

Creating Creative Environments

Nils-Eric Sahlin

All scientific creativity is problem solving, but not all problem solving is creative – assuming, of course, that “creativity” involves the generation of a truly novel idea, a scientific breakthrough, a new solution to a hard problem involving an ingenious conceptual reformulation of a theory, or an amendment of that theory’s fundamental laws.

Science needs good problem solvers. It needs people who can unravel difficult problems both with and within a theory. The Nobel laureates Francis Crick and James D. Watson are probably the best and most renowned *uncreative* problem solvers. They were jointly awarded the 1962 Nobel Prize for Physiology or Medicine. By contrast, their colleague Barbara McClintock, who was given the same prize in 1983, is an example of a creative problem solver. Unravelling the DNA molecule, Crick and Watson revolutionised genetics, biology, medicine and many other sciences. But they did not change the existing conceptual framework, nor did they break away from, or change, any of the fundamental rules of the sciences they used to solve the puzzle. McClintock, on the other hand, solved her problem by expanding our conceptual framework of genetics, by making a rather static system dynamic.

These are examples of first-rate problem solving, and in the McClintock case creativity as well. How do we promote creativity and problem solving? Is there a simple recipe for establishing creative research environments? Can we identify negative factors that hamper creativity and the formation of innovative environments? Refurbishing old ideas – inviting the charge of self-plagiarism, I realise, though I plead in mitigation that a recipe is a recipe! – I will first present a simple recipe describing how to establish a creative research environment. Then I’ll swiftly explain why you and I are unlikely to follow the prescription successfully even if we try and try hard.¹

¹ The recipe is presented and discussed in Sahlin, N.-E. (2001), *Kreativitetens filosofi*. Nya Doxa, Stockholm; the English version on which this essay is based can be found here: <http://www.nilsericsahlin.se/kreativitet/index.html>.

Creative environments

What is it that creative environments possess that uncreative environments don't? In asking this, my ambition is limited. I want to home in on a few of the factors that make the academy work – and make it fail. My recipe is stark. It involves nine simple ingredients.

1. *Generosity.* Creative environments are generous environments. In them knowledge and experience is shared. In the light of this feature the structure of scientific careers looks far from conducive to creativity. The young PhD student fiercely clutches on to his ideas so that no one else will pip him to the post. Many academics do likewise. And so it goes on. The quest for higher, and more prestigious, positions makes the researcher unwilling to impart any of his as yet partially developed ideas. He is more than happy to discuss what he has already done, and what he has published, but reluctant to reveal anything about work in progress. Generosity is counterproductive. Better say: "I will help you if and only if I find my name among the authors."

This behaviour is completely understandable and rational in the conditions under which so much research is now undertaken. It is nonetheless a serious impediment to creativity. Unfortunately, it is extremely difficult to do anything about the mechanisms that encourage the behaviour in the first place.

2. *A sense of community.* A creative environment without a true sense of community would presumably be impossible to build. A colleague once told me the story of two interdisciplinary research projects he had taken part in.

He described the first in the following way. On day one, the project leader called together the research group and went through all the formalities, allocating rooms, giving out keys and security passes, and then wishing everyone the best of luck with their work. The project never achieved the results it was set up to produce. The researchers spent most of their days in their offices. They carried on doing the research they had previously done at home, without making anything of their opportunity to be with their new colleagues.

The second project started off in a slightly different fashion. On day one, the project leader called together the researchers, maintenance men, assistants and secretaries and took all of them off on a week-long bus trip. The official purpose of the trip was to visit renowned medieval German churches, but since the project was on the foundations and the history of statistics and probability, the researchers' interest in that was likely to be somewhat limited. After a couple of days on the road, and too many churches already, some were ready to quit the project. Others had turned to mutiny and were discussing how to get rid of the project leader. But the real purpose of the trip was

obviously not to enhance the historical knowledge of the researchers, but rather to generate a sense of belonging in the group – to create a community. And the bus trip did that job. According to my colleague, the project is one of the most successful, productive and creative experiences he has had.

