Motivating teams requires attention to individuals

The growing body of social research on how to motivate and manage teamwork attracts increasing attention from research institutions and funding agencies

Philip Hunter

There is an entire industry and research enterprise based around working out how to motivate people. But it is not only industry that benefits from it: the issue of teamwork and how to get people to cooperate effectively and enthusiastically has exercised leading scientists for well over a century, dating back at least to Louis Pasteur, who came to rely on effective teamwork after a small stroke in 1869 left him partially paralyzed (Fig 1). One of his main insights was that research benefits from interactions between people who hold different ideas, perspectives and values.

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Since Pasteur, social science research into team dynamics and motivation has tried to explain why it is that teams working in related fields and comprising people of seemingly similar capabilities can differ enormously in terms of creativity and productivity. This has led to attempts to identify the factors that underlie success and to establish a firmer evidence-based methodology for measuring effectiveness. Today, the science of teamwork specifically within biomedical research has evolved into an independent discipline in its own right that has spawned a growing body of work [1].

The latest challenge is extending the study of motivation and team dynamics to large collaborative projects that involve multiple disciplines and institutions—a rapidly increasing trend in biomedical research. Holly Falk-Krzesinski, Vice President of Global Academic & Research Relations at Elsevier, and a leading expert in team science, pointed out that scientific projects now involve a broad spectrum of dynamics starting with individual motivation, through interactions within a team up to the macro level of different teams collaborating towards a common research goal. “At the macro level, it’s about how you assess whole programmes, where 12 different teams may be funded to the level of \$25 million and looking at what outcomes you get and whether they are better than if it was just individual teams operating alone,” she said.

A main challenge of motivation research is therefore to integrate the factors that relate to individual performance at a higher level. Doing so might lead to a more complete model for evaluating progress and performance across the spectrum of the research endeavor, from individual scientists to research programmes. “I’m working with colleagues at the George Washington University building on models of collaboration that were developed by the North Carolina State University,” Falk-Krzesinski said. “We are looking at tying what happens at the level of the team to what happens at the level of individuals. Then the next step will be to tie that back to the Trochim/Stokols/Hall model for measuring and evaluating the performance of a team over time.” The model in question was developed by Bill Trochim, Dan Stokols and Kara Hall for

evaluating teams on the basis of agreed metrics relating to outcomes and input [2].

But such models rest on assumptions that are not universally accepted. Moreover, and particularly relevant to scientific research, not all major funding agencies use the same approach to evaluate the performance of research teams, as Falk-Krzesinski conceded. “It turns out that assessment of teams is for researchers, university leadership and programme officers, the top area for more research,” she said.

Not all funding agencies even agree that there is a need for ongoing assessment, as some believe this could demotivate researchers and impose unnecessary bureaucracy. Indeed, a great deal of bureaucracy is associated with short-term projects that require frequent grant re-applications, which is one reason why the Danish National Research Foundation (DNRF), for example, focuses on long-term grants. Its Centre of Excellence programme has a clear remit to impose as little bureaucracy and micro management as possible on those it funds. Similar to the European Research Council and the German Universities Excellence Initiative, the DNRF funds projects purely on merit; in this case located at 40 selected excellence centers. “I’ve found that the one thing that makes people absolutely crazy is bureaucracy and red tape,” said Liselotte Højgaard, who took over as chair of the DNRF in 2013. “We give grants of [...] 10 years in total, up to €20 million for each center. They get almost unlimited freedom. We trust them, with very little paperwork compared to the usual standards and just tell them do the best you can.”

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Although the DNRF maintains a light touch, it still needs to assess the success of the centers of excellence it is funding, but it does so differently than some other research foundations by shunning raw citation counts and insisting on quality rather than quantity of output. “I tell people I don’t want to see 600 publications of low quality but 60 of high quality, which are transformative and important for patients and society,” Højgaard explained.

Unfortunately, not all research teams enjoy such largesse from their funders—many others are bogged down in particular by red tape. “There are four general trends that have been picked up by recent research,” said Grit Laudel, a specialist in the sociology of science at the Technical University Berlin in Germany. “First, increasing attention has been paid to the time researchers, particularly lab leaders, must spend on writing grant proposals, which is time they cannot spend on research. Second, there is the instability inherent to grant funding, which limits time horizons for projects and makes it more difficult to begin new lines of research, both on the individual and the lab level. Third, there is the inflation of grant applications resulting from this instability, which makes successful groups and labs grow beyond a size at which they can be efficiently managed. Fourth, the career prospects of postdocs now include quasi-permanent employment in a lab on the basis of fixed-term contracts.”

These problems, which are all related to funding and remuneration, have an effect not only on motivation levels, but also on

the quality of team management. The first of the four issues identified by Laudel, time spent chasing grants, is particularly debilitating. “Group leaders often do not work in the lab hands-on anymore because they have to do so much grant writing and administration,” Laudel said. “This certainly affects their ability to manage their group members’ work. They often rely on mediators, such as experienced postdocs.”

Figure 1. Louis Pasteur (1822–1895), the discoverer of vaccination, fermentation and pasteurization and an early pioneer in team management and team motivation. © French Photographer (19th century)/Private Collection/The Bridgeman Art Library.

