (U.S. Department of Health and Human Services)

Dec. 2006 (revised April 2008) – The Gallup Organization, working for the ORI, publishes results of a three-year study, “Observing and reporting suspected misconduct in biomedical research,” which uncovered the types and frequency of misconduct in projects funded by the NIH. Found that “**scientists...endorse open communication as a way to detect research misconduct**” (Wells, qtd. in Penrose and Katz 59).

Aug 2007 – ORI publishes revised “Introduction to the Responsible Conduct of Research:”

After a decade of sometimes spirited debate, in December 2000 the Office of Science and Technology Policy (OSTP) in the Executive Office of the President adopted a Federal Policy on Research Misconduct. The OSTP Policy is in most respects similar to earlier ones adopted by the Public Health Service (PHS) and the National Science Foundation (NSF), but it did recommend some significant changes to the definition of research misconduct. When it is finally implemented by all government research agencies (the target date of December 2001 was not met), all federally funded researchers will be subject to a uniform definition of research misconduct.

Definition. The OSTP Policy defines “research misconduct” as “**fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results**” (see accompanying box for details*). It also sets the legal threshold for proving charges of misconduct.

To be considered research misconduct, actions must:

- represent a “significant departure from accepted practices”;
- have been “committed intentionally, or knowingly, or recklessly”; and
- be “proven by a preponderance of evidence.”

These further stipulations limit the Federal Government’s role in research misconduct (fabrication, falsification, or plagiarism) to well-documented, serious departures from accepted research practices. When using the common Federal definition to discuss research misconduct, it is important to understand that it establishes a minimum standard for measuring acceptable behavior, not a standard for judging all research behavior. In particular, it does not imply that all other behaviors are acceptable. It also does not encompass criminal behavior, personal disputes, violations of grant management policies or other unacceptable behaviors not unique to research, such as discrimination or harassment. The government’s main concern in establishing this definition is to assure that publicly funded

research is accurate and appropriately represented by clearly stating that three practices, commonly referred to as “FFP,” are wrong. (Office of Research Integrity, “Introduction to...Research”)

*The “accompanying box” in this pamphlet reprints the ORI’s 2000 statement (http://ori.hhs.gov/policies/fed_research_misconduct.shtml):

I. **Research Misconduct Defined.** Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

- Fabrication is making up data or results and recording or reporting them.
- Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- Plagiarism is the appropriation of another person’s ideas, processes, results, or words without giving appropriate credit.
- Research misconduct does not include differences of opinion. (Office of Research Integrity, “Introduction to...Research”)

March 2009 – The Council of Science Editors publishes “White Paper on Promoting Integrity in Scientific Journal Publications, 2009 Update.” It addresses roles of editors, peer reviewers, authors (and allocation of credit), funding agencies, and relationships among them all (Scott-Lichter).

2009 - National Academies’ Committee on Science Engineering and Public Policy release updated third edition of *On Being a Scientist: Responsible Conduct in Research*. It claims to further address issues affecting the early 21st Century scientist. The order of chapters and chapter sections changed dramatically. Authorship-related chapters are now: Authorship & the Allocation of Credit; Intellectual Property; and Competing Interests, Commitments and Values. The Research Misconduct chapter now reads:

Some research behaviors are so at odds with the core principles of science that they are treated very harshly by the scientific community and by institutions that oversee research. Anyone who engages in these behaviors is putting his or her scientific career at risk and is threatening the overall reputation of science and the health and welfare of the intended beneficiaries of research.

Collectively these actions have come to be known as scientific misconduct. A statement developed by the U.S. Office of Science and Technology Policy, which has been adopted by most research-funding agencies, defines misconduct as “**fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research**”

results.” According to the statement, the three elements of misconduct are defined as follows:

- Fabrication is “making up data or results.”
- Falsification is “manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.”
- Plagiarism is “the appropriation of another person’s ideas, processes, results, or words without giving appropriate credit.”

In addition, the federal statement says that to be considered research misconduct, actions must represent a “significant departure from accepted practices,” must have been “committed intentionally, or knowingly, or recklessly,” and must be “proven by a preponderance of evidence.” According to the statement, “research misconduct does not include differences of opinion.”

Some research institutions and research-funding agencies define scientific research misconduct more broadly. These institutional definitions may add, for example, abuse of confidentiality in peer review, failure to allocate credit appropriately in scientific publications, not observing regulations governing research, failure to report misconduct, or retaliation against individuals who report misconduct to the list of behaviors that are considered misconduct. In addition, the National Science Foundation has retained a clause in its misconduct policies that includes behaviors that seriously deviate from commonly accepted research practices as possible misconduct.

A crucial distinction between falsification, fabrication, and plagiarism (sometimes called FFP) and error or negligence is the intent to deceive. When researchers intentionally deceive their colleagues by falsifying information, fabricating research results, or using others’ words and ideas without giving credit, they are violating fundamental research standards and basic societal values. These actions are seen as the worst violations of scientific standards because they undermine the trust on which science is based.

However, intent can be difficult to establish. For example, because trust in science depends so heavily on the assumption that the origin and content of scientific ideas will be treated with respect, plagiarism is taken very seriously in science, even though it does not introduce spurious results into research records in the same way that fabrication and falsification do. But someone who plagiarizes may insist it was a mistake, either in note taking or in writing, and that there was no intent to deceive. Similarly, someone

accused of falsification may contend that errors resulted from honest mistakes or negligence.

Within the scientific community, the effects of misconduct—in terms of lost time, damaged reputations, and feelings of personal betrayal—can be devastating. Individuals, institutions, and even entire research fields can suffer grievous setbacks from instances of fabrication, falsification, and plagiarism. Acts of misconduct also can draw the attention of the media, policymakers, and the general public, with negative consequences for all of science and, ultimately, for the public at large. (Committee on Science, Engineering, and Public Policy 16-18)

July 2010 – The Society for Neuroscience publishes, “[Guidelines: Responsible Conduct Regarding Scientific Communication](#)” – a publication acknowledging the importance of ethical communication in science. A summary of the guidelines was also published in the AAAS’s (American Association for the Advancement of Science; of which the Society for Neuroscience is a member society) quarterly *Professional Ethics Report* in fall 2010. The Guidelines address several issues in communication and authorship ethics (Society for Neuroscience).

May 2011 – This date marks the most recent update of NIH’s Web site, which gives this [definition of research misconduct](#):

Fabrication, falsification, or plagiarism in proposing, performing, or reporting research, or in reporting research results.

- Fabrication is making up data or results and recording or reporting them.
- Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that research is not accurately represented in the research record.
- Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.
- Research misconduct does not include honest error or honest differences of opinion. (National Institute of Health)

Appendix B

Summary of the Process of Responding to Allegations of Research Misconduct

Information is summarized and quoted from the Office of Research Integrity's "Sample Policy and Procedures for Responding to Allegations of Research Misconduct."

1. Complainant takes allegations to institution's Research Integrity Officer (RIO)
2. "The RIO will immediately assess the allegation to determine whether it is sufficiently credible and specific so that potential evidence of research misconduct may be identified, whether it is within the jurisdictional criteria of 42 CFR § 93.102(b), and whether the allegation falls within the definition of research misconduct in 42 CFR § 93.103. An inquiry must be conducted if these criteria are met." (9)
3. RIO notifies respondent; inquiry begins; research records are sequestered. RIO can consult with ORI regarding questions about records.
4. At most institutions, RIO assembles committee (or there is a standing one) that has no professional or personal conflict with the respondent to review the case. Note: "that the purpose of the inquiry is to conduct an initial review of the evidence, including the testimony of the respondent, complainant and key witnesses, to determine whether an investigation is warranted, not to determine whether research misconduct definitely occurred or who was responsible" (10). "An investigation is warranted if the committee determines: (1) there is a reasonable basis for concluding that the allegation falls within the definition of research misconduct and is within the jurisdictional criteria of 42 CFR § 93.102(b); and, (2) the allegation may have substance, based on the committee's review during the inquiry" (10-11).
5. Committee does research (within 60-day period) to see if an investigation is warranted – not to see if misconduct occurred. But if the respondent admits to misconduct during this process, the case may be closed (with permission from the ORI). Committee prepares a report and the respondent and complainant may comment on it.
6. The DO (deciding official) determines if investigation is warranted (this completes inquiry process). Within 30 days, the RIO sends the DO's decision and a copy of the inquiry report (which includes the institution's policies and procedures) to the ORI. If the DO said an investigation is warranted...
7. Investigation begins. "The purpose of the investigation is to develop a factual record by exploring the allegations in detail and examining the evidence in depth, leading to recommended findings on whether research misconduct has been

- committed, by whom, and to what extent. The investigation will also determine whether there are additional instances of possible research misconduct that would justify broadening the scope beyond the initial allegations. This is particularly important where the alleged research misconduct involves clinical trials or potential harm to human subjects or the general public or if it affects research that forms the basis for public policy, clinical practice, or public health practice.” (13)
8. A new committee (made up of people from the institution, possibly outside members, possibly a standing committee for such things) conducts investigation.
 9. Investigation committee and RIO prepare final report. Report has various requirements, including, “Each statement of findings must: (1) identify whether the research misconduct was falsification, fabrication, or plagiarism, and whether it was committed intentionally, knowingly, or recklessly;” (17). Respondent and complainant can add comments.
 10. DO decides whether the institution accepts the report, findings and recommendations of the committee, and then determines actions that need to be taken (if any). DO informs ORI. RIO notifies respondent, complainant, funding agencies and anyone else who needs to know the ruling.
 11. If institution allows, respondent can appeal. Institution must request an extension from ORI to conduct the appeal.
 12. The institution submits to ORI a copy of the investigation report, findings, judgment as to whether misconduct occurred (and by whom), and a description of actions that will be taken against the respondent.
 13. Per ORI, the RIO must keep “records of research misconduct proceedings” for 7 years (19).

Note: The RIO (who oversees this whole process at the institution level) has an obligation to notify “...ORI immediately if, at any time during the research misconduct proceeding, it has reason to believe that health or safety of the public is at risk, HHS resources or interests are threatened, research activities should be suspended, there is reasonable indication of possible violations of civil or criminal law, federal action is required to protect the interests of those involved in the research misconduct proceeding, the institution believes that the research misconduct proceeding may be made public prematurely, or the research community or the public should be informed.” (23)

ORI oversees the whole process with the RIO acting as an in-between. The RIO, among many other duties, must “[maintain] and [provide] to ORI upon request all relevant research records and records of the institution’s research misconduct proceeding, including the results of all interviews and the transcripts or recordings of those interviews” (29).

Appendix C

Information about Being in a Research Study Clemson University

The Scientist as Author: Exploring the Importance of Authorship Ethics in Science

Description of the Study and Your Part in It

Steven Katz, Ph.D., and Claiborne Linvill, a Master of Arts student in Professional Communication at Clemson University, are inviting you to take part in a research study. The purpose of this research is to learn how you, as a practicing scientist, understand research misconduct definitions and the role of authorship in research.

Your part in the study will be to help us understand the opinions and practices of a professional scientist.

It will take you about 30 minutes to be in this study.

Risks and Discomforts

There are certain risks or discomforts that you might expect if you take part in this research. They include sharing stories about difficult ethical situations you or others may have been involved in. Please note that your choice to share this information is completely optional, and your name will not be associated in any way with the information you provide.

Possible Benefits

We do not know of any way you would benefit directly from taking part in this study. However, this research may help us better understand how scientists view their role as authors, and may potentially reveal methods to improve integrity in scientific research and publication.

Protection of Privacy and Confidentiality

We will do everything we can to protect your privacy and confidentiality. We will not tell anybody outside of the research team that you were in this study or what information we collected about you in particular. Your name will not be linked with the interview in the research report, and your name will be removed from the final interview transcripts. Claiborne Linvill will retain the recordings and transcript from this interview privately; they will not be shared. After one year, the recording will be destroyed.

Choosing to Be in the Study

You do not have to be in this study. You may choose not to take part and you may choose to stop taking part at any time. You will not be punished in any way if you decide not to be in the study or to stop taking part in the study.

You may choose to stop taking part in this study after today. If you do, we will remove your information from the study. However, if we have already completed our research analysis, we will not be able to remove your information from the study.

Contact Information

If you have any questions or concerns about this study or if any problems arise, please contact Claiborne Linvill at Clemson University at 864-656-5427 or clinvil@clemson.edu. If you have any questions or concerns about your rights in this research study, please contact the Clemson University Office of Research Compliance (ORC) at 864-656-6460 or irb@clemson.edu.

Consent

I have read this form and have been allowed to ask any questions I might have. I agree to take part in this study.

Participant's signature: _____ Date: _____

A copy of this form will be given to you.

Appendix D

Interview Script/Questions

Thank you for agreeing to participate in this interview. First, I'd like to record this interview so that I can transcribe it later. I will keep the recording and transcription private. Your name will not be associated with the interview in my final report and will be removed from the transcription before it is printed. Do I have your permission to record this?

Thank you. Do you have any questions so far?

The purpose of this interview is to help me get a scientist's point of view for some research I've been conducting about ethics in science. I am not going to ask you to confess any infractions or expose any of your colleagues; instead, I'm going to ask you some questions about your opinions on some issues related to research and publications. You of course can answer however you choose, and feel free to ask questions or add information as you see fit.

Do you have any questions before we get started?

First, let's begin with some basic questions.

Please state your name:

What is your title at Clemson?

What is your field of research?

How long have you been publishing your research?

In what journals have you published your research?

Have you co-authored any articles with other researchers?

Have you ever received funding for your research from organizations other than

Clemson? If so, which ones?

How would you define research misconduct?

How did you come to this definition?

When you think about ethical research practices, does any aspect of communication come to mind?

How would you define ethical communication in science?

How did you come to this definition?

Are you aware that governing bodies like the Office of Research Integrity and the Office of Science and Technology Policy have published definitions of research misconduct?

If yes, do you know what the definition is?

Do the rules regarding research ethics affect how you communicate as a scientist? If so, how?

As a scientist, are you concerned about ethical communication practices?

Is authorship an important issue or concern in your research and publications?

What do you think researchers should consider when making authorship decisions?

Have you ever researched authorship guidelines?

If so, how?

Have you ever felt unfairly represented as an author?

If yes, how?

Tell me about a time when you felt fairly represented as an author.

Do you know of any circumstances in which a colleague was treated unfairly as an author?

Appendix E

Interview 1

March 18, 2011

CL: I'll start easy, with some basic questions. State your name:

I1: [name removed].

CL: And what is your title here at Clemson?

I1: Professor

CL: And your field of research?

I1: Computer Science.

CL: And, how long have you been publishing in this field?

I1: Do you want me to include grad school?

CL: Sure, if you were publishing in computer science then.

I1: Yeah, so, I guess I will go back to...I better check...around '98 or something like that. What does that make it?

CL: 12 years? 13 years?

I1: [laughs] Something like that. My earliest was...I think it was even earlier than that, I guess around '95 or something. So, whatever that is. 16 years? 15 years, let's say.

CL: OK, I can look at some of this on your CV online. But can you name some of the journals that you've published in?

I1: I'll look online for you [types in computer]. Not that there's been a huge many of them. In our field, computer science, for the record, we value conference proceedings – peer-reviewed conference proceedings – about as much as journal publications. Therefore my publication record reflects that, and so I have more proceedings papers than I do journal publications. And that'll vary depending on discipline, as you may find.

CL: that's good to know, thank you.

I1: I have published in journals. For example, I have here *Transactions and Applied Perceptions*. Usually what we do is I try to publish in our professional organization society, which is the Association for Computer Machinery, or ACM. And so the *Transactions and Applied Perceptions*, the TAP Journal, is one such publication of ACM's. There's also *Behavior Research Methods, Instruments and Computers*, *Journal of Human Factors*, those are the main ones really.

CL: Human factors is also psychology, IO, right?

I1: Hm. I sortof have one work in computer graphics, which is more my teaching domain, but I also do a little bit of research in that. Sorta my main focus is eye tracking, which evolves into human factors and computing. That's sorta the CHI field: Human/Computer Interaction. HCI. It used to be called CHI for Computer/Human Interaction, but they said "human comes first," so...

CL: Interesting. OK. Have any of these proceedings or journal articles been coauthored with other researchers?

I1: Oh yes, I think just about all of them have been. I like to collaborate and a lot of them are with other coauthors and a good deal of them are grad student-authored as part of their graduate work.

CL: Have you ever received funding for your research from organizations other than Clemson?

I1: Yeah. National Science Foundation, NASA, a little bit of funding from the military, the DOD, you could say as the sort of umbrella.

CL: Right.

I1: NSF is my main one. So...

CL: Great. Wonderful. OK. So, with that all cleared up, let's jump in. [I1: Sure] My question to you is, how would you define research misconduct?

I1: [pauses, thinks] Uh....

CL: It can be top of your head, it doesn't have to be formal.

I1: I dunno, the first thing that jumps into my head is plagiarism, would be one of the main things. There's I guess two forms. One is you ripping off somebody else. Or self-plagiarism, which isn't quite as bad but it's still frowned upon. Those are the two main issues, I guess, I would say. I don't know...from an institutional perspective, though, I guess if you're asking... I guess research misconduct from their point of view, maybe, I'm guessing, would be misuse of funds maybe in some way.

CL: OK. There's no right or wrong answer, here. I'm just looking for how you would define it. How did you come to this definition? Were you taught it somewhere, did you pick it up? Or is it just from your field?

I1: That's a good question. Um... You know, the plagiarism thing has really been passed down, I guess. I guess it was really, in some ways taught, but in an informal sense by professors in grad school, I suppose. And this was done via, as an example, one of my best classes that I remember was this class on the human-computer interaction, and what we did mainly that semester was read a ton of conference proceedings papers from this one particular conference, a good conference. So it was an example of good papers, right? And just via commentary, what that prof said was, you should know who these people are, who are the main authors, what they do, where are their research labs, and things like that. And sort of by and by, he would often comment, since he knew these guys, or a lot of them, he would say these are good, these are bad, and here's what's not to do. So that's how I sort of picked it up.

CL: By example...

I1: yeah, by example. Things you hear, that kind of thing.

CL: When you think about ethical research practices, doing your research ethically, does any aspect of communication come to mind? [pause while I1 thinks.] You mention plagiarism, which is writing...

I1: Yeah, cause that's dissemination of your results, right? [CL: right.] Communication, you mean like email? Skype, that kind of thing?

CL: More like, it could be, but also how you communication with your colleagues, how you write, publish, make decisions about working together...

I1: Well, yeah, all of that. I sorta don't get the question.

CL: That's fine. The fact that you said plagiarism first means that was a big part of your study. How – I guess this is related – how would you define ethical communication in science? Is that any different from ethical research?

I1: From unethical communication? I don't know, really. It's kinda... I don't know how to define that. Ethical communication? [pause]

CL: That's fine. OK.

I1: Communication to me is just, sorta, person to person kind of thing. So it's not really like broadcasting, right? CL: right. Me to others, me to another collaborator. So what do you mean by ethics there? How do ethics enter the picture?

CL: Well, that's sorta what I'm wondering. If you think they do.

I1: I guess... Well. Let's see. I'm involved right now in a program committee sense...so there's communication there. I guess there's some levels. There's just personal communication, where I can email a friend of mine at another university and say, hey do you know of any papers that talk about this topic? But that's just kinda you pick up the phone and call a friend. So I don't think ethics enters too much into that. So I guess where the ethics might come into play is in this program committee where I'm talking to a small number of people, my, let's say, other associate chairs that are running or organizing the conference and we're discussing other papers. So for example there, the ethics there would be in the way how we discuss the papers that we are reviewing. And that is usually done in a double-blind way in our conference proceedings. Not all conferences function like this, but these ones do. And so we, we discuss the papers in a kind of closed form, so there's a bulletin board that goes on where we talk about the reviews and the rebuttals and things like that. And the way it works is, we don't really know who the other reviewers are. So as reviewers, we don't know really who we're talking with. So it's kinda anonymous. So that's one way the ethics come into play, I suppose.

CL: So both the authors and the other reviewers are all blind.

I1: Yeah, reviewer-to-reviewer and reviewer-to-other-author are all blind. Sometimes the authors will mess that up and inadvertently or maybe that had a motive for doing it, they stick their names on the paper so you know who the authors are. But really what's supposed to happen is they're supposed to mask their identities so we don't know who they are reviewing and they don't know who reviews them. So that's one ethical kind of conduct for the peer-review system.

CL: That's perfect. Thank you. Now, did you know that the Office of Research Integrity – ORI – or the Office of Science and Technology Policy – OSTP – have published definitions of research misconduct?

I1: Nope. What do they say? Do you know what they are?

CL: I do. They define it as FFP: falsification, fabrication and plagiarism.

I1: AH, OK, great.

CL: And then they define what FFP mean. And different bodies – some of them say, just in your research, and some of them say – well, one of them has a clause that says, “and anything outside accepted scientific practices.”

I1: I see. I totally missed this. I just wasn't thinking about it.

CL: That's fine, that's what I'm looking at.

I1: Yeah, but of course that – that’s just something we assume we know what not to do. Doctoring your data, right? It just goes unsaid. [CL: No, that’s good.] So I didn’t say it! In fact, we’re conducting a study right now, and all that stuff comes into play. The ethics issues come into experiments. So I do a lot of human subject experimentation, we’re doing that now in the lab. In fact, you can be a subject. We’re looking for subjects.

CL: I will. I owe you one. Karma.

I1: Yeah, we’ll we’re rather desperate because, here’s an example. Our grad student messed up the order of the presentation of the stimulus, and so all the 16 subjects that we just ran, all that data is out the window and we gotta start over. Which is really annoying.

CL: But you made the choice to start over.

I1: You have to. Because in this case, it’s not so much ethics, but terms of the actual experiment design. If we don’t counterbalance the presentation we have a learning effect and it will mess up the data. That’s one thing. But the ethical consideration comes into play when you decide do you want to doctor to the data. Do you keep certain pieces, how do you analyze the data? Do you throw out data that doesn’t – the outliers that don’t fit your hypothesis, that sorta stuff? I know not to do that kind of nonsense. I’m pretty – at least I hope I am – I’m pretty good about not messing up data in that way. So I’m aware of all that. I stick to a pretty strict code of conduct, let’s say, where I don’t mess with data and if the data shows up something that doesn’t agree with what I was expecting, well that’s the way it goes.

There’s no way I’m going to mess up my scientific reputation by [laughs] by screwing data up like that.

CL: Exactly. Those rules you mention that everybody knows – do you ever think about them, do they affect how you communicate with your colleagues?

I1: It does in the peer-review process. I know what? I don’t think we ever really... it’s sorta a remote possibility that someone would do something like that. It’s really unexpected. So the only thing we really look for is really more into the design aspects of an experiment. We’re looking at how their results are, they look, and whether their study was conducted in a proper sort of experimental methodology. But you know we mostly assume that everybody is following the same conduct and nobody’s messing with their data.

CL: Is that part of some kind of scientific community?

I1: I would think so yes. I mean, there are written rules, but...[laughs]

CL: But you said it wasn’t the written rules that defined it for you, it was just...

I1: Yeah, it was experience, and I guess it’s one of those things you pick up at school or grad school or whatever from good professors that teach you the right thing. So yeah, that’s sort of how I got it, right?

CL: That makes sense. Let’s see. Is authorship, as a part of this community, is that an important issue or concern that comes up in research or publication?

I1: [laughs] Have you heard the term publish or perish? [CL: I have.]. So yeah, it’s important. It affects tenure, promotion considerations. It affects your reputation in the field. All that stuff. You know, I’ll tell you – I share this with my students and whoever asks, and since you’re asking... One of the comments that my advisor made, which has really stuck with me, was when I was leaving grad school for an academic position, I said

to him, you know Bruce, I don't know how this is gonna work out, maybe I won't be a good professor, but my understanding is that when I go for tenure, I have to send out for external reviews. What if people don't know who I am? And his response was, well that tells you something, doesn't it? [CL: right]. So the way to get people to know who you are is to publish. And go to conferences, present your work. That's how it works. [CL: right]. You'll keep your job if people get to know who you are and your work has been good.

CL: How do you think researchers – or how do you as a researcher – what considerations to make when making authorship decisions?

I1: Well, I guess, timeliness is one. Where to publish. Things of that nature.

CL: What about with coauthors? In terms of allocation of credit, order of names, who's leading the research...

I1: Sometimes it can be as simple as alphabetic order.

CL: Really?

I1: Yeah, in fact the most recent paper that my colleague next door here, we were involved in a pedagogical study from which a paper resulted – we presented our findings. He put everything in alphabetical order and it ends up being that I'm the lead author but I really wasn't. And so, if you look at it, it's just alphabetic.

CL: And everyone was OK with that?

I1: Yeah, I mean we all participated. Usually what happens I the author will distribute the paper and you can make comments or whatever and say “I don't like this” or “strike that,” so everybody's got a chance to provide feedback or change things or make their own contributions.

CL: In your field, is it the first author or last author who is the main one?

I1: The main? Usually the first.

CL: In some fields, the “famous” professor gets tacked on last. But different fields do it differently, I'm learning.

I1: I see. Yeah. I don't know. It depends on the paper. This one – well, we're all famous professors, so it doesn't matter [laughs].

CL: Have you ever researched authorship guidelines? Like looked up what your proceedings, journals or conferences expect out of authors?

I1: Nope. Do you know of any as examples? Like you said the famous one goes last?

CL: Well I know that some of the journals write out exactly what role you should have to be called an author as a way to prevent people from just tacking on names. I think there's an issue where people get listed, especially when they oversee grad students, sometimes get listed as an author when they may not have done any research.

I1: The token author?

CL: Exactly, token authorship. So I know some of the journals have authorship guidelines regarding credit and order.

I1: Uh-hunh. I've just learned as you go. Does it make sense to put somebody on there if they haven't contributed anything to it? Just in the case that they might get emailed or asked about this paper and say “I don't know what you're talking about.” I don't want to be embarrassed in that way, so you don't do that sort of thing.

CL: Have you ever felt unfairly represented as an author?

I1: Um...no, I can't say that I have.

CL: OK.

I1: Like I say, usually most of my collaborators send me the paper and I have the option of saying, well, if I don't like the paper, just take my name off. That's usually...I have that option. I don't like what you wrote there, just take my name off.

CL: Um...I was going to ask if you could tell me about a time you felt fairly represented. Is that the alphabetical example you gave me?

I1: That's fine.

CL: Was that fair to you?

I1: Yeah. Most times I think are fair, in the sense that if the collaborator gives me a chance to review where I am – not where I am in the author list – but gives me a chance to review the paper, put it that way – in that case, I don't really care where my name is.

CL: you don't?

I1: No, not really. Not anymore. Not after tenure. [laughs.] But actually, I don't think – it depends, I guess it matters the discipline or university. I don't think in our department they really care as to how many papers I was first author on. I don't think they counted it that way. And these days also, interdisciplinary collaboration is kind of a good thing, so it doesn't really matter here, from our perspective, in this particular department, where my name shows up on the paper. That's just been my impression. Nobody's told me otherwise.

CL: OK. That might answer this question. I was going to ask if you know of any circumstances where a colleague – in your field or out of your field – felt unfairly represented as an author. Do you hear about that kind of drama?

I1: [thinks]

CL: Or in your committee of reviewing papers, does it ever happen?

I1: I can't say it never happens, but I'm not aware of any particular instances. Um... [thinks]. Oh yeah... I do remember a case. This is plagiarism. It happens. So actually, you know, by reputation and sort of by friendship you kinda what to befriend people that are good if not better than you. I knew people – I'll leave names out – that they had written something and there was this other guy who wanted to write this book. And so there was this issue of him wanting to use the first party's paper as a chapter – this was a few years ago, so I don't remember exactly what went out, and I wasn't involved in this. But somehow this guy had used these peoples' work in his book, and I don't think he actually attributed that work to them. And it was almost verbatim. And so this is like...[CL: obvious.] "What the heck is this?" They were pretty upset about it. He claimed "ooh...I don't know..." something. I don't know how it got resolved, but basically that kind of thing...if you do that, and this guy did, people in your community, and my community, in the eye-tracking field, is somewhat small, and so you know you sort of get wind of this and then the name sticks and you remember this person and the next time he asks you for something you kinda "well, I don't know..." You know, you sort of shy away from collaborating with people. So, you kinda get, informally black balled as it were. If you commit these kind of things.

CL: So even if official government body didn't come down on him, researchers will.

I1: Yeah.

CL: He'll hear about it.

