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BY ETHAN BERNSTEIN, JESSE SHORE, AND DAVID LAZER

Count-offs at the beginning of musical performances, whether verbal (“One, two...”) or symbolic (with a baton or a snap), are a fixture of live collaboration for musicians. Conductors use them to establish tempo and feel, and to provide guidance on how to interpret the written rhythms — the patterns of sound and silence — that the ensemble is about to play.

Similarly, in the workplace, leaders help set the beat for their organizations’ and teams’ collaborative efforts. For at least a century, they have done this largely by planning working-group meetings, huddles, one-on-ones, milestone reports, steering committee readouts, end-of-shift handoffs, and so on. Through 30-, 60-, and 90-minute calendar meetings scheduled weeks in advance to prevent

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RESEARCH

In one experiment, the authors randomly assigned 51 groups of 16 people into four different network structures and asked them to solve a complex whodunit task, all using collaborative technology but with varying levels of connectivity.

In a second experiment, they randomly assigned 514 sets of three subjects to one of three levels of collaborative interaction (none, intermittent, or constant) and asked the group to solve the classic *traveling salesperson problem*, which is a complex optimization task.

They also reviewed the literature on information sharing in social networks, collective intelligence, brainstorming, and group and team problem-solving.

conflicts and at odd times to accommodate global team members, they have established the patterns of active interaction (“sound”) and individual work (“silence”) that form the rhythms of their employees’ collaboration.

But such rhythms have gotten much more complex and less controlled in recent years. Organizations now have a treasure chest of digital tools for collaboration — Slack, Teams/Skype, Chatter, Yammer, Jive, Zoom, Webex, Klaxoon — that they didn’t have before. (The global collaboration software market was \$8 billion in 2018 and is projected to double to \$16 billion by 2025.¹) Add to that email, texting, and messaging, along with the meetings that haven’t gone away, and the math is telling: Research shows that executives spend an average of nearly 23 hours per week in meetings (up from less than 10 hours 50 years ago),² while McKinsey estimates the average knowledge worker spends 65% of the workday collaborating and communicating with others (including 28% of the day on email).³ So collaboration has gone omnichannel. You can see why orchestrating all of this has become such a challenge.

Indeed, given how hyperconnected most people are now at work, one might question whether they even have a rhythm of collaboration, not because they lack sufficient interaction (sound) but because they lack any absence of it (silence). That observation prompted us, as researchers, to ask: *Should* organizations have a rhythm of collaboration that alternates on and off, or is more simply better, as people tend to assume?

Our findings suggest that alternation is essential for work that involves problem-solving. As collaborative tools make interaction cheaper and more abundant, opportunities to think *without* interaction are becoming more expensive and scarce, yet they remain critical. In fact, our research shows that when people trade a rhythm of on-and-off collaboration for always-on connectivity, they coordinate and gather information more effectively, but they produce less innovative, less productive solutions.

That’s troubling, given current trends in the workplace. By achieving more and more connectivity, humans are becoming a bit like passive nodes in a machine network: They are getting better at processing information but worse at making decisions from it. In other words, we’ve designed organizational

communication to make it harder, not easier, for human beings to do what we’re being told we need to do in the next decade or two — that is, differentiate our capabilities from the growing capacities of big data, automation, and AI.

It takes more leadership — not less, as the trend toward flatter organizations and teams might lead us to believe — to create an effective rhythm that alternates between rich interaction and quiet focus. Here, we explore what that means in practice for managers and draw on examples from organizations we’ve studied to illustrate how you can avoid common problems and establish an optimal collaborative rhythm for your team.

Connectivity: What We Gain, What We Lose

When we solve problems collaboratively — whether we’re making strategic decisions, fixing operational glitches, or generating ideas — we engage in two categories of actions: (1) gathering the facts we need to generate and develop various potential solutions, and (2) figuring out the best solutions.

