

The Critical Discussion Group: Fostering Personal and Scientific Growth

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As scientists, we greatly benefit from discussing our work with our peers. Informal, unstructured interactions often yield highly creative feedback. With this in mind, we created a group that fosters discussion of its members' work. The group engages us in new research fields and ways of thinking, and provides us with an opportunity for co-mentoring. Three key components were essential for making this group work: the emphasis on non-hierarchical debate; the diversity of the group members; and the mutual respect existing among the participants.

Scientific progress depends strongly on discussing our work, but not all forms of discussion are equal. When looking back on conversations that had a particular impact on our research, we noticed that they often occurred in an unstructured context, rather than following a polished seminar or a conference poster session. Many times they started in the hallway, or during a coffee break. They often involved colleagues and friends from diverse areas of biology, and not just people closely related to our area of research. Informal conversations such as these were insightful, critical, and relaxed. The boundary between speaker and audience was not always defined, with both parties contributing and learning from the other.

These conversations contrast with the ones we typically associate with scientific discourse in several respects. Seminars, for example, provide a good opportunity to share our findings with a wider audience, or to learn about recent work by others (Figure 1A). Typically, in these occasions we aim to tell a complete story. We welcome feedback incremental to our work, but rarely have to face comments that could lead us to reframe the way we think about it. And, as an audience expecting a complete story, our attitude shifts to one of judging another's work, rather than engaging with it.

We also discuss our scientific work at lab group meetings, where critical suggestions are encouraged (Figure 1B). Yet, in this case too, the hierarchy of the lab can affect the tone of the discussion.

Lab members might worry about embarrassing their colleagues if they present too many challenges to the presenter's methods. Moreover, as our lab mates often share similar skills to us, they are less likely to provide a very different perspective to our work.

There is a certain irony in this culture of organized scientific discussion: while creative and willing colleagues surround us, we have few opportunities to invite them to engage in our work until a late stage in our project. Our personal experience of feedback is that we are most receptive to it at early stages of a scientific project (Figure 2). Yet, we often hesitate to share our work with others before we feel it is mature enough. Most of us strive to present impeccable results, and to deliver a well-rounded story to our fellow scientists. Then, by the time our work reaches an advanced stage, it may be too late to pursue extensive feedback. Practically speaking, time and financial constraints may limit our ability to act upon criticism (Figure 2). Our investment in the work can also lead to an emotional commitment to our ideas, rendering us less receptive to comments that may challenge them.

What environment, then, can generate feedback through critical and creative group discussion? Formal and semi-formal presentations seem to establish a sense of hierarchy, with the speaker delivering knowledge, and the audience absorbing and subsequently gauging this knowledge. In our opinion it is this hierarchy, whether real or perceived, that

restricts the nature of the interactions. Non-hierarchical discussions, such as those that begin informally with people we feel at ease with, seem to allow for more relaxed group dynamics. Here, the roles of speaker and audience are flexible; the "original" speaker can switch roles to become the audience. All parties contribute ideas, or through discussion, modulate the ideas of others. The end of the conversation is not predetermined.

In an attempt to recreate the creativity and engagement that characterize these spontaneous discussions, we formed the Critical Discussion Group (CDG).

The Critical Discussion Group

We sought out people with a common style of scientific interaction, and formed a group of eight people. Members are all postdocs, working in different labs, and focusing on diverse areas of biological research including developmental and stem cell biology, systems biology, molecular and structural biology. In any given meeting there are people with backgrounds in biology, chemistry and physics.

We meet once a week for ninety minutes. The group sits around a table facing each other, rather than in rows facing the presenter. We feel this promotes a discussion that is not bipartite, involving only the speaker and an interlocutor, but rather has multiple foci. Coffee and cakes contribute to the relaxed atmosphere.