It's a commonplace that it takes time to get to know someone from a different background. It's no less true that it takes time to get to know someone with a different academic background. Scientists can share the same mother tongue, but nonetheless speak very different languages. My experience has taught me that genuinely creative environments are somehow able to overcome the differences that carve up the world of science without sacrificing any individual's sense of his own identity.

3. *Qualifications.* One thing characterising the creative environments I have been party to is the solid scientific qualifications of the researchers. Researchers display awareness both of what they do know and what they do not know. One thing that most definitely does not promote scientific creativity is a lack of scientific qualifications. Secure knowledge of your own specialist area equips you to step out into unfamiliar territory.

4. *Diversity.* While uniformity can serve to promote productivity, it seldom promotes creativity. In one sense, then, all universities and institutes of higher education are organised in completely the wrong way. For the purposes of education, it is important to have separate departments of philosophy, mathematics and psychology. This facilitates the passing on of knowledge. But from the point of view of research, this kind of organisation tends to favour repetitive, unimaginative work. We let scientific space be determined by artificial boundaries governed by disciplinary frontiers, and as a result we become entrenched in mechanical research in isolated subject areas. The result is a fruitless departmentalisation of work.

Much has been written about cultural differences, and the awkward behaviour of Westerners in unfamiliar cultures is a popular theme in literature and film. A similar sense of dislocation can be felt by the scientist, but this needn't be a bad thing. I have occasionally worked with psychologists and lawyers, and researchers from other disciplines, faculties and scientific cultures. My experience is that it takes both a long time and plenty of goodwill to achieve an understanding of one another's scientific idiosyncrasies, but that it is well worth the trouble. When we enter into other traditions or activities with a little open-mindedness, we nearly always find that it promotes our own work. A measure of dislocation can be an indispensable ingredient in the creative environment.

5. *Trust and tolerance.* Psychologists have shown that trust is an important commodity – particularly when issues requiring effective risk communication and risk management are at stake. Among other things, it has been found that it takes time to win someone's trust, and even then it is very easily eradicated by one, or just a few, fool-hardy acts.²

There is also evidence that events eroding trust tend to be more “explicit” than the factors that create and maintain it, and this is quite simply due to our all-too-human readiness to spot another's mistakes and frequent tardiness in appreciating others' achievements. We can carry out a hundred good deeds without anyone noticing them; a single mistake is always eagerly noted. The argument concludes that one trust-breaking occurrence carries more weight than the trust-creating process itself. Given that bad news is considered more reliable than good news, the bad news carries enormous weight when it comes to the breakdown of trust. If you have been untrustworthy on one occasion, then, fairly or unfairly, you will be marked with the same untrustworthiness on another.

A creative environment must be built on foundations of reciprocal trust and tolerance. Trust-breaking mechanisms have to be controlled and their effects neutralised. If ideas are the bearers of creativity, then it is important to cultivate an environment in which people are receptive to alien thoughts and courageous enough to break the rules.

To generate trust is to safeguard against ridicule. With this security, a person can afford to be bold.

6. *Equality.* Another prerequisite of creativity is equality. This does not, of course, mean equality in its naïve sense, in which the need for a boss, a treasurer, a secretary or a maintenance man is denied. On the contrary, the creative environments I have experienced have had very well defined structures of responsibility. A researcher's time should be spent doing research and not making photocopies, attending to administration and fixing computers – for the very obvious reason that more often than not there are others who are far better trained to do this kind of work. A creative environment cannot afford the waste of resources that an “all do all” workplace requires. In any case, equalising does not necessarily produce equality.

In the creative environments I have in mind, no one has ever been elevated to the status of a guru. Everyone has worked with the same status, generosity, enthusiasm and power towards a common research goal.

