After this workshop, participants will have the knowledge and skill to:

- Identify the different functions of authorship, such as credit, credibility, and integrity;
- Understand power dynamics in authorship decisions, up and down the hierarchy;
- Employ strategies for fairness, such as authorship policies & statements; and
- Navigate hierarchies in research collaborations, both as leaders and team members.

1. Contributor Roles Taxonomy[1]

CRediT is a general taxonomy of 14 roles for contributing to research developed and tested through feedback from scientist & editors across a wide range of fields (Brand et al. 2015).

Contributor Roles	**Specific Contributions**
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims.
Data curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later re-use.
Formal analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.
Funding acquisition	Acquisition of the financial support for the project leading to this publication.
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection.
Methodology	Development or design of methodology; creation of models.
Project administration	Management and coordination responsibility for the research activity planning and execution.
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools.
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components.
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.
Validation	Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs.
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.
Writing – original draft	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).
Writing – review & editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages.

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[1] CRediT was approved as a NISO (US National Information Standards Organization) ANSI standard in 2022: ANSI/NISO Z39.104-2022. For more information, see https://credit.niso.org/contributor-roles-defined/

2. Case Study Series

Ethics & Team Power Dynamics in Authorship Decisions

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Isis Settles[4,5], and Patricia Soranno[1]

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Abstract/Background: Below is an interrupted case study about authorship issues in collaborative research teams, focused on exploring issues of ethics and team power dynamics in authorship decisions. The case study can be used to foster discussions about the many factors involved in authorship decisions and the effects of those decisions on careers. This case study was written by an interdisciplinary team (two ecologists, a psychologist, a philosopher, and a historian) with the idea that it would be useful for scholars in any discipline that publishes multi-authored papers. The authors used this case study to facilitate discussion during the following two workshops: 1) *Authorship: Advocating for Representation*. Workshop at the American Association for the Advancement of Science (AAAS) Meeting in Washington DC, February 16, 2019 and 2) *Navigating Team Power Dynamics in Authorship Decisions*. Workshop at the Science of Team Science Meeting in Lansing MI, May 20, 2019. During these workshops, the participants discussed many complex and authentic issues of authorship, particularly those pertaining to power dynamics and ethical decision-making. These discussions demonstrated the ubiquitous and challenging nature of authorship issues and the utility of the case study for eliciting learning from such shared experiences.

Citation: Kendra Cheruvelil, Kevin C. Elliott, Georgina M. Montgomery, Isis H. Settles, Patricia A. Soranno. 2019. Case Study: Ethics & Team Power Dynamics in Authorship Decisions. *Online Ethics Center*. DOI: https://doi.org/10.18130/w70m-m509. https://onlineethics.org/cases/case-study-ethics-team-power-dynamics-authorship-decisions.

Case Study Part 1

Amanda Stone is a postdoc in Dr. Max Smith's natural science lab at a University of California system university. She is applying for tenure-track positions in environmental science. She's anxious about making the short list this year because she would like a permanent position.

Amanda has 3 years of postdoctoral experience and has published 8 peer-reviewed journal articles in moderate or high impact journals. She occupies the prestigious first author position denoting her leadership on 4 of those articles, and across all 8 articles there is an average of 6 total authors. However, a mentor recently told Amanda that her publication list may not be strong enough to get short-listed for tenure-system jobs and that she needs to focus the coming year on publishing more publications with fewer co-authors and having a leadership role in those publications.

The project to which Amanda has devoted most of the past 3 years is very collaborative and interdisciplinary. Max is the lead project principal investigator (PI) on this project. In addition, there are 3 other PIs (1 other natural scientist and 2 social scientists), 3 other postdocs, 5 graduate students, and 8 undergraduate students. As part of this project, Amanda is working on multiple manuscripts that are in various stages of development.

Discussion prompts:

1. How do you think others will view Amanda's publication record (numbers and order)?

2. What are the power dynamics in Max's lab and on this project? How can Amanda navigate these dynamics?

Case Study Part 2

Max is a full professor who enjoys mentoring early-career researchers. His lab currently includes Amanda, another postdoc, 2 PhD students, and 3 undergraduate students. Everyone in Max's lab is currently working on this research project, with the postdocs and PhD students leading different components of the research. Max's lab does not have a written authorship policy. However, he wants to support early-career researchers, so he has the opinion that all 7 members of his lab should be on all papers that come out of this research project. Additionally, since the project is interdisciplinary, he expects that social scientists will be included as coauthors on the papers that his lab submits. He generally expects that his name will be last in the list of authors, which in his field denotes that he is senior author (i.e., that he is the head of the project).

