Cooperative Institute for Research in Environmental Sciences
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Team Science Team Dynamics Toolkit

A comparative guide to scientific culture, decision levels, groupthink and decision gradients

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Effective scientific collaboration depends on far more than technical expertise or shared goals. Team dynamics shape whether teams learn, innovate, and sustain productive working relationships over time. This quick toolkit synthesizes four core dimensions of team dynamics that commonly affect scientific teams: scientific culture, decision levels, groupthink, and gradients of agreement. Together, these concepts provide a practical framework for diagnosing collaboration challenges and designing healthier team practices. Read through our other individual explainers on these different team dynamics to learn more.

❖ Scientific Culture Sets the Default Rules

Most science teams operate within a shared scientific culture shaped by disciplinary norms, academic training, and institutional incentives. This culture often emphasizes hierarchy, individual achievement, and productivity measured through outputs such as publications and grants (Merton, 1973; NASEM, 2015). As a result, teams frequently default to vertical structures of authority, where power and decision-making are concentrated among senior members.

While these norms can create clarity and efficiency, they also tend to disproportionately benefit senior scientists and disadvantage junior members, staff, and trainees. Horizontal collaboration, where influence, voice, and ownership are shared, is often difficult to achieve without intentional effort. When teams fail to reflect on their scientific culture, they may unintentionally reproduce power imbalances, silence dissent, or misinterpret structural constraints as interpersonal problems (Bozeman & Boardman, 2014).

These dynamics are further complicated in interdisciplinary, international, or cross-sector teams, where assumptions about hierarchy, communication, and collaboration may differ. Without explicit discussion, differences in training or cultural norms can generate friction and misunderstanding rather than productive diversity.

Key takeaway: Scientific culture provides a powerful default that does not necessarily produce a neutral and cohesive set of values, norms nor behaviors. Teams must intentionally reflect on how culture shapes power, participation, and collaboration.

❖ Decision Levels Clarify Power and Prevent Mistrust

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One of the most common sources of tension in teams is confusion about who has decision-making authority. Team members often assume that participation in discussion implies shared power, while leaders may view the same discussion as consultative only. When expectations are misaligned, trust can erode (Edmondson, 2018).

Clarifying decision levels helps align participation with actual authority. These commonly include four tiers from least to most empowered:

1. Directive: Leaders decide; the team complies.
2. Consultative: Leaders decide after seeking input.
3. Participatory: Teams propose plans requiring approval by leaders.
4. Delegated: Teams (or sub-teams) decide and act autonomously.

Problems arise not because a particular level is "wrong," but because the level is unstated or inappropriate for the task. Teams that rely on implicit power structures often lean on assumptions embedded in scientific culture, rather than making authority explicit. As a result, team decisions may automatically default to directive decisions. Importantly, moving to higher decision levels is not always necessary. What matters is clarity. Explicitly naming decision levels can help teams reduce potential interpersonal resentment, support group psychological safety, and ensure that engagement is meaningful rather than performative.

Key takeaway: Mistrust grows when power is assumed rather than discussed. Naming decision levels within a team can help align expectations and strengthen collaboration.

❖ Groupthink Silences Ideas and Weakens Science

Even when decision levels are clear, teams may struggle with groupthink or a dynamic where individuals withhold ideas, opinions, concerns, or dissenting views to avoid conflict or personal risk (Janis, 1982). In scientific teams, groupthink often shows up as premature consensus, deference to authority, or silence in response to dominant opinions.

Groupthink is especially likely when:

1. Hierarchical or authoritarian leadership styles are present
2. Feedback channels are unclear or unsafe
3. Team members feel insecure or expendable
4. Past dissent has been punished or ignored
5. There is unresolved interpersonal conflict

In these environments, silence is often mistaken for agreement. Over time, this reduces creativity, weakens critical evaluation, and undermines the scientific process itself (Edmondson, 2018). Addressing groupthink requires more than encouraging people to "speak up." Teams must design and use structures that reduce social risk and separate ideas from status. Techniques such as small-group discussions, silent brainstorming, pros-and-cons lists, and best/worst-case analyses can help

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surface diverse perspectives without forcing a potential group confrontation.

Key takeaway: Groupthink is a structural problem in teams, and is not due to individual flaws of team members. To overcome groupthink, teams must intentionally design for dissent and psychological safety. Teams should never assume that their group is not prey to groupthink.

❖ Gradients of Agreement Help Teams Move Forward

A often overlooked barrier to effective teamwork is the assumption that full agreement is required before action can occur. When teams believe everyone must be 100% aligned, even minor concerns can stall progress and create unnecessary gridlock (Kaner et al., 2014).

In reality, agreement exists along a gradient or spectrum. Tools such as agreement scales (i.e., "loathe it–love it", "endorse-veto", etc.) originally comes from the work Sam Kaner, Duane Berger and the staff of *Community At Work* in the 1980s. This type of scale, regardless of which version used, helps teams distinguish between strong opposition, manageable reservations, and sufficient alignment.

A common five-point gradient includes 5 categories representing the following positions:

1. Totally opposed
2. Serious reservations
3. Some reservations
4. Can live with it
5. Full agreement

For many decisions, the goal is reaching a point where most team members are at Level 4 or able to support the decision even if it is not their preferred option. This represents intentional commitment to the group decision and not personal resignation or passive compliance (e.g., "agree to disagree"). Using agreement gradients helps teams avoid false consensus, acknowledge concerns transparently, and move forward while documenting risks or uncertainties that may need revisiting.

Key takeaway: Productive collaboration does not require perfect harmony but clarity, honesty, and shared commitment that a agreement gradient scale can help facilitate.

In Summary

These four dimensions are deeply interconnected. Addressing team dynamics requires intentional reflection across all four areas. The consequences of teams making assumptions across scientific culture, decision authority, groupthink and agreement can freeze team progress. Teams that engage these ares explicitly are better positioned to collaborate effectively, equitably, and sustainably, especially in complex scientific and interdisciplinary settings.

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Notes

You can learn more about *Community At Work*, by visiting their website at https://communityatwork.com/

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