I1: Yeah.

CL: That's all the formal questions I had. Did you want to add anything or have any formal questions for me?

I1: No, that's about it. So maybe...what's the...debrief me. Is there anything else that, I don't know, you feel there's more involved...like what's going on.

CL: Well, I'm going two directions with this. What's been of interest is the Office of Research Integrity. This definition, the FFP definition, people in my field who study communication writing feel that it's not representative of all the depth of issues that come up regarding communication, like the peer-review process, more definitions of plagiarism than just copying, the way people work together, authorship order. There's a ton of journal articles of different scientists arguing how authorship works. [I1: really?] So there's been a call from a few people to add more authorship considerations into the definition of research misconduct. There were actually a couple of formal briefs by committees in government saying we might need to revamp this definition of research misconduct to include more than just FFP (which is falsification, fabrication and plagiarism). And then a big study came out where they had scientists self-disclose small misbehaviors they'd done – not big stuff like that guy plagiarizing an entire chapter – but little things like “I might have slightly done this to the data,” or “I may have taken a little bit of my grad students work” or something they thought was small – and they actually reported at really high rates that this was happening. So in that kind of environment and several people calling, the ORI is still putting out – as is the NIH and some of the major organizations – are still sticking to “research misconduct is only FFP, and we don't want to consider anything else.” So I'm looking at, from the writing point of view, what does that mean for scientists? Does that mean that authorship stuff is not important? How much does it matter? Is it really affecting how scientists work? Because my other thing I realize is that I went in with a bias assuming scientists care. And I've realized they might now. As you said, they regulate each other.

I1: But we do care.

CL: But you might not care what a governing body says about it. I don't know.

I1: I don't know exactly. How to fit in the government oversight into this. I guess I would say that – I'll give you sort of an analogy from my skydiving days. So skydivers are peculiar lot. They have their own community and all that. And while there are official guidelines – what is it, the FAR? I forget cause I haven't done this in a while – the FAA governs everything that happens in the air, I guess, including skydiving. So the FAR Rule 95.1 or whatever it was. So there are guidelines and specific rules for skydiving. But skydivers are really...I can't find the word...but they really like the fact that they're mostly self-regulating. And I think the scientific community would, in my opinion, echo that kind of sentiment. The self-regulation. I don't know, in some ways I would sort of even prefer that we as a community sort of sift out these bozos that don't operate properly, let's say. Versus having some government body coming in and saying whatever.

CL: Right.

I1: So that's sort of my opinion. Seems to be working for us.

CL: OK. I think it's interesting your field seems to practice more congenial than some others about authorship order and...

I1: Well let me add also that we have um – I don't know if other fields use this kind of stuff or not – but we have computational tools that we use. For example, for tenure promotion considerations – you know, what's important is, well, in some ways, some will argue this – whether, is it the number of publications – no, not really – it's the quality of publications. It's not quantity, it's quality, right? If you have a seminal paper somewhere that gets referenced by 1,000 people that's great, that's what they want. In fact, what I'm talking about there, being cited by 1,000 people, you can get on whatever, Google Scholar, there are these numbers – I can't remember what they are, H numbers? [CL: right, I've seen them]. So, you know, you can look at your paper and find out what its H number is, or yourself and find out an H number, so that kind of stuff plays a part too. I don't know where I was headed with that, but I wanted to mention that this is also available to us and in some ways, you can use these tools to compare papers for plagiarism or things like that, or look at authorships or whatever, so I don't know if we use those things and other disciplines don't... [CL: right.] But the stuff's there, so we're aware of it as well.

What is it...there was one joke out there... So also where you publish is important to us. So we publish in peer-reviewed places and full articles – not just abstracts, right? And so the joke...there's this conference out there, I don't know the names, but some program was written that would sortof just send out – the monkeys in the room, a room full of monkeys – this thing would assemble, you know, syntactically correct sentences that art kindof meaningless and construct a full paper that fell into the typical sort of paper format: abstract, intro, background, methodology, results, conclusions – that kind of stuff. [laughs.] So they would construct these bogus papers and send them to conferences and these things would get accepted.

CL: I think every field has people who do that.

I1: So we are looking at that and say, I'm not going to send my paper there, because it's a joke. So that kind of thing matters too. Authorship, places where you publish...

CL: Peer-review process...

I1: Yeah, where do my “esteemed colleagues,” as it were, where do they go?

CL: Well, and a lot of that is threatened also – this is out of the scope of my research – by online publication journals now, too. There's some argument as to whether or not they are fully peer-reviewed and are you skipping the process, and...

I1: Yeah, and for that same reason I've shied away from those, the online journals. I really don't know much about them, how they work, how well-respected they are, you know? So I really haven't submitted any to those things yet.

CL: Ok. So the authorship credibility is important?

I1: Sure.

CL: Well, I appreciate your time very much.

I1: My pleasure.

[recording ends.]

[The morning after the interview, the participant sent me the following email]:

Fri, Mar 18, 2011 at 9:49 AM

Claiborne,

I forgot to mention one more interesting ethical story that happened at a conference, regarding attribution. One important aspect that I failed to mention about authorship is proper attribution of other peoples' work---while you can't plagiarise [*sic*] their work, you can of course, and are expected to, cite their work. In fact failing to do so is frowned upon.

One example of this, which was inadvertent and excusable, was during a conference. A fellow submitted a paper of a particular method he had come up with independently. After the review process somebody piped up saying it was the same approach they had published a few years ago and this new paper had not cited the old paper. In this instance, the omission was excusable because the author admitted he had not been aware of the previously published work. Although it was too late to put into the paper, he did acknowledge this omission during the talk and apologized.

This kind of thing does happen from time to time, particularly if a relevant paper was published in an "obscure" source. Interestingly, this sort of thing may occur more frequently as interdisciplinary boundaries are crossed. For example, a computer science author might not be aware of a paper appearing in a Psych journal that they typically don't consult on a regular basis.

Anyway, just wanted to throw that in, as it was a sort of uncomfortable situation for me, as I was chair of the conference, but in the end the situation was resolved I think to the satisfaction of all parties concerned.

Interview 2

March 22, 2011

CL: So this is [name removed], and it's March 22, right? [I2: Right.] OK. Alright. I'll first give you my whole – the purpose is that I'm trying to get a scientist's point of view on some research I've been doing on authorship ethics and research misconduct. [I2: OK]. I'm trying to say what scientists think about things, and then I hit a wall realizing that I actually need to talk to scientists about what they think about things [laughter]. So that's my line of questioning – totally your opinion, so answer however you want, ask me questions.

So we'll start with the basics, where I ask you to please state your name.

I2: My name is [name removed].

CL: And what's your title at Clemson?

I2: I'm an assistant professor of bioengineering.

CL: And what is your field of research?

I2: So I'm in the department of bioengineering. I do nano- and micro-scale mechanics of biological systems. [CL: OK]. That's not very glamorous sounding.

CL: It sounds very glamorous.

I2: I also do a little bit of instrumentation work. Mostly having to do with developing rural countries.

CL: OK.

I2: I do two separate things.

CL: How long have you been publishing your research?

I2: I think my first paper came out in 2001...somewhere around there?

CL: So about 10 years?

I2: 10 years, yeah.

CL: I can check your C.V. online, but what are some of the journals you publish in?

I2: I've published in the *Journal of Biomechanics*, the *Annals of Biomedical Engineering*, the *ASME Journal for Biomechanical Engineering*, I think. They all sound the same. I also publish in more chemistry journals. So *Langmuir*...um...I'm totally blanking on those names. I do some like, molecular stuff, so that's in there. Um...shoot. ACS publications... *Langmuir* ...and then some materials ones, like *Bio*... not *Biomaterials*, I haven't published there, but like *Biomedical Materials Research*, or something like that.

CL: OK.

I2: Let me think. Um... *Materials*. Trying to go back through the different journals I've published in. Oh, *Journal of Engineering, Fibers and Fabrics* is the last one. That was kind of a side project having to do with wool fibers. [CL: Fibers...?]. Yeah, that was a grant.

CL: With all these articles, were any of them coauthored with other researchers?

I2: All of them were.

CL: OK, and have you ever received funding for your research from organizations other than Clemson?

I2: Yes.

CL: Which ones?

I2: [laughs].

CL: Or some...

I2: Government agencies including NIH, NSF. I'm getting some DOE funding. Um...the South Carolina Space Grant, which is NASA for South Carolina. Those are kinda the government agencies. In grad school I was on a Whitaker Foundation Fellowship. Um, I've gotten the wool stuff was funded by industry, by a local wool manufacturer.

And....I'm missing some...probably AHA, some longer, like, whatever these are called.

CL: Government?

I2: Societies, not governments. Funding societies? American Heart Association – so whatever those are called.

CL: OK. Perfect. Thank you. OK, so jumping in to – all that established – how would you define research misconduct?

I2: Whew. Uh... um... So, there's a couple of things I would define as research misconduct. Definitely, since we were talking about papers, if you don't either give someone credit or credit is due – if they aren't listed as an author even though they did work that deserved to be an author. Plagiarism is a big one. Like not citing something. And then fudging or lying about your data. Um... Which I have not been involved in, but I have friends who caught someone doing that when they reviewed papers. Yeah. Well, it's not – it's a weird thing, but it's definitely for bio stuff, when you have images, you can't fudge the images, you can't sharpen, blur the image.

CL: Right. Interesting, OK. How did you come to this understanding or definition?

I2: Um, I guess in grad school? With interactions with my advisor, like what's appropriate, not appropriate type behavior. I think a lot of it is somewhat common sense if you sit back and think about it.

CL: OK. When you think about ethical research, or practicing ethical research, does any aspect of communication or how you communicate with others come to mind?

I2: Yeah. So I think even when you're doing say an oral presentation or something, you shouldn't pass off somebody else's work as your own. So like, definitely citing previous work and making a clear distinction of what is yours and what is somebody's work you're basing your stuff on.

CL: Yup, OK. And was this – did your understanding of how to communicate well as a scientist also from grad school?

I2: Yes, my advisor. Definitely my advisor taught me. The other one you learned also in class, maybe they covered some things of like ethics and things in class. But yeah.

Communication ethics is from my advisor.

CL: OK. Are you aware that governing bodies like the oversight groups like the Office of Research Integrity or the Office of Science and Technology Policy, do you know that they have published definitions of research misconduct?

I2: Yes, and they... I usually check those, especially when I'm submitting a grant or something, to make sure. Because sometimes there's subtle things you just want to make sure you're not doing anything bad.

CL: Have those rules ever affected how you choose to communicate?

I2: [pause]

CL: That's hard – I know that's hard.

I2: Yeah... yes and no, I think like in terms of citations and stuff and grant proposals, I'm always really careful. Because I know, some of them they actually have published what they think is misconduct and they tell you how they check. So.. you know...just to make sure I didn't accidentally ... when you're typing up a grant or even a paper, I always double-check through the thing we can do for students' papers, also – like Turn It In, as like an app that checks for plagiarism. Because I feel like sometimes when you're writing a paper, you've read all this stuff, and just to make sure I'm not actually plagiarizing by accident so...

CL: Well that's smart.

I2: Yeah. That's not happened before, but it puts my mind at ease.

CL: Right, right. OK. Would you say that, as a practicing scientist, you are concerned about ethical communication in science?

I2: Yes, yeah.

CL: Sounds like you're pretty on top of that...

I2: Yeah, it comes up a lot, actually. And there's definitely some people who, when I got here, I was, you know, I was told – not at Clemson, but around, in the community – I was told to be careful when I talk to that person, because they steal people's work, they'll ask you for looking over a proposal or something and then you suddenly find your data in their papers, and stuff like that. So. I think actually when I started the faculty position that became more, like... Most of the time, I'm OK sharing stuff, but there's definitely some times that made it clear that there are some people who apparently don't follow, you know, proper conduct [laughs.]

CL: Right, that would totally change how you chat about your work [I2: Right].

Interesting. OK. Would you say that authorship is an important issue or concern in your research and publications?

I2: Yes. And I know when you're a grad student and post doc, it's good to be first author. And once you're a faculty member, at least in our field, you want to be the last author, the corresponding author. For tenure, that is an issue. They want to see that you have a published track record as you being the corresponding author and the way that shows in our field is that that's the last author.

CL: So the last author is “corresponding author” [I2: yeah] and that's the most prestigious [I2: yeah].

I2: Which is not the same in all fields.

CL: No, it's not, I'm learning that.

I2: In computer science, where my husband works, it's just alphabetical. Makes things a lot clearer, I think. I mean, there's a star beside who's the corresponding author, but at least there's not quibbling about orders of peoples' names.

CL: Right, right. What do you think that researchers should consider when they make those authorship decisions?

I2: Well, I guess who did the bulk of the work, like whose work is it? So that's usually the graduate student or the post doc or whoever it is. And then, whose lab was that in? And that's usually the grad student/post doc advisor. So usually it's easy to figure out who's first and last. It's the ones in between that's tricky. So usually I have my student

and I sit down and figure out who helped out and who did part of some work that should get authorship. Also, who had significant input on the discussion. So sometimes, even though it's not like someone did like...you know, sometimes you take your samples and they get imaged by somebody else, and that's definitely authorship, but sometimes it's like, we had a bunch of discussions with this person and we should put them on the paper. Yeah.

CL: That's perfect. You've mentioned you researched the general misconduct policies. Have you ever researched authorship guidelines?

I2: The journals sometimes have them. But I haven't looked all that recently because they tend to be all the same in the ones I publish.

CL: OK.

I2: It hasn't really been an issue on any of my recent papers.

CL: So do you just kinda go online to the journals?

I2: Um-hm. You can also tell from how the authors are laid out on previous papers in that journal.

CL: OK. Um. Have you ever felt unfairly represented as an author?

I2: Hm. Yes... [chuckles]. Yeah. Um... [pause].

CL: Are you comfortable talking about that?

I2: Yeah, no, I'm trying to think... I think most of the time it got sorted out before the thing actually got published. Um. So that's why I'm trying to say whether it's yes, really – or sorta like in the process and then we sorted it out and it got worked out. I don't think there was anything – there's probably one or two minor things where it's like a conference proceeding or, you know, not like a paper, where I was like, well, I probably should have been an author. But by the time the paper comes along, we've had more discussions and then... So maybe then the answer is no. Does that make sense?

CL: Yeah, but would you mind...the one that got sorted out...what were y'all sorting out?

I2: Well, I know I've... it's gone both ways actually. So I know I've gone to things where, like I've gone to talks at conferences and I'm like, "My name wasn't on the author list," I think that usually they acknowledged me in the acknowledgements. But I'm like, "You know, I did a lot of that work. In fact, you acknowledged me a lot." So by the time the paper comes and we write the paper then I'm an author on that paper. [CL: OK]. And so conference proceedings in our field aren't as...prestigious...they're not, they sorta count, but not really, so it's not as big of a deal. Um. I've definitely like, in grad school, there was one paper where it was like, "Should I be first author or should the other person be first author," and I was like, "It's my paper." [CL: Yeah.] And I was first author. There was, there's a paper where I was listed as an author where, I mean I helped with discussions and helped on a little bit of coding of the computer code, where they put me as an author. And I was very grateful, but that surprised me. I didn't expect to be an author on that one.

CL: Ah, so it works both ways.

I2: Yeah, it does. That's why I was saying there's probably both ways. I probably would have been OK just being an acknowledgment in the acknowledgments section. So that's like journals and stuff. I've definitely – the weirdest one on the other direction – was

there was a big presentation about this big grant that got awarded for the state, where they had like a big center grant, or something like that. And I remember, I'm sitting in the audience, and they're talking about it, and they're like, "And these are what the different components are, and who's working on this component." And I remember looking at the slide and going "oh look, a [her last name] at Clemson who's doing work that's really relevant." And then the next slide I'm like, "Wow, really the same as what I am doing." And it occurred to me that that was me [laughter]. So they put me on this grant, which was great, I get money everything, but they never asked me until after that whole presentation and after it got awarded, which... So part of me is like, "yay, I got money," but part of me is like "they really should have asked me before." You know... And also, like, where did they get those slides? Oh [CL: right, photo rights...] Yeah. So it was a little off... So that was definitely a weird one. I mean it worked out...you know, it pays for a student or whatever. But that I was definitely... Plus afterwards, all the people were like, "So you were on this grant, what was this all about?" I'm like, "I don't know." [laughter]. And afterwards they were like, "I hope it was OK that we put you on this grant. " I'm like, "yeah...?"

CL: A phone call the week before would have made a world of difference.

I2: Yeah.

CL: interesting. [I2: yeah]. On the flip side, can you describe to me a time where you felt fairly represented as an author. [pause]. I mean, I'm sure it's something that happens...[crosstalk]

I2: Yeah, most of the time I think that that happens. I definitely...it's easier to think of being fairly represented as an author when it's either from one of your lab groups or one of my students being an author or me being the first author. But I've definitely had great collaborations where I'm not the last, I'm not the first author, but they definitely, I felt like they put me in the right spot. Usually, when it gets to the point that we're writing the paper, very early on – before the paper is written – usually we have a discussion of what should the authorship order be. Who should be on the paper. And so people have been really good about that.

CL: So the discussion of order was before...

I2: Yeah. Like, I mean, the work's been mostly done. Probably we've had a couple conferences and things. But like, for the actual paper, figuring it out. Yes. So it doesn't cause problems. And I think there was one paper where, when I was a post doc, where I really helped train that student to do the stuff, I even did most of the first round of data stuff because he wasn't used to the technique. And then he was writing the paper, and he wanted to put me first author. And I probably could have been like, "Yeah, sure," cause I did it.. But I think it was definitely...I told him to put himself first and me second just because I thought it was his work. I mean, the second half, he did it. I supervised or whatever, so... I think as long as people have good discussions beforehand...? [CL: yeah]. Like, not the "I'm submitting in 24 hours, does this look OK to you?" format, I think it's fine.

CL: Right. Um...do you know of any circumstances in which a colleague, a friend of yours, was particularly treated unfairly as an author?

I2: Yes.

CL: would you be willing to share?

I2: You should probably talk to my husband.

CL: I might. If this goes beyond pilot research, I will.

I2: So my husband, in his master's research, his former master's advisor, um... so...

Brian had a master's thesis, and he wrote it up and then he had the paper, it took forever, but he left and things weren't great with that adviser anyway because he was doing other things. And then, I think we were already at Clemson, either that or right before, he got an email from some guy in Italy that was like, "I noticed this paper by your former advisor. I don't understand this particular proof. I know you worked with him before, could you help me out?" And it turns out the guy had published pretty much Brian's thesis without acknowledging him at all on the paper.

CL: Wow.

I2: Yeah. So the funny flip side of that is that there was a bug in Brian's thesis. So then Brian was able to write a paper that was basically like, uh, a revision, or a, you know like, pointing out this error in this other paper because he wasn't an author on the other one [laughs] [CL: right].. Yeah. And that particular advisor, actually, eventually left the university because, and was I think right when Brian was doing his doctoral work the second year he was asked to come in for an interview because there were other issues of that particular advisor not conveying proper credit to students. [CL: wow].

And then I know of some people here whose work got kind of scooped/stolen from proposals... And it's funny cause now you interact with them, and they're really, you can tell who those people are because they won't share their proposals. Even if you're on a proposal with them, there are certain people where I'll never see the whole proposal. They'll give me like, "This is the section I want you to write; this is the overall big idea," but I'll never actually see the whole thing. Because they've had bad experiences in the past. Which I think is bad because it kind of, you know, I'm sure we would actually work better if we could actually see the whole thing.

CL: Right. So like, collaboration, discussion, gets limited [I2: yeah]

I2: And then there's that one guy who I was warned about when I got here who I got warned about because he basically stole people's work. [CL: right]. So...yeah.

CL: OK. Is there anything else you feel related that you want to add, or any questions, or...? Anything I might have missed in asking?

I2: So actually, since we did mention that Turn It In thing, which is useful for checking, I think one of the issues with it is that the default is that it will post everything to its repository. So, and it's kinda scientific and things like that. But I'm always careful when I use it to uncheck that box because, like, for students' work, and all this stuff, I don't know where it's going, and copyright issues like that. They shouldn't be getting a copy. You know what I mean?

CL: it's almost, like, published on Turn It In?

I2: Yeah. Even though it's not...no one can actually pull it up that way. But then their paper's on there, and someone else... Even, say like an internal paper or something and you write it up and you just want to check it and it's posted. And then later you write a journal version of it. You know that journal uses the same service to check and if your student paper is up there and has very similar... So that's one of the issues with these

online systems. Just because a lot of times it'll show up stuff that isn't really plagiarism. Like it's... yeah, I think it has probably a high false positive rate. And internally, when I'm looking at it for student work, it's not a big... I look at what it is actually saying is plagiarism. And most of the time you're like, "oh, well, that's the bibliography section." [CL: right]. But you never know when it's like a grant or a journal, they're going through so many papers and things all the time that anything that comes out positive is going to look bad, so. And then there's an issue that's coming up now with things being so, kind of, automated.

CL: Interesting. I didn't really think about that. So just so you know, kinda to debrief: This started with me looking through the history of ORI and OSTP and the definitions they put of research misconduct as just falsification, fabrication and plagiarism. [I2: yeah]. And those are the only three things. And yet, I have a sense at least from the research we do over in Professional Communication that there's a lot more – especially with authorship – issues that really affect scientists. [I2: yeah]. So why is plagiarism or fabrication considered the only authorship issue when there seems to be a lot more going on. [I2: yeah]. And a couple different journals and a couple different societies have started to put up codes of conducts concerning authorship [I2: yeah], but they haven't been adopted by the major oversight boards. In fact, the major oversight boards every few years redo their definitions and they continue to just say FFP: fabrication, falsification and plagiarism. So I'm kinda looking at, do scientists care? Do they want more authorship guidelines? Do they not? How important is this?

I2: And I think it's more of an issue when you go between fields. And not even like in that unrelated of a field. Because, you know, the stuff we do and then the stuff my husband does in more computer science/math, I think even physics, where they do alphabetical order, so you've got a paper, and if you have people from different fields, then there's this whole, "which order author do we do for this journal versus..." And it would just be easier if it was standardized across the board. I know I've had friends in physics stuff where they have, they go work at like some Brookhaven or one of those big things. And then you get put on the Author List. So while you're there and doing work, your name's not on that Author List. But then like years later, any publication that comes out for like three years, your name is on there. It seems very weird.

CL: So it's just like you were an author group?

I2: yeah, it's this big long list of people. It's just weird. So I think having some kind of guidelines or at least like definitions of how these work in different areas or journals would be good.

CL: Do you have to change at all? You said you publish in three fields, bioengineering, materials, and... I forget the third one [I2: Oh, chemistry]. Chemistry. Have you had to change your authorship?

I2: No, no, not in those. I have one that I'm working on that I should be getting out this week that's with the math department on, and it's probably going to go to kind of a sort of bioinformatics journal. Those are really weird because depending on the bioinformatics journal, the authorship order changes. Like, if it is a slightly more math journal, then it's alphabetical order. If it's a little more bioinformatics, then it's the order like we do. And

so, it's kinda odd. Because that's all the same field. It's like all – they cite each other, and it seems weird.

CL: Formatics? Is the word form with “atics”?

I2: Yeah. INformatics. Like computer science kind of things. Algorithms having to do with bio. So yeah, it's kinda odd in that field because depending on which direction you come at it from, if you come at it from the informatics side or the bio side, your authorship order changes. Which is weird.

CL: most of the examples you gave me, people were... you said you kinda learn, you said people tell you not to work with these people. You said the one professor probably ended up leaving that institution because of not citing work. Do you feel like most of the regulation comes from top-down, or comes from like peers?

I2: Well, there's definitely regulation from top-down. So the guy who left it was because it finally got to the point where they got someone from the top came down and did an investigation. I think for people that are skirting the line, where they've done a couple things and it's like, annoying, it's hindered stuff, people are mad but they're not mad enough that they're going to say anything, then it comes at the peer level. Where you basically get told “careful” when you're working with that person. [pause].

CL: OK.

I2: It's like in class, right? If you have like cheating in the class, how bad is the cheating? If the cheating is bad enough, then someone will step up and say something to the teacher, teacher comes down and kicks the teacher out. If it's like “well, he's kinda leaning over my paper, he's probably reading some of the answers, but it's more trouble to raise my hand, say something, and prove that he's doing it than it is to just kinda sit on the other side of the room” [CL: right]. Then that's kinda what I think happens in the field.

CL: Well, I think that's about all I have. Is that good?

I2: That's fine.

CL: Thank you so much.

[recording ends. I2 went on to share with me a lot more details about the colleague she mentioned who she was told not to talk with because he had a reputation for stealing ideas. She told me about his recent firing and how he had gone to the press about it. But she also said she was giving me all these details because the recorder was off, so I can't explain more.]

Interview 3

March 25, 2011

CL: Ok, again I'll come back so if we end up publishing this, I don't think I will, cause I think this will just be pilot...

I3: Be confident!

CL: We'll see, but if you have any questions let me know. The point of this, I'm looking at research misconduct and I realized I didn't really know what scientists thought about it. So I can speculate from my field of research about communicators, what we think about it, but I need a scientist's point of view. So this is all about your opinions, your thoughts, there are no wrong answers or anything. But feel free if you have any questions, if you think I'm not asking the right question, feel free to jump in.

So we'll start with an easy one: your name please?

I3: [name removed].

CL: Ok, What's your title here at Clemson?

I3: Assistant Professor Biological Sciences.

CL: Is that your field of research? Is biological sciences... does that describe it?

I3: No, I would say it would be kind of an intersection of biochemistry, microbiology, and parasitology ...and some cell biology.

CL: That is a lot of 'ologies.

I3: It's hard to categorize it, it's usually easier to just say the department.

CL: But your field of research...

I3: Yeah I would say my hats would be biochem, microbiology, parasitology, cell biology.

CL: Ok, perfect. And how long have you been publishing your research?

I3: My first paper was published in '97 I think. 1997.

CL: That's 15 years?

I3: Yeah OK, there we go.

CL: Ok I can definitely check your CV online, but can you name a couple journals you've published in or conferences, whichever is more important in your...

I3: Journals are more important.

CL: Journals are more important, OK.

I3: On the lower end of the scale would be *FEBS Letters*. And on the higher end of the scale would be the last paper we just published, *Molecular Microbiology*.

CL: OK.

I3: Oh and I'm second author on a *Science* paper.

CL: Of all these articles, are any of these co-authored with other researchers?

I3: All of them were co-authored.

CL: OK, and have you – you've already mentioned this to me but to be official – have you ever received funding from another organization other than Clemson for your research?

I3: Yes.

CL: Which ones?

I3: Yes, the NIH and I guess the NSF for the communications laboratory curriculum, course curriculum laboratory improvement grant, the CCLI grant.

CL: OK, all right, those were the basics and now we're jumping in. How would you define research misconduct?

I3: I would say, I think it boils down to dishonesty. So, and I kind of break it into, I guess there's misconduct during the doing of the experiment or during the analysis usually. Not usually during the experiment but during the analysis. And then there is sort of in terms of writing up the analysis or communicating through posters or whatever...and then I think there is a third category which is more about undermining other people's work or disregard of regulations and rules, things like that. So you know throwing reductivity down the sink I consider research misconduct.

CL: Yeah.

I3: Yeah.

CL: Yeah, OK great.

I3: Pretty broad definition but...

CL: No that was pretty quite thorough actually. How would you say you came to this definition?

You know when I first started working in a lab the first thing you do is go through all kinds of training and so you become...and I think back to that day when they didn't require this module Responsible Conduct of Research, RCR, Responsible Conduct of Research training, but I had to undergo like five safety training, chemical training and radioactive safety training. And so you immediately become aware of the, you know there is a lot of rules and regulations surrounding what you're doing so that's kind of the first part of it. And the second part of it was in terms of keeping an accurate lab notebook because you need to be able to go back and have the facts at your disposal...and how you did this experiment. And that was when I was an undergraduate.

CL: I was about to ask, you said you first learned your training in a lab, that was as an undergraduate?