One of the papers Amanda is leading, and thus is 1st author for, is nearing completion. She used data collected by the team (natural and social science data) for this paper. Two others in Max's lab were very involved in the paper - one of the undergraduate students (Sam Hunt) helped with data processing and one of the PhD students (Alex Manton) helped outline the paper and conduct a literature review. Amanda conducted all of the data analyses and drafted all of the manuscript text.

Amanda first shared the completed manuscript with Alex (the PhD student), made revisions based on their feedback, and then had two rounds of back and forth with Max (the PI). Then Amanda circulated the paper to the rest of the research team (21 people total) and received constructive feedback from 4 of them, 3 social scientists and another natural scientist not in Max's lab. She's made revisions and is prepared to submit the paper to a journal for peer review.

Discussion Prompts:

1. What do members of your group think of Max's approach to supporting early-career researchers (i.e., including all members of the lab as authors on all published papers)?

2. At your table, decide who should be included as authors (and in what order). How did you decide who should be an author (and in what order) on Amanda's paper?

Case Study Part 3

As part of getting ready to submit the paper for peer review, Amanda drafts the following author list and circulates it to the whole team:

- **Amanda Stone, Alex Manton, Sam Hunt, and Max Smith**

She receives three responses from the team. First, Max replies saying that he expects everyone in his lab to be included in the author list. Second, Alex replies thanking Amanda for not including everyone in the lab (or the team) as authors, which Alex believes will help them get the credit they deserve for their work. Third, one of the social science PIs who provided constructive criticism at the end of the writing process replies asking why they (and the rest of those who provided feedback) weren't included as authors, especially when they provided some of the data included in analyses.

Discussion Prompts:

1. How should Amanda respond? What sorts of potential conflicts and values did you consider in making this decision?

2. What advance steps could have been taken to prevent the emergence of conflicts as the manuscript was being prepared for publication by either Max or Amanda?

3. Template for Creating an Authorship Policy[2]

Authorship policy for: *Insert project name, team-name, or group of individuals who the policy will apply to. Insert names of all individuals who have contributed to drafting the policy.*

Update Date: *Insert date of most recent update to the policy*

Goals for the policy: *Describe the goals of the policy document. These could include a statement about providing general guidelines for a team or lab regarding authorship, providing a more specific authorship policy related to a particular team or lab product (e.g., manuscript, proposal), etc.*

Guiding principles of authorship:
This section should describe the principles or values that the group is trying uphold with the policy. There are many competing values that play into authorship and many factors to consider. Some examples might include: ensuring that only authors who have made significant intellectual contributions are included as authors (and what 'significant' might entail), open and transparent communication, professional development of early career team members, considering issues of power and status, and others.

General strategy for assigning authorship in multi-authors publications[3]:
Describe the general steps (numbered) that individuals on the project or in the group should take to initiate a manuscript; expectations regarding communication with the project or team (how, when); expectations about working together, expectations about approval of final manuscript; how authorship order will be assigned; conflict resolution steps; etc.

Steps to drafting an author contribution paragraph:
It is strongly recommended that an author-contribution paragraph is drafted for all manuscripts early in the writing process, that it is revised throughout the writing process, and that it is published as part of the manuscript.

Description of the type of manuscripts that the group/project is expected to produce and whether there are any special circumstances related to article type:
It is helpful to discuss the variety of article types that are likely in advance and how authorship practices may differ depending on the article type (and discipline). Examples include: disciplinary research articles (for each discipline in the group); commentary/essay articles; review papers; data papers; papers in which graduate students are the lead author and which the paper is part of their thesis/dissertation; etc...

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[2] Created by: Patricia A. Soranno and Kendra S. Cheruvelil (East Lansing, MI, June 2019). This template is based on the authorship policy developed from the project MSB: A macrosystems ecology framework for continental-scale prediction and understanding of lakes, 2016-2021. PI's: P.A. Soranno, K.S. Cheruvelil, C. Gries, E.M. Hanks, N.R. Lottig, E.M. Schliep, E.H. Stanley, P.-N. Tan, T.Wagner, J. Zhou.
https://lagoslakes.files.wordpress.com/2019/01/Cont-Limno-Policy-Authorship_DEC18.pdf
[3] This template is written with manuscripts or journal articles in mind. However, it may be helpful to use it for other scholarly efforts such as grant proposals.

