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Scientific Production: An Exploration into Organization, Resource Allocation, and Funding

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INTERVIEW PROTOCOLS

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Principal Investigator Views

I. Research Goals and Organization

We are interested in your overall goals for research and how you organize your research.

1. *In a few words*, describe your major field of interest and the major research questions you are currently pursuing? For those who are tenured, ask how their research has changed before and after tenure.
2. Do you have a physical lab or labs? Is your research done largely alone or with a group of fellow researchers (who may be students or colleagues at large)? How large is this lab/research group in terms of number of researchers (including students and postdocs)? (This may or may not include collaborators outside the lab—a research group is composed of individuals who routinely interact on research topics).
3. If lab: Do you have an individual whose duties include managing the lab? If so, have they undergone formal training for that role?
4. How important are each of the following (1=not important, 5=extremely important) factors in determining the size of your lab (research group).
    a. Nature of the research topic:
    b. Funding:
    c. PI time:
    d. My university's space allocation (approx. square footage of your space):
    e. Other (specify)
5. Which of the factors in #4 is the most important?
6. What do you optimize for in managing your lab? That is, what are your goals? (scale of 1-5, 1=not important, 5 = extremely important)
    a. Maximizing my publications and scientific reputation
    b. Having the best students and staff
    c. Launching new careers for students
    d. Creating new knowledge
    e. Other (let them talk)
7. Of your research budget in a year, what portion is for:
    a. Equipment (purchase, rental, and or maintenance)
    b. Materials
    c. Students
    d. Postdocs
    e. Technical staff
    f. Other (specify)

II. Research Topics

We are interested in how you choose research topics; how many topics you pursue simultaneously, and the relationship of the topics you pursue. Think about some recent research projects that you think are representative of your research.

For an identified project:

1. Give a brief description of the major research question.
2. At the beginning of the project how did you rate the project (on a scale of 1 to 5, 5 is extremely important) in terms of
    a. Spawning dissertation topics for students
    b. Likelihood of success (i.e., resulting in a publishable paper)
    c. One of the more challenging problems in my field
    d. Likely publishable in a top journal
    e. To have commercial potential
    f. Solving a "real world" problem
    g. Easy to obtain funding
    h. Costs of materials and/or equipment
3. On a scale of 1-5 (5 is extremely important) how important were each item in part 2 in the decision to start the research?
4. Is the project still ongoing? If not why?
    a. The question was answered and published
    b. Experiments failed
    c. Funding dried up
    d. Someone else solved it first
    e. Other (specify)

III. Evaluation

1. How do you evaluate the research output of your lab or research group?
2. For published work, how important are citations and the journal "ranking" in aiding your evaluation?
3. Does your lab evaluation process involve clear milestones for dropping a project?
4. To your knowledge, are your evaluation methods typical for your field?

IV. Competition

1. On a scale of 1-5 (5 is extremely competitive) how competitive is your field? (including competition for space in journals, students, postdocs, funding)
2. Has competition changed over time? If so in what ways and why?
3. Would more or less competition be better for the progress of the research area? Explain.
4. What determines the level of competition (e.g., journal policies, funding priorities and policies, number of PhDs awarded)?

V. Knowledge and Information Sharing

1. How are knowledge and information shared within your lab (e.g., weekly meetings, informal discussion)?
2. To what extent do you share information outside the lab prior to publication?
3. If you share outside how important is it for
    a. Feedback
    b. Establishing your position on the research
    c. Getting others interested in working on the problem
    d. To avoid being scooped
    e. Other (specify)
4. To what extent to you think your answers are typical of others in your field?
5. How important are the following for disseminating results from your lab?
    a. Journal publication
    b. Preprints –depends. When we have an accepted paper, we submit it as a preprint which a lot of people read. It's only important in that it gives more lead-time
    c. Conference
    d. Juried conference proceeding
    e. Other (specify)
6. How does competition shape information sharing?
7. How does commercial orientation of your topic shape sharing?

