The Solemn Frivolity of Art And Charming Frigidity of Science

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Abstract: 'Creative' is an adjective applied both to eminent scientists and eminent artists. However, C.P. Snow's famous Two Cultures schism still exists, and many people remain reluctant to apply the term to scientific accomplishment. In reaction against this, others glibly claim that creativity is creativity: i.e., there is no difference between scientific and artistic creativity. This claim is as wrong-headed as devaluing scientific creativity, for while these two domains of endeavour do share certain characteristics, they differ both in methodology and how accomplishment is evaluated. The similarities and differences of creativity in the arts and in the sciences is the subject of my book, *The Secret Agents.* This paper, a summary of one chapter, specifically addresses the role of 'playfulness' in making art and doing science.

Keywords: Art, science, creativity, play.

Introduction

'Creative' is an adjective now applied both to eminent scientists and eminent artists. But the relationship between the creative endeavours of artists and scientists is still misunderstood by both artists and scientists.

In 1959 the novelist C.P. Snow gave the Rede Lecture at Cambridge entitled "The Two Cultures" where he lamented the lack of understanding between artists and scientists. As was traditional, the following day the lecture was published in paperback. Gradually at first, but soon exponentially, a wave of reaction, often extremely hostile, rose in the intellectual community of England, then on the Continent and the United States. Snow had touched a nerve in pointing out that there was a schism between the two cultures of art and science. Even now many people on one side or the other of this artificial divide do not understand the nature of the other's endeavours.

The "Two Cultures" schism still exists, and while artists are assumed to be 'creative', many people remain reluctant to apply the term to scientific accomplishment. In reaction against this, others glibly claim that creativity is creativity: i.e., there is no difference between scientific and artistic creativity. This claim is as wrong-headed as devaluing scientific creativity, for while these two domains of endeavour do share certain characteristics, they differ both in methodology and in how accomplishment is evaluated.

The similarities and differences of creativity in the arts and in the sciences is the subject of my book, *The Secret Agents: Creativity in The Arts and in The Sciences.*

This paper, a summary of one chapter, specifically addresses the role of 'playfulness' in making art and doing science. Both art and science, and the creativity of both, have their origin in the playfulness of children. Both artists and scientists remain, in some ways, childlike, even childish. But they have taken different paths to the mature play of their lifetime endeavours. In both cases the play has become more serious, and the results of this mature playfulness highly valued. Unfortunately there is a common misperception about the nature of these noble endeavours: for science, the seriousness is exaggerated; for the arts, the playfulness.

Art: The Serious Nature Of Play

You look out your front window. Two young boys are standing on your lawn. They both have their fists cocked. Suddenly one of them ducks down and charges the other, knocking him to the ground. You rush out your front door to find them wrestling each other, rolling dangerously close to your carefully tended flowerbeds. You dash over and pull them apart—partly out of a sense of adult responsibility to prevent children from harm and partly (let's be honest) to prevent them from crushing your beloved dahlias. And how do they respond? In unison: "Hey, mister, relax, we're just playing!"

Of course their combat looked serious. That is because play *is* serious business for children. In fact play seems to be serious and essential in all organisms high enough up the evolutionary scale for us to recognize it as play. A major part of the charm of puppies and kittens and all manner of young animals is their playfulness.

What are the young doing when they play? They are rehearsing. Whether we speak of kittens 'hunting' a ball of yarn or those young boys on the lawn, what they are doing is rehearsing for the role of adult. This is directly useful for many species, but kittens and boys are special cases. The kitten will never need to be a hunter: his food will come in a can. The boys will never need to physically battle for dominance and survival—assuming your lawn is a suburban one, not an inner city patch of weeds. So does the kitten *need* this rehearsal? Unlike his cousins, the wild cats, probably not. Does the boys' play acting serve any purpose? Yes, it still does. But not because of the practice it gives at combat, but because it exercises the imagination, develops the ability (perhaps unique to *Homo sapiens*) of hypothetical thinking.

Children make up stories and act them out. They imagine scenes and draw them. Some even invent melodies. Some kids are very good at this and some are not so good. (When a gang of kids get together to play act an adventure, they all know which of one of them to rely on to supply the plot.) Some kids derive so much pleasure from exercising their imaginations, they never give it up. And some never give it up just because they find so little pleasure in the real world. Most, of course, 'grow up', put away childish things, and concentrate on getting that MBA or job at the local plant.

Because so many follow the latter path, and because the exercising of imagination is so obviously a part of childhood, a number of dubious conclusions about creativity have been widely accepted. It is, for example, a cliché with great currency that all children are naturally creative until the school system destroys this natural, innate creativity. Kids are told to colour inside the lines and no, a green face is not acceptable. Well, always willing to think the worst of the school system, my knee jerk response is agreement, and the biographical evidence we have of unquestionably creative people offers indirect support for this contention: it is true many brilliant kids had trouble in school—at least partially because they didn't colour inside the lines. Many eminent people had check marks on their report cards next to "Doesn't work and play well with others."