As an undergraduate doing research and then in graduate school we got into, but I didn't really receive, what you would call ethical training. And I didn't publish as an undergrad so I didn't get into whole "how you write papers," you know, that kind of thing. But then when I was in graduate school because of the NIH training grant that supported graduate students, they require ethical training and so we had to go through a series of workshops and they would talk about...honestly they talked far more about egregious instances of misconduct which were very obvious. Like, you know, complete fabrication of data. And you know, none of us were even close to do anything like that. Where it gets really tricky are the gray areas that are very subtle. And I felt like, especially now when I'm training graduate students and we are trying to write up our research, you know we run into a gray area every day practically in terms of at what you know...so my own motto is, "What's honest?" What's the honest representation of what do we think is going on with the system, not what do you want to be going on or what do we think, what is our data telling us? Because you run an experiment five times, you'll get three results that look the same and two that look different, so what do you do with those two, do you fold them in? Or do you leave them out? And sometimes, and really the pressure to publish will force you

to pull those out, but if you've done it many, many times and it mostly looks like the three that match versus the two that don't, then do you, if you add those in, you open up questions from the reviewers saying "ohhh the data is very blah blah blah."

And in my field, this sort of molecular sciences where we tend to do a lot of stuff in test tubes, there is not so much...really the noise in the system is much smaller than if you go into the ecological or geo-chemical, when you go into the natural world ecology and behavioral biology where there is a lot of variation, they have ways of dealing with that, but if we were to employ those loads of analysis in my own research the reviewers who are not in that field are resistant to that, and they're like, "I don't understand why don't they just draw a line with bar graphs instead of writing a linear progression." Something that – and social science is the same way – you tend to do more statically running regressions comparing whether the two regressions are different or not. Things like that, but here they want you to go point by point by point instead of a regression.

CL: Details matter.

I3: Yeah, so we are running into some of those issues now where our data is noisy. And the data is all saying the same thing but to a greater or lesser degree in terms of numbers on a scale. So it makes it very difficult to make a nice neat graph the way they're supposed to. So even now, I'm in the middle of deciding what is that right thing to do as far as, it's important to tell the story, it's important to get published, not just because it's good for our careers but because you did the work and no one else is doing the work, and it's important to get it published in a timely fashion. So how do we take the data that we have and make a cohesive story out of it that represents the truth? Without being dishonest? And we go back and forth on whether we should show all of the data, and run all of the regressions, and let the chips fall where they may with the reviewers, or should we take the subset of data that tends to hang together more? And that's a tough decision, I mean, mostly because, you know, it's not just one person doing these experiments, this is several people over several years doing these experiments, and so it makes sense that there is a lot of noise, but it's hard to explain that in the context of the *Science* paper where there is no place to say this was done by several undergraduates. You know, there is gonna be noise because they're not perfect.

CL: So it sounds to me kind of like that even though you started with basic training the real experience of what to do everyday is still as you go.

I3: Yes, as you go through. As you do experiments. Did you run a control with that set of data? No? Then you can't use the data, so you learn as you go. "Oh I have to re-do the whole experiment with the control." So there are rules that you learn as you go through but, and, that's mostly where people go mired up in research misconduct. The spectacular cases where they are fabricating data, most researchers are pretty honest about it. But most of us, really idealistically, we are truth seekers. What is the truth about the system? And part of that is because there are other people working on it, so if you don't publish the truth, it will be found out. Some people are OK with that, they will publish anyway and just to get their papers out and later when they have to retract them or they get disproven by three other groups because they did not do their experiments carefully enough, but they are like, "that's OK, because I already got credit for that paper." But those people get to be known in the community as, "oh they're just publish anything," so

eventually truth will come out. But the thing is that half the time, even if they're careless, they're still right.

But yeah, and now actually there is lot... Now, any NIH funded project is required – not just training grants but any NIH funding project – is required, so everybody in my lab goes through a lot of bio-safety training as well as RCR. But in terms of how to present your data, that is still very one on one, where in the lab meeting, you know, “Did you do the experiment right? Oh now we have two experiments that say one thing and two experiments that say the other is. The answer is we don't know the answer then. We have a noisy system and we need to nail that down before we can make a...”

CL: So you can't really publish an article that says, “We don't know the answer because of...”

I3: Yeah in fact, there is a common refrain saying that you can't publish negative results. It's rare. Sometimes you can but it's very hard to prove a negative, so if you delete a gene and there is no effect that you can find, sometimes you can publish that, but it's usually in a much lower-tier journal. Where is if you can find a phenotype or find an effect from whatever manipulation you're doing then now you've got something you can hang your hat on. But so they, there is a very strong push to have something and I think you know, there are a lot of areas of research that are fairly subjective, like prophecies, because you're looking through a scope and I guarantee you can make up, based on the field of view on the microscope you pick, you can sell any story you want with those pictures. So people have gotten to be very like, “Twenty fields were selected at random,” meaning you're not looking at through the scope, you just randomly move the slide around then look through, focus, take a picture and then move the slide. So you are sort of trying to blind yourself when you are selecting the field. If you say, “oh this looks good,” then you self-select into whatever story you want. At the same time, if you are going to pick a picture for publication, you pick the one that is maybe not representative, but one that tells the story the best. But everybody knows this, so when you read a paper and read an image, you know the image they are showing you is likely to be the best image they have of that particular.

CL: OK that makes sense. Thank you. You just covered a lot of ethical research practices.

I3: Sorry.

CL: No that's great. What I was looking for...would you put in any aspect of communication into this?

I3: Absolutely because often times when we're doing the experiments we're already thinking about how are we going to write this up for publication and often times it would be ok if the experiment goes one way how would we spin that or how does that fit into the story and if it goes the other way then how does it fit into the story? And in some cases you're like either way its not going to fit into the story very well, so do you do the experiment? And we have these discussions because do we do the experiment because every experiment takes time and money. So it's like do we do the experiment? Should we do the experiment? Is that the responsible thing to do? We don't want shirk from doing our responsible duty but do we do that experiment or not? And sometimes the answer is that it's not going to add anything or take anything away and it's really expensive so we're not going to do it. Or its pretty easy we'll go ahead and do it because we should go

ahead and dot that I. But money can drive these decisions, its not always ethics, it's also ok if we have to do this one time it's going to cost another thousand dollars or something. That, or a thousand dollars of other experiments for something else. And sometimes its how in a hurry are you to get your publications out so it seems like there are a lot of forces but I mean I think in terms of choosing how to when you are communicating your science you tend not to communicate in the order in which it was done. It's not like you did this experiment first and then this one. Usually you figure out your storyboard of how are we going to make a cohesive logical story so it makes sense logically. A lot of time you get here and you're like ohhh and then you end up doing these other experiments but if you tell it that way I'ts confusing so you re-order it so it makes more sense. I think nobody thinks that's unethical because the ideas to make it easy for the people reading your paper to understand ultimately what you do or what the results are. But sometimes when we're doing journal clubs we'll kind of Monday quarterback it by saying ohh I bet they did this experiment first and had to go back. You know, you can sometimes tell when you read the papers. Usually you try to make story art that makes logical sense. Its really you are constructing it out of these pieces of data and it's almost never in the order in which you do it. And that's true for posters as well. So the two main forms, well three, one is the paper but that's the high stakes one that gets you the most recognition, and then conference presentations that can be in oral, PowerPoint, or poster, The stakes for that are less field because rarely in my field are they published. Sometimes depending on the meeting there will be something where they videotape the slides, so that has more permanence to it, but there is even a rule often at conferences where you are not allowed to photograph or tape conference presentations. The idea being you can present unpublished data for preliminary data there and no one is going to record it and use it to scoop you. They could still take it, but so people are careful about what they say. They may not tell you the whole story at a conference if there are competitors. So that's another area where if your competition is there, and I'm not in a highly competitive field, but when I was in graduate school I was and there we were coached on how much to say and what not to mention. And in fact things would be left off of a poster so if someone came along and basically wrote all of the experiments down you couldn't necessarily reproduce the experiments or you're leaving out some key thing so you can't be scooped. And that's considered fair actually in the field, because you're trying to protect your own intellectual property. It is not fair however when you publish it, when you publish it you are supposed to put enough data in there and enough information so that someone reading the paper could reproduce your experiments.

CL: That makes sense.

I3: Yeah and you're also supposed to, if it's NIH funded and probably NSF funded, if you have cell lines that you have made or antibodies or any kind of re-agents you're supposed to be willing to share them with other scientists so they can reproduce the results.

CL: Right.

I3: So sometimes scientists are very slow to give those things out. They're not saying no, but then they just never give it out. So that's kind of a grey area that is considered bad behavior but nobody would ever report them to the NSF or something about it, its like oh

he's a jerk, he never sends out signs. You know, unless there is something you can do for him. You know, something like that. That's more prevalent in high competition fields. In low competition fields it's more of a sharing philosophy. So I don't have to deal with that now thank goodness.

CL: Ok, so do you have a definition of ethical communication in science? You touched on a lot of things already.

I would say, definitely to put enough information in the paper so that they can, so that someone else can reproduce. In other words don't hide important information. Two, tell the story clearly, you know, don't obfuscate the process and try to...sometimes people right very densely and I think in some ways it is to sometimes failing to their own writing capacity but sometimes I think its purposely confusing to throw people off the scent so to speak. I think the third thing is that when you're showing the data; I think its ok to show slightly messy data. And if I had my way, words and all, because honestly we all know what raw data looks like. We all know how these things go, so I really don't like the idea of throwing data out because it doesn't make a pretty picture, but the fear is, it will never get published if you don't have at least a semi-pretty picture. So I really don't like that. And there are conventions on how to show certain kinds of data and you can run into fights with the reviews if you break with convention.

CL: Interesting.

I3: So yeah, and that's kind of annoying sometimes. But essentially I would say to be honest and tell the truth and be clear and be complete.

CL: Perfect. OK. And you learned this basically from practice?

I3: Yeah I would say most of it's just through the process of writing papers and doing research and discussing it. I mean it's a very, people have this view of researchers as sort of the sole of people of the bench and it's actually a very social endeavor in these little lab groups. And you know we give lab meeting we show our raw data to our lab members and they're like wait a minute you didn't think about this so you get hazed initially within the group, things get tightened up, and a lot of it is there is a lab culture so every lab I was in there was a culture that valued truth and doing it the right way. And you know representing the data well and not being afraid of messy data too much. But you know there are other lab cultures, which I haven't been in, but some of my former colleagues have jumped from this kind of culture into a culture that's publish at all costs. Damn the torpedoes, full speed ahead, if something doesn't fit its probably, it's just something wrong with it we're going to ignore it and move forward. And that is a whole other kind of culture and it's out there. I mean there are labs that are like this. And some of them are very esteemed labs, Nobel Prize winning people at the lab. And yet I would you know most of the time they're right because they're very smart but I think there methods for doing science is questionable. But yet they perpetuate, so there are people out there who can perpetuate for quite a long time in the system because they can stay within the grey area and they never go full fabricating data or full lying or making up you know entire panels of people in a study that doesn't exist. I mean that kind of fabrication takes an awful lot of work already.

CL: Are you aware that there are governing bodies like the office of...integrity or OSTP, science technology policy that have published definitions of research misconduct?

I3: Yeah I probably read them.

CL: OK, do you have any idea what those definitions are?

I3: Uhhh No, but it is probably like some sort of government-eese like you know, representation, fabrication, I mean they probably have different categories of research misconduct but I couldn't quote you...yeah I would have failed the test. I am actually due to re-up my training because you have to re-up it with the RCR.

CL: Thank you for the answers. My other ones..OK, so specifically going from general research misconduct into authorship. Would you say that authorship is an important issue or concern when you are working on your research publications?

I3: Yeah it is, because authorship is credit, it's the coin of the realm basically, so if you are not on a paper you get no credit for that work that you've done. It is a very touchy area, extremely touchy. And so, there are different, even in different fields there are different definitions of what constitutes authorship. In fact we were just having this discussion in my lab yesterday because I have a student working in my lab, she's an entomology, more field work, she's doing a molecular component so she's using my lab because I have all the stuff to do molecular work. So she was saying so what would you constitute authorship and I said where there is a range, some are, you have to actually do produce the data that's in the paper and that's probably the most stringent form of authorship. The other is significant intellectual contribution. Which could be ideas, and feedback, and guidance, as well as doing you know not necessarily doing research work but providing maybe a significant direction to the project or an idea. Some would, the grey area, and I think that people differ on that you know like what level of intellectual contribution would constitute authorship versus acknowledgement. And some people would give people an authorship in return for re-agents, that's another thing that can happen. If you use my antibody then you need to, I need to be an author. And that kind of reagent is really in my field, that's not good in my opinion, that's not good. But that depends on the re-agent. If its an entire you know data set that they spent three years collecting and they are just going to hand over to you and you're gonna do a third of the work off of that data set that is a significant, I would call that a significant intellectual contribution. Or if it's some you know knock out mouse there is room there for, your not supposed to even, you know mice are supposed to be freely distributed but I mean it could be, for example, a friend of mine who works at Hopkins, a colleague of hers made the mouse for her and has maintaining the mouse line for her so he is going to be an author on the paper even though he didn't really contribute intellectually to the paper this was a significant help to getting the research going so she felt he earned an authorship in there. But you know some people will do it if like almost like a reward. Oh ill put you as an author on this paper because you drove me to the airport. I mean I dunno...probably not that shallow but I mean I had a colleague who I helped him out with a couple of things and he wanted to put me an author on the paper and I said I don't feel comfortable doing that because I don't feel like I've contributed enough to warrant it. So but that's kind of, sometimes you'll ask do you want to be an author on the paper or not and in our field which I think is not true for others but the order is important so the first author is the primary, that's the one who made the most contribution so the special spot is the first author and last author in my field. So the last author is the lab head and the first author is

the one who did all of the work or most of the work, and then the ones in the middle are sort of by second author did the second most amount of work, the third author did the third most, and the senior positions if there is more than one lab head, if your next to last that shows less of a contribution then...but a lot of times when a collaboration has started a very important part of that collaboration is to determine at the beginning that if this works out like we think then I would put you as third author on this paper or I think since its about half and half why don't we have your graduate student be first author on this paper and I'll be last author. And then they can be next to last and so there is some sort of negotiation and problems arise when that negotiation doesn't take place or if science you know goes funny ways and sometimes the person that is third author ends up generating most of the data for the paper then there must be a re-assessment of author order and that can cause a lot of tensions because and that happened not with me but with my best friend in graduate school where she was going to be first author in this paper but then the post-doc that she was working with ended up doing...just so it ended that by the time that it was all done the paper ended up shifting focus on his stuff so he became first author, she was not happy about this because she had put a significant amount of work into this thinking it would be first author and it wasn't but you know the lab head is like he did more work on the final paper and she's like well lets put the papers up so he can have his piece and I can have my piece. And the lab head is like well no because then its two far lesser papers then you know a science paper is what it ended up being so he was like he was like no and to this day she is mad about that. So that is probably the twitchiest area and the other area that is twitchy that is if you suspect a lab person or another lab mate too that is not, that is fudging, which I think is the nice way of putting it. Maybe not full fabrication but you know not being completely honest with all of their data and eliminating groups or eliminating data points or only showing the best data and you know they got it to work three times right but eight times it went another way but they are not showing that eight times to anybody, that kind of thing. So then the PI is like ohhh everything looks good, you did it three times, you replicated it, we're moving on. You know, so that can happen sometimes. I remember there was a student, I don't know if it ever came to anything, but I was on my way out of the lab and there was a new graduate student and I never saw him in lab and no one ever did either but yet when we had lab meeting he would have data. We were like when is he working? Because in between people who come in at 7 in the morning and people like me who left at 10 at night- it's like is he working from 10 to 7? When is he ever here? That raised some flags and I think one of the other students asked him and the thing was is that he would do a bulbous of work on the weekend when no one was around, which is a little suspicious in and of itself but he was an oddball anyway.

CL: He was being regulated by his peers a little.

I3: He is being regulated by his peers. Because we're like you know, my lab when I was a post-doc wasn't very secretive so you know we would kind of look through their lab notebook which is a bit of an invasion of privacy actually but its sort of like he wasn't around and you'd see dates and your like ok I don't know when he's working but apparently he's working on stuff so we'll just let it slide. Because that's a big deal and without any proof you, you could destroy a lab environment a lab working environment

really fast so it's something that you know is kind of a fragile ecosystem so you would need a lot of proof to bring that up

CL: So the big considerations in the office would be who did the work and who did the work well?

I3: Who did the work, you know, some people would also argue that you know who wrote the paper because some labs the PI writes every paper, the students never write the paper they just make the data and the PI writes the paper. But in other cases the students have to write the first draft or it's kind of more a back and forth process. I think that's better because it trains people how to write. They never learn to write if they never struggle through that first draft. But it also means that you know the PI is not is pretty far from a project. So if they are writing a paper and wonder, there is a disconnect, a little bit, because if you like the last paper I'm probably going to write entirely by myself is probably the first draft I'm working on now because there were six undergraduates working on it and none of them are actually around of them, and two, they can't write this you know. But I actually did some experiments so I was like ok I'm connected enough with the work that I can write a paper. But the other stuff that is coming out, the student have to write the paper, I'm like I don't know how you did that, I don't know what details, I mean I don't have time to go through your notebook to find the details so you have to write the paper. And so there is definitely the first author should, in my opinion, have a significant input in the writing of the draft and actually all of the writers should read the paper prior to publication and signed off on it. I mean if you're like a middle author you should have at least gotten one or two drafts and made some comments on, but usually only one or two people are actually writing a paper.

CL: Right, but everyone reads it, or should read it.

I3: Yeah yeah, but unless it's like where there is a hybrid so then like this lab will write these sections of a paper and this lab will write these sections and then they'll try to fight out the discussion. But yeah, but some people feel like if you didn't help write the paper, you shouldn't be an author either which is where you get into intellectual contribution or not. I don't feel that way, I feel like there are people who should be on the paper who may not be actively involved but I do feel like every author should have the opportunity to comment on the paper. In terms of group writing is a nightmare so its you know usually one or two people and they're moving back and forth. The drafts are moving back and forth. And then when you have a sort of cohesive draft then you send it out to the other authors. But most journals require all the authors to sign off; there is a sheet that they have to sign off on now a day. And I don't think every journal does that but some journals require that every other sign off. Which means that you have to keep in contact with them and they require contact information for each author as well. As I can imagine some authors get left off because they are out of the picture for too long and no one knows where they are

CL: So you mention some journals require that, have you ever looked up authorship guidelines?

I3: Oh yeah, actually when I sit down to write a first draft the first thing I do is look up instructions to authors and they discuss all of that information and every journal has a whole policy sheet from authorship and disclosure rules, and copyright rules, and down

to we want your line images to be 300 DPI, they are very specific, so once we figure out what journal we want to send it to we, I do that before I start writing a draft actually. That's step one.

CL: Great, have you ever done that for grant writing too?

I3: Yeah, I mean because you need to know the format of the grant before you do it. Authorship on grants is a little different because generally its there is a PI or maybe a co-PI and some grants only allow one PI. And some will allow up to three Co-PIs and they're usually getting money so they will get some sort of funds from the grant. And then there are additional personnel that are listed but are different. But they have a, but grants usually have a, actually you know in some ways they don't have a lot of rules. I mean they have text rules but there is no for example citation format, generally. Sometimes there are, some foundations have a specific format, the NIH does that, they're like you know use whatever citation format you want and sometimes they'll limit the number of citations you have. But in terms of, I think its kind of expected that if you're reproducing, if you're gonna for example, when I first submitted a grant to the NIH, I knew a piece of data that wasn't published but I didn't mention it because it was not published and I thought it wouldn't be that important but it turns out that when the reviewer comments came back they said umm well you haven't really shown the importance of this pathway. And the fact that I knew established definitively the importance of this pathway but it was not published, so finally I basically, I said I emailed and it was from more formal lab so I was around when they generated the data, so I emailed Sophie who was my colleague who did the work and I emailed my former boss, Paul, and I said dear Sophie and Paul I have this grant, I would like to use this fact, and the fact that I wanted to use was a figure, an unpublished figure that they had, can I use this? And they said yes you may use this and they sent me a letter and I had to put that letter in the grant and then I put personal communication, I put with permission and I put that figure in there but I had to map it to them with yes that we acknowledged this, yes you may this thing with permission blah blah blah for your grant. And the reason why they felt ok with that was because they could have said no but you know grants are supposed to be shredded after the review process so the grant review process is private and so even though the reviewers of the grant have access to that data its not out in the wide world. And plus I think that information was already on a poster in some meeting or somewhere. But still in that case that was a very specific case where it was not my work, it was someone else's unpublished work and I had to get permission to put that in the grant. But I needed that and they helped me out. But if you put that in there and didn't attribute it or back it up I don't know if the grant reviewers, they might disregard it.

CL: Or could have it been seen as plagiarism?

I3: Yeah, and now the university is putting our grants through TurnItIn as well, which we don't like because in some ways there are only so many ways you can say some stuff. I can run through my canned description of fatty acid synthesis occurs in a cycle of conserved reactions...honestly it's like blahhhh there are only so many ways you can write that. So I've had discussions with friends about you know this doesn't happen to me so much but I have a friend who works in kind of a boutique area and she has written

more reviews than I dunno than anybody, people are like ohhh can you write me a review of blah blah blah. The thing is that with especially review articles it's very hard to write it differently. And by now she has written like 15 reviews and she's getting to the point where she is starting to plagiarize herself because they want one slight different perspective but the entire introduction to the field would be, its not like she copies and paste, but she really struggles with not following into these grooves, once you've figured out the fewest words needed to describe a particular phenomenon you tend to follow into the same set of words again and again and again. It is sometimes hard to avoid self-plagiarism. But I have noticed, we call it recycling papers, where essentially the same data shows up in 2 or 3 papers and you're like dudes come on, new data, new paper. And usually its like paper in high profile journal, its like your going through and your like oh I haven't seen this one yet and its in a third tier journal and you find out its basically the same paper. I mean or a subset of it, and it was published after the high profile, you know, its not like you can't even say we published a preliminary version in the Polish journal of cell biology or something and then got more data and re-hashed the whole thing in journal of cell biology. Usually it seems to be that they come out in different, within the same time frame. And I don't know if it's like to get everybody a first author paper or...

CL: Is your field where you submit to a journal, you can only submit to one journal until you hear back?

I3: Yeah.

CL: Yeah so is ours. You've given us a lot of examples of colleague stories, have you yourself ever felt unfairly represented as an author?

I3: No.

CL: OK you mentioned that story about being offered authorship that you turned down. That was a time where you were fairly represented, where you felt almost unfairly represented because you didn't think you deserved the credit?

I3: Yeah I guess so, He's a very cool colleague of mine and I would call him a friend as well, he is senior to me but he's just over effusive about everything so it's sort of the nature of his personality. And I was like, "no Dennis, don't put me on the paper." "But of you've helped so much with this and this and this..." "It was my pleasure but no, don't put me in the paper because I didn't do any of it."

CL: Can you walk me through a scenario where you felt fairly treated as an author?

I3: Um yeah, so my, I was a little disappointed with how it came out so my authorship on my *Science* paper, I am a second author on that paper but my data didn't actually make it into the paper. By the time we were done writing the thing, my contribution ended up relegated to a footnote so to speak, which I was a little bummed out about but *Science* has such a restrictive format that, you know, my little... I mean I basically generated a figure worth of data which was sort of following up on some stuff so it wasn't central to the story so by the time we got done, we're only allowed 4 figures, and originally we were writing it for *Cell* so we were like, "oh great," but then I don't know what happened but then they decided to try for *Science*, that meant we had to actually re-write the whole paper because the format is extremely different and we had to cut the figures down to the bare bones. So that figure basically ended up getting chopped, it's like your part got cut

out of a movie. But it was an important, intellectually it was important because it..basically there was an alternate explanation for what we were seeing and my data proved that it wasn't the alternative data, so it was important but it basically ended up being a sentence. So in some ways I was proud of my contribution to the project but also felt a little like you know, "uhhh you've got a second author *Science* paper," and I'm like "yeah, yeah but except my part isn't in there anymore," I felt....

CL: Did you help write it?

I3: Yes, yes I did, I was involved from the beginning. And actually I made up the title because I'm good with words; I'm good with titles.

CL: Yeah, those journals have more interesting titles than some of the other ones.

I3: Yeah so I came up with the title

CL: How many authors were there total?

I3: I think there might just be three of us. First author, and me, and Paul, second author. I'm trying to think if there was anyone else involved.

CL: So was the person who did the majority of the work the lab head, then you in the middle as a contributing author and contributing data collector

I3: Yeah.

CL: OK.

I3: Yeah I'm trying to remember if, I don't think anyone else was on that paper. If there was, there might have been someone else on there but I don't remember now.

CL: Ok I think that's about all the questions I have.

I3: OK cool.

CL: Just to debrief you a little, what I am looking at is that most of the governing bodies justify research misconduct as FFP which is fabrication, falsification, and plagiarism and they are the three words that are all over the place however I am finding a lot of information all over the place from science commentary and from different commissions and especially from journal editors who are really concerned about authorship as a major issue of research misconduct so the question is...

I3: I'll tell you one other thing; authorship can lead to more egregious, I mean..

CL: Are people doing fabrication, falsification, and plagiarism in order to impact the ability to publish?

I3: Well authorship is the only thing that matters in terms of getting credit for the work that you do so it's the ticket to everything else so that's why its so twitchy why everyone is so twitchy on it and why its so important to talk about it from the beginning. But the problem is there are not hard and fast rules

CL: That's part of the thing, that there is, that from my point of view I seem to think that the major oversight board should start defining authorship better since there seems to be a concern about it but they've heard these concerns and continue every few years to revise their definition and it doesn't include anything about authorship. So before I've started steam head rolling calling for authorship guidelines I wanted to actually see what scientists felt about this. And you see it varies a lot by field...

I3: Yes it does and that is. And even fields that I think even from your perspective seem similar are different. Like omniology is a different field from me. And even like ecology...

CL: Computer science does alphabetical order, no question, and that is revolutionary...

I3: And my husband is an economist and there it's first author is the key position and then you know it's in descending order of...

CL: Yeah I don't think social sciences give any credit to last author, that's just hard sciences. And a lot of the journal editors, there are a lot of associations of science journal editors and most journals have their own definitions and the editors talk about this a lot and have some incredible guidelines, the Council of Publication Ethics, COPE, has some wonderful guidelines on this, but from what I am learning, authors or scientists don't really pay as much attention to that as much as where they want to go or where their lab goes. That's what I'm kind of trying to figure out.

I3: Yeah we're kind of embedded into the culture more than anything and I think that one thing that people find are well inconvenienced is this trend in journals where author contributions are listed.

CL: The medical journals started that from what I've researched, where you actually spell out in the paper whatever they did.

I3: XYZ designed the experiment, XYZ did the data analysis, X wrote the paper, and Z you know edited or whatever and it makes I think that might have cut down a bit even though in some journals it's voluntary and other journals have started making it a requirement. I actually favor that because I think that it cuts down on this sort of authorship as reward so if you have to spell it out it's going to look stupid if it's like because it's like they helped my hand when I did the experiment the first time or something.

CL: Well and I'm kind of finding that medical journals are leading the way, biomedical, because they have so many ethical considerations. They are almost the lead on this and then other people catch up. And here in the social sciences we do whatever science does and so we're not...

I3: So there is sort of a cascade

CL: There are papers that have like 80 people on them, which I know this is happening in sciences as well because you have to get credit to everyone that works in the lab or everyone who funded you.

I3: And you know there is this you know with these big genome-sequencing projects and things like that where you do have, I know my organism's genome had like 80 authors but that's because they had 80 people annotating where they would pick someone for chromosome 6 and then they would run through and annotate all of the genes so they did actually, there really was 80 people who worked on it. Now I find that instead of listing all the authors on the author thing they'll say consortium to blab blah blah and then as a footnote or somewhere they will define the consortium members so then it's kind of a shared, the consortium is the author and yeah it does allow for ok if you did one gene, annotate one gene, do you get authorship on that paper? And people factor that in- oh you worked on the genome project? Even though it's a science paper it's probably, oh you worked on genome but it's not like having a science paper where it's a primary project that came out of your lab. The only one that really helped is the guy who started the consortium and managed the whole project. He is the one who gets the reward, and my field is small enough that we know who that is. But yeah I think what's weird though that

if you ever have to bridge into a different field the convention, its very, I've been surprised because I didn't really interact with the colleges or behavioral biologist very much and now I see that the way they do science is extremely different on every aspect. It's been interesting, that part has been very interesting because its very different

CL: Well super, thank you so much.

I3: It's been fun.