VI. Ethics and Norms

1. Rate how strongly you agree or disagree with the following statements (scale of 1-5 with 1 = strongly disagree and 5 = strongly agree).
    a. Open exchange of information, materials, data, etc. is usually practiced among researchers in my field.
    b. Researchers provide valuable feedback to other (and possible competing) researchers.
    c. The first to come up with results is highly esteemed among.
    d. Researchers often use ideas and results of others without acknowledgement.
    e. Researchers often falsify data and/or results.
    f. Researchers often take false credit (e.g., taking credit for a student's work).
2. How important are each of these to progress in **your field** (1-5, 1= not important and 5=extremely important)?
3. Have ethics and norms changed over time? If so, how and why?
4. How are ethics and norms formed in your field? E.g. how are students made aware of these norms?

VII. Collaborative Patterns

1. How common is it for you to collaborate with researchers outside of your lab or research group?
2. If it is common,
    a. What is the major motivation (complementary materials, skills, etc.)
    b. How do you choose and/or find collaborators? If not common, why?

VIII. Funding

Now consider a situation in which your research budget can be doubled with no constraints on use (that is, this money is not in response to a specified research proposal), and that this doubling is expected to last for at least the next 5 years. How would you respond?

1. Would you continue your current research both in terms of direction and level? Would you refuse a doubled level of funding and prefer to stay your current size?
2. If you were to accept some or all of the increased fund, would the ratio of research labor, capital and space inputs change? If so, how? Would you use different types of inputs? If so, what changes would you make?
3. Would you introduce a new research stream?
4. Would you be able to obtain necessary research space?
5. Would your collaborative patterns change?
6. Would the organization of your research group change (e.g., would you hire additional lab/research directors under your direction)?
7. Would you consider using some or all of the additional monies to make a grant to another research group (that is, would some of the funds be under the direction of a different research group)?
8. [How much of your equipment is shared?]

Deep Dive Interview Protocol

Demographics:

1. How long have you been at this current institution? (Year in grad school)

I. Organization and Collaborative Patterns

1. *In a few words*, describe your major field of interest and the major research questions you are currently pursuing?
    a. How did you come to work on this? Are they research questions you thought of or were they brought to you by a PI?
    b. How open is your advisor to allowing you to pursue your own research agenda?
2. How did you pick the lab you work in now?
    a. What was appealing about this place?
    b. Did you apply elsewhere?
3. Now I am going to ask you about your research group, where a research group is composed of individuals who routinely interact on research topics:
    a. Do you work in a physical lab or labs? **YES/NO**
        i. If lab: *Who manages the lab?* Have they undergone formal training for that role?
    b. Do you work with other people or alone? **YES/NO**

If 3b) was answered with YES:

    i. How did that collaboration come about? Was it assigned, or did you seek it out?
    ii. What kinds of tasks do you usually work on with other people?
    iii. Are you assigned the work or do you lead it yourself?

    c. How large is your research group?
    d. Do you work with a different lab? [At this university and/or not at this university, on or off campus? This may or may not include collaborators outside the lab.] **YES/NO**

If 3d) was answered with yes:

    iv. How common is it for you to collaborate with researchers or students outside of your lab or research group?
        i. What kinds of projects motivate those collaborations?
        ii. Are they any different from work you would do with lab members?

IA. Physical Workspace

1. Please describe the space and layout of where you work?
    a. How big is the space? What's in it? Is it sufficient for your research?
    b. How many people do you share it with?
    c. Who do you work with that doesn't use this space?
    d. Are there tasks that you usually work on elsewhere?
    e. Do you work remotely? When and where do you work remotely?
2. What sorts of changes would you like to see in the workspace you have?