But by the reasonable working definition of creativity as the creation of a significant cultural product, this allegedly universal creativity among children is obviously absurd. First of all, children do not create anything significant in either art or science. Secondly, it is downright silly to assume that all kids have the potential to be another Matisse, if only adults would encourage green faces and just leave them to their own devices.

What all kids do have, however, and what school certainly does interfere with, is the powerful drive to play. Play, for children, is serious business. Play, for artists, is serious business. This is no coincidence. And every child knows the simple fact that school is work, not play; and work interferes with play. You only put on your play clothes when you get home from school. All the well intentioned efforts to haul the playground into the classroom are misguided and foolish. Playgrounds already exist. Classrooms serve a different purpose: they are workshops for learning, not creativity. They are places where teachers should be attempting to pass on to their students as much as possible of the accumulated wisdom and knowledge upon which our civilization is founded—and teach these students the necessary skills to use this information. This means (unfortunate as it may be) formal structure and some suppression of individualism. The kid with potential for real creative accomplishment is almost certain to find this a 'hostile environment', but there is no evidence that educational reforms that pay lip service to 'encouraging creativity' really do so, or create a more 'friendly' environment. If Einstein, poor student that he was, had been educated in an "open concept" school, I doubt he would have been any happier—and he may even have missed learning some critical material that made his discovery of the Relativity Theories possible.

According to Freud (who took everything very seriously, including play) people always resist relinquishing their pleasures, and if forced to, they transform them, hide them by dressing them up in different guises. Play is serious and one of the reasons it is serious is that it is one of the primary pleasures of childhood. So what does it get transformed into according to classical psychoanalytic theory? In 'normal' adults, Freud suggests play becomes internalized where it is safe: it becomes the fantasies of daydreams. In artists, it becomes their art. As one writer, Monica Dickens, admitted: "Writing is a copout. An excuse to live perpetually in

fantasy land, where you can create, direct and watch the products of your own head. Very selfish."

Assuming this to be true, and it is one of the more plausible of psychoanalytic ideas, how does one reconcile this with the statements of those many artists who insist that the act of creation is hell? One possible, albeit cynical, explanation is that artists, knowing they are among the fortunate ones who spend their life playing, complain about how hard a life it is just to deflect the criticism of the average working stiff.

Another explanation is that the average artist's life really is a hard one. Except for the few that receive widespread recognition—and the financial rewards that fame brings—most artists for most—often all—of their lives receive neither the respect the average 'gainfully employed' receives nor even a living wage. This is the price they pay for playing, and it is understandable that not too many hearts bleed for them. Often, too, the artist's life is hard because of the personal characteristics that come with being creative—the disagreeableness, the hypersensitivity, the compulsiveness and the socially disruptive monomaniacal commitment to one's art, even the serious mental instability that is not uncommon in the creative.

But probably the major reason many artists are not innocently and childishly happy with spending their lives playing is that somewhere along the way the play has grown to be deadly serious. Certainly children can be serious about their games, but as the years roll by we all become more and more and more excessively serious about everything we do. Adults, even artists, are a bloody serious lot. We set ourselves higher and higher standards and become more self-judgemental—a characteristic uncommon in prepubescent youth. The creative are perfectionists, and perfection is impossible. As William Faulkner said: "The work never matches the dream of perfection the artist has to start with."

Science: The Playful Pleasures Of Seeing What Happens

You look out your front window. Two young boys are standing on your lawn by your flowerbeds. One of them has a salt shaker and is sprinkling salt onto the blooms of your dahlias. The other is watching intensely. You rush out your front door and demand to know what the hell they think they're doing. "Putting salt on the flowers," the one boy replies, wide-eyed. "Bees like sweet things, so we thought we'd see if they like salty things too," the other adds. "Don't be mad, mister," says the first one, "We're just *experimenting*."

Kids try stuff and they call it 'experimenting'. And of course it is also 'playing' around just to see what happens. And of course this is the basis of all science—and to a great extent all art.

However, professional scientists, especially insecure social scientists, vehemently reject this use of the word. To most of them the scientific method is a rigidly

defined, rigorous set of statutes, its laws and rules of conduct more immutable and unquestionable than any Church dogma of the Middle Ages. And the enforcement of these regulations is downright Draconian. Because it is a public activity, one's behaviour as a scientist is under constant scrutiny by the most eager to convict enforcement agency on the planet—one's research colleagues hoeing the same row. To breach the rules of research design is tantamount to committing a felony, and there are probably scientists out there who like to see it made a capital offence. "He didn't use a placebo in his control group! Off with his head!"

I teach basic scientific method, and I have a deep respect for it and the importance of rigorous— even what could be called 'rigid'—critical thinking about research. But after berating my students about the importance of rigour in research design, I try to balance this with anecdotes from the historical literature that show that there are two stages to scientific research. The first is very much like the kids with a salt shaker "experimenting" on my dahlias. The second is where the rigour is essential. Unfortunately, for many professional scientists, since only the latter stage is what they've been trained to consider important, it is officially approved and carefully controlled dial twiddling of parameters that becomes their primary occupation and preoccupation. On the other hand, the truly creative scientists are too busy just playing around to pay much attention to the rigorous rules until it becomes necessary.