Interview 4

May 9, 2011

CL: It is just audio. Okay, the purpose of this interview, I'm working on my Master's in Professional Communication. And what I'm studying for my thesis is scientific communication; how scientists communicate. So what I've been looking into, some ethical issues with scientific communication, but I realized I wanted a scientist's point of view. What do scientists think about what it is that I'm looking at. So that's why I'm going to be asking you questions. They are entirely your opinion, you just have to speak from your personal experience and share as much or as little as you'd like. And feel free to ask me questions back. [I4: Okay] But that's what I'm looking at and you'll understand more and I'll debrief you in the end if you have any questions. [I4: Okay]. Do you have any questions before we start?

I4: No. But, well what's your sample size? How many people are you interviewing and how many disciplines are included?

CL: I - my pilot research was three and I'm hoping to expand to at least ten and I'm trying to get as many different fields as possible. Ranging from computer science to various science, chemistry to physics and I'm even going into agriculture and extension. [I4: Okay]. So I'm trying to get a wide overview. But all of the scientists I'm looking at need to be actively publishing and actively researching.

I4: Okay. So it sounds like you'll have maybe one representative from each of those fields that you're trying to...

CL: That's what I'm trying. Though I have realized, through my pilot research, even within one field, even if I say you know, "Biochemistry," there are still so many nuances within there that publish within different journals that are actually have some differences.

I4: Yeah.

CL: So yes, I'm trying to have a representative from each field, but some of them may on the surface look like they have the same title, but when I've gotten down to it, they, they might have some differences.

I4: Oh sure.

CL: That's my goal. And that's when Dr. [name removed] referred you. She knew I was looking for some different fields.

I4: Oh some of those that are sort of far out.

CL: Yeah. Right.

I4: Okay, yeah, sure.

CL: Okay um, okay so first of all, for the sake of this recording, would you please state your name?

I4: My name is [name removed].

CL: And what is your title at Clemson?

I4: Professor of Entomology.

CL: Okay. And your field of research is?

I4: Field of research is uh, it's rather wide ranging. In entomology but tends to focus on insects of medical and veterinary importance. Especially in relation to disease issues. So

insects that are associated with economic problems of animals, disease problems of people and animals.

CL: Okay. Um, and how long have you been publishing your research?

I4: Almost thirty years. It's twenty-nine or so.

CL: And I can definitely check your C.V. online, but could you name me a few journals where you've published your work?

I4: Yeah. Let's see, some of the recent ones, *Annual Review of Entomology*, um, um, *Environmental Entomology*, *Journal of Invertebrate Pathology*, let's see, *Evolution*, *Epidemiology* um, *Molecular Biology* I think.

CL: Okay. That's great. [I4: Okay.]

CL: Really prolific. Um, and were any of these articles uh, coauthored with other researchers?

I4: Yes. In fact...

CL: Yes.

I4: The majority of the articles that I'm involved with are coauthored. [CL: Okay.]

CL: And have you ever received funding for your research from an organization other than Clemson?

I4: Many times.

CL: Can you name a couple of them?

I4: Yeah. National Science Foundation is the primary source. Um, the um, Natural Resources Foundation of Wisconsin, NATO, um, National Institutes of Health.

CL: Okay, so very, that seem to be state or federal type.

I4: Yeah, primarily federal. For my [CL: Okay] work, most of the funding is going to come for me, from National Science Foundation, which is federal.

CL: Okay, great. Um, so those are my preliminary, just establishing where you are in the field [I4: Okay]. Um, how would you personally define research misconduct?

I4: Anything that knowingly deviates from, from honesty. From not presenting results that might contradict their study, to falsifying results of the study in anything and everything in between.

CL: Okay. Great. Um, do you know where you learned this definition or where you developed your concept of it?

I4: Well I mean yeah. It goes back to my childhood. I was brought up...

CL: Yeah.

I4: In a family where, where honesty was paramount. I went to an undergraduate institution where the um, centerpiece of that university, Washington [inaudible 0:05:53.9] University, was the honor system. [CL: Yeah.]

I4: The honor code. And it was a rigorous honor code. Not only were you guilty if you performed some indiscretion, if you knew about somebody else and you didn't report it, you were as guilty. [CL: Wow]. And so it really drove home to me the importance of honesty. [CL: Right] and the bounds. I mean the, the, you have to adhere to if you're going to have an honest system.

CL: Right, right. Um, when you think about ethical research practice and the definition you just gave me, does any aspect of communication come to mind?

I4: Yes. I, you know I think, yeah, there's a, there's perhaps a fine line and I'll give you an example because maybe this would explain it best. In my field, as in most fields, you present your research not only in writing but also orally. And if it's an oral presentation, you typically are timed. You'd have ten minutes. And so it's up to you what you present in those ten minutes. And if one is not very careful, it would be possible to leave out some of the problems that were encountered that might be relevant to the study. In other words, might provide some context for the results. [CL: Right]. And so it's a little bit like false advertising if one's not very careful. And that doesn't mean you have to present - I'm not saying you would present every pitfall [CL: Right] or every problem you ran into because a lot of them you're going to work through in order to present [inaudible 0:07:44.8]. But if any of those problems impinge on the veracity of what you're presenting, then I think you need to be straightforward and indicate that. But in a ten minute talk when you're pressed for time, I can see that well there may be [CL: gloss over]tendency to, yeah.

CL: Right. And okay um, so do you have a - I have a question here. How would you define ethical communication in science? But it sounds like of importance to you is including all the details.

I4: Well I think in what whatever you present must be transparent.

CL: Be transparent.

I4: Yeah. That if you're going to make a statement if there are any qualifiers that you're aware of that would affect how that statement is interpreted, then you would need to include it. We do have certain measures in my field that try to address these kind of things. And an example, are we okay?

CL: I think so. I don't know why it did that. [Inaudible 0:08:54.4].

I4: That, I think was my watch.

CL: Your watch. Oh okay. Sorry.

I4: It just turned 3:00 by my watch.

CL: Oh okay.

I4: Yeah, so for example, uh, if somebody claims to be working with a particular species, well once the study is done, that species they worked with disappears. I mean it's not there for anybody to check. However, a lot of journalist demand, and the profession really, to an extent, demands that those specimens be deposited in museums so that they represent a voucher of what you did your work on.

CL: Ah, okay.

I4: And you know, that's not so much well it's not so much honesty as just um, an additional assurance that what you claim you worked on, is in fact what you worked on. [CL: right] and science may demonstrate that what you thought you worked on is something else [CL: Oh true] and then it changes and people can go back and say well this is really what they had.

CL: Are the specimens kept alive in case...?

I4: No.

CL: Okay.

I4: They're deposited in a museum. [CL: All right]. They could be in alcohol or on [CL: right]. [Inaudible 0:10:08.9]. [CL: Right]. Yeah.

CL: Okay. Um...

I4: And - oh sorry.

CL: No, please go ahead.

I4: Yeah, and along the same lines, I think it's important to deposit notebooks with their material, any field notes you took, any correspondence that you have, I think should be hard copied and kept so that there is a paper trail. I think this is becoming more and more important because you know, all of this information can evaporate [CL: Right] if it's an email correspondence and you delete everything.

CL: Especially if the specimen is gone and the emails are gone, did it ever exist?

I4: Yes.

CL: Right.

I4: Well imagine the trouble historians are going to have trying to - a hundred years from now - figure out what somebody was doing at this point. You know it's not like Charles Darwin kept every little scrap of paper [CL: Yeah] and every correspondence you know [CL: Right] that he ever had. So it's a treasure trove researchers can go to. What are they going to have if everything is deleted, deleted. You get an email, read it [CL: Right] , delete it [CL: Right]. I think some of the, some of the honesty or accuracy in communication can be assured by keeping copies of that material.

CL: Great. This import - you put in - transparency and in leaving notes. Did you learn that anywhere? Was it taught to you?

I4: You know, it, it was, yea I would say it was pervasive and it was in the books that I read from the time that I was a kid up until the present time. It's either implicit or explicit in much of what we read. There are honor societies, there's a Sigma Xi, if you're familiar with that [CL: I am]. A scientific research society that has as its core value ethics and research. And so I've been a member of that since 1979 and

I try to ensure that my students become members of it. Because despite all the you know, societies you can belong to out there and all of them take your money and [CL: Right] and you have to be selective, I think that's one that's extremely important because it does emphasize the core value of honesty and research; ethical conduct in general.

CL: Just so you know, I'm taking some notes just in case this gets destroyed per your point [I4: Okay]. Just [I4: inaudible 0:12:57.8] to make sure I could put back this interview if I had to. Are you aware of governing bodies like the Office of Research Integrity or the Office of Science and Technology Policy? Do you know that they publish definitions of research misconduct?

I4: Yes. Yes. Yes. As a matter of fact, Academy of Sciences, the Academy of Sciences has put out, I think since about '85, a document that's wonderful that is used a guide for researchers. And I structure one of my labs in one of my courses, around that document. So we have a three hour lab where the students are asked to read this little pamphlet and then we discuss and debate some of the case studies that they present.

CL: Interesting. Okay. Is that early on in the class? Is that like a...

I4: It, it's a rainy day [CL: Oh, okay] lab because it, the class is one that I try to do outdoors [CL: Oh, okay] as much as possible [CL: Right] if we're going to have some rain and so forth. So it may come up around the middle of the class or toward the end.

CL: Okay. That's interesting. I have come across that pamphlet when I was looking for it. So do you know what the official definition is of research misconduct from the body that produced that?

I4: I don't.

CL: Okay. Okay. Um, do those rules that regard research affect how you communicate as a scientist? Sounds like, I mean you mentioned that some of your communication skills come back from childhood and what you've read. Do you think those were more influential than any rules you read?

I4: I think that was my, yeah, my foundation. I think that was my foundation that, that you know, those were established early on. I didn't suddenly come to that realization as an undergraduate or a graduate student. You know, certainly my undergraduate education and the honor system reinforced that and you know, through the rigor, if you're guilty of, you know about it and don't report it [CL: Right] and just seeing how you know, really the, an honor system did have to have teeth and, and had to be stronger than maybe I would have previously thought. Yeah, building on that and then being exposed to it, almost on a daily basis in writings either implicitly or explicitly, you know it becomes part of the way you try to conduct yourself.

CL: Right. Right. Okay. As a scientist, as you're practicing, would you say that you're concerned about ethical communication practices?

I4: Yes [CL: Okay] I am.

CL: Good. And then this is related but another kind of tangent from this conversation, would you say that authorship, specifically, is an important issue or concern while you research and publish?

I4: It is. [CL: Okay] It's an important issue, it's an ethical issue, it's a moral issue [CL: Yep], it's a personal issue, it's a difficult - sometimes - it's a difficult issue.

CL: What do you think researchers should consider when they make authorship decisions?

I4: The individ - probably more than anything, the intellectual contribution to the paper. More so than the financial contribution. More so than the actual physical doing of the experiment because a lot of times the person who designed the experiment may have worked on it in his mind or [CL: Right] her mind for ten years and presented more or less the cookbook to a student and the cookbook is simply followed [CL: Right]. And so that - because the individual might have done most of the work hands on doesn't necessarily mean they should be first author. I sort of think they should be an author.

CL: In your field, could you frame for me how authorship order is delineated? Like...

I4: Yeah. You know it's so highly variable. But typically, as a rule of thumb, the individual that writes the paper or oversees the writing, for example, if multiple people are writing, the person who is ultimately responsible for putting the sections together and framing the context [CL: Mhm], that would be the first author. And because typically they have the most intellectual investment in the work.

CL: Right. That's the first. And then are any other positions within the authorship in order of importance?

I4: You know, it's variable. And these are issues that are discussed because they can vary depending on the laboratory, depending on the country [CL: Right], depending on

the discipline. You know, for some people, in some countries, being the last author on the paper is very important. Because that would demonstrate that it's your lab that everything emanated from, from you.

CL: But that's not important in your publications? Usually?

I4: I, I personally tend to order the people in terms of how much they contributed [CL: Okay]. Okay. So the first authorship would be the person with the most intellectual input and the person who contributed the most of the actual writing. And then from there to the last author would be the relative amount of the contribution.

CL: Okay. So you're not last author on everything done in your lab?

I4: No. [CL: Okay] No. But I'm often a second author because there's a qualifier and I realize this is not particularly commonly practiced. But I you know, at my point in my career, I don't need publications to advance my career [CL: Right]. But my students, all of whom I work closely with, I want them to be first author. And so even if sometimes I might have more of the input, I ultimately put the responsibility on them to be the first author.

CL: Right. Okay. I ask because I notice that's very different in every field [I4: Mhm]. It's been quite interesting.

I4: Yeah. And not just field. I mean it differs from person to person.

CL: Okay. So I did interrupt. You were saying what you should consider an authorship order and you said number one most important thing was the intellect - the actual intellectual contribution [I4: Yes] to the paper. Is there any other consideration you take into account?

I4: That - well the intellectual input would include the writing [CL: Right] of the paper. So those are, they're not exactly the same thing but they're - I would consider them to be very closely related.

CL: Can an author be on there who has not written anything?

I4: Yes. Yes. If that person contributed to the ideas and contributed to the actual hands on work, absolutely [CL: Okay]. Not only could they be on there, they should be on there.

CL: Okay. Have you ever researched authorship guidelines

I4: I have read articles. For example, in *American Scientist*.

CL: The new one?

I4: Yeah.

CL: Yeah.

I4: Mhm, that's a good example. And I read those frequently and there are letters to the editor then they follow up in the next issue with a comment on those articles. So you get input from other scientists, not just authors of that particular article.

CL: Okay. And then making this a little more personal, have you ever felt unfairly represented as an author?

I4: My collaborators, and I've had many, have been generous. What I sometimes find a little bit disturbing is that I will collaborate with somebody and it might be a student at another university, or it might be a faculty member at another university, we might write the paper thinking there might be two or three authors and when I get the paper back from them and their comments, another author has been appended [CL: Ah]. And it's

usually a higher administrator and the first thing is, who is this person? And what in the world did they do? So that...

CL: Interesting. Okay.

I4: Is not necessarily representing me unfairly. However, a paper that really had two authors who did all of the work, now has three. And so it would appear as though that the individual, the two individuals that did all of the work, really did not do as much as they did.

CL: Why do you think that third author gets added?

I4: Because that individual is typically an, either an administrator or a unit boss, a laboratory boss or if it's a student I'm collaborating with, it's their advisor and they may demand it. And it may be a cultural thing. Once you get outside of North America it does tend to be a cultural issue.

CL: I've started to see that. I'm not sure that I'm going to take that in or not, but I've noticed the opposite. The Rutland Institute here is dealing with Australia, apparently, is making a lot of new laws about authorship [I4: Hmm]. Because they deal, deal with it differently than we do.

I4: Yeah. Yeah. Well it, it's mainly a problem it seems to me, in third world countries.

CL: Okay. So luckily you only had one or two instances of, of a possible unfair treatment. Can you walk me through a scenario where you felt fairly represented as an author?

I4: Well, I would say the vast majority of papers on which I have been an author, I feel I'm fairly represented. If I'm not, it's my own fault [CL: Right]. You know because I said nothing up front and felt that maintaining a collaboration was better than jostling around for second or third authorship.

CL: Up front. So does a conversation happen before you start?

I4: Um, you know it's usually implicit. I have never had a problem with the order of authorship. It's almost always implicit and I have never really been discouraged by the order of authorship if I'm not in charge of the paper. Really, the only issues I've had are when an additional name or two are added to the paper and that was never discussed up front and I don't know why they're being added [CL: Right]. I've never met the individual. You know, those are, yeah, those are discomfoting [CL: Right], but then I have to take into account that this is a different culture that I'm dealing with. It never happens in this country - well it did when I was a graduate student [CL: Yeah]. It used to happen when I was a graduate student every once in a while. But you know, in the last twenty-some years, it has never happened except when dealing with foreign countries.

CL: Where as a graduate student you had to add someone you weren't comfortable adding?

I4: Yes.

CL: Okay.

I4: Yes. Mhm.

CL: But you think that's happening less now?

I4: I don't know.

CL: Oh. But not to you personally?

I4: Well it doesn't happen to me [CL: Right] because I'm no longer a graduate student. But [CL: Right, right] you know, I came up in a system where some advisors felt that the student was an "item" to further the individual's career. And, and that's something that really goes back pretty deep in this country. I mean I've - some of the government publications that came out in the 1800's and early 1900's had authorship by a person who never did any of the work, but he ran the lab [CL: Right]. So you know, it was his minions that were out there doing all of the work. Actually in some cases, writing the paper, and then he simply puts his name on it. That was just the way it was done.

CL: Do you, the journals you contribute to, have any rules about what constitutes an author or do they require everyone to sign off on a final copy or anything like that?

I4: More and more, that is the case, yes. Especially the higher tiered journals. So there are a number of regulations that are appearing more and more. Some of these high powered journals, like *Science and Nature*, you have to list what, you have to state in writing, what the contribution of each author was, briefly [CL: Right] of course. If a paper is submitted to a journal by one of, let's say several authors, then that journal often will send an email to all of the authors and say, "The following article was received. Either send us an - it'll say either send us an email that you agree to have your name on it and you agree with the contents" or it will say, "If you don't agree, if there's a problem then you must contact us."

CL: But that means whoever is submitting it needs to have contact information for everyone involved.

I4: And that's required.

CL: Yeah. Okay.

I4: Yeah. So the journal would require that the contact information, emails for all authors, be given. And then when that journal article is submitted for consideration, the editor, editorial staff, will send out the email to all the contacts. If contact information's not given, then the paper's not going to go out until it's available.

CL: Right. Now are they approving the fact that the paper got submitted or do they actually approve the statement of what they contributed

I4: They...

CL: Does everyone see that statement?

I4: They would see the paper [CL: Okay] itself and would know whether or not the authorship is correctly represented, whether or not the contents of the paper are as they thought they should be.

CL: Right. Okay. Do you have any circumstances where a colleague of yours, either at Clemson or elsewhere, had an unfair authorship situation?

I4: Well I've seen it in students a lot. Yeah. Where I think that the faculty member, the advisor is being too heavy-handed in demanding that their name be on the paper when I know they contributed nothing. Their comment would be, "Well, I allowed the student to work in my lab. They used my facilities. They used my reagents." You know. "I wrote the grants that got those..." It can be justified, but to me it's getting a little slippery [CL: Right. Right] you know, for, because again, there has to be some kind of intellectual input either in writing the grant that gets the money that does that particular work or in - even if you're doing a cookbook there has to be some intellectual [CL: Oh right] exercise.

CL: Well those were my questions and what I'm looking at is that the official government oversight bodies, like ORI and the OSTP, the formal definition of misconduct is falsification, fabrication and plagiarism; FFP [I4: Mhm]. It has been ever since they've formed a definition in the '80's. and there is no mention plagiarism is the only authorship concerned mentioned in research misconduct. But I've since found in talking to scientists that there is a lot of communication ethics that are actually related to research misconduct and perhaps authorship being the biggest one. And that the demand for authorship, as you've said, it's not as important to you, now that you're tenured, but that, that press for authorship might actually lead to research misconduct perhaps or - and so I'm trying to figure out if we feel the government oversight body should add authorship definitions. If there should be a formal, a formality of what it is. I mean because what you told me is it's not even by feel, it's by person. And I know some of the journals have - there's plenty of information from the journals, the publication editors and that sort of thing, that have their own ethics. But [I4: Mhm] it's what I'm looking at is if the drive to authorship is so important that perhaps it should be elevated to a level of research misconduct. And if government regulation would help simplify.

I4: You know, my guess is no. because it probably would be more paperwork and we are becoming so bogged down with paperwork that often it's a response to a minority doing something wrong [CL: Right]. I mean you see that at the university [CL: Right]. We got this form because somebody violated you know, principles that [CL: Right] everybody recognizes as inviolate. Nonetheless, no, I don't really think that some oversight body is needed. I think that would bog down in yet additional bureaucracy and administration and we certainly don't need that. What I think works best is two things. One, educating students that at the core of science is the business of ethics and actually discussing ethics. We do that in my lab, during our lab meetings. I've introduced it into my classes and discussed it in the classes. We even do the exercises I talked to you about [CL: Right]. And then one of the things I really like is in the journal article, for example in a little section, maybe in the acknowledgements, just having a statement there that says, so-and-so contribute this and then the next author, whoever it might be, contributed this. Just a brief statement that says to succinctly but accurately as possible, what each person did.

CL: From my understanding, the biomedical journals have all moved to that. *Science and Nature*, I think it's voluntary for one or encouraged somewhere around the, may even be required at this point.

I4: I think it's required.

CL: It's required, yeah. So it came from biomedicine where they really wanted that identification [I4: Yeah]. And I think part of that is also disclosure of payment, like if your lab is funded by Astra Zeneca or something that [I4: Right] [inaudible 0:33:06.2].

I4: Well that's actually a separate statement you know.

CL: But it's separate, right down at the bottom [I4: Yeah, yeah]. Okay.

I4: Revealing any funding and conflicts of interest and so forth.

CL: Right. So that statement of authorship contribution I think is going to bleed through to more journals [I4: Yeah], but I do think, I agree with you, I think it's good recommendation to get everyone clean.

I4: Well you know, it's, it, it's, it's a perpetual arms race. There will be those few, the minority, that will find some way to get around that and then you know, the, the minority that is violating the standards will then cause some reaction to make sure that doesn't happen and that just ratchets up and ratchets up. That's why we are where we are now with authorship issues [CL: Right]. The reason that *Nature and Science* and these biomedical journals are you know, demanding that authorship effort be stated explicitly is because people were just putting their names on there. Maybe the person loaned a piece of equipment and said, "Well this is why you have to put my name on there."

CL: Right. A gift authorship.

I4: Yeah. Yeah.

CL: Okay. Well wonderful. That's about all I had. I appreciate your time.

I4: All right.

CL: And for your insight and the fact that you're teaching ethics to your students.

I4: Yeah, it's actually a fun, a fun class and it can be difficult because some of the issues we choose to look at are ones that are not always clear cut [CL: Right]. Not always straight forward.

CL: They rarely are.

I4: Yeah. You're right, they rarely are.

Interview 5

May 11, 2011

CL: So the purpose of this is to help me get a scientist's point of view on research about communication ethics. I'm not going to ask you to confess or turn in anybody or anything. It's more just a discussion [I5: OK]. So share whatever you are comfortable sharing and if you think I'm not asking the right questions and you want to veer me in a different direction, that's totally fine. This is open ended, okay? Do you have any questions before I start?

I5: No.

CL: Okay, great. So first I'm just going to start with some basic just demographics about who you are. So just state your name please.

I5: My name is [name removed].

CL: And what's your title at Clemson?

I5: I'm an Assistant Professor. As of August 15th I will be an Associate Professor.

CL: Congratulations.

I5: Thank you.

CL: Okay, and what is your field of research?

I5: I'm a plant ecologist. So I am both, I look at plants both on the population level, which is many individuals in the same location [CL: Right] and in the community level, which is many different species occurring in the same time and place.

CL: So technically what department are you listed in?

I5: I am in biological sciences.

CL: I've learned that encapsulates quite a lot of fields.

I5: Yeah.

CL: And how long have you been publishing your research?

I5: Since 1999. So 22 years. Sorry that's - no...

CL: That's 12...[laughter]

I5: That's 12 years. It's like 22? What am I talking about?

CL: That makes me feel old. Right. 12. And I can check your C.V. online, but can you name a couple journals where you've published research?

I5: Sure. *Ecology* um, *Oecologia*, which is O-E-C-O-L-O-G-I-A [CL: Right]. Um, *American Journal of Botany*, *Plant Ecology*, *Forest Ecology and Management*.

CL: Okay. And were any of those articles coauthored with other scientists?

I5: Yes. All but one of my journal articles have been coauthored and I have a book chapter that was also single authored. But everything else has been with coauthors.

CL: Book chapter. I haven't encountered a lot of that in sciences. Okay. And have you ever received funding for your research from an organization other than Clemson?

I5: Yes, I have.

CL: Can you name a couple?

I5: National Science Foundation and the UI5A.

CL: Okay. All right now, jumping in, how would you personally define research misconduct?

I5: Research misconduct. Um, I would personally define it as um, influencing the results of the data collection in a way that is not - that is subjective I suppose. That is based on opinion.

CL: Okay. Do you know where you came up with this definition? Or learned it?

I5: I - um, it certainly, I've never taken a class. I'm sure I sat through some kind of seminar or at least a component of a seminar in which they discussed research misconduct. But I've never, yeah but actually maybe I haven't. I'm sure there has been stuff that I have signed [CL: Right] especially for - more like for reviewing I guess.

Which you know, which is different kind of ethical or misconduct...

CL: Reviewing as in editor of a journal?

I5: Editor for a journal or for grant proposals.

CL: Oh okay.

I5: Probably even more tricky would be the grant proposals.

CL: Yeah. So as a reviewer you felt like you encountered definitions and discussions about research misconduct more than as a scientist?

I5: Yes.

CL: Okay. And when you think about your definition of ethical research, how you practice ethical research, does any aspect of communication or how you communicate, come to mind?

I5: Well certainly - well - I guess there's sometimes in my mind, there's maybe a tricky line between presenting a story, which is what we all try to do to make our, make the results easier to understand [CL: Right]. So in trying to tell a story one might be tempted to leave certain aspects of a study out [CL: Right] because it might detract from the story. And so - but there's the - especially when it comes to statistics. So you know there's that [inaudible 0:06:05.6] famous quote, which I'm probably not even going to correctly quote. But it's like "lies, damn lies and then statistics" [CL: Yeah]. And it really is true that you can - there's many people and probably including myself, who know just enough statistics to be dangerous. Because, I mean I know what kind of assumptions I need to make sure that the data or the models that I'm going to meet [CL: Right]. But, but there's still a variety of different ways to analyze data. And so the - while I feel pretty confident about when I go out and set up an experiment and you know, with the design and the data collection, it's, it's in the statistics that I get most uncomfortable [CL: Right] and that's why the mis, and misconduct I think could come in at many different stages [CL: Right] of, of a research project. But it may um, come into play a little bit more when analyzing data and analyzing it in a, a way that gives the outcome that you sort of desire. And then how that is communicated, I mean which analyses you choose to put in, how you choose to interpret them [CL: Right] could be, could definitely be

CL: Yeah, right. So would you have a definition of ethical communication in science? I mean it's to your point it's, you were saying before it's including the data and trying to not have a biased interpretation.

I5: Right.

CL: If I heard you right. But...

I5: Yes. So try not to have a biased interpretation but then there's um, to a certain, well it, well realizing that we're all going to be biased in some way based on you know, we have

this observation, we create, we come up with a hypothesis. Obviously you wouldn't come up with that hypothesis if you didn't think there was something to support it [CL: Right]. And so most times the trickiest results to communicate are when they don't support the hypothesis that you had. Because, not so much because, it's just because oh people don't want to, or journals, don't want to publish negative results. But when you don't find a significant effect, there's always the question of well was your table size big enough? Did you do everything to be able to detect it? So we don't want to fail to support, or we don't want to reject a hypothesis so easily. Um...

CL: Someone said to me you can never get a publication out of a null hypothesis. Even though that might have been informative [I5: Right] you're wrong but you're not going to get a publication out of nothing.

I5: Right. And, and it's because of this. Okay well so if there was a hypothesis in the first place, it must have been somewhat substantiated [CL: Right]. And so by not finding support for it, what does that mean. You can always, somebody could always come back and say well you didn't, you didn't control for this, that or the other [CL: Right] or and so it is a lot more difficult to, to publish that "no" result [CL: Right] or that negative result I guess.

CL: Okay, interesting. Um, were you ever taught or how do you think you learned how to be an ethical communicator in science?

I5: I don't think it was ever really discussed.

CL: Okay. Are you...

I5: Although, just as an aside, my husband was in a business, an MBA program in which they had to take at least one class in ethics. And he said his professor was probably the most unethical person he encountered in the business school [CL: Wow] so that always makes me a little bit weary of people who teach ethics [CL: Yeah] [laughter].

CL: Interesting. Um, are you aware that there are governing bodies like the Office of Research Integrity, ORI or the Office of Science and Technology Policy, the OSTP? Do you know that they have a published, formal definition of research misconduct?

I5: No, I - well I would assume that somebody would have but I'm not aware of it.

CL: Okay. So would you say that there are, that any official rules that say what is and is not misconduct guide the choices you make as a scientist?

I5: Say it again. Ask the question again.

CL: So, do the rules that regard ethics, that tell you, that are these published rules.

I5: Given that I didn't know about them, I would say no [laughing] [CL: Right]. If I knew that there were rules out there that I could read and apply to my research, would I do anything differently? [CL: Right] No.