II. Research Goals

1. What are your major goals as a researcher and as a student? (What do you hope to accomplish?)
2. Do you think your goals and priorities align with your advisor/PI's? **YES/NO**
3. Can you tell me how important the following things are to you? (scale of 1-5, 1=not important, 5 = extremely important)
   i. Maximizing my publications

not important				Extremely important
1	2	3	4	5

   ii. Establishing a scientific reputation

not important				Extremely important
1	2	3	4	5

   iii. Working with the best faculty and staff

not important				Extremely important
1	2	3	4	5

   iv. Building a successful career

not important				Extremely important
1	2	3	4	5

   v. Creating new knowledge.

not important				Extremely important
1	2	3	4	5

   vi. Other (let them talk)

III. Research Topics

Think about a recent research project that you think is representative of your research. For an identified project:

1. Give a brief description of the major research question.
2. Did you choose this project or was it assigned to you? [motivation for the project, idea generation/source]
3. On a scale of 1 to 5 (5 is extremely important), why did you pursue this project?
   i. The likelihood of success (i.e., resulting in a publishable paper)

not important				Extremely important
1	2	3	4	5

   ii. It is one of the more challenging problems in my field

not important				Extremely important
1	2	3	4	5

   iii. The project has commercial potential.

not important				Extremely important
1	2	3	4	5

   iv. The project solves a "real world" problem

not important				Extremely important
1	2	3	4	5

   v. There was funding

not important				Extremely important
1	2	3	4	5

4. Is the project still ongoing? If not why?
   1. The question was answered and published
   2. Experiments failed
   3. Funding dried up
   4. Someone else solved it first
   5. Other (specify)
5. For PhD students: Once you graduate, can you continue working on this line of research/projects that has (have) yet to be completed?
6. How many other projects are you working on right now? How do they fit with each other?

IV. Evaluation

1. What are your career goals? Where do you see yourself upon graduation? / Next 5 years?
2. What do you think potential employers look for to judge you as a candidate?
3. How do you know when you are doing well? What kind of feedback do you get? Who gives it to you?

V. Competition

1. How competitive do you think your field is (On a scale of 1-5 (5 is extremely competitive))?

not competitive				Extremely competitive
1	2	3	4	5

2. What determines the level of competition (e.g., journal policies, funding priorities and policies, number of PhDs awarded, availability of jobs)?

VI. Knowledge and Information Sharing

1. How are knowledge and information shared within your lab (e.g., weekly meetings, informal discussion)?
    a. If you could change this at all, would you? How?
2. To what extent do you share information outside the lab prior to publication?

a. If you share outside how important is it for

1. Feedback

not important				Extremely important
1	2	3	4	5

2. Establishing your position on the research

not important				Extremely important
1	2	3	4	5

3. Getting others interested in working on the problem

not important				Extremely important
1	2	3	4	5

4. To avoid being scooped

not important				Extremely important
1	2	3	4	5

5. Other (specify)

3. What kinds of things do you share with people outside your lab? (e.g., paper drafts, data, code, materials, samples, etc.)
    a. Why do you share those things? (What is the benefit, or incentive for sharing?)
    b. Are you told to share these things or are you motivated to for other reasons?

4. How important are the following for disseminating results from your lab?
    a. Journal publication

not important				Extremely important
1	2	3	**4**	5

    b. Preprints

not important				Extremely important
1	2	3	4	5

    c. Conference

not important				Extremely important
1	2	3	4	**5**

    d. Juried conference proceeding

not important				Extremely important
1	2	3	4	**5**

    e. Other (specify)_____

5. How does commercial orientation of your topic shape sharing (*where commercial is defined as involvement with industry and/or the production of patents, shape sharing*)?

VII. Ethics and Norms

1. Rate how strongly you agree or disagree with the following statements (scale of 1-5 with 1 = strongly disagree and 5 = strongly agree).
   a. Open exchange of information, materials, data, etc. is usually practiced among researchers in my field.

Strongly disagree				Strongly agree
1	2	3	4	5

   b. Researchers provide valuable feedback to other (and possible competing) researchers.

Strongly disagree				Strongly agree
1	2	3	4	5

   c. The first to come up with results is highly esteemed among peers.

Strongly disagree				Strongly agree
1	2	3	4	5

   d. Researchers often use ideas and results of others without acknowledgement.

Strongly disagree				Strongly agree
1	2	3	4	5

   e. Researchers often falsify data and/or results.