Yet, grant chasing is the reality for most researchers and research groups, though Les Rymer, Policy Advisor for the Group of Eight, a coalition of leading Australian universities, believes that this in itself might be some kind of natural selection for highly motivated individuals. “I think the reality of a highly competitive funding system in which, in

some cases, the chance of success is less than 1 in 5, means that anyone prepared to go through with the process of seeking funding must be by definition highly motivated. The fact that success depends in part on researcher track record in itself puts pressure on researchers to be productive.”

However, Rymer conceded that funding pressure alone does not necessarily lead to maximum creativity or high-quality science; the size and makeup of research teams is also important. In his role as policy advisor, he has studied team dynamics and the relationship between overall team size and quality of output. He cited two major reviews that are still yardsticks in the field—one from the University of Sydney, Australia, in 1994 [3], and another from the University of Sussex, UK, in 2003 [4]. Both reviews came to a similar conclusion: irrespective of the scientific field, individual productivity measured in number of papers per head increases up to a certain size, but above that, the productivity of a team increases merely linearly with size. Rymer added that the ‘optimum’ team size varies between fields, being somewhat higher in applied subjects such as clinical medicine, and lower in the case of more theoretical subjects such as pure mathematics.

One of the negative factors that drags down the performance of larger teams is the ‘coordination cost’ associated with communication and interaction, which can be balanced against the opportunity of including a wider range of skills and resources. Given that

this balance differs with the nature of the research, some decision makers, such as Højgaard at DNRF, do not believe it makes much sense to be prescriptive about team size. She cited CERN, the European Centre for Nuclear Research, in Switzerland, which requires large multidisciplinary research teams of up to 100 experts and more, given the scale of the problems involved. “If you look at CERN

and Atlas [the particle physics programme at CERN], which I visited a week ago, they have very large groups. They are extremely dedicated and I don't think there is much waste there. They need to have many people to find the Higgs Boson," Højgaard said.

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Any large team needs people dedicated to project management, and it is those skills, or the lack thereof, that can impact on productivity and, to an extent, creativity. One of the problems for research is that the culture of science does not encourage or celebrate such skills, according to John Pearson from the Center for Cognitive Neuroscience at Duke University in the USA. “The most important thing to understand about management within science is that no one trains us how to do it,” he said. “You either learn as a postdoc, by supervising graduate students or undergraduates, or you cobble together some kind of strategy as you go. Most of us are naturally skeptical of a lot of corporate management practices, because we think of ourselves as having very different kinds of workplaces. I'm not sure that's true, but it does tend to put a damper on most kinds of systematic thinking about how to get the most out of our teams.” However, Pearson emphasized that the notion of a team in science often remains elusive. “Our training system in science is still largely individual, it's an apprenticeship,” he commented. “We may work in teams, but our projects are not truly team-based in the academic setting. For the most part, everyone has her own project.” Pearson added

that within this setting, the best results are usually obtained by project leaders or mentors who are compassionate and respectful of the personalities and individual needs within a team.

The emphasis on individual projects in biomedical research is reflected by the way in which credit and recognition are awarded in science. “There is a focus on the individual,” said Falk-Krzesinski, noting that major prizes are awarded to just one or two people and often leave out those who have made other major contributions to the same work or field over time. Another issue of awards that diminishes their potential to motivate a team is the fact that the impact of a particular project in science often cannot be truly assessed for 10, 20 or even 30 years after the work has been done.

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At least some institutions have taken steps to address the recognition of younger scientists, such as the German Max Planck Society (MPG). “We reward MPG-internal prizes, like the Otto-Hahn-Medal, to young scientists,” said Werner Marx from the Max Planck Institute for Solid State Research Information Service in Stuttgart. “Motivation is also a special issue around the organization and the support/supervision of the International Max Planck Research School (IMPRS).”

But motivating young scientists is not really about money or medals, Marx insisted. It is fundamentally about team management and the attitude of leaders. “Group leaders and department heads should be more addressable and accessible,

in particular for the younger scientists,” he said. “They should, for example, not travel too much, but should take part in dinners, coffee breaks and spontaneous discussions as much as possible. This seems to me most important for the motivation and stimulation of scientific work.”

The clear message from research into the topic and from experience is that to foster and maintain a motivated research team, red tape should be minimized and the engagement of team leaders should be maximized without becoming stifling. There are still unresolved challenges around scaling up assessment and management to very large projects, although there is much to learn from industry and examples of successful research institutes like CERN. At the very least, an acceptance by science leaders of the value of project management and people management skills as real, learnable and valuable would be a good first step. Notwithstanding, research might still be best served by adhering to Ernest Starling's insight: “Find the best of men, give them what equipment you can afford, and leave them alone.”

References

1. Bennett LM, Gadlin H, Levine-Finley S (2010) *Collaboration and Team Science: A Field Guide*. Bethesda, MD, USA: National Institutes of Health
2. Mâsse LC, Moser RP, Stokols D, Taylor BK, Marcus SE, Morgan GD, Hall KL, Croyle RT, Trochim WM (2008) *Am J Prev Med* 35: S151–S160
3. Johnston R (1994) *High Educ* 28: 25–37
4. von Tunzelmann N, Ranga M, Martin B, Guena A (2003) *The Effects of Size on Research Performance: A SPRU Review*. Brighton, UK: University of Sussex. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.160.9463&rep=rep1&type=pdf>

Philip Hunter is a freelance journalist in London, UK
Email: ph@philiphunter.com

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