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Rules of Scientific Collaboration: Distance

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The Importance of Distance for Scientific Collaboration

We have known for decades that the amount of physical distance between collaborators shapes their propensity for interaction and the quality of those interactions. This finding was famously expressed in "the Allen Curve," discovered in the late 1970s by MIT professor Thomas J. Allen. Allen found that the distance between engineers' offices had a strong negative correlation with frequency of their communication, particularly after a critical threshold of 50 meters, after which communication became almost nonexistent. Allen later showed that this effect still holds in the internet era, with frequency of electronic communication also reducing with increased physical distance between collaborators (Allen & Henn 2007).

The Challenge of Distance

Research since Allen's original formulation has confirmed that distance imposes key challenges to collaboration that are difficult to overcome (see Olson & Olson 2000; Olson et al. 2008). This is because distance makes task coordination more difficult, because the use of electronic proxies for face-to-face communication such as Zoom leads to fatigue and mixed-messages, and because it is more difficult to nurture the kinds of rich interpersonal relationships that enable the psychological safety and trust that facilitate scientific productivity and creativity.

For example, a recent study based on data from 20 million research articles concluded that across all fields, periods, and team sizes, teams that work remotely are less likely to make breakthrough discoveries, and that despite striking improvements in digital technologies, remote teams are less likely to integrate their group members' knowledge into new, disruptive ideas (Lin et al., 2023).

Addressing Distance

Though face-to-face collaboration is almost always more effective, there are ways to help mitigate the negative effects of distance.

Face to face meetings

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If possible, ensure that the group's first meeting is face-to-face to help establish familiarity and rapport and set up a firm social foundation for collaboration at a distance. This tactic can also help collaborators discuss expectations regarding their roles, to foster trust, respect, and intrinsic motivation, and to develop conflict management strategies.

One can also design punctuated forms of collaboration in which the group engages in shorter periods of intense face-to-face collaboration interspersed with longer periods of working at a distance, allowing for group bonding, developing a shared vision and language, and enjoying the benefits of the efficient communication that comes with co-presence to establish a firm foundation between longer sessions of remote work. This method has proven effective, for example, in the National Science Foundation's suite of national environmental synthesis centers.

Hub-and-spoke model

Another method for managing distance is to develop a hub-and-spoke model in which co-located subgroups work together and are linked by individuals who work across them and foster communication among these groups.

Leader solicitation

It is also important when working at a distance that group leaders solicit contributions from all group members to ensure that the full diversity of opinions and experience is shared within the group, and so that those working remotely feel respected and included.

Finally, if collaboration must occur at a distance, it is important to purposely design virtual group activities that allow members to develop a shared understanding, shared vision, and shared language.

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