Academics are not strangers to the study of problem-solving. There is a large body of research about it, with contexts including recreational venues like adventure racing⁴ and escape rooms,⁵ simulated laboratory experiments, and real-world field research in the workplace. But most of the research has focused on individual rather than collective problem-solving.⁶ Even among studies of collaboration, few have looked into how much we want to have.⁷

So we headed to the laboratory to explore that question. In our first study,⁸ we randomly assigned individuals to 51 16-person organizations — some more connected by technology than others — and asked each organization to solve a complex problem: Divine the who, what, where, and when of an impending terrorist attack (akin to the famous Clue whodunit game but with higher hypothetical stakes). Each organization used a platform not unlike the collaborative tools used in workplaces today: Through their computers, individuals could search for information, share it with one another, and contribute theories about solutions while the platform tracked all behavior.

We found that connectivity had different effects on the fact-finding and figuring stages of problem-solving. For finding facts, more connectivity

was better, without limitation. But figuring out what to do with those facts — actually creating the solutions — was undermined by too much connectedness. The same connections that helped individuals collaborate in their search for information also encouraged them to reach consensus on less-than-perfect solutions, making connectivity a true double-edged sword.

Fact-finding and figuring are, we believe, representative of broader classes of activities. If we were to describe this trade-off more generically, it is the question of whether the task primarily requires coordination or imagination. If there are acute coordination needs (for instance, avoiding redundant effort by ensuring we don't all look under the same pillow for the keys), then always-on connectivity is helpful. If imagination is more critical, then always-on connectivity can make it nearly impossible to manage the creativity of multiple minds, which requires a balance between allowing those minds to learn from one another and enhancing the capacity of each one to generate fresh ideas. Too little communication, and there's no learning and no synergy. Too much communication, and all the minds end up in the same place, focusing on the same types of solutions.

Breaking the Trade-Off

Does that have to be the case? Do organizations and teams need to choose between being great at fact-finding and being great at figuring?

To further investigate, we returned to the laboratory, this time with the goal of directly asking whether deliberately choosing a rhythm of collaboration (that isn't always on) could help.⁹ We asked a number of three-person groups to solve what's called the *traveling salesperson problem*. Each person was given a map with the locations of 25 fictional cities that they needed to visit. Their task was to find the shortest trip to visit each city once and then return home to their starting point.

For decades, academics have been using the traveling salesperson problem to study complex problem-solving, in part because the set of all possible solutions forms what is called a *rugged solution landscape*: If you were to visualize all options as paths up a mountain (where the altitude reached is the measure of success), getting from a good solution to a better one might require you to hike back down the mountain and climb a very different path. So myopic decision makers (as we all inevitably are) risk getting stuck at a low peak because they didn't see the higher peak before they started climbing. This happens in the traveling salesperson problem because the choice of which city to visit next is constrained by the other choices made in one's route. To find a better solution, one must often go back and reconfigure those decisions.

In our version of the traveling salesperson problem, people attempted to solve it under one of three conditions. The members of one set of groups never interacted with one another, solving the problem in complete isolation; members of another set constantly interacted, as we do when equipped with always-on technologies; and members of the third set interacted intermittently.

Consistent with our previous study and other research,¹⁰ we anticipated — and found — that the groups with no interaction were the most creative, coming up with the largest number of unique solutions, including some of the best and some of the worst in terms of total distance traveled to visit each city and return back home again. In short, when isolated, they produced a few fantastic solutions but, overall, a low average quality of solution due to so much variation.

We also anticipated — and found — that the groups with constant interaction were the most consistent, producing a higher average quality of solution but finding the very best ones much less frequently. In other words, when always on, they produced less variable but more mediocre solutions.



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Groups that interacted intermittently — with a true rhythm of collaboration — broke the trade-off, capturing the best of both worlds rather than succumbing to the worst of either one. They preserved enough isolation to find the best solutions at least as frequently as the groups with no interaction, but also enough collaboration to maintain an equivalently high average quality of solution compared with the groups with constant interaction.

Learning was a key factor: During periods of separation, people naturally struck out on their own and tried new and diverse approaches to the problem — but when they came together again, they could learn from these different solutions. Even if the new solutions people found on their own weren't effective overall, they often included a useful idea or two that could be learned from and recombined with other solutions. In this sense, intermittent interaction created the conditions for collective intelligence, rather than relying on a few leading individuals to come up with the strongest ideas.