There is a term that historians of science use to describe the way many of the most important discoveries are made: serendipity. It refers to the happy combination of chance and a scientist's preparedness. The chance element in this equation is Opportunity knocking—on the lab door. The drudge scientist responds by having the lab soundproofed so he can continue his dial twiddling undisturbed. The exceptionally creative scientist, out of the curiosity that defines him as a real scientist, walks over and opens the door. Voila!

Examples are legion, if sometimes apocryphal. (Newton may not have actually been literally beaned on the head by an apple.) I'll use two examples, described with only a little poetic license, to make my point. Both are important medical discoveries that also have tangential implications that are somewhat disconcerting.

The first of these is quite famous. In 1922 Alexander Fleming 'accidentally' discovered that lysozyme, a chemical found in tears and mucus, could kill bacteria. Fleming had a severe cold, and while puttering in his lab, his nose leaked, the snot dripping into a Petri dish where he was growing bacteria. The bacteria were almost immediately destroyed! This suggested to him that there might be other substances that could kill bacteria, that there might be a 'magic bullet' for bacterial infection that would not harm the host.

Six years later, Fleming was cleaning Petri dishes that were rife with bacteria by washing them in Lysol, when he noticed that one had a mould on it, a mould that apparently had killed the Staphylococcus culture he'd been growing. That the

culture had been so contaminated was an accident, a chance event, which his preparedness and curiosity responded to in an important way. Why were there no bacteria still alive in this mouldy dish? And thus, the first wonder drug, penicillin, was discovered.

Penicillin is a by-product of the penicillium mould that grows well on citrus fruits. The story goes that Fleming had left a mouldy orange lying about his lab and the mould spores are what contaminated his Staphylococcus culture. So we have in this moral tale a classic example of serendipity. The discovery of the first antibiotic, penicillin, was not the result of careful trial and error testing of various agents—but rather the result of a runny nose and a dirty lab. And, of course and importantly, also of Fleming's attentiveness and preparedness. Neither discovery could have occurred in a modern, hygienic lab, where certainly no mouldy oranges would be lying around, and where the Petri dishes would be sterilized mechanically, and certainly not by the chief researcher.

My second favoured example of serendipity is Oscar Minkowski's less well known discovery. He was using the age old and crude technique of figuring out what something does by removing it. What goes wrong if you remove the starter from your car? What goes wrong if you remove the front left tire? The wiper blades? The alternator? As these examples show, if you pause to think about them, is that you learn something about what is essential for your car to function, and in some cases may even learn specific functions. But the technique has been quite reasonably criticized for its imprecision. And it is one thing to do this research on your car, where you can put the parts back; it is quite another to do it on animals, where replacement is impossible. So this example is sure to disturb animal rightists.

In 1879 Minkowski was removing the pancreas from dogs to see what got 'broken'. One of the unlucky dogs to have had his pancreas removed had pissed on the floor of the lab. When Minkowski came into the lab and saw the pool of urine, which was swarming with flies, his reaction was not what would be most people's reaction. He didn't curse out his lab assistant for not having cleaned up the mess, not to mention leaving the window open so flies could get into the lab. Instead he said to himself: "Hmm, this is interesting!"

So in this case Opportunity had not bothered to knock, it had come in through the open window, and Minkowski didn't hurry to close the window and clean up the pool of pee on the floor. Instead, his interest was piqued. Why are flies on a pool of urine interesting? Because, as Minkowski knew, urine is not only sterile, it contains no nutrients. Flies swarming about your dog's droppings are not surprising: they are attracted to feces because there is still a meal to be had on the not fully digested excrement. Urine, however, normally offers no such dining out. Surely the flies weren't just bathing?! So Minkowski analyzed the urine and found sugar in it. Thus, the cause of diabetes was discovered. He lived to see, in 1922, as a result of his important discovery, the introduction of therapeutic insulin, which has saved countless lives.

Once again one has to wonder how this fits in with the traditional view of doing science: the methodical, carefully controlled manipulation of variables—with great care to keep extraneous variables out of the picture. What kind of lab was Minkowski running anyway? Dogs peeing on the floor? Open windows with flies buzzing about? (Mouldy oranges in a lab are nothing by comparison.)

Although in science, unlike art, there are objective criteria for finally evaluating the 'truth' of a discovery or creation, the actual doing, the actual discovering or creating, is much like it is in art. So often, at least in the most important science, the scientist is just like the artist—merely playing around to see what happens. The salted dahlias die. Later carefully controlled studies will conclusively demonstrate the adverse effects of salinity in the soil.

Conclusion

Both art and science have as their creative source an extension of the playfulness of childhood. However, only the mature play of artists and scientists involves a second stage where both self-evaluation and peer-evaluation of the results of this play is important. Nevertheless, for creativity in both art and science, "the play's the thing wherein" it all begins.

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