Strongly disagree				Strongly agree
1	2	3	4	5

   f. Researchers often take false credit (e.g., taking credit for a student's work)

Strongly disagree				Strongly agree
1	2	3	4	5

   g. Other (specify)

2. How do you learn about ethics and norms of conducting research in your field?

Speculative / miscellaneous:

1. If you could change something about the lab (management, space, collaborations, technology) what would you change?

Research Group and Funding Interview Protocol

We are interested in how you organize and define your research group. Second, we're interested in your allocation of effort, given the funding situation. The purpose of this questionnaire is to better understand the relationship between the organization of research and the current funding situation, such as time-money tradeoff in scarce and abundant funding environments.

I. **Research Group Organization**

1. Is your research done largely alone or with others? Please describe your current research group of groups.
    a. What is the structure of your research group—e.g. hierarchical, horizontal, core-periphery—and what are the roles of persons in your research group?
    b. How large is this lab/research group in terms of number of researchers (including students and post docs)? (Does your research group include collaborators outside the lab?)

2. How many research groups would you consider yourself part of, currently? If multiple research groups:
    a. How do you allocate time and effort to each group? Equally, etc.
    b. How do the groups fit together, if at all?
    c. How many groups is too many to be part of? Too few?
    d. How long have you been in each current group? How did you come to be part of the group(s)?
    e. How frequently does your research group change?
        i. Describe the reasons for changing.
3. Would you say your current research group the same as your current lab?
    a. Is your research group corresponding with recent co-authors on outputs like papers, grants, patents, data, etc.?
    b. A research group is composed of individuals who routinely interact on related research topics or streams and consider their being part of the group as providing mutual benefits. A research group may be composed of individuals over whom you have supervisory control and-or peers.
    c. Do you consider _____ part of your research group:
        i. lab manager
        ii. computer programmer
        iii. sequencing facilities
        iv. undergraduates
        v. clinical data-providers
        vi. visiting scholar
        vii. competitor
        viii. co-author
        ix. co-PI
        x. colleague you only see at conferences
        xi. faculty in your lab whom you've never co-authored with.
        xii. Person who email with
        xiii. Facebook friend from grad school
        xiv. Dissertation advisor

II. Effort Allocation

		Techniques (t); methods	
		Familiar to PI	New to PI
Phenomenon (p); topics, domain areas, research streams	Familiar to PI	*E.g. Bread-and-butter, Early doc students*	*E.g. Hire a postdoc*
	New to PI	*E.g. Analyze data for an external group*	*E.g. Multidisciplinary collaborative grant*

Familiar (phenomenon) x Familiar (technique): _____%
Examples: _____

Familiar (p) x New (t): _____%
Examples: _____

New (p) x Familiar (t): _____%
Examples: _____

New x New: _____%
Examples: _____

Other: _____%
Examples: _____

1. How much time do you currently spend on:
   a. Administrative
   b. Classroom /teaching
   c. Doing research yourself
   d. Working with, training, supervising students in research lab
   e. Service
   f. Other

2. How does this allocation of time relate to collaboration?

Imagine funding went up by 50%: how would you allocate across these 4 quadrants? (2x2)
Familiar (phenomenon) x Familiar (technique): _____%
Examples: _____

Familiar (p) x New (t): _____%
Examples: _____

New (p) x Familiar (t): _____%
Examples: _____

New x New: _____%
Examples: _____

Other: _____%
Examples: _____

1. How much time *would* you spend on:
   a. Administrative
   b. Classroom / teaching
   c. Doing research yourself
   d. Working with, training, supervising students in research lab
   e. Service
   f. Other

2. How does this allocation of time relate to collaboration?

Imagine funding was reduced by 50%: how would you allocate across these 4 quadrants? (2x2)
Familiar (phenomenon) x Familiar (technique): _____%
Examples: _____

Familiar (p) x New (t): _____%
Examples: _____

New (p) x Familiar (t): _____%
Examples: _____

New x New: _____%
Examples: _____

Other: _____%
Examples: _____

1. How much time *would* you spend on:
   a. Administrative
   b. Classroom / teaching
   c. Doing research yourself
   d. Working with, training, supervising students in research lab
   e. Service
   f. Other

2. How does this allocation of time relate to collaboration?