Even people with the best solution at any given point in the experiment did better in an intermittent environment. They were exposed to new ideas from their peers that they could use to improve their already good solutions. And of course, people with worse solutions could adopt the best solution in the group as a new jumping-off point for their next period of solo solving.

By contrast, people who interacted constantly had many opportunities to learn but fewer ideas to learn from, given how closely they hewed to group consensus. Those who never interacted generated more (and more diverse) ideas, but their isolation prevented learning from occurring.

There are two key lessons for managers in those results. First, when it comes to solving complex problems, collaboration yields diminishing returns — beyond a certain point, the average quality of solutions does not improve from more interaction. Second,

too much collaboration has its costs — you drive out the diversity of thought that is helpful for creating the best solutions.¹¹

Finding the Right Rhythm at Work

Clearly there's value in having a rhythm of collaboration rather than always-on interaction. But how do you choose one and then put it into practice? What's the equivalent of a musician's count-off by the leader of an organization or team? Here are a few approaches that seem promising in light of our research.

The light switch approach: Turn it off — in cycles. As with so many things, collaboration technology has simultaneously solved one problem (too little interaction) and created another (too much). Our research and that of others¹² suggests that it's important to find opportunities to unplug not just off-hours but also during work. Many of us eagerly anticipate the time we get to spend in the quiet car of the train, on an airplane with no Wi-Fi, or in a cabin that is just a bit too remote to be on the grid. Leaders can provide that kind of time in the workplace, too. While people are getting used to putting smartphones in a box on their way into a meeting (to focus on one form of collaboration versus another), more and more organizations are also creating coordinated unplugged times for heads-down work.

Flicking the collaboration light switch is something that leaders are uniquely positioned to do, because several obstacles stand in the way of people voluntarily working alone. For one thing, the fear of being left out of the loop can keep them glued to their enterprise social media. Individuals don't want to be — or appear to be — isolated. For another, knowing what their teammates are doing provides a sense of comfort and security, because people can adjust their own behavior to be in sync with the group. It's risky to go off on their own to try something new that will probably not be successful right from the start. But even though it feels

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reassuring for individuals to be hyperconnected, it's better for the organization if they periodically go off and think for themselves and generate diverse — if not quite mature — ideas. Thus, it becomes the leader's job to create conditions that are good for the whole by enforcing intermittent interaction even when people wouldn't choose it for themselves, without making it seem like a punishment (such as a time-out from childhood).

In some companies, unplugging is enabled by physical spaces and norms that prohibit collaboration. Meditation rooms and meditation coaches, for example, are on the rise — not just at Apple, where Steve Jobs introduced the 30-minute daily meditation break, but also at companies as varied as Google, Nike, Pearson, and Nationwide. At Amazon, instead of jumping right into a collaborative review of bullet points on PowerPoint slides, meetings may start with people sitting silently while reading a memo, discussing the topic only after everyone is done reading.

But it's not enough to provide space and permission for quiet focus. Role modeling by leaders is key. In an age in which it is transparent to others when you are plugged in (messaging systems indicate whether you are online, how recently you were, and whether you've read a received message), leaders send clear signals with their own behavior. At the most recent Wharton People Analytics Conference, former CEO of Deloitte U.S. Cathy Engelbert said she realized how closely people watch leaders for cues when an employee leaving the company (someone she didn't even know) said that she "didn't want to be like Cathy Engelbert," working and available to interact with colleagues "at all hours." The employee had inferred this — correctly or incorrectly — from repeatedly seeing that Engelbert's instant messaging status was online at night. Unless leaders themselves visibly unplug, meditation rooms and their ilk may become the latest equivalent of the dot-com foosball table, getting used by people who are the most likely to be laid off during the next downturn.