The environments in which I have seen a guru, on the other hand, have shown signs of stagnation. The reason for this is very simple. A great deal of energy in such institu-

2 Slovic, P. (1999). “Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield”, *Risk Analysis*, Vol. 19, 689–701.

tions is spent on tributes to the guru. And in places with a guru at their head other people in the environment tend to be little more than poor imitators. What you will be listening to is but a choir of epigons.

7. *Curiosity.* Can an environment be curious? Of course not, but it is possible to generate an atmosphere in which curiosity between colleagues and co-workers is really encouraged. In the best creative environments every kind of curiosity between heaven and earth will be given full rein. It is impossible to underestimate the stimulation that radiates from colleagues who share a wealth of different interests. A genuine interest in film, cooking or animals, for instance, gives a greater scope of experience, which is extremely important for creativity and problem solving.

One striking difference between the creative and uncreative environments I have visited is the intellectual acuity and curiosity about life in general displayed in the former. In the creative environment, a traditional research seminar on human decision-making can quite easily end with an animated political discussion or the analysis of a film shown on TV the night before.

8. *Freedom of spirit.* There is a story of a Finnish long-distance runner who applied for supplementary funding in anticipation of a European championship. His letter of application was as simple as this: "I intend to win both the 5000m and the 10000m races at the European championship." He received the funding and duly fulfilled his promise.

A creative environment does not define the finer details of an activity. There is a goal. The precise way to it is not determined in advance – the means to the end are willed but not diarized. The very idea of finding a creative solution to a problem implies that one has the freedom to reach that solution in unanticipated ways, to take the road less travelled. One must be entitled to solve a problem with methods that have yet to be invented and tested.

A common complaint here is that one cannot simply dish out research resources or funding so haphazardly. But why not? If you want to reach a goal, win victories, or gain new skills, you have to be willing to take risks. If you back the wrong horse and fall short of your own or others' expectations, you are under no obligation to back the same horse the next time.

Funds that require the researcher to describe the route to the goal in detail, to say how the scientific problems are to be solved, to set out in what ways exactly the training will be approached, or to show how the experiments will be carried out, do not encourage creativity. Such a system may give some assurance in advance, but sadly it also guarantees repetition and lack of imagination.

9. *Small scale.* A creative environment should not be too large. My experience suggests that a group of between 10 and 15 people is perfect – say, 12. The environment must be substantial enough to have critical mass, but not so big that the colleagues lose contact with each other. This is why a university, or a larger company, can never generate a creative environment across the board. It is possible, however, to create small, relatively autonomous, islands of creativity within large organisations.

For obvious reasons, it is difficult to pursue research on creative environments. At least, it is hard to undertake the type of research that delivers not only indirect knowledge but direct knowledge based on well-designed experiments. In trying to characterize creative environments, we must rely largely on comparative historical studies, anecdotal evidence, and past experience.

However, studies directly or indirectly supporting my observations do exist. Evolutionary psychologists have found that grooming is an important cement of society. The function of grooming is to strengthen social bonds – bonds that are crucial for survival and reproduction. We see this clearly in primates, but all social animals groom. However, grooming takes time, and that means that the groups cannot be too large. There must be time for other activities – for example, the finding and eating of food. And there is a limit to what you can accomplish with a beak and a couple of claws, or two feet and two hands.

Among monkeys and apes, social grooming is known to be used to strengthen individual relationships, and the amount of time devoted to it is proportional to group size. That means that in small groups you have time for other activities. In larger groups (50 animals or more) individual members must spend as much as a quarter of their day grooming. In practice this makes it hard to maintain groups of around 80 individuals. Cohesive groups of 150 are pretty much out of the question, because in them a typical individual will need to spend half his waking hours grooming his fellows.