Despite the informal surroundings, there is a structured presentation scheme,

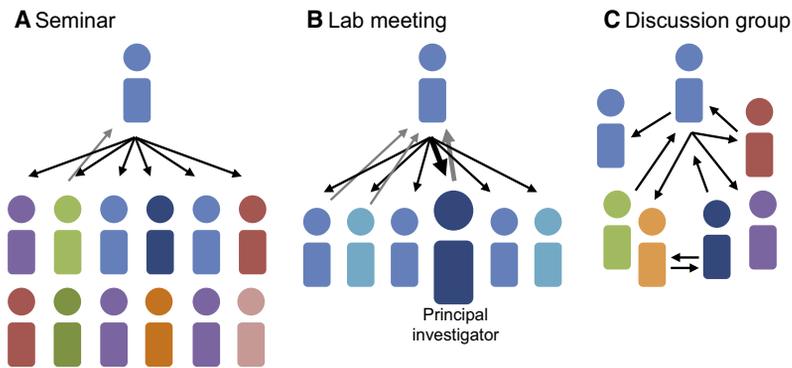


Figure 1. Hierarchy and diversity of inputs in scientific discussions

Shown are cartoons of presenter-audience interaction in three different environments. Colors indicate diversity of scientific fields. (A) Seminar interactions are hierarchical with mainly unidirectional input from the speaker, while (B) lab group meetings show more interactions yet discussions are often bipolar, focusing on feedback from the principal investigator. (C) The critical discussion group facilitates multi-polar, non-hierarchical, discussions between colleagues from diverse fields.

where every week one person presents his/her work, opening it up for discussion. The presentation schedule is not fixed: at the end of each meeting, the stage for the following week is given to any member in need of discussing some aspect of their work. This gives the presenter time to think about the issues to be raised, and to decide which aspects of her/his work the group should concentrate on.

The main focus of the meeting is to provide thorough and unbiased attention to a particular aspect of the presenter's research, with the intention of strengthening and advancing it. Through this, the group engages in a discussion that benefits the audience as well. After a brief introduction, the discussion typically narrows down to a question that can range from the technical to the conceptual. Sometimes we discuss a broad issue such as the relevance of the scientific question being investigated, or whether the hypotheses addressed are well posed and testable. On other occasions, the discussion can also deal with more particular aspects, such as whether the experimental approach is likely to challenge the hypothesis, or whether the experiments are properly controlled.

Over time, we came to realize that the structure of the discussion group presentation does not have to be rigid. In sharp contrast to seminars or group meetings, there is no need to stick to the original presentation plan, or to round up a full story by the end of the session. If required, the same presenter can continue their

presentation on successive weeks, so as to receive more comprehensive feedback. In such cases, the first presentation becomes an introduction to the subject discussed, providing the elements necessary for relevant feedback in future meetings.

The benefits of a critical discussion group

Being able to openly discuss any matter with an audience of fellow scientists may sound better in theory than in practice. Establishing a group for critical discussion might merely add yet another seminar series to an already busy schedule, with little actual benefit to ongoing research. The success of the group can be undermined if the speakers find it difficult to accept feedback, and become defensive when they are challenged or questioned. The group also requires a motivated audience that feels it has something to learn.

However, our CDG has been meeting regularly for more than a year now, and we feel it has been a successful initiative on many levels.

As presenters, the feedback we have received has improved and strengthened our work. We are constantly exposed to new experimental and analytical tools, and more than once we have received pragmatic solutions to project-specific issues. Presenting to a diverse group of scientists has also provided fresh perspectives in the way we ourselves think about our project. The need to describe our work to people coming from different

disciplines forces us to think about it more carefully, to refine and sharpen our research questions, and to regard our experimental approach in a different light.

As an audience, we find this interaction to be equally stimulating – and fun. There is evident value in being exposed to novel ideas and approaches, far removed from our daily scientific work. As postdocs, most of us remain focused on just one or two projects. We feel that the opportunity to deal with a wide range of scientific questions has increased our confidence and our ability to think critically on a variety of subjects. It has also increased our awareness of available tools, generating a range of possible future directions and perhaps scientific collaborations. And, in contrast to regular seminars and lab meetings, the group generates far more questions and broader discussion. There is a feeling of satisfaction in contributing to another project, and a pleasure in the scientific debate. Participating in these discussions has also provided us with an opportunity to practice delivering and receiving feedback.