CL: Okay. That answers the question, thank you. Would you say that you are concerned about ethical communication in science?

I5: Absolutely [CL: Okay]. Because we all somewhat assume that everyone is, is following ethical guidelines and that's, we think science is supposed to be this completely objective line of study or way of studying. And if we're not being objective, then it sort of all crumbles.

CL: Right. It's like the foundation [I5: Yeah. Yeah]. Okay. Now slightly shifting gears here, you specifically talk about authorship [I5: Mhm]. Would you say that authorship specifically is an issue or concern as you do your research and publications?

I5: It is. I, I am, I guess I am not as concerned about it as I guess some people are. But it is definitely a concern.

CL: What - well let me just ask a side question to make sure I have the background [I5: Mhm]. In your field, how are authorship order, for example, is often, is a discussion? How is authorship order listed in your journals or conferences?

I5: Um, the way that most of them, most of them are ordered, is by percent effort. So overall, in terms of idea generation, implementation, analysis and writing, the people who contributed the most or in decreasing order of amount of time, effort, whatever is how they're listed. Now I have one publication with 22 or 23 coauthors and after the first three they're alphabetical [CL: Oh okay]. So um...

CL: So there's no - in your field, the last author isn't of [inaudible 0:13:44.5]?

I5: It - we have discussed that in ecology whether that is the case or not. And I think it's on somewhat of a lab by lab basis, which means it's kind of difficult to determine what exactly is the practice [CL: Right]. But it, that seems not to be the case most of the time. However, so I would say that is not the case if you have three or fewer authors [CL: Okay]. When it gets to be four and five, then sometimes the head of the lab might be put on at the end. But it, yeah.

CL: It kind of varies.

I5: It's kind of variable and that does create some strife.

CL: Right. I have to ask, you rattled off very eloquently, idea generation, implementation, analysis and writing [I5: Mhm] as the factors that affect publication. Are those terms from somewhere or is that just off the top of your head?

I5: Those terms probably are somewhere, but there have been various publications that I've talked with my lab and other labs or other, in other settings about it in terms of determining authorship. So there are, there have been published in, I think usually, I can't remember where it was published but maybe in the, one of the bulletin of the Ecological Society of America guidelines about if say for example, in one model, if someone contributes to two of these four areas, they should be an author [CL: Okay]. So there have been discussion [CL: Yeah] in our field about what merits authorship [CL: Right]. I, but I also add into my list, if you couldn't have published this paper without the person, even if they only contributed statistical help [CL: Right], then I would list them as a coauthor.

CL: Okay. Also, I think you answered my question. I was going to ask what should be considered when making authorship positions, but you just said that beautifully. Have you ever researched formal authorship guidelines? You mentioned you probably read the bulletin from your society, main society [I5: Right]. Would that be the extent that you've ever researched authorship guidelines?

I5: Again, there are a couple of different papers that have been published that I've looked at [CL: Okay] or yeah. So it has definitely been something that I have looked into.

CL: Right. It's interesting, American Scientists had a big publication on this like two weeks ago, so right in the middle of my interviews some of the people [I5: Oh wow, yeah] keep bringing up that.

I5: Oh no. I haven't seen that.

CL: Okay. [Inaudible 0:16:32.0]. Have you ever, this is now making this a little more personal, have you ever felt unfairly represented as an author in these discussions you mentioned?

I5: Unfairly represented meaning...?

CL: Maybe whatever you would feel by the time a paper reached publication that you felt like either the order of your name or the inclusion of your name or what they did with your data or something that you, once it got published that you felt something was kind of unfair or somewhere along the publication process.

I5: I, no, I don't.

CL: No. Great. Do you know, can you walk me through a time maybe a recent publication where you felt fairly represented? Maybe share a little bit of the process of how it was decided that you would be on that paper or what order you would be in and why you felt that was fairly handled.

I5: Mhm. Um, let's see. So the most recent publications have been first authored. So um, I'm trying to think about the most recent one where I was a coauthor and I guess the most recent one of those, I contributed help with the implementation of the project and some with the writing. But I wasn't, but I was one of twelve, fifteen authors and we were alphabetical [CL: Oh]. Actually I think I was out of order, but that was a mistake [CL: Oh]. I mean I was bumped up [CL: Right]. So in the last let's see, ones where I was on with a graduate student, I feel like I was in the right place.

CL: The ones even if you've been first author, is there a discussion that's ever had on authors? Does everyone kind of know it or...?

I5: No there definitely are discussions and the only time that I've ever felt some sort of strife with the author or author, order of authors, was one on which I was the lead author and then there was my PhD advisor and the person who helped me a lot in the field and with day-to-day kinds of things and with ideas. But I wanted to put my PhD advisor last, thinking that she was the head of the lab and [CL: Right] even though she had contributed a lot, I thought that rather than her being in the middle, she would be third. But she felt like she should go second because she thought she had put in more effort than the other person.

CL: That seems like what you were saying earlier about because your field hasn't decided last is [I5: Right] important or not.

I5: Yep, yep. So at that point, I thought oh, based on other models that I had seen, especially from cell molecular, that it would be that she would belong or be happy as to [CL: Right] it was a shock to me when she said, when she kind of got bent out of shape that that is the way the manuscript came to her, when the draft came to her [CL: Right] with her being third author.

CL: She wanted to be second.

I5: Yeah.

CL: Okay. Then I guess you answered my final question, which is, did you know of any circumstances that you've heard through the rumor mill about a colleague who felt particularly unfairly treated as an author? That's about you had a personal experience but you, you've heard any stories?

I5: I can't um, there are definitely ones out there, but I guess I haven't heard of any really egregious ones that people [CL: Yeah] talk about or have um, I mean every once in a while and on some papers by colleagues, I've thought, you know, would, I could have been an author on that [CL: Right] if they had, I mean they could have brought me in and - especially on a like a review paper [CL: Right] of some sort. You know I could have helped with that. And but, okay they decided that they didn't want that or perhaps, especially when it goes from being two authors to three authors, there's sort of a big change [CL: Yeah] and yeah, just being a part it all [CL: Right, right]. You know, it's not as nice as being in the two. So I mean I guess I haven't heard any really, yeah, issues.

CL: That's the end of my formal questions. And just to let you know, what I'm looking at is that these major oversight bodies define research misconduct as falsification, fabrication and plagiarism; FFP, the standard definition.

I5: Simon can you wait a couple minutes?

S: Sure. Do you want - I'll come back.

I5: Okay.

CL: And so the only thing that dealt with authorship or communication at all is plagiarism. But I'm speculating, hypothesizing the communication ethics are actually a big deal and really affect the way a scientist work, does his or her work [I5: Mhm]. So I'm trying to look at maybe should there be a recommendation that an oversight body start regulating communication ethics? Should that be brought up earlier or taught earlier? And where does it fit into, is it even important? Like I, I was going to go off on this tangent about communication ethics being so important, but I needed to stop and talk to scientists and see if it actually was [I5: Yeah]. So that's what I'm looking at and it's what I'm interviewing about ten of y'all and try to, try to understand. But [I5: Uh huh] and then it became, as I started pilot research authorship was just the issue that kept coming up as something that really takes up time and concern and relationships and the drive to publish affecting how research is done [I5: Mhm]. So...

I5: Actually now that you sort of - I don't know, I just remembered one where I was a coauthor of a fairly small number of people and then - and I did a lot - for it and then for the publication - and then at the end, there were five other people added on as coauthors and I [CL: which diminishes] yeah, diminishes my impact as it goes [CL: Right] um now it wasn't a very important paper or one that I really cared that much about, so it's not, it, I didn't lose any sleep over it [CL: Right]. I didn't contact the person that was responsible for it. I let it go without ever making any kind of comment. But...

CL: Do you know why they were added?

I5: I don't [CL: Okay] and that might have shed some light on why. But I have a feeling that it was not for, it was not ethical [CL: Right] the reasons why they [CL: Inaudible 0:23:51.7]. Yes, yeah. Yeah. Yes. And yeah.

CL: Do your journals, if I can ask real quick, do your journals require any statement of what was contributed? Any...?

I5: No I've only seen that for the PNAS. I mean there are, yeah. Hmm, at least that I can remember that...

CL: From what I, from my research it kind of started, the biomedical journals require it and science and nature now [I5: Okay] require it. It seems to be trickling down [I5: Yeah] but the journal editors are a whole different group of people making these kind of decisions so [I5: Yeah] and they vary by, not only by field but I'm sure you've found by journal how they want authors listed or...

I5: Right. And I don't think there are any guidelines - actually okay, so the, here's another example that I just remembered [CL: Sure]. The paper that I had that was first authored by a former masters' student of mine and then me and somebody else, it went out for review, it got rejected from the journal that we sent it to but the editor actually called me up to tell me that to that in the reviews there was one reviewer who kind of went above and beyond but sort of in a bad way [CL: Yeah] in searching on the internet and had found a student report from, from this other university where the student had been working with my masters' student and had published this like little tiny [CL: Ah], tiny project. But this reviewer thought that this person should have been a coauthor on the, on the article. Even though, yeah, I, I know the reviewer and he signed his review so it wasn't revealed to me by the editor [CL: Right, right]. He disclosed it but it was just a strange thing that he thought - I, I thought it was pretty clear to anybody who would read that student's report, that they came, like she came for two weeks and did this little tiny project and that was made possible by this longer project by my masters' student was working on.

CL: So it wasn't a plagiarism accusation.

I5: No. It was a like, you should have included, like why isn't this person included because I think there was a statement in the report that said she analyzed his data. So the person thought that she did the data analysis and actually what she did was take part of the masters' student's data to put in her report [CL: Oh] and she analyzed it for her report [CL: Right, right]. She didn't have anything to do with his masters' project. And in fact, so it was many layers of why would you think this [CL: Right]. But what the editor told me was, "Look, we, we, first of all, we don't think that your student did anything wrong. But second of all, even if he or she had, we do not determine who's an author on paper. You determine that. So if, even if this person had done a fair amount of work, if you the authors decided that it didn't merit coauthorship, we are not going to say we think this person should be a coauthor [CL: Right]. So I think even if somebody wrote to this journal and said, "Hey, I should have been a coauthor on that article" they're not going to do anything [CL: Right, right] yeah.

CL: Interesting. Okay. Well I appreciate your time. Thank you so much. This has been great. And I, as I said, I know you're busy, so thank you for working us in.

Interview 6

May 17, 2011

I6: ...Research papers, so I'm kind of used to it.

CL: Oh. Okay, perfect. Um, okay, the purpose of this is I'm trying to get a scientist's point of view. I've been doing my own research on scientific communication or on communication ethics in science [I6: Okay]. But I realized I wanted to actually hear what the scientists thought of it and their value. So I'm asking a couple of y'all from different fields, for your opinions. The interview is totally what you think [I6: Okay] share as much or as little as you want. If you feel I'm not asking the right questions, feel free to divert me [I6: Sure]. However you want to approach it [I6: Okay]. Do you have any questions for me?

I6: Not particularly. So [CL: Okay] are there any particular results or conclusions you're looking for in this? Or [CL: Um] is it kind of a comparison between what scientist in different fields think about these issues or...

CL: Part of it's me learning how the different fields approach [I6: Okay] and after we get through the questions, I'll kind of debrief you in what I think I'm looking at and you can let me know [I6: Okay sure] if that makes sense [I6: Okay]. I don't want to lead you [I6: That's probably good] in one direction too much in the beginning [I6: Okay]. So we'll start with just the basic demographics [I6: Okay]. Please state your name.

I6: Okay, my name is [name removed].

CL: And what is your title at Clemson?

I6: Currently Assistant Professor. I just found out last week I'm going to be appointed to Associate Professor as of this summer.

CL: Congratulations.

I6: Thanks.

CL: Professor of...?

I6: Computer Science I guess.

CL: Yes.

I6: Now we call it the School of Computing. So [CL: Oh] whatever that makes my title. I like to say computer science because people know what that is.

CL: Right. What is your field of research?

I6: I mostly study algorithms and optimization. So how to efficiently solve large scale computation problems kind of very broadly.

CL: Okay. And how long would you say you've been publishing your research?

I6: Um, probably, counting my graduate years as well?

CL: Yeah, if you were publishing in journals.

I6: Probably nine, ten years, something like that.

CL: And, I mean I can check your C.V. online, but can you name a couple journals where you've published your research?

I6: Sure.

CL: Journals or what's big in your field.

I6: So I computer science, actually conferences have a lot of weight in addition to journals. But a couple of, of journals that I've published in recently, let's see, *Algorithmica* is one that I've published a few papers in, let's see, there was a big paper we published in *Mathematics of Operations Research*. Let's see, what else. *Discreet Applied Math*, um...

CL: What about some of the conferences?

I6: Conferences. So, what are some of the recent ones? Um, actually let me pull up my list so I can get in the most recent. So, some of the recent ones. Automated Software Engineering, there's one called the Algorithms and Data Structures Symposium.

CL: And I can pull - this is from the Clemson site?

I6: That's just from my Clemson site.

CL: Okay, perfect.

I6: Grab the list from there real easily.

CL: Great! Thanks. Okay. And of those conferences and journal articles, are any of them coauthored with other people?

I6: Quite a few, yeah.

CL: Quite a few. Is it most or...

I6: Probably all of them actually. Almost every single paper, it's at least authored with a student or with other, other professors here in the department.

CL: Okay. And have you ever received funding for your research from an organization other than Clemson?

I6: Yes, from NSF.

CL: Okay. Super. All right. Now delving in, how would you personally define research misconduct?

I6: Wow, easy questions.

CL: I know, I jumped in.

I6: Research misconduct. There are many kinds of research misconduct. So I'm not sure there's one catchall definition that, that gets all of them. Because there's all sorts of bad things one can do in research. Is there one particular kind of type of misconduct you're focusing on or...?

CL: Well just general. You say there are several different kinds of misconduct. What kinds do you think of?

I6: So there's misconduct in kind of being dishonest about your research results. You know, misrepresenting results kind of claiming that certain things weren't true, your results that aren't true or kind of bending the truth a little bit more than you should be. There are some difficult issues misconduct involving projects in which you have multiple investigators you know, not assigning appropriate credit or authorship issues, things like that. There's probably misconduct in funding. You know spending funding on things that it's not supposed to be spent on. So there's all sorts of issues with, with kind of academic misconduct you could probably get into.

CL: Okay. These different definitions or the look into it, do you say, how would you, how did you come to that? Did you learn that somewhere? Is it...?

I6: Um, actually they don't, or at least for me, they didn't teach me much about kind of ethics and academic you know, how to properly conduct academic work. They didn't

teach me much about that as a graduate student. So it's kind of you learn by kind of keeping your eyes open and listening to what you know, other people have told you about their experiences and you kind of learn by example. Not necessarily by engaging in this conduct yourself [laughter]. You hear enough things as, as an academic that you kind of quickly learn about you know, what to do and what not to do and everything. And there are ethics type you know, all nine tutorials and such [CL: Yeah] that Clemson makes you go through to make sure that you're certified as a responsible researcher and whatnot. It seems like they have a new one of those every year that they make you go through.

CL: Like the PI certification, that sort of thing?

I6: Things like that, yeah.

CL: Okay. When you think about how to research ethically in your different ways that could go, does any aspect of communication come to mind?

I6: Um, so what exactly do you mean by communication? [CL: Um] That's a word that I've never quite...

CL: That you - right. How you interact with other researchers, with your how you publish in general, um, the process of publication, of correspondence...

I6: Okay. So there's [CL: I mean it's...] I guess there's...

CL: I'm leaving the door very open to see [I6: Okay] if you think of any way how you communicate with somebody else or through publication.

I6: So I mean publication to me is kind of a - the act of publication itself is a communication [CL: Yes] and then there's [CL: Exactly] the communication that goes on during the research effort with your investigators. You know, building the publication in the first place [CL: Right]. So both of those [CL: Yes] would interest you [CL: Yes]?

So, okay.

CL: And the fact that you identified that is an interest. So yeah. So when you think of those two aspects of communication, do you think of those as being ethical? Are there ethical issues involved in either of those?

I6: There are several ethical issues involved with both of those I guess [CL: Okay]. You know, just the publication in general, it's more of you know, representing your research properly. You know, not stretching the truth or kind of any claim that needs, that you know, didn't happen in your results and then being as honest as possible [CL: Right] and then being within your own collaboration, it's important to make sure that everybody is on the same page as far as you don't want to kind of get to right before publication and then say, "Oh by the way, I'm putting you as last author on the paper" and you know, having someone be surprised by that. You know, there should be kind of a understanding all the way through of how much credit everybody's getting and if there's funding, you know how the funding's being allocated. So um, everybody should be on the same page with, with those sorts of issues. So it's important [CL: Right] to communicate as clearly as possible about those things I guess.

CL: Right. You mentioned last author. How does authorship rank work in, in your field?

I6: Uh, it's actually, it's easy actually in computer science. I know in most other scientific disciplines, like first author means something very specific. Last author actually means something very specific [CL: Right]. In most computer science publications, it's strictly just alphabetical order. So that makes life easy. Especially for those of us who have

early alphabetical names [laughter] because we always end up at the front of the list [CL: Yeah]. So to some extent, that removes a lot of the uncertainty or the, the squabbling that happens for authorship orders. It just doesn't exist so much in my discipline.

CL: Yeah, I'm finding a lot of different...

I6: It's kind of interesting...

CL: The fields are very different regarding that.

I6: It's interesting, if I collaborate with people from other disciplines and for me, I've kind of gotten used to the fact that authorship order just doesn't matter at all [CL: Yeah]. It's strange for me to kind of work with other people because they're, they care a lot about what order the names appear in and so that's kind of been a challenge for me to kind of figure out what's the most appropriate thing for me to you know, to do as far as my name, the name order matters [CL: Right]. Usually it doesn't bother me too much [CL: Right]. To me it's just you know, it's either on the paper or not on the paper.

CL: Is that a conversation when you have to work, when order matters, is that a conversation that happens early in the research?

I6: That should probably happen early, right [CL: Yeah]. Unless you get to the end of the project and realize so-and-so really didn't put much effort in at all and you'd like to you know, not list him as the first author as a result of that or something [CL: Right]. That's kind of the exception of the rule.

CL: Right, okay. I think you kind of mentioned this when you used the term allocation and getting on the same page, but would you have a definition of ethical communication in science?

I6: Definition of ethical communication in science. Um, I would say that when you're, when you're publishing results, what you write in your publications should be an accurate and truthful representation of, of your actual results. And it shouldn't, not only kind of factually accurate, that it shouldn't imply or kind of twist things in ways that are kind of you know, too far away from the truth [CL: Right]. And in terms of communicating with your peers, it's important to be as open and honest as possible about everything that, I mean so sometimes there are reasons in academia to withhold information. You don't have to divulge all of your research to every single person [CL: Right] at any point in time. But you have to be open and honest about things that matter like publication order or funding issues or things like that.

CL: Okay. Do, where did you learn that definition?

I6: Where did I learn that definition? Um, nowhere I don't think [CL: Okay]. I think it's just kind of collective experience over years as a faculty member probably.

CL: Okay. Um, are you aware that there's a governing body like the Office of Research Integrity, ORI and the Office of Science and Technology Policy or USTP? Do you know that they have published definitions of research misconduct?

I6: I would not be surprised. But I did not know that specifically.

CL: Okay. Um, would the rules, I mean if you did know them, if you did go and read a, a formal rule on research ethics [I6: Mhm], would that affect how you choose to communicate as a scientist?

I6: Probably not. Not much. I would expect their definition would line up with my definition pretty closely probably.

CL: Yeah. Okay. Um, would you say, as a practicing scientist, that you are concerned with ethical communication practices?

I6: Definitely, yeah.

CL: Okay. Okay. Going from kind of big to more specific, you brought up authorship [I6: Mhm]. Is authorship an issue or a concern as you do your research and publication?

I6: Uh, for, for me personally [CL: Mhm]? Um, it is. I mean in computer science, like I mentioned, it's less of an issue because most things are done alphabetically [CL: Right], so it's not as much of a stressful issue as it could be in other disciplines. And I think I kind of care less about where my name appears on a paper. I, I'm kind of happy if, if a student wants to have their name more prominent, I'm happy to let the student you know, put their name in the prominent spot because you know, they kind of need their moment in the spotlight you know [CL: Right], to get their careers started. I think um, so it's kind of authorship, you kind of do whatever makes sense strategically for the participants involved. You know, who needs the most credit you know, based on where their moving in their careers and things like that. Or if you're applying for funding, maybe you want to make sure that the principal investigator is the one that's got their name more prominently, you know, displayed [CL: Yeah] since the funding agency will view that well or something. But for me, it, authorship is not that much of a source of stress or concern. It's mostly just how many papers is my name on. That's what's the thing I care about the most.

CL: So there is a concern to have a certain number though?

I6: Right [CL: Yeah]. Quantities, quantity matters a lot for evaluation for you research productivity. When you move up the food chain to the dean and the provost, it's mostly just you know, how many papers did Person X publish [CL: Right]. So...

CL: So for job concerns.

I6: For job concerns, yeah.

CL: Okay. What do you think researchers should consider when they make authorship positions? To your point of order or who's the PI or who gets more of the funding and that sort of thing, when you're working on the affect of authorship, what concerns?

I6: I think one of the biggest and more complicated issues in authorship is figuring out when somebody should be an author on the paper or not. Because a lot of times, people make small contributions or they'll be in the research group that puts out a publication and so it's not possible to talk to them at all about the you know, the content of the paper that the question is, at what level should they have contributed before you know, their name gets added on to the list. Uh, and...

CL: Do you have an idea of like, do you have a way that you define the contribution worthy of authorship?

I6: I think for me, generally you have to be kind of official, you know, officially kind of on the team of people working on the problem and you have to, in some sense, be kind of an active participant in the discussions. So a graduate student for example, the, the, as long as they are kind of, you know, they come to all of the meetings and all of the discussions for the paper, they help write the paper, it doesn't matter if the main idea from the paper doesn't like, originally come straight from them you know. As long as they are

a participant in the process, I think that's usually fine [CL: Okay]. But they have to kind of participate and contribute as much as they possibly can.

CL: Does everybody write something?

I6: Uh, that depends. I mean if you have like five or so authors, you may not have every single person writing the paper [CL: Right]. But usually I ask the, at least for students, that they try and write. Mostly just for training purposes [CL: Yeah]. In many cases, I have to rewrite a lot of papers myself, but um, writing versus not writing, I don't think is as important for authorship. I think it's more did they participate during the research process as opposed to the, putting the paper together process.

CL: Okay. The research and discussion [I6: Yeah]. Okay. Um, have you ever researched any authorship guidelines?

I6: Um, it's something you talk to a lot of people about, but I'm not sure I've officially researched any, any guidelines on, I mean I know I've, I've probably read articles about it here and there. But I can't say that I've actively gone out and sought advice on that subject.

CL: Right. But even like when you're applying for your NSF grant, you do check on it.

I6: Not particularly.

CL: Okay. Um, I guess it's, this is a little trickier for computer science regarding order, but at least I would say regarding whether or not you got on a paper or not, have you ever felt unfairly represented as an author?

I6: Um, not too often. Maybe early in my academic career there were some issues where I felt like I should have been further up on the author list. But now that I have enough papers published, those issues don't bother me so much kind of any more.

CL: I'm confused, so you're talking about - so there must be some interest in being early in the list.

I6: Well, so when I was a graduate student, there were some papers that I was on where the order mattered I guess [CL: Oh, okay]. And so in, in that case I think I was a little bit probably too stressed out about you know, making sure my name was first [CL: Right] because those were my first papers and it kind of mattered a lot that I you know, had a lot of recognition. Recognition at that point in my career. Nowadays, even if the order matters, it doesn't really concern me too much where I am in the ordering [CL: Yeah] so...

CL: Can you tell me maybe about a recent journal or conference you did about the process about how you felt fairly represented as an author? If that's the norm, like...

I6: How I felt fairly represented as an author. So for example, I'm collaborating with neuroscientists at MUSC and a group of five or six other neuroscientists and also a graduate student of mine. So it was a paper we sent out that had eight or nine authors that really you know, longer author list than I'm used to. And so the question is, how do you acknowledge all of these people contributing? And I think we ended up using my name as the last author um, because it made sense for my collaborator to be listed as the first author so that - because we were publishing a grant and he needed that sort of credibility [CL: Right] and last author kind of is special because it indicates, the person who's lab the research takes part in [CL: Yeah] so that kind of made sense as well. So I think that

was overall a fair thing to do. I would have been fine being second author as well but [CL: Right] or whatnot.

CL: Did y'all have a conversation, as you said, before?

I6: We did.

CL: You started?

I6: We did. Yeah, I think it's key when during the planning process is putting the paper together before it really gets substantially underway. Everyone kind of has an idea of where the authors are going to stand in the authorship list, if the order matters.

CL: Right. Do you know of any stories or circumstances of colleagues of yours who had a particularly unfair treatment as an author?

I6: Um...

CL: You don't have to give names or anything.

I6: Yeah. I've certainly seen issues where people have contributed a lot more than is kind of demonstrated by their ordering and author list. It can easily happen to people without much power or say, like junior faculty or graduate students. Because a lot of times you want to put some you know, some big prominent person's name on the paper to kind of make sure that it has a better chance of being reviewed positively. The trouble is, the big prominent people often are not the ones that are doing most of the work behind the scenes, so [CL: Yep]. That's usually where things are kind of slightly unfair [CL: Right] is that the junior people kind of do most of the work but don't get as much of the credit as they should.

CL: Right. Now I had no idea this is allowable, but Delphine had mentioned an interesting story about your masters' [I6: Oh yes]. And I don't, if you're not comfortable sharing it, she was very vague in her terms but um, if you are comfortable sharing it, can you explain that to me from your point of view? It sounded like it was an authorship.

I6: It was authorship and also generally just kind of how he treated his graduate students from an intellectual standpoint. Kind of his graduates generated a lot of good ideas. Lots of his research is based on ideas that his graduate students came up with and I don't think he acknowledged the graduate students as much as he could have. There were many papers that I saw him publishing further down the road that were basically ideas that old graduate students had come up with and the papers had basically just his name prominently on them, not much mention of the graduate student. And issues like that. So generally not giving his students enough credit [CL: Right] for the work.

CL: Power dynamics seem to play into a lot of this.

I6: Yeah, it does. You have, it's interesting, you have a different perspective on it as a professor you kind of look back and you think, well okay, as a student it seems like I came up with the idea, I should be the first author on everything and, and you know, why should my advisor even be on that paper because you know, he didn't really contribute. He seemed to just you know, I wrote the thing, I came up with the idea. But it is fairly accepted practice that you know, the person who's funding you and the person who's kind of you know, generally advising you and whatnot, should at least be on your publication [CL: Right]. So, so kind of your view on that kind of changes I guess I guess as you grow older and see it from the other side. But yeah, the masters' advisor, he ultimately he did not get tenure and he left because I think a large part of that was word got around

that he wasn't treating his students fairly [CL: Right] kind of from an intellectual standpoint and assigning credit where credit was due [CL: Right]. And there were some specific examples here and there of you know, I had written a paper with him where the draft of the paper had my name, then his name and then right before sending it out he swapped it over and sent it. So it kind of you know, surprise you know [CL: Yeah, yeah]. So it kind of - that would have been less annoying if we had just talked about it early in the process. Even if the order, the fact that the order was switched didn't bother me too much, it's just that he kind of just did that at the last minute and then sent the paper out kind of...

CL: Without discussion.

I6: Yeah. [CL: Yeah]. That's the kind of thing and then you know, finding later on, papers that he writes that you know, based on my research that either have my name or don't have my name on it, but that I just never knew about, things like that kind of, those are a little bit kind of outside what you would expect kind of standard ethical researchers to be doing [CL: Yeah]. So...

CL: The um, senior publish, the senior faculty tending to give themselves more credit [I6: Mhm], do you feel that's a drive for job concerns or for prestige or for funding? Or all?

I6: It's probably more for funding.

CL: Funding. Okay.

I6: You sometimes feel like a paper has a better shot if it has a big name on it as the first author or for funding, if you've got a really impressive you know, investigator who has won all these different grants, you figure make them, you just kind of put them on your grant as a, you know as the big name behind the grant that everyone kind of will believe that you know - because a lot of getting funding is believing that the person on the grant you know, has the ability of pulling off what they're proposing. So if you put someone on there that has an established track record, that gives the grant some more believability.