Humans live and function in much larger groups. 150 individuals is not an unusual group size. It is well known, for example, that companies of between 150 and 200 employees have an optimal size, and that problems start to emerge when they grow larger. Evolutionary psychologists such as Robin Dunbar argue that we can operate in larger groups (despite our limited physical resources: two feet and two hands) because we differ from other animals in possessing language. Language is a very efficient grooming tool.³

Creativity is a demanding activity, a special type of problem solving, requiring us to be, among other things, imaginative, ready to take risks and willing to break rules. To be creative, we need an environment offering trust, tolerance, generosity and fellowship, and one that allows for mistakes. This, in turn, necessitates a special kind of grooming. The grooming mechanisms have to be extra sturdy, creating at one and the

3 Dunbar R. (1996). *Grooming, Gossip and the Evolution of Language*. Faber and Faber, London.

same time pliant and hard-wearing ties between individuals. My guess that in creative environments there is an upper threshold of around 12 individuals seems to be both supported and explained by evolutionary psychology.

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The observations above are based on my own personal experience of universities and research institutes. This raises the question whether there are any important differences between the way in which creative *research* environments function and the way in which creative environments function in other areas. As far as I can see, there is no evidence to suggest that there are.

It is also easy to see that a creative environment is fragile – fragile, in the sense that even the smallest change can lead to the collapse of its structure. To maintain its structure, a creative environment needs to recruit people who will “fit in”. Recruitment should therefore be carried out on a holistic basis, rather than by allowing publication lists and CVs to dictate decisions on their own.

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Why are there so few creative environments? In effect I’ve offered a kind of recipe for them. The ingredients are as simple as they are self-explanatory. Yet despite the artlessness of the recipe, there are very few genuinely creative environments. Why is this?

The answer is not very pleasant: we are driven by pride, greed, gluttony, envy, lust and anger, shot through with an arrow of sloth. We have all met them, the *peccata mortalia* hooligans. They act among us, but still worse, they act for and within us.

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Ghost-writing, salami publications, misconduct and distrust are all symptoms of a system that is none too healthy. Do we find unethical, low quality research and pseudoscience in truly creative environments? Probably not. If you want to solve really difficult problems, do something that has not been done before, as Crick, McClintock and Watson did. Then there is no time for bullshit.

We encounter all these problems because we have confused the issues. Creativity and serious scientific problem solving is not the same as productivity. The academy is not a market – not an industry.

A few years ago I had a graduate student from the Faculty of Engineering who wanted to take a course in philosophy of science. She hadn’t thought about this field before, but during the course she realised she could construct an experiment that falsified

her hypothesis (theory). It was a simple but ingenious experiment. She told her supervisor about it. He said: “Don’t falsify anything. You only have four years to complete your thesis. Falsifying gives you nothing – make sure you verify the hypothesis.”

Another student of mine, this time a young professor, came to my class and told me that he had just been awarded a substantial research grant. He was very happy, but at the same time worried. He had to sign a contract saying that he promised not to do science for the sake of science.

These examples are genuinely worrying. If we mistake productivity for creativity, if we believe that what matters is the number of papers we write, or the number of students we produce, or the size of the grants we have, if we think that creativity is measurable – well then, as sure as fate, we will find ourselves supporting ghost-writing, salami publications, scholarly misconduct. We shall do nothing but promote distrust.

Today very few large scientific projects fail. Isn’t that odd? Isn’t science all about taking a leap into the unknown? We should formulate new and bold hypotheses, try them, fail, and then start all over again. Good science is as much about failure as success. History teaches us that successful failures have been the impetus of science. But a scientific system based on productivity does not allow for failure. For failure – however much serious research, problem solving and creativity you put into the flop – you never get brownie points.

If we need creativity, but the research environment we have created tends to stamp it out, what shall we do? With luck volcanic islands of creativity will emerge from the sea. Universities might even follow the example of some multi-national companies and outsource creativity. Another student of mine, Kristofer Jansson, thinks the solution is open source research – an interesting hypothesis and an idea worth thinking about.