Other companies are placing stricter limits on the time colleagues can spend interacting. At the Italian headquarters of one of the world's top fashion houses, the office goes dark at 5:30 p.m., forcing an end to the workday. In part, the CEO tells us, that is out of respect to the families who await his employees' arrival home. But it also signals an end to

collaboration and a start to individual time, something cherished at a company that depends so heavily on creativity. While 5:30 p.m. may be an unrealistic cutoff in many settings, leaders can apply the same basic idea in more targeted ways, for a shorter period of time or even staggered across individuals or teams, as was the case with Boston Consulting Group's Predictable Time Off initiative.¹³

The underlying principle here is not new. One of the most seminal academic studies of work time in the 1990s showed how a software engineering team could reduce their feelings of having a "time famine" and improve productivity by instituting a policy of mandated quiet time, when interruptions were prohibited.¹⁴ Today, that simply means having work time when all our collaboration tools are turned off, taking us back to the days when we naturally had an ebb and flow of collaboration — individual work time punctuated by scheduled meetings and calls.

Agile approaches to teamwork incorporate some of this intermittent cycling, given that they are organized into short sprints during which groups of people focus on solving a particular problem. Harvard Business School professor Andy Wu and his coauthor Sourobh Ghosh have termed this *iterative coordination*.¹⁵ The challenge is that, as one executive at a large financial institution told us, "our sprints have gotten so compressed together that there is no downtime in between them." Plus, just because a team is sprinting doesn't mean others in the organization won't interrupt individual members of the team with collaboration needs that have nothing to do with the sprint.

Hackathons also involve intense collaboration for relatively short, predetermined periods of time. Because they are often organization-wide events — or at least everyone in the organization tends to know about them — they are somewhat more immune to interruption by colleagues, especially when they are sponsored by senior leaders (which provides implicit permission for out-of-office auto replies). But hackathons offer space and time for collaborative innovation — not for quiet, individual work. Leaders must find other ways of bringing that into employees' day-to-day rhythm by literally or figuratively flicking off the lights at regular intervals.

Executives have been counseled to be collaborative leaders and to set the example at the top that

they want to see in the rest of the organization.¹⁶ They have taken this message seriously, transparently devoting more and more of their days to in-person and online collaboration. By role modeling such ubiquitous use of collaboration technology, business leaders have helped define an era of always-on collaboration. It is now time to role model a more sustainable, productive rhythm of collaboration.

Even some of the tools' creators are advocating this approach: Ryan Singer, one of the first four employees at Basecamp, a maker of project management software, has written a book (collaboratively online) based on 16+ years of watching companies struggle with project-based collaboration. In it, he writes that "there can be an odd kind of radio silence" during the first phase of effective project work, "because each person has their head down" getting oriented, finding the best approach, and engaging in exploration — doing what he calls *legitimate work*. He claims that it is "important for managers to respect this phase [because] asking for visible progress will only push it underground."¹⁷

The Fitbit approach: Track it to hack it. It will not come as news to anyone that workplace collaboration tools do not just enable collaboration, they also track it. The result of all the time we spend collaborating online, and increasingly in person, is a stream of digital exhaust that defines what's recently been termed *relationship analytics*.¹⁸ (See also "Collaborate Smarter, Not Harder," in this issue.)

This goes beyond weekly reports on how much screen time we've had, instead capturing each individual's precise rhythms of collaboration with others in the organization. For example, Microsoft now offers two tools that use email, calendar, contacts, and other Office 365 data to provide insights about collaboration: MyAnalytics (for individuals) reports on how responsive you are to collaborators' emails (on average and with specific individuals), reminds you to book focus time "before meetings take over," highlights the "impact of your after-hours emails" on others, and so on; and Workplace Analytics (for an organization) uses the same data, anonymized, to shed light on overall collaboration trends. Ambit, a spin-off of the team at the Stanford Research Institute that developed Siri's voice algorithms, captures your voice profile and then, during times of active collaboration, can track in real time

how well you and your collaborators take turns (total number of turns, average turn length, longest turn length) and how each of your voices will be perceived by others (a so-called tonal analysis that shows when each collaborator sounds fearful, angry, joyous, sad, analytical, confident, or tentative).