Finally, regularly sharing our work with our peers has generated a context where co-mentorship is possible: we discuss not only our current scientific problems, but also where to take our projects next. Also, we exchange ideas and advice on issues peripheral to research, which are common to all scientists undergoing a given stage in their careers.

What makes the CDG work?

We identified several guidelines that, we believe, should promote the environment of open feedback and effective debate of our CDG. Although these guidelines may be particular to the character of our group, they might nevertheless prove helpful for others who wish to form similar groups.

1. *Identify and include members who share values of mutual respect and style of discourse.* The group discussion requires a culture where there is room for all to express their ideas, and to criticize the ideas of others. No one should feel offended by another's questions or comments. Conversely, being part the group requires some commitment to active engagement and participation.

2. *Participants should feel confident about sharing work in progress with the rest of the group.* It may therefore be preferable to construct a group from individuals working in non-overlapping fields. This has the added value of providing a wider range of perspectives.
3. *Group size should enable active participation of every member.* For us, eight to ten members constitute an optimal size. This group is small enough for all to participate yet large enough to provide a wide scope of inputs.
4. *The CDG is confidential.* As work is presented at a very early stage, it is strictly agreed that ideas will not be discussed with others without the agreement of the presenter.
5. *The speakers should predominantly present work that is in progress.* The idea is to have one's work challenged and to engage in problem solving, not just to be educated by the speaker. Speakers have to be prepared to have their work scrutinized and dissected, with the aim of making it stronger. In fact, in the few cases when speakers have presented published work, we found the discussion quickly become bipolar (speaker versus audience) and provided few opportunities for feedback.
6. *It is the work, and not the speaker, that is evaluated.* When this assumption is in place, no one feels threatened or in need to impress.

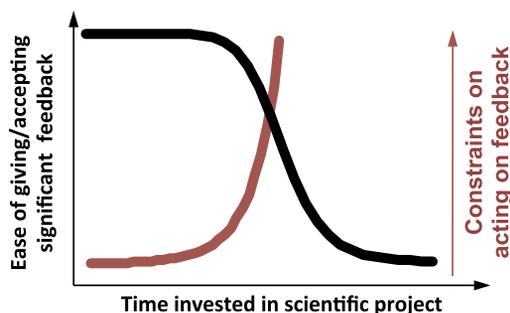


Figure 2. Modulating a project through feedback becomes more difficult over the lifetime of a scientific project

Our personal experience of responding to feedback is shown schematically. We are most receptive to feedback at early stages of a scientific project, and most likely to modulate another's work during these stages. The effectiveness of feedback, as measured by our ability to act upon it, decreases as we progress in our project.

This also sets the stage for acceptance of potentially difficult questions and criticism, which are intended to help rather than to undermine.

7. *Group meetings should occur regularly.* Although the group discussion is relaxed, the meeting logistics are taken seriously. The group meets every week during term time. To keep the group running, it is recommended that one of the participants will be responsible for its coordination.

These guidelines impart the group with a character that makes it complement and not overlap with other discussion and presentation formats (Figure 1). Here the audience is composed of people working on diverse areas of biology, and their daily work is rarely related to

the work being presented. By being 'outsiders', the listeners are not influenced or restricted in any way by the paradigms and biases intrinsic to their field. Participation is voluntary and there are no hierarchical differences among the members of the group. This creates a more open environment for discussion, which feels completely different to what takes place in other environments: rather than communication being largely unidirectional (Figures 1A,B), the interactions are distributed among the group, leading the conversation in unexpected directions (Figure 1C).

The CDG has provided us with an environment where we constantly hear new ideas, and where our own ideas can be challenged and often improved. It is a place where we are invited to engage deeply in the work of others. Where through co-mentoring with our peers, we can shape and strengthen our scientific identity. For many of us, the love of thinking about biology is what motivated us to become scientists. To be able to do this "just for fun" has been a privilege and a real source of enjoyment.

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