CL: Right. Does the, when the person in power requests being on...?

I6: That's, that's tricky. I guess if they request, if the person however requests being first author or last author, then that's the usual thing of you know, do you try and put your foot down or do you disagree with your boss or [CL: Right] and that, I haven't actually dealt with that issue much myself.

CL: Okay, so it tends to be more gift authorship than someone...

I6: I would say so, yes. [CL: Yeah, okay]. It's more kind of uh, in a lot of cases I'd say it's probably initiated by the junior person just to kind of - you want the, the, the, the people that are uh, in power, you want them on your side because they're the ones that are on the committees that are evaluating your performance and everything [CL: Right] so you figure you know, if you are nice to them and offer them authorship on papers that probably you know, puts you on their good side, things like that [CL: Right, right]. So...

CL: Okay. That's about all I have of formal questions [I6: Mhm] and little sidetrack, what - just so you know, the formal definition of um, research misconduct that comes down from above, the governing bodies, is um, fabrication, falsification and plagiarism.

I6: Ah, interesting. Okay.

CL: Which you actually touched on almost exactly. Um, and it's been the same definition forever or since the '80's.

I6: I think plagiarism of all, that is one issue that I see...

CL: You did - right - you did say that you need to allocate the proper credit, which is related, but not the same.

I6: But, yeah that does bring up a, kind of a slew of - I mean, yeah blatant plagiarism is obviously wrong [CL: Right], but there are many times when you have kind of issues of self plagiarism that there's kind of an interesting gray area where [CL: Yeah] you're submitting to a conference, kind of a report on results that you've published some of them elsewhere and you know, so there are some complicated issues with - or sometimes you submit to a journal a paper that you've already submitted to a conference that's been expanded so [CL: Right] self plagiarism is more of a complicated issue than just outright plagiarism.

CL: Right. Oh and it's under great discussion from different fields and things. And even our ethics institute on campus has been discussing self plagiarism for sure. Um, what's interesting is that, that FFP definition has not changed um, and yet there seems to be a lot of discussion about authorship and about communication ethics. So it's [I6: Interesting] kind of looking at whether or not communication ethics should be rolled into the overall definition of research misconduct.

I6: Is it falsification, [CL: fabrication] fabrication okay, [CL: And plagiarism]. So fabrication is just making stuff up out of thin air [CL: Right]. Falsification is twisting it a little more than it should be to - okay.

CL: And then plagiarism, as you said, that even has lots of different definitions. But, plagiarism is the only communication related misconduct and yet I am sensing that there is actually a lot of other communication issues that, that can lead to misconduct [I6: Sure]. So I'm wondering if communication issues are so important to scientists, especially authorship, should authorship be included into a grander definition of research misconduct? Um, do you even care what the definitions are? That's sort of where I'm [I6: I see] hanging out in my research.

I6: I'm still kind of hung up on communi, so communication to me sounds like you can make that term so broad that it covers whatever you need it to cover. So everything's kind of a communication issue [CL: Yes] in research and science you know [CL: Yes]. Because everything is - involves communication to some extent [CL: Yes]. Um so, [CL: But]to make things complicated without a specific kind of notion of, of...

CL: Well that's why I've - it does make things complicated. Um, and authorship kept turning out over and over again and that's sort of what I'm focusing on within the [I6: Okay] communication is everything. However, you are - your ability to say communication is everything sets you apart from some of your peers you say, "I'm a scientist, I don't really communicate" [I6: Oh, okay] or I you know, that's not of importance to me. I just do my science and write a paper and - so there's, there is a disconnect between the role of scientist as an author, as a communicator [I6: Interesting, okay] and that's part of what my field is trying to do is make scientists better aware that they are communicators.

I6: I thought that's what scientists were supposed to be.

CL: That's fascinating that you've acknowledged that. That, that yeah. That's not prevalent.

I6: I guess you've got scientists that kind of, they like to live in their own world and kind of do their thing and then meet and send out papers and whatnot. Um, but I think of science more of something that has to be - you know, you have to interact with the world outside you, with your peers and I think the most exciting things I come across in science when I talk to people that are not in my little world, you know, that are different worlds of communication, you know over on the other side of campus where they do you know, really fun stuff. So um...

CL: Exactly. The fact that our campus, it goes back to Plato. Do you really want to know this division between rhetoric [I6: Yes] is artsy and it takes you away from the truth, versus there is a truth that scientists can discover [I6: Right], so there's, there's a history of separation I think we're now getting a little bit more savvy to realize the scientist is a communicator, but I really don't think everyone's there yet [I6: Yeah]. So with the understanding there's communication, means that there's communication ethics. And so, that's what I'm trying to figure out, is how important communication ethics are and whether or not they should be part of the scientist's research misconduct definition like that not always involves plagiarism, but should there be more formal rules about authorship and about [inaudible 0:30:50.0].

I6: I see. It's tricky because every situation is different [CL: Yeah]. And so there are some general guidelines but it's really kind of, you use a one size fits all definition for kind of ethics in general. I mean, ethics is tricky because everyone kind of knows what, what it is and what's ethical. You know, there's probably a few gray areas but, it's really hard to kind of write a one sentence thing because of, it's that [CL: Right], so, it's, it's a challenge.

CL: But um, the authorship's interesting because some journals have definite definitions of what makes an author [I6: Yes]. Some of them require a statement at the beginning that says what every author contributed, so they...

I6: That's becoming more prevalent I think, yeah.

CL: Yes. That's what I'm finding as well. It started in biomedicine and it's kind of filtering to other ones.

I6: Because they've had some, some bad cases of ghost writings and such that [CL: Right] have spurred that I guess.

CL: Exactly. So I think I've ended up focusing on authorship because it's one really prevalent, or I needed to see if it was prevalent and my pilot research shows that this um...

I6: Yeah, people care about authorship.

CL: Yeah. It seems not be affecting your field as much, which is part of the reason I wanted to talk to a computer scientist, because I had one in my pilot research and I had never heard about the alphabetical and that seems to alleviate you from some of the stress. But then again, you still talked about power issues and grants out there and it does still come up.

I6: There are still issues of trust [CL: Right] yeah. It's funny, there's I mean I teach mostly mathematic type stuff in my classes and so I usually don't get a chance to teach much about ethics and computing. I guess there are some ethical issues in computing, but they don't come up a lot in my classes versus like what Delphine teaches, where

ethics is a big part of it [CL: Right]. Um, and so on course evaluations, there's a question, that's a standard question, that says, does your instructor cover the relevant ethical and societal implications in, in the coursework that you're being taught? And I always got a really low score on that because there just isn't much ethics in like the mathematics area that I'm teaching [CL: Right]. So for fun, the last lecture that I give my students in my class is the ethics lecture [CL: Oh yeah], which is, it's kind of silly. It's one slide that just says only use algorithms for good, not evil. [Laughter]. My ethics score shot up quite a bit after that. So I kind of take light of it I guess, but I think there are definitely some important issues to um...

CL: Yeah, maybe you can talk to them about if they go and publish, how can they be ethical [inaudible 0:33:15.6].

I6: I try, any time I come across an interesting example, I like bring it up. You know, I take my students out to lunch every week, so we always have discussions about these issues. I figure it's my goal as an advisor is to not just teach them the science, but also kind of the how to conduct the science [CL: Yeah]. That's something that a lot of advisors don't actually get into at all. So that's...

CL: You mentioned that you didn't cover...

I6: Yeah, I kind of, you get here and you find out you have to be kind of all these things you were never trained to be, like a manager and then whatnot. So you kind of have to learn it all as you go [CL: Right]. So that's important to let your students know about all these other issues that you have to think about as a faculty member [CL: Right]. But uh...

CL: Do you have grad students?

I6: I've got quite a few, yeah. I've got four PhD students right now.

CL: [Inaudible 0:34:02.1] the PhD?

I6: No, they, they're pursuing PhD.

CL: What's the program at Clemson that's the PhD?

I6: Uh, they'd be pursuing a PhD in computer science.

CL: Okay. I didn't realize we had a computer science PhD.

I6: Okay.

CL: I gotcha. Yeah.

I6: So.

CL: I thought - okay.

I6: So you're graduating, you're graduating by the end of December you said?

CL: That's the plan.

Interview 7

May 18, 2011

CL: Thank you. Okay, um as I said, I'm looking into communication ethics, so I have some questions if you want to answer them or not answer them you're welcome to. If you think I'm going in the wrong direction, feel free to turn me around. And the purpose of this is I've been looking into communication ethics and um some other issues that I'll get into. But I realized I needed a scientist's point of view. I was speculating on the importance that scientists gave to this and so I decided to interview um, scientists from several different fields. I'm trying to be broad and see what your point of view is on some of the stuff that I'm looking into. [I7: Sure]. Okay, so do you have any questions before we get started? [I7: No]. Great, I'm going to start out with basic demographics. If you could um, give me your name please.

I7: [name removed].

CL: And um, what is your title at Clemson?

I7: I'm an assistant professor.

CL: Of...?

I7: Chemistry. [Throat clearing] Excuse me.

CL: And I'm writing just in case this crashes.

I7: That's perfect. You're fine.

CL: It's my back up. And your field of research?

I7: Chemical education.

CL: Okay. Um, and about how long have you been publishing your research?

I7: I think the first thing came out about eight years ago now.

CL: Okay.

I7: Yeah, yeah, I think.

CL: Um, and I can check your C.V. online, but could you name a couple of journals where your work has been published?

I7: Uh, where I send a lot of stuff is *Chemistry Education Research and Practice*, which is published by the Royal Society of Chemistry. Uh and I've published one thing on, in the *Journal of Chemical Education* which is published by the American Chemical Society.

CL: Okay and um, have you coauthored any of your articles with any other researchers?

I7: Yes. I mean so are you – I've coauthored with my PhD mentor and my students whom I consider researchers.

CL: Right. Have you coauthored with any colleagues?

I7: No.

CL: Or co-researched?

GL: No, I'm trying to think. No. I mean yeah. Well we have a submitted paper with a couple of folks from one of the engineering departments.

CL: Okay. Um, and have you ever received funding for your research from an organization other than Clemson?

I7: No. Well yeah, the University of Oregon.

CL: Is that why you were at Oregon or...

I7: Yeah, that was my first job was there.

CL: Okay so you've been funded from your institutions.

I7: Yeah.

CL: Okay um, perfect. Jumping more into what I'm looking at, how would you personally define research misconduct?

I7: Oh God.

CL: Yeah I know, it's a biggie.

I7: Uh, I'll give you two, two answers.

CL: Okay.

I7: Um had we not ever – so as I was telling you when we were coming down here, uh, we've done some publishing in this area of um, ethical development [CL: Right], scientific ethics. And so that forced or gave me an opportunity to look at some things that I probably wouldn't have.

CL: That's right, yeah.

I7: So had I not looked at that I think my definition would have been something to the effect of taking work that is not taking, taking work that is not yours that you have not primarily produced and, and selling it as your own. Not giving uh, people acknowledgement for ideas that – so for example, I had a paper published last year where somebody from the Center of Ethics, we were just in a conversation and I was telling him about something and he said, "Oh you know, this kind of sounds like you know, they are applying this idea, like this other idea." Now I didn't think that merited authorship from him, but I do think it merited an acknowledgment [CL: Yeah] because I would never have thought about making that connection had it not been for his comment [CL: Okay]. So I think that's really important [CL: Yeah]. Citing people for, from where you get the main, the major ideas that show up in your, in your um, in a publication. Now um, after having done the research [CL: Yeah], one of the things I would add is to look at your professional society's code of conduct.

CL: So your research, your definition of research misconduct is what your professional society said, says it is?

I7: I would say that is an addition to everything else that I said [CL: Okay]. I would have not thought much about the professional society's code of conduct because frankly, I didn't know to what extent even my professional society had [CL: Right] a detailed code of conduct

CL: Right, okay. Your professional society being...?

I7: The American Chemical Society [CL: Right]; the main professional society. I mean I'm part of [CL: Right] a couple others, but those are...

CL: Right. Okay um, so my next question was going to be how did you come to this definition? Um, we'll continue to do it in two steps. So your general understanding before you began your research was...?

I7: I think general understanding was mostly shaped generally by some of my personal ethics and a lot of looking, observing others who were in mentoring positions or colleagues and both negative and positive modeling [CL: Yeah]. Like this thing about not giving people credit for ideas. I've seen actually that it's given very little importance

to. I was once actually told by a research mentor of mine that you know, “Well why did you say that these were you know, in your group presentation you said you know, all of these are, this idea was somebody else’s and that idea.” And I said, “Well they were.” Because I was relatively new at that time [CL: Right], I wasn’t going to come up with [CL: Right] many of my own ideas. And he saw this as something inherently negative. Uh but [CL: Hm] yeah, so be it.

CL: Right. Um I mean it sounds like your other understanding of professional societies has come through your research [I7: Yeah] and education, right?

I7: Yeah, yeah, yeah.

CL: Okay.

I7: And the other and I’ll should add, the other couple of things that it’s come into is that I’ve done a lot of work especially with Clemson’s Office of um, the IRB Office. So I’ve given some talks on, on um, God, ethics and mentoring and things like that. So between that and thinking about what are, what are the ideas that I would want my students to leave with as far as what’s acceptable and what’s unacceptable.

CL: Okay, so research you’ve done on how to teach ethics, right?

I7: Well it’s just, just mostly a reflection on what you would want you know, want your research students to get out of. Because [CL: Right] by my modeling, they’re going to take things away [CL: Right] by how explicit I am about letting them know, okay this behavior that you see is very purposeful versus you know, that some other behaviors that are just kind of incidental.

CL: Right. Okay um, when you think about how to ethically do research, does any aspect of communication come to mind?

I7: Yeah every aspect, especially written communication. That’s one of the biggest things to me because that’s where you can either purposefully or inadvertently do things that are unethical. The inadvertent thing is that sometimes you, you, you end up uh plagiarizing an idea and not realizing that this has been published before.

CL: Accidental plagiarism.

I7: Yeah. And then of course you can purposely do that too. But I, but I think it goes back to even in verbal communications, if you’re talking with just an informal communication let’s say with a, with a peer at a conference. I think it’s important to be as careful in again, citing people’s ideas that you’re using rather than leave them with the impression that this was your idea or your insight [CL: Right]. I think it’s really important to give people credit for their insights that you’re using.

CL: Right. Okay. I think you just did this, but in terms of the ethical, a definition of ethical communication in science. It sounds like sharing ideas and giving credit for them?

I7: Yeah. I think.

CL: I don’t want to put words in your mouth.

I7: Well I think it’s mostly making sure you give appropriate credit for the ideas. I think the extent to which you share your research results sometimes, unfortunately, becomes a lot more complicated [CL: Right]. Just because there are – my field is much easier, not just my field, also the nature of what I do is unique in the sense that no one does research

on graduate students and their development. So I'm not worried about you know, research competition because nobody's, nobody does the type of research that we do.
CL: So your – to make sure I understand your research, graduate student development within the study of chemistry or...?

I7: Yeah, yeah [CL: Okay]. So, so basically what we study, we mostly study graduate students for a lot of methodological reasons, but what we're interested in understanding is, how does scientific expertise develop [CL: Ah]. So based on that you know, I worry about some things that if I weren't a more conventional area of science that you worry about, which is that you know, you're racing against somebody else so to speak.

CL: [Inaudible 0:11:58.0].

I7: Yeah. [CL: Yeah]. So we don't really have that issue [CL: Okay] for the most part. So I don't, for the most part, have to think about what to withhold and what not to. What I am learning more of having to sometimes withhold things or when it comes to writing grant proposals [CL: Yeah]. It turns out that you sometimes want to show that you've actually done more work you, so the proposal, you want to have a certain amount of work to show that you know, as in proof of concept [CL: Right]. So if you were publishing something, you would withhold that. Excuse me, or you would just withhold the manuscript period. Which, I think fundamentally, a lot of these things are you know, just games that you are playing and they're unethical, but it's also unfortunately something I'm having to learn because just trying to understand the whole funding game.

CL: Yeah. Um did you learn how to communicate ethically in the same way that you learned of the definition of research misconduct? Was it from observation of others?

I7: Yeah mostly. Yeah.

CL: Or were you formally taught?

I7: No.

CL: Okay. Are you aware that there are governing bodies like the Office of Research Integrity of the Office of Science and Technology Policy? That they have published definitions of research misconduct?

I7: Yeah.

CL: Do you know what they are?

I7: No. I couldn't offhand tell you.

CL: Okay.

I7: And for that matter, I could not tell you offhand what my professional society's definition is either.

CL: So I guess that answers the question, are the rules that regard research ethics that come down from above, do they affect how you communicate as a scientist?

I7: Probably from the societies, not that much.

CL: Okay. As a scientist, are you concerned about ethical communication practices?

I7: Yes.

CL: Okay. And in going a little more specific, I'm going to go back to authorship, which you brought up. Is authorship an important issue or concern as you do research and publications?

I7: It is mostly to make sure that my students who work with me are appropriately represented. And fortunately I have not had any sort of real sticky situation to you know

where two people have done almost the same amount of work and how to divide that up or whatever. So I've been fortunate that until now that things have been very clear cut.

CL: Yeah. For [inaudible 0:15:18.9].

I7: Yeah, for, for...

CL: What do you think researchers should consider when they make authorship decisions?

I7: I think original, intellectual contribution to the work because there's a difference between a lot of times people may do – so there's original and intellectual contribution and what is considered, by your field at the time to be part of the cutting edge. So I'll give you a couple of examples. So what I don't always necessarily think should decide authorship is how much work you did [CL: Okay]. And the reason is because there are people for example who are technicians who often do a lot of work, but they don't take any intellectual responsibility for any of the results or thinking about okay, what am I going to do next depending upon what, you know, what the outcome of this experiment is or whatever.

CL: So they're just basically lab workers [I7: Right], people figuring out the data.

I7: Right. Now they deserve authorship, but not primary authorship [CL: Okay] because they don't – now um they um – oh and the other thing is that who provides the resources. So both resources of, not just financial resources, but literally access to being able to do research.

CL: Both. [Inaudible 0:17:10.7] in the lab or...

I7: Right. So for example when I was a graduate student, if I did not have my PhD's mentor's group to work off of, I could not dependently do any research. So he deserves, he's providing all of this infrastructure [CL: Right] to be able to do the research. So you know, he deserves a certain amount of credit for that.

CL: In your field, is there a difference, is there, there's a primary author you mentioned. Is there anybody else in the rank of importance?

I7: So yeah. It really depends on how – and this becomes, especially when you're – actually I was talking about this with somebody today, when you're trying to hire people, this can become a huge issue of trying to interpret what authorship the – what to people authorship actually means. Because there's a corresponding author and that's primarily the person who is essentially, at the end of the day, responsible, takes responsibility for the work.

CL: The corresponding author.

I7: Yep.

CL: Where are they placed?

I7: Well see it depends [CL: Oh okay]; sometimes at the beginning, sometimes at the end. I place mine at the end when I'm the corresponding author.

CL: So it's not standard that's to your point to why it's different for hiring [I7: Right]. You don't know...

I7: Right, because if somebody, there are some people, let's say if you have four students working on a project, there are some people who will just list them alphabetically, except that there are others who will interpret this, oh you're the first author, so you have the greatest contribution to this. So that's the problem that there aren't standard [CL: Right]

practices. Even though there are dictates for standard practices there are – and if you read the, you know, each journal has definitions of how authorship should be.

CL: I was going to ask. One of my questions is have you looked into the journal?

I7: Yeah and they're very vague. They're almost, I would say, purposefully vague [CL: Oh]. Because what happens is that they will basically say that they're you know, they'll use a term like you know who, based on contribution, well that assumes you can agree on the contributions [CL: Contributions]. That's, that's uh...

CL: So even within the field, even within something specific like chemistry education [I7: Absolutely], you're still not sure?

I7: Yeah absolutely in every – so this becomes a real problem. Now for me, going back to this issue of how to what the state of the art is in the field. So I'm part of, before I came to chemical education, I was synthetic organic chemist for a while and then I lived as a biologist for a few years [CL: Wow]. And there was a time in biology that if you could isolate a protein – well there was a time, if you could isolate a protein purely, you got a Nobel Prize. So the person who isolated insulin got a Nobel Prize [CL: Yeah]. But even – and you know, and that was 56 years ago now – but even 20, 25 years ago, if you isolated a protein that was a PhD dissertation; just literally isolating it, no other. But nowadays, it's become so routine that it does not even merit mention in a publication [CL: Wow]. Even though it's a lot of work [CL: Right]. So, that's what I meant by what your field considers state-of-the-art; I think that. So you may have isolated a protein and done all of the work to get to that point, but if you don't do anything that's original to your field at the time, it's not worthy of primary authorship.

CL: Okay that makes – I've talked to a couple of people who have talked about reagents and using someone's reagent [I7: Right] or someone's really well-developed mouse [I7: Mhm] the more important that reagent or mouse is, the more likely they are to get authorship [I7: Right]. But they're not that important, possibly.

I7: Yeah, so I mean like you know nowadays like a lot of people look at citations and things like that. So Albert Einstein is one of the least cited authors [laughing] and part of it is part of his work is in the common domain of knowledge. You don't need to cite it.

CL: That's interesting because we still cite Plato in our papers [laughing].

I7: Right, yeah. So...

CL: It's common domain, but he also gets a book. Okay, so you have researched authorship guidelines. Mainly, did you go to these journals' Web sites?

I7: Yeah. Yeah.

CL: Okay. And you've kind of touched on this, but do you have a story in which you felt, you personally felt, unfairly represented as an author?

I7: Uh, kind of. And the reason I say kind of is because I, I agreed to it for – so when I – the first research group that I – I, I took a very circuitous route to my PhD because I thought I wanted to be a synthetic organic chemist first and in that research group, my – so it was a huge research group of 45 individuals and so what my advisor did at the time is he had every new student attached to a post doc [sp?] or senior graduate student. The post doc that I was attached to – sort of typically what happened was that, that meant you got attached on an advanced project which was going to be at the completion you'd get your name on a paper pretty early on [CL: Oh okay]. It wouldn't be primary authorship

more than likely; it would be secondary. But nonetheless you would still have the publication very quickly [CL: Right]. What happened was that the post doc guy that I worked with, he – it was in a weird situation where he had, because of stroke of luck or whatever, had very few publications; I think one publication prior to this. And he asked me if I would stay out, off of the paper and I agreed to. At the time I agreed because if I figured oh you know, I'm at the beginning of my PhD and I'm sure I'll publish a bunch of things with this guy [CL: Right]. But I left his research group without ever publishing anything with him [CL: Ah]. So it's not something I necessarily – I don't regret it because I can say that everything I published is my own work [CL: Yeah]. So, so you know, it's not that I did essentially technician work for somebody.

CL: But that's interesting. He was negotiating based on what he needed [I7: Yeah]. Is that, so the negotiations are often about – is it job concerns? Is it power plays?

I7: In his case, it was job concern. I don't know, a lot of times I mean, there isn't much negotiation amongst students per say [CL: Right]. It's the advisor who often will dictatorially decide what happens. The only other thing and I don't think this is necessarily unfair, but it just happens that I was part of some work that was done that just never got published. And it's novel, it's publishable or at least it was at some point. But again, it, that doesn't bother me because I was a sophomore or I just finished my sophomore year, I didn't have a lot of intellectual contribution to that, so even though I may have done the first experiments, I didn't have any intellectual contribution. So it doesn't really, like in any of these cases, it really doesn't bother me per say. Even though that technically I would have been considered, I should have gotten a publication [CL: Right]. But like I said, at the end of the day, it doesn't.

CL: And do you think part of the reason it didn't is because you changed fields so it didn't affect your job or your colleagues as well or do you think they just weren't – you were publishing enough that you didn't need those early ones? Or...?

I7: No not publish – I wouldn't say not because of being prolific [CL: Okay]. Part of it may be because of changing fields, although it would have helped to have these other publications. But I think partly just because of arrogance maybe [CL: Okay], of being able to say you know, what I have out there is mine [CL: Is enough] and not that it's somebody else's stuff that has my name slapped on it.

CL: Right, right. On the flipside, can you walk me through a time, maybe recently, where you felt you were fairly represented as an author? Kind of the process that...

I7: Yes. So the, the um, I did some assessments/evaluations for a, one of the engineering departments and so I was working with a couple of their faculty members and so when we put a manuscript together – I mean it was really weird in that we never had an explicit conversation, but when I got a, one of the versions back from them, I had my, I was a corresponding author. Which, given the fact that basically I collected all of the data, I taught them how to analyze the data, you know, all of that [CL: Right], I think I deserved that, but I didn't have to fight for it or anything.

CL: Right. In engineering, are those journals also recognize a corresponding author, a final author, as the...?

I7: The corresponding author is the person to whom – any time you have the corresponding author, it's assumed that you are, this is your...

CL: Right is it labeled corresponding author? Is it just known that that's the last guy?

I7: No so the corresponding author is not necessarily the last person [CL: Okay]. You'll, it'll be specifically labeled.

CL: Labeled. Okay. Because it's my understanding that some of the journals are starting to really require you to spell out the contribution that every author made [I7: Right]. It's kind of where they're going. Okay, do you have any stories; of course you don't have to mention names of colleagues who may have had a very unfair or bad experience with, of authorship?

I7: Yeah, too many [laughing] to actually...

CL: So it's prolific?

I7: Yeah. It is. And I think because things are not very well defined and most of us are not aware of the things that are defined. Like you know, you ask me the questions about you know, whether I could say anything about the guidelines of you know, certain Offices of Research Integrity [CL: Right] or even my professional society. So I would say I'm in the minority of people who are even aware that they exist [CL: Yeah] and but I wouldn't be able to even tell you word one [CL: Right]. And then I think when you add on the fact that when, I think what a lot of people do is they go to – well they either go to the journal or they model basically what their PhD or post-doctoral mentor did [CL: Right]. And like I said, the journal to me, I don't – I'm not a conspiracy theorist, but I think it's almost purposely, purposefully vague so this way they don't really have to adjudicate anything and they leave it up to whoever is submitting the article to fight it out between them.

CL: Figure out themselves, yeah. I had one question for clarity. Right now you're studying chemistry education. Are you actually doing, is any of it like quantitative lab work or are you more...

I7: No, I simply I, the only research I do is education research.

CL: Do you – this is kind of off topic – but do you still get, you still get [inaudible 0:30:34.1] scientist, yes?

I7: Yeah, I do. That's been, so one of the things I study is professional identity [CL: Yeah]. And so that has been, that's been an interesting thing in my development of that because there are times I did consider myself a scientist and times that I haven't [CL: Right] you know and times that I am again.

CL: Is your PhD in chemistry or is it in ed?

I7: It was in the chemistry department, but my dissertation was in, it was an education topic.

CL: Interesting. Okay um, well those are my formal questions. Just to kind of debrief you, what I started looking at is what the governing bodies define as research misconduct, which FYI is falsification, fabrication and plagiarism, FFP and has been since they first defined it in the '80's. But I was beginning to come under an understanding that authorship and communication ethics were actually of great import and I wanted to talk to scientists to see if they actually were important and then try to, wonder should we be teaching authorship guidelines, should we be discussing communication ethics more and then should these government bodies include authorship or communication among this definition; falsification, fabrication and plagiarism? Plagiarism hints at a communication

and publication issue. But it seems to me maybe that a lot of ethics are tied into the drive to publish, the drive to get credit so maybe those are so important that the governing bodies should – or that – they're so important that maybe they should become taught just like fabrication is bad.

I7: Yeah so where, where the difficulties are, are some of it rests on – so for example now National Institutes of Health, National Science Foundation both require explicit training [CL: Yes]. Except that, what does that explicit training mean, you know? So...

CL: Is it an online training tutorial like the PI thing where like you just click through?

I7: Yeah, where it's like a, the thing is it's like um, for students, when they're early in their career, for a lot of places that even do give some lip service to that, they'll have students take a course in their first year of graduate school; which is inadequate at that time. It's the equivalent because where you actually have to think about things, about what would you do when you're invested three months into your PhD degree, it's real easy to say that you'd walk away [CL: Right]. When you ask an 18-year-old who's dating somebody for three months, you know, what would you do if your partner cheated on you? "Well you know, I'd throw his or her ass to the curb." [CL: Right]. You ask somebody that's been married 20 years and has three kids and get a very different response. So it's the same type of thing that [CL: Yeah], you know, four years into your PhD that you're going to think twice about just walking away and throwing that time away [CL: Right]. So my wife is a psychologist and that's what her PhD is in and they do training, what I think is definitely more effective. So what they do in their first year is they basically do the, the, their professional society's guidelines. So basically what they're teaching you is so called rules in your first year. And that's you know, I mean you're ready to, you know you're smart enough at that point [CL: Right], where you can – and then you're in your third year, then the, in, so part of your, she's a counseling psychologist, so what they do is every term they have practicums where they actually counsel, they're in a clinical setting. And as part of their third year of their practicum is they revisit their ethics and ethical situations. And now you have some experience, it's [CL: Right] not abstract anymore. You've been with it; you've been in the wild so to speak. And now you can actually start thinking about well, what would I really do. And I think that's much more, much more effective.