Strategy for file-sharing, data-sharing, and code-sharing during and after the manuscript:
> *It is advisable to talk about how the coauthors will share files, data, and code during the writing process and at publication stage before the writing begins. This discussion might include where the files will be stored, how they will be named, versioning systems, final repository location, etc…*

Table that provides a list of possible author contributions for any manuscript:
> *It is recommended that you create a comprehensive list of the many ways that individuals can contribute to a manuscript. It is recommended that you include all possible contributions for as many different types of articles as you expect on your team. Contributions that you may want to consider include: (a) conception of idea; (b) outlining the manuscript; (c) data creation; compiling data; (d) writing code; (e) performing analyses; developing novel method; (f) critical results interpretation; (g) drafting figures and tables; (h) mentoring of a student; (i) procuring funds; etc. You may want to consult this website for further ideas: https://casrai.org/credit/ or look at an existing authorship policy.*

A statement that describes the degree of contributions from the above table that warrant authorship:
> *Although it is not always possible to decide who should be an author in advance, it should be decided whether a certain number of contributions or a level of importance of contributions are needed to warrant coauthorship.*

For further information, please also see "Strategies for effective collaborative manuscript development in interdisciplinary science teams" by Oliver et al. in *Ecosphere* (2018) https://doi.org/10.1002/ecs2.2206

4. Sample Authorship Policy[4]

Manuscript title: *[Insert title]*

Co-author list: *[Insert names]*

Author lead/co-leads: *[Insert names]*

Target journal(s):   *[Insert journal names]*

Manuscript type: Select from these options, or add other: *(A) Disciplinary research article, (B) Multidisciplinary article, (C) Essay or commentary, (D) Data/Database paper, (E) Graduate-student led article, (F) Other (please specify)*

MS management strategy: To the degree that you know, select from these options or add other: *(A) Lone Wolf; (B) Dynamic Duo; (C) Board of Directors; (D) Round Table; (E) Organized Chaos; (F) Other* ; see Table 1 in Oliver et al. (2018), https://doi.org/10.1002/ecs2.2206

This document is intended to foster an open dialog on authorship that starts at the very beginning phase of a manuscript and carries through until manuscript submission and acceptance. We ask that all co-authors describe their contributions in the table below as a way to clearly define each co-author's responsibilities and accomplishments throughout the effort. We ask that in the early phases, you consider what components of the research effort you would like to contribute to; then, in the middle of the effort, to revisit your contributions; and finally, at the time of manuscript submission, we ask all co-authors to assess the contributions that they did. Using this information, the author-contribution statement will be written and reviewed by all authors.

Instructions: Please add your initials in the cell next to the contribution. Please also add a short-description of the activity. As a starting point, we recommend that <u>co-authors participate in at least a single activity in 2 of the 4 major categories in the following table AND participate in a total of 3 activities combined</u>*; although, we expect there to be exceptions as well, some of which are identified below.

All authors are expected to perform a critical review of the manuscript at least once for intellectual context (i.e., not just spelling/grammatical edits, and not only comments that suggest revisions, but rather making the actual revisions).

ACTIVITIES	Author Contributions
Category 1: CONCEPT AND DESIGN	
a) Conceived of the MS idea/concept– individually or collectively, helped to frame the overall idea for the MS, research questions, or scope; drafted conceptual figures or tables	

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b) Designed/outlined the MS – individually or collectively helped to determine structure and content of the MS	
c) Supervised co-authors and MS progress – oversaw the MS progress	
d) Other -	
Category 2: DATA/ANALYSIS/MODELING *Note that papers led by graduate students may have fewer contributions from co-authors in this category because the students should have primary responsibility for these activities*	
e) Compiled or synthesized data	
f) Wrote code (or performed analysis) for an analysis or model for widely-used and cited methods – provided code for an analysis for a fairly standard model, requiring a relatively small amount of time & intellectual investment	
g) Developed code (or performed analysis) for a NOVEL analysis or model – developed code and novel method/analysis, requiring a large amount of time & intellectual investment. *For ecology paper, this contribution by a computer science/stats scholar is typically sufficient to be a co-author, regardless of other contributions (although we expect frequent participation in MS development)*	
h) Provided critical ecological interpretations related to either of the above analytical methods *For computer science/statistics paper, this contribution by an ecology scholar is typically sufficient to be a co-author, regardless of other contributions (although we expect frequent participation in MS development)*	
i) Interpreted results – individually or collectively helped to interpret meaning of results	
j) Drafted figures or tables	
k) Other -	
Category 3: WRITING	
l) Wrote sections of text - even if eventually these sections were not included in final version	
m) Other:	
Category 4: SUPERVISING and MENTORING	
o) Student or post-doc mentoring - Served as advisor/supervisor to the lead author of the manuscript throughout their career on the project and through the development of the manuscript effort. *Generally assumed to be a co-author, although we expect frequent participation in MS development and other contributions above.*	
Category 5: OTHER	
p) Other contributions not listed above (e.g., person has a light-bulb moment that completely changes scope/slant of project), please specify	

Additional Resources on Ethics & Authorship

Visit the *Online Ethics Center* for more helpful resources on bias and concerns about authorship practices, authorship policies, team culture, and authorship scenarios to facilitate team discussions: https://onlineethics.org/cases/case-study-ethics-team-power-dynamics-authorship-decisions.

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