In the not-so-distant future, we expect that similar tools will draw on large data sets and machine learning algorithms to seek to directly solve the challenges we highlighted above. Your device will remind you to make your collaboration more intermittent when your solutions seem to lack sufficient diversity and encourage you to come back together and learn from one another when enough diversity has been generated. Artificial intelligence may help us improve our collective intelligence by coaching us on how to regulate our collaboration.

Although that lies in the future, the promise of these tracking tools is already evident. Just as our Fitbit encourages more physical activity by making our current activity levels visible, these tools affect our collaboration behaviors by making those visible.

The design approach: Create enlightened collaboration tools. Both solutions above rely on us to change our own behavior, and that's hard. If it were easy to regulate our rhythms of interaction, we wouldn't be sleeping with our smartphones.¹⁹ But the same tools that permit us to become addicted to interaction can, if designed well, also help us make it intermittent rather than constant.

Some of this has already happened naturally. Consider Slack, a tool that was initially designed on the premise that all communications would be visible to the entire organization, encouraging immediate responses and constant connectivity. Under tremendous pressure from its user base, Slack soon changed its stance and created private channels, which now account for a majority of the collaboration in most work spaces. It also created a status function that allows you to signal when you are offline for one of any number of reasons. Indeed, while we are not aware of any social enterprise software programs that initially offered a feature allowing users to indicate whether they are available or not, nearly all of them have such a feature now. These changes allow for more "off" time and give tacit permission for more intermittent involvement.



The world has asked technology companies to create tools that enable collaboration as much as possible — and that’s what they’ve done. How to enable intermittent collaboration is a different problem to solve.

The next generation of these programs is trying to go a step further by improving the rhythms of collaboration in live meetings rather than replacing them. Matthieu Beucher, founder and CEO of Klaxoon, intentionally developed Klaxoon with this goal in mind, because meetings themselves can be sources of intermittent interaction. Here’s how it works: Meeting participants connect to Klaxoon with their own devices (cellphones, iPads, laptops) even if they are colocated. They then select an activity (brainstorm, poll, questions, decisions, and so on) that supports the group’s immediate task or objective. Depending on the activity they select, the tool sets a particular rhythm of collaboration. In some cases, information and ideas are visualized for all to see immediately; in others, data is stored so that the group can make decisions after a period of reflection or, at the very least, after everyone in the meeting has contributed their views. Beucher likens each meeting to a new song and says Klaxoon is designed “to provide different tools to improve collaboration for different parts of the song.” As Klaxoon has evolved, it has given users more room for intermittent interaction. For example, it now allows people to turn off the user-identification and time-stamp features so that they can collaborate on their own terms and avoid judgment, by peers or bosses, about when or how much they are or are not collaborating.

The promise of the design approach to balancing separation and connectedness — of using technology to create constraints that permit, nudge, or enforce intermittent interaction — is to make creative and productive skunk works types of teams routine rather than rare self-organized phenomena. For this approach to come into its own, however, we need to know more than we do today. In general, the world has asked technology companies to create tools that enable collaboration as much as possible — and that’s what they’ve done.

How to enable intermittent collaboration is a different problem to solve. The best ideas for doing so are most likely yet to come — perhaps after technology companies learn more about how the customers who buy and use their products create their own work-arounds to add intermittency to these tools.

SOCIOLOGIST GEORG SIMMEL once wrote, “Usually, we only perceive as bound that which we have first isolated in some way. If things are to be joined they must first be separated. ... Directly as well as symbolically, bodily as well as spiritually, we are continually separating our bonds and binding our separations.” Intermittent collaboration may be not only productive but also inherently human.

And yet, to achieve it, we must overcome our equally human impulses to stay connected in a world increasingly marked by omnichannel collaboration.²⁰ Leaders can play a significant role in providing the policies, data, and tools to establish a productive rhythm of communication.

It’s also a collective challenge. To return to our music analogy, leaders essentially do the conducting — but every team member affects how the collaborative rhythm is played. So culture becomes a critical reinforcing factor. Unless individuals feel safe to intermittently disconnect and see that behavior modeled and rewarded by the leaders around them, they’re more likely to stay too connected, no matter what their managers say they expect and what kinds of tools and opportunities they provide.

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