CL: Right. I was – especially with the role that authorship and the drive to publish play that I'm finding play in your ethical decisions. Maybe working with people once they're actually working on publications or once they're negotiating how this works or once their data doesn't show what they wanted it to show and [I7: Right] they're deciding how to write up the paper. Maybe that should be another discussion.

I7: Exactly and the other thing which comes with this is that, which often gets ignored is that so if you're going to talk about let's say scientific ethics in this issue of fabrication, falsification right? So when you do any research, you collect probably conservatively you know, anywhere from 500 to a 1000 times material than you're actually going to use finally in whatever you disseminate [CL: Right]. And it's perfectly ethical to exclude things, but how do you exclude it [CL: Yeah]? That process and understanding that process, presumes understanding of certain, not just the ethics of your field, but how knowledge in your field is created and how it's – and which is essentially that type of

training is nonexistent [CL: Right] in the sciences. It is kind of assumed that by doing science, you automatically know this. And we've seen, both from research that we've done with graduate students and research now that we're doing with faculty, how little they know and how much they're modeling basically what they get from their advisors.

CL: That's interesting. Our fields kind of overlap there, because a lot of research I've been doing for this and then goes into scientific communication is you know, how is a fact relayed – how does it become fact. So what are the rhetorical powers that a scientist uses to establish something as this is fact. We don't technically just discover something. You witness it and then you frame it in such a way that everyone agrees with you that it's true. And so we study a lot of the rhetorical [I7: Right] techniques that establish that credibility and like the credibility of the scientist itself and how that makes us more likely, if the person's already published a lot, we're more likely to believe them and persuasive [I7: Right] a lot of that stuff is what I've been looking – is my background research going into this. But in a sense, you made a, just because you've known this, is the distinction between scientific or research ethics versus communication ethics. And that's you know, what I've been looking at. But I guess I'm starting to see that they really shouldn't be separate camps.

I7: It can't be [CL: Yeah]. Because one inherently involves the other. Because again as you start trying to define those things, you have to be able to look at what you know, how you've actually processed the data.

CL: Right. So that sets you apart from some of your peers is that understanding.

I7: So it's just dumb luck mostly.

[laughing]

CL: Well I really appreciate your time today.

I7: Absolutely.

CL: And I didn't even realize I'd come across somebody who is doing this and it's really helpful.

I7: I have a favor to ask you then.

CL: Yes.

I7: Would you mind touching base with a student of mine who's doing the project on the faculty perceptions on contributions? So we're doing a research project on science and engineering faculties' perceptions of contributions and um God, in the context and how credit is assigned in the context [CL: Oh] in the context of a scientific collaboration.

CL: Wow, okay yeah.

I7: So I think there might be some good overlap.

CL: Yeah.

I7: So her name is Andrea Verdan [sp?]. And...

CL: V?

I7: E-R-D-A-N.

CL: Okay.

I7: So if you don't mind, what I'll do is I'll drop you an email and introduce you through email. Out of sheer narcissism, I'll send you the paper that we published I think last year.

CL: Yes. No I...

I7: Where we looked at ethical development of graduate students.

CL: That'd be fascinating. Thank you. What journal did you publish that in?

I7: That was in *Chemistry Education Research* [inaudible 0:40:00.2].

CL: Okay. That's another problem I'm having with this is that it seems all the different journals have had articles talking about authorship. *American Scientist*, I don't know if you saw [I7: Mhm], that happened in the middle of my interviews so it keeps coming up. So most of the journals take, give some lip service, give an article periodically about authorship and there have been more recently [I7: Right], but again they don't agree with each other, the editors, there's a council of publication ethics where the editors are trying to agree on stuff. But to your point, it's pretty vague [I7: Yeah]. But from what I'm finding most scientists don't even bother to look at the journal understanding. So it's – what I'm wondering now too is does it even matter what oversight boards say or is it more just a discussion among people?

I7: No on the oversight because most people aren't even aware [CL: Right] of the fact that there is even an oversight board [CL: Right] let alone what they say. Yeah, one of the other things about this issue of what happens when – you know, in the training itself, I mean one of the reasons we did this study was that when I – so in Oregon, they actually tried to do some training in ethics and but it was for the first year grad students [CL: Okay]. I taught it the two years that I was there. It was an awful experience. Not because of the students, but because number one they were at a point where you know, most of the, most of the responses were you know, I would leave [CL: Yeah] the program if you know. Because all of the, and the scenarios are all abstract [CL: Right] so for example, talking asking a graduate student to decide how you dole out authorship is kind of ridiculous because they don't they're more often than not, they're, they don't have the power to make that decision.

CL: Just the understanding of how a department works [I7: Right], the power plays and who's on your committee, personnel committee, who's determining your jobs. It all gets a lot trickier when you're...

I7: Oh yeah. And then I had one of my senior colleagues who, you know he was very well meaning, but you know, he came in one day and he talked about you know, what you would do when you're you know, applying for a faculty position. These folks are in their second quarter of graduate school. They're purely trying to make it through their first year [CL: Yeah]. They're not thinking about they're going to be a professor and what they have to do to put their dossier together [CL: Right]. So and so you know, the *National Academy* publishes a lot of stuff [CL: Yeah], but all of these case studies are not applicable to more often than not, students. So what we wanted to find out is what are the ethical challenges students believe that they face, and see if we can eventually build something off of that rather than what their professors think could be potentially important - which is usually irrelevant.

CL: Right. Do you do anything with identity development?

I7: Yeah. Yeah, we've done some work on that; very interesting.

CL: Because that's what my husband does, student perspectives based on whether or not they perceive political bias in the classroom [I7: Mhm]. So he studies their [inaudible 0:43:40.8] development and if they think that professors are biased. Not that professors are actually biased [I7: Right], but if students think it.

I7: We've studied only professional identity development [CL: Okay], not all of identity [CL: Right] before we've left that. So...

CL: Interesting, stuff all overlaps but we're in such different fields.

I7: Yes. Well I've talked to Steve quite a bit [CL: Okay] in some other things that we do and on representation. So he's been really helpful [CL: Yeah]. So...

CL: Um, let's see I had one more, oh in biology all the biology students have to take 316 I think it is, which is writing in the sciences [I7: Mhm] that Dr. Katz [sp?] and Dr. Tosinardi [sp?] kind of oversee and then – it's English professors who teach it.

I7: So 314.

CL: 314?

I7: Yeah.

CL: English lecturers teach and it's how to write biology and there are some ethical discussions about publication and credit and then how your responsibility to speak to different publics, you know, the everyday person versus your colleagues, and there's some discussion. Do chemistry or any of the other programs have a writing course?

I7: Chemistry is required to take 314.

CL: Okay so it's the same.

I7: Uh but there are several things about the English department because of budget cuts and their personal limitations, want to take that off the books. The [CL: Oh] other thing is that, and this is nothing about – no reflection on the instruction – I don't think the students get a lot out of it because they go in there disengaged.

CL: It doesn't apply to them, quote unquote.

I7: Well either it doesn't apply or just that there are other priorities [CL: Yeah]. When I was in graduate school, my penultimate year I took some statistics, and as I've said, the only thing that I got out of that was a wife [laughter] because what happened was it's not that I – so of the two semesters, the second semester, the instruction was quite good. But it had nothing to do with him. It, I, it didn't matter how good the instructor was going to be, I was, I had so many things going on and I knew that if I don't really use it, I'm not going to really learn it anyway. I knew I wasn't going to use it any time soon and I knew I have enough of a technical background that just knowing how to do well in math, I could do well in the class [CL: Yeah]. The interesting thing is that fast forward whatever many years, um I, who did exceptionally well both semesters, asked my wife who barely scraped by with a B, questions about statistics because I don't remember anything [CL: Okay/laughter]. But then again, it has nothing to do with the instruction, it was that I chose to be disengaged [CL: Right]. And so what happens is that our students, they take it at a time when they've got so many other things going on that they just don't understand how this is going to fit in because they can't fathom writing a research article for themselves or whatever at that point.

CL: Right. So it's similar to the ethics training [I7: Yeah] timing.

I7: Right. Yeah, that it's just, it just doesn't you know...

CL: Is your proposal that they take a class like every year or that it gets worked in a little bit throughout? Have you reached that point in your research?

I7: I think it has to be worked in at different times. Theoretically you know, I don't think every year. What it would do is just saturate people [CL: Yeah] and you get to the point

where it's just, again, you're just going through the paces again. Um but I think the problem with the sciences is we're in a culture of telling rather than asking and these are types of things that getting students to reflect is a hell of a lot more powerful than tell – because we all, I mean, it doesn't take a genius to know that if I copy something off of your paper on an exam that I'm probably breaking the rules [CL: Right/laughing] you know? But the question is that what are the things that I actually face? And you know, think about just this process of just doing this interview. How many times did I go back and say, “Oh well there's this other thing I do” or you know [CL: Yeah]. So you know, it's by provoking somebody to think about it then there's construct thinking about what are the things that they actually face and have these you know, holy shit moments of “Oh I've never thought about it” [CL: Right] “and I don't know how to think about it” [CL: Right] and whatnot.

CL: So that's what y'all's work is with the engineering faculty is?

I7: No the...

CL: [Inaudible 0:48:31.6].

I7: Engineering faculty was, yeah that was just...

CL: Oh that was the same paper you already accomplished.

I7: Yeah. Yeah.

CL: Yeah, okay. Great, I will look that up. Are you the main author on that one?

I7: Yeah, but I'll send it to you.

CL: You can send it to me. Perfect.

I7: Drea [sp?] is actually the first author, but I'm the corresponding author.

CL: [Laughing] Fair enough. By the way, that's different from every field, but nice.

I7: Really, yeah.

CL: In computer science, it's always alphabetical.

I7: Yeah, so that's, that's the thing you know.

CL: And as such...

I7: And in chemistry it just depends on what your advisor likes to do.

CL: Which is – how do you move on when you switch jobs or...?

I7: Well that's the problem because you're going to interpret the way you feel like interpreting because this is how I do it [CL: Right], so obviously that's what this article means. Yeah.

CL: Well thank you for your time [I7: Sure] and I again [I7: Sure]...

Interview 8

May 20, 2011

CL: ...Recorder. Um so what I'm doing is, I'm looking at communication ethics in science and I'm getting my Masters' Degree in communication. So we study a lot about how scientists write or should write or don't write. And I was doing my research on this and realized I needed a scientist's point of view. So that's what I'm here to look for. I'm interviewing a handful of scientists to get your perspective. So this is totally what you personally think or have encountered. Share as much or as little or if you think I'm asking the wrong questions, feel free to divert me [I8: Okay]. And if you don't mind, I'm going to take notes just in case this you know [I8: Oh, I don't mind] freaks out on me. All right, my first questions are just some basic demographics, which is to state your name please.

I8: [name removed].

CL: And what's your title at Clemson?

I8: I'm associate professor in department of genetics and biochemistry.

CL: Okay and what's your field of research?

I8: I am a molecular parasitologist. [Laughing]

CL: Is that the same thing [name of another scientist, a personal friend] does?

I8: Oh, same idea.

CL: Same idea, yeah.

I8: Yeah.

CL: And how long could you say you've been publishing your research?

I8: Uh okay so, I've worked on parasites for my PhD as well. So do I go back...

CL: Yeah.

I8: Back to then also?

CL: Yeah if you were published.

I8: Um oh yeah, so since 1992. So that was a long time ago. Is that 20 years?

CL: Just about.

I8: Oh man. Okay.

CL: [Laughing] And while I can check your C.V. online, can you name me a couple of the journals where your work has been published?

I8: Sure, I've published in the *ENBO Journal*, which is a pretty good one.

CL: ENBO?

I8: E-N-B-O J.

CL: Okay.

I8: And the *Journal of Biological Chemistry* for example.

CL: Okay, perfect.

I8: And those are both pretty good.

CL: Yeah. And were any of these articles co-authored or co-researched with other people?

I8: All of them [laughing].

CL: And have you ever received funding for your research from an organization outside of Clemson?

I8: Yes.

CL: Which ones, if you can name a few?

I8: The NIH, American Heart Association, Rockefeller Brother Foundation, um, that's about it.

CL: American Heart for parasitology?

I8: Mhm.

CL: That's cool.

I8: One of the parasites we work on causes heart disease.

CL: Really?

I8: Yeah, in Central and South America and in Southern Texas and in Florida.

CL: That's fascinating!

I8: Yeah [laughing].

CL: Do people know they have a parasite?

I8: No.

CL: Wow!

I8: Yeah [laughing].

CL: Wow. I'm from Texas and the joke is always like, if there's anything that's going to hurt you, like any creature that's going to hurt you, it's in Texas.

I8: Yeah, pretty much. It's true.

CL: They migrate elsewhere, but they start in Texas. Okay, jumping in, how would you personally define research misconduct?

I8: Oh I don't know, boil it down, lying, cheating, stealing.

CL: Yep.

I8: I mean it's pretty straight forward.

CL: Okay. And how did you learn this definition?

I8: Well learn. Um...

CL: Or come up with or come to?

I8: Yeah. I mean I think as a 2-year-old I was taught what was right and wrong.

CL: Yeah.

I8: And I had good parents. I just don't see how it's any different than the way someone in a normal civilization, you know, civilized society behaves [CL: Yeah]. You tell the truth you know. It's, to me, it's, there really is not a distinction between everyday life and research in a way.

CL: That makes sense. Okay. So when you think about ethical research practices, working as an ethical scientist, does any aspect of how you communicate come to mind?

I8: Sure, sure. I mean I think you have to have, you have to be completely transparent in everything you do and that means you know, that goes from having no books that are thoroughly documented as far as you know, documentations about what you have done exactly all the way to in public presentations, not overstating what you've discovered. And I think you can look at the Wakefield case, right?

CL: Yeah.

I8: Autism, and really learn about – I mean there are some gray areas of ethics.

CL: Yeah, oh yeah.

I8: And I'm not going to defend that guy [CL: Right]. But some, in some cases, I can see people not understanding what's ethical. But you certainly, at that point, if it's at all questionable, you need to seek advice, right? And that's what mom and dad didn't teach me...

[Chuckling]

But certainly, the IRB we're talking about here you know, that document may have surprised you that you needed to have, right [CL: Yes]? Given that you're not touching me [CL: Right]. But you can learn about it right [CL: Right]? And do the right thing. Go find out about it [CL: Right] before you do it.

CL: I actually am probably one of the few people who is really fascinated by the IRB process. Like the things you have to do online [I8: Yeah. Yeah, yeah], the course you have to learn. So if I said how did you learn to be an ethical communicator in science, you'd say the communication came more from training?

I8: Uh, I think it includes, and this sounds really ridiculous, but includes my upbringing, right [CL: Yeah]? But I do think having mentors who are clearly straight shooters you know, that don't participate or even tolerate any sort of misleading behavior. You know it's, that helps.

CL: That's not [inaudible 0:06:02.4]. Um, do you have a definition of ethical communication? Is it be transparent? You said be transparent and don't overstate. Would that be...?

I8: Yeah I mean I think that's fair. That sums it up.

CL: Okay. Are you aware that there are governing bodies like the ORI, the Office of Research Integrity or the OSTP, the Office of Science and Technology Policy? Do you know that they publish a formal definition of research misconduct?

I8: Uh so am I aware? Yes, I'm aware. I don't know what they are so I'm on the IBC, which is the Institutional [inaudible 0:06:40.1] Safety Committee [CL: Ah]. And so we deal with a lot of NIAG's, which I think the groups you mention also are entirely attached to those groups, right?

CL: I believe ORI and OSTP are the like most senior oversight [I8: Right]. They're part of the Department of Health and Human Services

I8: And I'm familiar with them because of things like in *Nature Magazine* [CL: Yeah] they talk about people losing the ability to apply for grant funding because they cheated or lied or stole something [CL: Right] or you know, they misbehaved [CL: Right]. So that's where I really know them. I'm not surprised

CL: Institute of Biosafety or International Biosafety?

I8: No, it's the Institutional Biosafety Committee.

CL: I haven't come across them.

I8: And we deal mostly with recumbent DNA and then dangerous chemicals and things like that. People have to get approval from us at Clemson, to do experiments. And that's where transparency is really important you know? You've got to go to us first.

CL: So you partner with the IRB? Like they have to get both levels of approval?

I8: Uh the IRB is going to be a different channel [CL: Okay] but parallel, yes [CL: Okay]. So if you were going to give me a drug, that part would come through both IRB and us [CL: Okay] or a recombinant thing.

CL: So do most – do all universities have some kind of biosafety committee?

I8: Absolutely.

CL: Okay. So you apply on the university level?

I8: Yes.

CL: Okay.

I8: Gotcha.

CL: Do the rules – these rules that you learn – you said you weren't aware of ORI's, but from IBC that sort of thing, do the rules that regarding research ethics affect how you choose to communicate?

I8: Yes [CL: Yeah], they do. I tend to think, and this might get me in trouble and that's okay, what you publish, what you write, has got to be precisely correct and honest. I tend to tolerate in public presentations like posters and talks, a little more this is preliminary data kind of talk [CL: Right]. Even from my own group. I don't object to that because if you say it's preliminary, that means it's not published, therefore it's not gospel, right?

CL: It has been peer reviewed?

I8: Right. And as long as you say that I think you can get away with an experiment that doesn't have enough replicates or things like that, just to provide the audience you know, some juicy tidbit that may or may not be play out right. It could be exciting.

CL: The conversation should come before the paper, right?

I8: Absolutely, yeah.

CL: As a scientist, would you say you're concerned with ethical communication practices?

I8: Am I concerned? I am concerned because I am selfish, right? I'm concerned because I think my group plays by rules and I think there are people who don't and that in the end, can influence the number and quality of publications you have and therefore the amount of grant funding and you know, if we're not all playing on the same level field, it's not exactly fair [CL: Exactly]. So I guess I would be concerned.

CL: Okay. Kind of taking us in a little bit more, specifically to authorship, would you say that authorship is a...

I8: Could we back up just for a second? I think the tenure promotion thing also is, is tied into that and I think it can be bad. The pressure to get tenure and to have a job and you know, I have a friend who is at a big university who has a very sick child and who needs to be at a big university because of the medical system. If he doesn't get tenure you know, it's bad news for his child too [CL: Wow]. So the pressure on him is immense. So the field has got to be absolutely level or he is going to be cheated.

CL: Right. Or he is going to be tempted to cheat.

I8: Or conversely right? He, he right. He may say everybody else is doing it you know [CL: Right]? And so I'm telling you, that tenure promotion system, in my opinion, is really broken frankly [CL: Um]. Anyways...

CL: Is it...

I8: And I'm tenured [laughing].

CL: Is it, in your field, is it based on, is it quantity or quality? I know some departments are like how many publications, others are how the top, the tier of the journal, the more rank you are as author.

I8: I think, in our department, it's an 'and' [CL: Okay]. So there has to be some amount right, demonstrating breadth of effort or something. But I do think you, publishing in the Bi-Lo [sp?] shopper doesn't count [CL: Yeah, right]. So...so, so yes, a combination of those things [CL: Okay]. And our department's small enough where we know the weight of various journals [CL: Right] and we appreciate that.

CL: Right. So it sounds like, that you backed up you kind of answered my question on the importance of authorship. To research a publication you would say yes it's important because it's about your job.

I8: Right. That's how I'm evaluated [CL: Right]. But it's funny, placement and authorship in our field is important too.

CL: Can you tell me how your field does order? Because I'm learning it's different in different fields.

I8: Yeah, it is. So the first author and the last author are the two, sort of, main contributors. The last author tends to be the senior person who perhaps directed the first author, right and provided the funding and probably mentorship.

CL: And the first is...?

I8: The person who did the lion's share of the work [laughing] and the writing, typically. And everybody in between, in theory, is supposed to have contributed something that is essential to the publication of the paper.

CL: That's one of my questions, contributing something essential [I8: Yes], what kind of considerations do people do you think people personally should make when considering authorship?

I8: Uh okay, so is data from somebody in the middle, in a figure? Does it make up a figure? And could the paper stand up without them? So those are some important questions, right? But I've noticed again, this, I'm starting to straddle a couple of different fields, which is new to me [CL: Yeah]. So I'm sort of this kinetics guy who now is playing with medicinal chemist types. And there, I ran into occasion where a guy made a compound, years ago, that we needed [CL: Yeah]. He wanted to be an author on our paper. You know, you've made that compound; you've published it in 30 different journals you know? But yet our paper wouldn't be as strong without it [CL: Right]. So I mean I could see it in both ways. He's getting these throwaway publications and has you know, on his C.V. 200 thumbs [sp?], but it's all junk you know [CL: Right]? But everybody in that field does that. They make an important compound and then they claim – you know, stick a stake in it and say [CL: Yeah] “we don't do that.” [CL: Oh okay]. I, I, I was hired at Clemson primarily because of reagent [CL: Yeah]. They didn't know that at the time but that's why I was hired and...

CL: Because your reagent was getting used.

I8: Yeah. And it's still used and we don't get complications from it. That's the way it is. It was published once and then some people had – they got advice from me on how to use it, maybe I got a few authorships out of that but then you know, the reagent. So...

CL: Is that trend, with the exception of this guy, does that tend to happen when you do a reagent or a mouse or something that's really important, it gets published for a few times while people use it, but after that it kind of becomes common knowledge?

I8: Yeah, well I think formally, it's, if the NIH pays for it, it becomes a reagent after it's published one time [CL: Oh okay]. I think there's some courtesy where for example, the reagent that I made, some people needed a fair amount of help with it. They sent people up here to use it [CL: Oh okay]. So then I have contributed to their effort [CL: Right]. But everybody else, people in Germany who are using it, I just sent it to them and they just [CL: Okay]... They acknowledge you sometimes. In the acknowledgments they say 'Thanks to Jim [CL: Right] for this', but I don't get authorship.

CL: Okay. So you have, if your data's used in a paper or if the paper can't stand without you. So you don't have to write to be an author.

I8: No but I think you need to read and edit and - so here's where I'm torn and I don't know the answer to this. I'm sure that it's available, but I don't know it. You look at these giant labs that have 20 post docs and 20 graduate students and then this guy who runs it and he's on the end of, the last author on every paper [CL: Right]. What does he know about that paper, right? And that's where we have, I mean we can look at well the guy who runs NIH, Francis Collins had a kid, made up a lot of data in his lab you know, they had to retract all kinds of papers [CL: Ah] and, and, and you know, Collins is not the one who's cheating, it's this student.

CL: But technically your last author doesn't have any ownership of the...

I8: You have looked at this paper and you agree with what it says. But, but his case is that, I think, and you know, I don't know but I think it is, is that I have to trust the data that the kid was showing me [CL: Right]. And if the data was falsified, nobody would know that. Well so at some level, the middle authors are going to have to be - I mean, I know in the Wakefield paper there are a couple of those authors who said, "No thank you" anymore [CL: Yeah]. They realized all this stuff happened. And, and how can you know from afar, what's really going on [CL: Right]? But it's sort of your job to keep an eye on it you know. And, and...

CL: When you've been author in the middle as you said, do you get a chance to read the paper before it's submitted?

I8: Absolutely.

CL: Are you expected...?

I8: You better [CL: Okay]. I mean - yeah.

CL: Okay, um...

I8: But you know, at some level you read the paper and you're in the middle and you don't know day-to-day what happened to get the data [CL: Right], you just see the data and you're like any other reader in a way.

CL: Right. You just have to assume.

I8: So it can be dangerous. You have to have you know, some working relationship with the people that are involved.

CL: Right. Um have you ever researched authorship guidelines?

I8: Sure. Journals right? Journals have these. And maybe I'm not answering the question.

CL: No that's...

I8: But the journals provide guidelines about who they think should be an author and who shouldn't. And some of them now are asking for explicit you know, what did you contribute to write this out [CL: Right]. And, and you know, it's just as much or as little as design and development of the paper. You know, what does that mean [CL: Right]? With the talk in the hallway about some key idea you know. But still they want you to at least look it.

CL: Is that online that you go look at the...?

I8: Yeah. And I think it's in part to fight this idea that people add senior folks to help in their cause right? If I have a paper that some very senior on it, views are going to be very different [CL: Right] than if it's just me.

CL: Paper. Does that apply to grants too?

I8: Uh, it can, yeah. Yeah.

CL: So in theory, if you gifted authorship to this senior person [I8: Right] on the journals that require you to state what they contributed, do people just kind of say [I8: Well, well] oversight or ideas or do they not do that because it gets...?

I8: Well I don't know, but if I were to do that I would definitely make sure that they contributed intellectually [CL: Yeah] whatever that means.

CL: Right. Okay personally, have you ever felt unfairly represented as an author? Either in the order or whether you were included or not or how it's published or where the money went, I mean there's a whole bunch of...

I8: No, not personally. No. I, I have seen, as an observer, and this is hearsay, you know I've seen where in a lab that I was in, in my past life, where two folks were invited to be on a paper; a student and a mentor. The mentor said, "No" and he said the student should stay on it because she contributed something significant. He said no because he didn't agree with the conclusions of the paper [CL: Oh]. And it didn't hurt the student because she was providing you know, a key figure that was not misinterpreted according to him [CL: Okay]. That's how he justifies it [CL: Okay]. But I haven't had that problem. I mean it's, I have good colleagues [laughing].

CL: Yeah. Fair enough. Um so can you walk me through on the flipside of time when you felt fairly represented as an author? Like how that process goes?

I8: Okay so the stuff from my lab, I feel for sure, right I mean, that, that's...

CL: If it's from your lab, you're always last author.

I8: Yeah. Uh I'm always...well, so far. I mean I would say that in fairly, I have provided the funding and a lot of the sort of theoretical drive behind experiments right? I mean, it's sort of my ideas also. So that's fine.

CL: So does everyone know that when the experiment starts, when the paper gets done?

I8: Do my students know that? Yes. And they're the people I'm published on.

CL: That you know that and okay.

I8: Yeah.

CL: Okay.

I8: So recently we published a big collaborative effort along medicinal chemists and the funding line came directly out of my lab. So I was the last author. But the first author was not someone from my lab [CL: Oh], which was kind of interesting [CL: Yeah]. And

uh, but again, these people are working at the University of Pittsburgh and I've been to visit them. We had a very close working relationship with them and we still do their EPA [sp?] and it's, it's the kind of dream collaboration that you can imagine [CL: Yeah]. We're always on the phone with each other and we know what's going on so it's almost like an extension of my group or I'm an extension of theirs. That's the way it should be and it's been great.

CL: And it's, it...

I8: Is this blinding you, by the way?

CL: No, no you're fine [I8: Okay]. And it's been really amicable authorship order and [I8: Yes, yes] - okay.

I8: And I think the near future presents a new challenge 'cuz now there's a new group, there's a third group involved [CL: Ah]. So we did this one thing with the group in Pittsburgh and that was fun. The third group comes on board to provide all these, some more expertise or something else and now so there're really three parties and I don't know how it's going to play out because there's not three places to put people [CL: Right]. And one of my students was heavily involved in this project and I'd like her to go first, but you know, I don't know how it's going to play out. It may be that we take a bigger story and break it into littler pieces, which at some level you have to have ethics. That too, but um...

CL: Are these discussions that are happening? Do y'all sit down and talk about authorship order or is it assumed and then contested later or...?

I8: Mm, I don't know how it's going to work out. We again, have conference calls and all the parties involved, I really like [CL: Yeah]. It really helps that we get along [CL: Yeah for sure]. We see, I mean, everybody's aware of this [CL: Right] so we sort of danced around it and it's not, it's not going to be bad. I think what will happen is the medicinal chemist will have a paper that is stand alone that could have been rolled into a giant paper, and they'll take the lead authorship on those and then we'll take sort of the biology side [CL: Yeah]; us and Pittsburgh [inaudible 0:21:54.9] [CL: Right] you know. And it'll work out. I mean, at the end of the day, we're working on a neglected tropical disease that nobody cares about [laughter]. So what we care about is trying to help some folks out in Africa right [CL: Right]? So...

CL: So the authorship of that. Um...

I8: Uh, for me, I'm tenured now, so it doesn't - I mean I hate to say that 'cuz for [CL: No, that's] grants it does, right? [CL: Right]. It needs to be clear that it came out of my group, but if I don't know, I'm not going to suppress some beautiful publication just because I'm annoyed about my position.

CL: Okay. And you touched on this with the story of the mentor student in your lab, but do you have any circumstances that stand out where you've heard about a colleague or a peer that got really unfairly treated as an author?

I8: Mhm.

CL: Are you willing to share any of those?

I8: Mm, I mean I, so sure. There, there, I think it comes down to interpretation of data, right? And I had heard where there were two local colleagues and a third party that was off campus you know, in a different place. And one of the local colleagues said, "I don't

agree with the way you guys are interpreting this." And so the solution was not to address it experimentally, but rather just to dump it [CL: Oh]. And because it was in part a philosophical, but not entirely, in my opinion [laughing], but you know I can see it from, I tend to try to look at things from both sides [CL: Right] and I can see the issue. If you don't agree with this complaint, this person is going to complain until you're paralyzed you know [CL: Right]. And what do you do? And if what they're suggesting you do takes another two years well, and it may not answer the question. I, we're in such that, the thing's so fluid that you've got to act [CL: Right] right? So, but [CL: That's interesting]. That really, to me, is a really gray area [CL: Yeah]. We deal with committees too. I don't know if you, if you're graduate committee [CL: Yes]. You know this, right [CL: Yes]. You got a committee member you don't agree with or he's being a pill about your thesis, you know what you should do? Kick them off and replace them.

CL: It's easier said than done, right.

I8: Well, but you can do that [CL: Right]. And - your boss can do it.

CL: Well my husband's [inaudible 0:24:18.6] committee had a few bumps along the road.

I8: Yeah. So what was his...?

CL: There was a committee member who was too busy to show up to anything except for the defense and then at the defense raised concerns that should have been raised back at the proposal level and so, but his chair was the least senior member [I8: Yep]. So she didn't feel like she [I8: See, tenure] - yeah, very tenure related and so it became, he got caught up basically in politics and had to do a revision that should have been something that was cited a year before.

I8: Hey, not to get too nosy, but what program since we're being open?

CL: He's in [department removed] [I8: Okay] is what his PhD is in. He's actually um, works at Clemson now.

I8: Oh cool.

CL: So yeah. Actually everyone...

I8: Do I know him?

CL: Do you know [husband's name]?

I8: No. Okay. 'Cuz I know some new people who are over at the office that get mad at you when you break rules. And they're all education leadership people too, I think.

CL: The office gets mad at you when you break the rules.

I8: So it's the integrity office [CL: Yes]. Yeah, yeah, yeah.

CL: One of the, Dr. Fishman's on my committee [I8: Okay]. She's head of the Rutland Institute [I8: Okay, cool]. Yeah.

I8: All right, anyways, I'm sorry.

CL: But yeah, no that's okay. And actually most of the people on his committee have now left Clemson, but it was just, it was very educational for to watch him go through the process and learn about the effects of tenure and power and...

I8: Well okay, so...

CL: And committee ethics.

I8: I'm a science nerd [CL: Yeah] in high school, college, always a science nerd. Guess what? I have tenure now.

[laughter]

I can be a bully.

[laughter]

Bully. What's going to happen when you grant somebody, who forever has been squashed, now some sort of authority. Well they're going to be complete jerks just because they never had it, socially or you know?

[laughter]

I mean I just, the system is so broken [CL: Yep]. So anyways.

CL: Well now you've answered my questions and basically to let you know what I'm looking at is um, so the Office of Research Integrity and the OSTP, those two big government oversight, their definition of research misconduct is fabrication, falsification and plagiarism - FFP and have been since the '80's when they first defined it. But, based on publications that have come out and conversations I'm having with scientists, seems like authorship mainly is a really big issue or an issue of import that causes a lot of these gray areas. And I'm hypothesizing maybe even that the drive for authorship is what causes the falsification, fabrication and plagiarism.

I8: Certainly I think maybe not authorship in the middle, but you know, authorship to tenure [CL: Yeah] that process to grant...

CL: The drive to publish.

I8: Is, is I think drives most of it. But, but you know, and again, I think this is sort of off the record but you can include it, I don't care. We have found that it's a societal thing too [CL: Yeah]. Um you know, back when I went to school it snowed all the time and I walked up hill both ways right [CL: Right]? And that kind of thing. But now there is a monster out there, this database of information that a lot of us don't know how to handle and, and a lot of us being even the new generation and as graduate coordinator in our program, I saw a lot of plagiarism that was inadvertent [CL: Yeah]. Right? We have the machine, turn it in in other programs that will hunt the stuff down. You know, it's unbelievable like what those programs can do. And there's a new one even related to science papers that I know you - this guy made this algorithm where they look at all these science papers and they can see who's copied their own stuff in intros over and over and over.

CL: It's self plagiarism.

I8: Yeah. Yeah, yeah, yeah.

CL: That's a real interesting side issue.

I8: But I, I, I, what we have found is that in, in to be fair, we most identify the people who are nonnative English speakers first. And that's not fair, but so obvious [CL: Yeah] that they'll do some exercise and the grammar's perfect in some area [CL: Right] and you'll say this is - but then turn it in and boom, they've copied it off the internet without a reference. Well there's a lot of that that goes on in society that's tolerated. Just not here in the U.S. so explain that issue [CL: Ah] is a bit tricky you know [CL: Right]. It's, it's breaking a habit that is longstanding. It's their entire lives right [CL: Right]? Because they're young and they've been doing this forever. The idea being, why rewrite something when it's perfectly written anyways, right? I mean, I can kind of understand where it comes from, but, but it...

CL: Well we'll tolerate it as long as you cite it.

I8: It's insidious. I mean it's - is that the word I want? Recipient. Yeah so anyways, you know the word I'm looking for [CL: Yeah] right? To the point where you know Wikipedia, you can almost - so these large classes that I teach, these Intro to Genetics classes, you'll have them do extra credit and you can almost look at Wikipedia and find those answers in the stack [CL: Wow]. And you know, it's, it's not cheating it's just the way we do it. We communicate by copy and pasting and, but in my opinion it's...

CL: It is.

I8: It's plagiarism.

CL: Plagiarism, yeah.

I8: And, and holistic people gets run off the, you know they get mad [CL: Right]! Run them up and say this is plagiarism and I'm going to get, you know I've warned you about it. You can't copy from the internet. But, but I do think both at the societal level where different societies tolerate this differently and then the age group you know? I, I'm an old fogey. And I, I have to somehow be sensitive to that right?

CL: Our, our ways of learning how to collect information were different than our current generation.

I8: Right. I mean I learned in a library in fifth grade that you had note cards [CL: Note cards] and you write down something and you know, you'd write where you got it [CL: Yeah]. Then you'd glue the note cards together on - you know, that old thing [CL: Yes] and that's just not the way it's, that's not the way it's done now. It's so easy to and that doesn't make it right. I'm just saying it's an interesting [CL: Right] problem.

CL: It's making an [inaudible 0:30:06.4] plagiarism. I mean that's why Turn It In exists.

I8: Okay, but to see some of these papers that have come out. In *Science and Nature* they talk about them, these things that were um, cobbled together science papers that are all other people's data. And you can never, because of the volume of it, discover them [CL: Right], right? Until now there are these, these programs these guys have written that really were not - they were looking for um, I don't know they were sort of database mining base programs that were converted into looking for cheaters [CL: Wow]. And there have been some articles about them and you know, some of these papers are completely fabricated and, and I understand again coming back to this tenure thing, it's, it's all tenure and it's all grantsmanship [sp?]. Those things are what really creates corruption because without those things, you can't be powerful right? And without power you're going to be the science geek you were in high school, you know?

[laughter]

You know I mean, I understand the motivation is, and it's longstanding and it's just human nature [CL: Right] to be in charge.

CL: In our field, often if you just write the review paper, that's where you're going to get all your citations, so every few years you write a review paper to up your citations and everything.

I8: Yep. I don't know, it's true in our field too so it's not, it's a little bit different, but we have you know, impact factor [CL: Yeah]. Well how does a journal crank on its impact factor? Well you get people to submit reviews [CL: Reviews], the reference and then their impact factor goes way up [CL: Right]. It's a complete bogus you know.

CL: But I, one of the scientists that I know is in a field where you know, on Google now you can search for an article and it'll tell you how many citations it has and they actually, it goes in their tenure file, their number of citations. So the quantity [I8: Yeah] does...

I8: Well I, my, my, one of my resumes, one version of my C.V. has, it's a um, so there's a group of a thousand scientists who had this journal called whatever, Thousand Scientists Journal, I can't remember [CL: Right] the name of it right now. It's off the top of my head, but anyways, they read papers that they think are of note and give them some sort of score [CL: Oh]. You know this is a meritorious paper um, and so I include that about the papers that are being considered and you know, that [CL: Right] what does it mean? Well nothing. It means who have I talked to in that group or who do I know on that panel. You know? I, but yet again, it's all about power, prestige, blah, blah, blah [CL: Right], tenure. There's no way around it. I don't know how unless you give everyone pie, you know a piece of the pie [CL: Right]. Here's your grant money every year and [CL: Right]. And some people aren't cut out to be scientists [CL: Right, true]. But that should have been figured out a long time ago I think.

CL: And so your peers filter you out.

I8: Yep. So.

CL: Well thank you for your time. This has been great.

I8: Good.

CL: And that's what, like I said, I'm trying to get ten of y'all and I think I have eight now. And it's been really fascinating how the fields are all different or authorship order of fields is different.

I8: Well you'd get a different answer from somebody in my field perhaps. I mean I...

CL: No and it's, it's, part of it's the personal angle of it. I mean, I'm, if I wanted to know what all scientists thought, I'd do a giant survey but I'm trying to get just some ideas through interviews. For example, computer science, they list authors alphabetical. No question.

I8: Oh wow. So how do you figure out who did what? Or you just know?

CL: You don't really care.

I8: Oh.

CL: You've all worked on it, you put it alphabetical. They did say, every once in a while you'll put an asterisk next to somebody if they really were first author.

I8: Wow.

CL: But in, when they work with other fields, they enter into this conversation and then people start to care and not care and it gets tricky. And then I spoke with another field where no one has agreed on whether or not there's a last author. So you don't know if, for example, someone's applying for a job and they were last author on similar articles, you don't know if that meant that they were the corresponding most important or if they were applying to journals that just did alphabetical or if they just didn't care because there's no regulation in that field. So while some people might be arguing over it, other people don't care but then how do you know? How do you compare? [I8: Yep, yep, yep]. So it's [I8: Wow] something as little as order. See I guess I'm wondering is if these government oversight bodies should start putting author regulations as part of like the very most senior things that they look at. Or if at least they should elevate the importance of

communication among, besides just plagiarism, but like how you present your data. How you share your information [I8: Ah]. Should that be regulated? Just...

I8: I mean so the meetings we go to are really interesting 'cuz there's been a, an evolution in this. I won't keep you, but it's, so for example, if you identify every protein in an organ, a couple of years ago, what would happen is the person would say, "We've identified every protein in this organ using this new technology and here they are. Here's the list" and it would be numbers, would not be informative [CL: Yeah]. Number one, number two, number three. And you'd say, "What is number one?" And they'd say, "We can't tell you. Sorry. Come see me afterwards and we'll talk about it."

CL: Because they couldn't share?

I8: Because they weren't willing to share [CL: Okay] because somebody would scoop them [CL: Right]. They put all this effort into identifying them and then somebody sitting out in the audience would, would and their fear was having stuff you know, stolen [CL: Right]. Which that must have happened because they did it. And then some of the organizers in these big meetings we'd go to every year, got up and said, "You can't do this. This is a waste of our time." And it is a waste of our time. Except I understand you know [CL: Right, right]. So then how do you handle that? Well you encourage people not to scoop, but you know, it's, again, it's about greed and you know pride and all this stuff because by golly I identified every single one of them. But you know, I can't study all those.

CL: Right. But that's part of the balance too because the, scientific paper from my understanding is supposed to present your data in such a way that someone else can replicate it.

I8: This is a talk.

CL: This is a talk, right.

I8: This is not, so many people have taken this preliminary data thing to an extreme where they don't show any data.

CL: Just so it's a progress report?

I8: Yeah.

CL: My father-in-law is a meteorologist and he always says when he was on review committees, "I hate when people tried to publish progress reports and not final."

I8: Yeah, yeah.

CL: But interesting.

I8: Yep.

CL: Yeah it's a, it's, and back to the internet, when things want to get shared it can go all over.

I8: Boom!

CL: Yeah. Yeah.

I8: Gone.

CL: You need to hold onto it tighter.

I8: Yep. You used to have to ask somebody for one of their manuscripts you know, if you didn't have a subscription to the journal which you didn't have them all right [CL: Right]. You could send them a letter and you'd say, "Can I have a copy of your reprint."

[CL: Right]. And some way you knew who was looking at your stuff. In some way. Not, it wasn't entirely that way, but nobody asks now. You know 'cuz you've got all...

CL: That's only like 20, 15 years ago.

I8: Yeah.

CL: Yeah.

I8: So.

CL: Shocking.

I8: Right. Okay.

CL: Thank you for your time.

I8: Yes ma'am.

CL: It's been fabulous. I appreciate it.

I8: And your timing is perfect.

Interview 9

May 18, 2011

CL: Okay, I'm studying communication ethics in science and as part of my thesis in professional communication program and I was writing about how scientist work and write and think and realized I needed a scientist's point of view. So I'm conducting interviews, trying to get various fields of science represented. For just your personal take on communication ethics and some related stuff that we'll get to with the questions. So before I get started, do you have any questions?

I9: No, no. Not at all.

CL: We'll start with some basic demographics. Your name?

I9: [name removed].

CL: And your title at Clemson?

I9: Assistant Professor.

CL: Of...?

I9: Biology I guess.

CL: And your field of research?

I9: Um, developmental biology.

CL: I've never heard that term.

I9: It, it refers to how embryos develop and the processes [CL: Ah] involved in taking an organism from a single cell to, to when it's born.

CL: Okay. And how long have you been publishing your research?

I9: Eleven years.

CL: Okay. And though I could check your C.V. online, could you name me a couple journals where your research has been published?

I9: Development [CL: Oh] yeah, *Developmental Biology*, [CL: Okay] I wish I could say *Nature Science* and so on, but...

[laughing]

CL: Not yet.

I9: Not yet. Yeah. [laughing]

CL: And of these articles that have been published, were any coauthored with other researchers?

I9: All of them except one. And I think there's sixteen of them.

CL: Okay.

I9: Ish. [laughing]

CL: Right. And then have you ever received funding for your research from an organization other than Clemson?

I9: Yes.

CL: Which ones?

I9: NIH [CL: Okay]. The Wellcome Trust.

CL: Welcome?

I9: Yeah, W-E-L-L-C-O-M-E. It's the biggest biomedical charity of the world. It mostly operates in the United Kingdom.

CL: Oh, okay. Yeah, okay. Great. Now jumping into the more involved questions, how would you personally define research misconduct?

I9: Uh, it's a really hard topic [CL: Yes]. I find it very hard. Um, in my opinion, it's any point where you misrepresent your data. Data is always data. How you interpret it is another thing entirely [CL: Right]. And that's why I publish in peer review journals, because hopefully if I am miscalculating something or there's something I don't know, they can point it out to me and then I can update my interpretation. But the data is the data. And how you collect that data and present that data has to be completely ethical. You have to be able to repeat experiments. That's a big problem is sometimes people publish stuff and no one else can repeat the experiment.

CL: Because the [inaudible 0:03:52.1/cross talking].

I9: That doesn't necessarily...

CL: I'm sorry. Because they didn't share enough information or because it's not actually replicable?

I9: Sometimes it's not replicable because the person who collected the data lied [CL: Yeah] um, and, and you know, usually it's not replicable because there's some sort of issue [CL: Right]. It's not that you know, the chemicals don't work in one lab but they do in another or so on. Usually it's because something's wrong.

CL: Right. Perfect. And how did you come to this definition or understanding?

I9: There is nothing formally written down about the rules. So most of this comes from my mentor. Starting you know, as an undergraduate student and moving all the way through personal [inaudible 0:04:50.7] training.

CL: Starting as undergrad?

I9: Yeah.

CL: Did you have the same mentor the whole time?

I9: No. I [CL: Oh okay] had different mentors, but every single one of them has you know, stated very much the same thing. And, and that's a good thing [CL: Right] because you hear it again and again and again. Then you know um, you know it really ingrains it into you. And of course, as you start writing your own papers, you start questioning your mentors and saying, "What about this?" and "How does that work?" But I would say that there is no set of written rules for communication ethics in research biology, at least.

CL: Right, right. Okay so when you think about ethical research practices, does any aspect of communication come to mind?

I9: Um...

CL: You mentioned interpretation. How the data's interpreted.

I9: Yeah. You know, so there's many different types of data. There's images [CL: Mhm], images are a huge problem. Most of the journals in our field now employ software that determines how an image has been manipulated.

CL: Wow. Interesting.

I9: Yes. Statistics are another huge problem. Mostly because biologists don't actually know much about statistics.

[laughing]

CL: It can be really misleading though.

I9: Oh absolutely. You can use statistics to tell people what you want them to hear [CL: Right] so you have to be you know, a bit careful. Um, you know, many of my scientist friends say that science is self-correcting because when someone tries to repeat your experiment, they get a very different result. Then you know, you have to figure out you know, who's right and who's wrong and, and what's going on. And it creates doubt [CL: Right]. But this isn't always because there's something wrong. It's just because of interpretation [CL: Right] and you know, when there's twelve hypotheses for something and you're trying to you know, shore up your own pet hypothesis, it can be um, it can take a while before we can reach a consensus. So you know, but that's a good thing. That means you know, we're trying to find out what the reality is.

CL: Right. It seems you put a lot of import in the role of your peers.

I9: Absolutely. Yeah. I mean, you need it because no one scientist can know everything. [Chuckling]

Well there's some that thing they can, but...

[laughing]

You know, knowing you know nothing is the beginning of wisdom so [CL: Yes] that's the path to wisdom.

CL: Right. So would you have a definition of ethical communication in science?

I9: I would say that ethical communication has nothing to do with the truth. Rather, it has to do with accuracy, repeatability, I was going to add another word but it's lost. Um, and the, I guess that you recognize that your interpretation may be incorrect. I think that's something that's very important for scientists to actually admit [CL: Mhm] is that maybe I've got this wrong. If somebody comes up with new data, then you know, we'll have to change our outlook.

CL: Right. How did you come to this, to this definition of ethical communication? So the same as mentors at school? Or...?

I9: Well um, I've you know, we're not really taught ethics as scientists, um, I have a friend called Scott Gilbert who has written a book on um, ethics and evolution. That's a very good textbook. Of course I've done Clemson's ethics course as well.

CL: IRB or a different one?

I9: It's the one run by the institute of...

CL: Right. The Rutland Institute.

I9: Yeah.

CL: Okay.

I9: But I think that ethics are something that I teach my students all the time. I talk about the ethics of research in lab meetings. When we talk about how to present data for a paper, I talk about the ethics. You can change your picture this way, but you can't change it that way [CL: Right]. But in awful lot is pretty much word of mouth.

CL: Right. Okay. You mentioned no formal rules. I was going to say, there are governing bodies like the Office of Research Integrity, ORI and the Office of Science and Technology Policy, OSTP. Are you aware that they actually have published definitions of research misconduct?

I9: I wouldn't say I was consciously aware of it, I'm aware that they must have, but they have no impact on my research or how I communicate my research whatsoever.

CL: Okay. That answers two questions right there.

[laughing]

All right, my next one is do the rules affect how you communicate, so I'll say no. As a scientist, are you concerned about ethical communication practices?

I9: Of course. Of course, you have to be because there's money in science and there's power in science. At any point, people are trying to keep a job or get a job or get a grant or move to the next step in their career. Ethics is always a problem. There's, there's a lot of pressure, especially in younger scientists to succeed. And it's very tempting to make the data up because you think that is what your supervisor wants [CL: Right]. And that's why you have to constantly communicate with your lab and classes you teach about the ethics.

CL: It's interesting because you said you don't feel like you formally learned it in school, and yet you make it a point of teaching your students in school.

I9: Well I think because my mentors made it a point of teaching me.

CL: Okay.

I9: It's something that was talked about regularly, openly you know? There was no secrets. It was like, because the thing is, is that if you, if you lie, you're going to be found out. Maybe not this year, maybe not next year, but eventually and retracting papers because they are false, there's false information in them, that'll kill your career [CL: Right]. And so it's very important that you instill this in young scientists from the beginning because one mistake is all it takes.

CL: How does it kill your career?

I9: Um, because people know that you've lied. People know that you're prepared to manipulate the data to get where you want to be.

CL: So they won't work with you? Or they won't hire you?

I9: Yeah, they won't work with you. You go in a blacklist with the journals, they won't publish your work, um grant awarding agencies can sanction you with things like you can't apply for grants to them for three years, five years, ten years. And if you can't get grant money, you're finished.

CL: Right. Okay. Going specifically from general communication ethics to authorship, would you say authorship is an important issue or concern to you in your research and publication?

I9: Um, in what aspect? You mean which author is on the paper or...?

CL: It's, mm, it's kind of up to you to define. People have talked to me about authorship order [I9: Mhm] or generally the drive to publish, to be an author, to have your name on a paper at all.

I9: Right. Okay, well let's deal with those first two. So in my field, there was a convention of authorship.

CL: What is that convention?

I9: The first author is generally the person who did the work. Who physically sat there and did the experiments [CL: Wow]. And they would also, so for example they'd be a graduate student or post doctoral fellow [CL: Okay]. They would also be expected to have intellectual input. In fact, all authors on paper should have intellectual input into the paper. They, you know, they may have done experiment number two, experiment

number three, but they should know what the entire topic is about. And then the senior author, in other words the last author on the paper, is usually the principal investigator, which is me.

CL: Right. So that's interesting. That's a little different than other fields in that first author might be a low level student if you will, but if they were the ones in the lab every day, day in, day out doing it then they would get a first author.

I9: Yeah. I have published with a technician as a first author, but basically that person did the work.

CL: Right. If there's more than two authors, how is authorship determined within those?

I9: Authorship is determined by the intellectual contribution and the amount of work contributed to the paper. Usually when we're doing this research, we have discussions about who has, in you know, quote, unquote "ownership" of the paper. Because you give a project out to a single person, but sometimes that person may supervise an undergraduate for example. Now we don't put undergraduates on paper generally unless they've made a significant contribution. Then for the more senior authors, usually there's only the PI so I'm always the senior author. But if we've collaborated with another lab for example, it's a very important thing that right when you start collaborating, you have discussions and you write to each other to determine authorship. So if my...

CL: So even before the research is done?

I9: Absolutely. It's, it's critically important because people assume and that makes an ass out of you and me [CL: Mhm]. And often when it comes to actually publishing the paper, they find instead of being an author, they're suddenly in an acknowledgement. There's some huge feuds in science because of those kind of miscommunications.

CL: Right. Right. So that's regarding order. You said you might also touch on just the drive to be an author; the drive to publish. Is that a concern?

I9: Um, I'm just a very driven sort of person anyway and I believe that if the science is good, it should be published. And one of the reasons I believe that is the public is paying for this research. And so the research needs to be made public. Also, it depends on which country you, you get trained. In the U.S., it's expected that you will publish as a first author prior to getting your PhD. And so for students to be successful and move on to the next phase, which is a post doctoral fellowship, particularly in my field, there's really no hopping straight to a tenure track position or faculty position of any type. Unless you've published, you can't really prove to the people in your field and people you're applying to for jobs that you're actually worthy. And given the intense competition to, to get that next job, even I, I get, I get several applications a month, emails, people asking me you know, do I have a job. And one of the first things I'll do, if I think they're at all interesting is I'll have a look and see what they've published. And if they've published nothing, I'm really not interested because only people who've published generally have the motivation and the determination to succeed in this field. But of course, that does create problems because it opens up temptation to get the publication. And, and of course the thing about young scientists is, and young people in general, is they cannot see things from our perspective. I've read everything. If, if they copy something from another paper and put it into the paper, I can usually recognize it [CL: Right]. And our technology's given us the, the help in order to determine plagiarism [CL:

Right]. And in fact, I never submit a paper or a grant, even if I write it myself, without running it through Turn It In or ET or one of the other plagiarism detectors. And it's not because I think I'm plagiarizing, it's just that sometimes you copy and paste something and you forget to paraphrase it or [CL: Right] or even reference sometimes. And so you know, it's nice to be able to use technology to help me.

CL: Right. Right. Have you ever researched authorship guidelines?

I9: Hmm, I've done some of the um, research uh, what is it called? The program we have here. Um, responsible conduct of research [CL: Yes] and they've given a, a number of um, um, if only I could talk English it would help so much wouldn't it.

[laughter]

A number of references online and so on. And of course, the other thing is that if you're going to publish in a journal, it's always a good idea to read their [CL: Right] definitions so that you know what they expect.

CL: You read it online?

I9: Yeah.

CL: Okay.

I9: Yeah. I certainly don't read you know, paper books about this. It's all online.

CL: Right.

I9: In our field...

CL: Do you find they all have different definitions?

I9: They do.

CL: Okay.

I9: For example, some journals will require a statement at the end of the paper detailing what the individual scientists or individual authors contributions were [CL: Right]. So you know, I may have conceived the study and written the manuscript and you know, first author number one um, did all of the experiments and number two author did experiment three. And they actually require you to detail this is an attempt to stop senior authors from let's say for example, the department head, saying any paper you publish has to have my name on it [CL: Right]. And that has been pervasive and they're trying to get rid of it. The other thing is sometimes what will happen is that a lab with lower standing will try and get a well-known author onto their paper. They will offer them a gift authorship as it were, in order to try and raise the profile of the paper. And of course, that's completely unethical.

CL: Do you think the listing of author's contributions has helped curb this? Or do people...?

I9: I think it has. I, I think that the publishers themselves have done a lot to raise awareness of who should be on a publication. It also depends on how you do your science. I mean some labs are what we call factory labs. So person number one will do all the sequencing and person number two will do all the mouse work and person number three will do all the histology. And so every paper they publish has every worker in the lab on it. I, I prefer to publish based on you know, individual contribution [CL: Right]. But as I say you know, there's nothing wrong with running your lab in the factory way. It, it just depends on the type of research you're doing.

CL: Right. Have you ever felt unfairly represented as an author?

I9: No I don't think so. Occasionally I haven't been on paper that I thought I should be on [laughing].

CL: Yeah. Like in the acknowledgements but not authorship?

I9: Yeah and that, that tended to happen when I was a younger scientist. I guess the you know, the PI I was working for felt that my contribution wasn't sufficient. I felt differently, but you know, that's okay. I, I, I think you know, because when you're young, you're so desperate for that first paper [CL: Right]. But once you've published one, two, three papers, then, then that kind of goes away I think. I think almost every paper I've ever published, I've either been first or last author [CL: Okay]. Um, there, there's a few where I'm kind of stuck in the middle somewhere, but yeah. But I don't think it's a problem.

CL: Okay. In that case, can you walk me through a situation in which you were fairly represented as an author? What was the process that made you feel that that was fair?

I9: Well I think, as I said before, it starts very early on in the, in the process. Which is to say, you know, to give ownership of a project to a member of the lab. And to say you know, "Look, you're going to be the first author on this if you do X,Y and Z [CL: Right]. So for example, currently in the lab, we're writing a paper where two graduate students have both done work on the paper. But clearly, one of them has done much more of the work than the other. And so we had a discussion, we had a sit down and said, you know, do you feel that you know, you, you would feel that you're being ripped off or do you feel this is unfair if you're the middle author and this person's the first author? And, and that's really the way to deal with it is to have a sit down and have an open communication. And that's pretty much what we've always done. I, I think that sometimes as PIs, you have to hold back people. I know my previous PIs have sort of had to you know, rein in a little bit because I, you know because I wanted to be a senior author and I kind of got [making noise], but as you move on you realize you know, that, that's one of the things that motivates you to go and seek your own position [CL: Right] is because you want to be the senior author, you want...

[equipment failure; remainder of interview was not recorded]

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