Art-Science Collaborations

Why Do They Matter to Medicine?

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Art-science collaborations between medical researchers and artists provide insight into their practical relevance. It is critical to recognize that while artists can communicate aspects of medical research to the public, art also opens up new avenues for representing relationships and may therefore jump-start creative ideas for new insights, technologies, and collaborations. These in turn may improve teamwork, raise social or historical contextual awareness, or inspire product development.

A person searching for “art-science collaborations” on the Web will find new projects with each inquiry. They could discover George Khut’s pulsating representations of human heartbeats coupled with the act of breathing [1], Drew Berry’s stunning animations of cellular processes [2] or Andrea Polli’s live visual representation of air pollution in Pittsburgh [3].

The (United States) National Endowment for the Arts, the Wellcome Trust in the United Kingdom, the University of Arizona and the University of Western Australia are just a small sampling of the organizations and institutions that have sponsored art-science collaborations.

Why are these interdisciplinary projects proliferating, and what can they achieve?

As our world simultaneously “shrinks” through global connectivity and expands through a technological capacity to scrutinize the microcosm and the macrocosm, the traditional boundaries between science and the humanities, so vigorously defended in support of scientific literacy more than half a century ago [4,5], are now eroding. For example, on the cellular level, advances in neuroscience have helped identify the intimate neural connection between cognition and emotion [6]. Meanwhile, global events such as climate change are now recognized as multifactorial in both cause and effect, indirectly challenging our methodological tendency to isolate scientific phenomena from social, cultural and geopolitical complexity. Finally, technology has disrupted the boundaries between the animate and the inanimate [7]. Jennifer Haley, author of the play The Nether, chillingly explores the notion that it is possible to upload one’s consciousness to a computer in order to remain viable in a world that has become unlivable. Youngmoo E. Kim, working in conjunction with colleagues on smart fabrics with sensing capacities, argues that “as humans and robots interact more and more closely . . . [the robots] will need to be aware,” that is, they will need to gauge the meaning of people’s expressions and emotions. “These machines must also be designed to evoke empathy,” he adds. “We have no problem developing emotional attachments to inanimate things” [8]. For better or worse—we can’t always be sure—the arts and humanities weigh in with equal heft as the sciences in inventing new technologies and processing our ever-expanding technological capacities.

It’s vital to emphasize that the disparate perspectives of the arts and sciences do not simply enhance each other in friendly collaboration. Underlying the quest for bilateral enrichment is, yes, an appreciation of curiosity and innovation—but also of risk [9], due to an innate tension between art and science that has evolved in an era of increasing specialization. The implicit mutual critique this tension involves may be the very reason why we should engage in cross-disciplinary interactions. Without the discomfort through which such interactions provoke and edify, art-science collaboration might not be so compelling.

Significant achievements of art-science collaborations deserve notice and provide insight into their relevance for medical practice as well as research. My first example draws on the work of Amar Dhand, a neurologist specializing in stroke [10], who was interviewed for this essay. Dhand developed an interest in the changing configuration of social networks of stroke survivors, which he represented using technical drawings. Dhand invited one of his patients, Lindsay Obermeyer, who happened to be a textile artist, to represent these networks in the form of crocheted mandalas. This was in essence a “translational” project for public viewing. As Obermeyer states, “my job was to visualize in some manner the research of Dr. Amar
Dhand and make it more accessible to the general public” [11]. Obermeyer used colorful yarns to attract the eye and crocheted simple circular geometries to explain social connections, with the patient at the center of colored circles representing different degrees of social proximity. The work was exhibited at Barnes-Jewish Hospital, where Dhand hoped the mandalas would resonate with stroke patients and their families.

Less naturally in quest of translation for public consumption was the work of malaria researchers Julian Rayner and Oliver Billker [12], about which Rayner and his collaborating artist, Deborah Robinson, spoke in respective interviews [13]. Robinson in fact explicitly emphasized the exploratory nature of her project, which, in order to safeguard the creative process, needed to be free of any predetermined purpose. Following her own interests as an artist, Robinson took to poring over old video footage of malaria eradication projects from the 1950s and developed an installation called *Parasite* [14]. The project explored the history of malaria eradication: In particular, her work focused on the failed use of the potent insecticide DDT with archival clips of spraying programs in continuous loop while the digital parasite slowly—and symbolically—eats away at the film, accompanied by a mosquito soundtrack. When she showed this work to malaria researchers at an international conference, she was surprised by how little they were used to thinking about the historical context of malaria eradication programs, which they warily interpreted as an indictment of their own work.

But ultimately the project did succeed in helping the scientists within the lab and in the scientific community of malaria researchers recognize a broader context for their work. This context comprised not only macroelements concerning the history of malaria research but also the microcontext of the lab. Rayner said of his protégé’s interaction with his lab:

> I don’t think you could say it’s influenced the sort of experiments we do. There is a broader question though about team dynamics and team integration with the work. There’s a non-quantifiable impact at all levels within a team to be involved in this kind of activity, [to] think about their work in a different way, about the impact of what they’re doing and how they think about their careers [15].

These observations are similar to ones Dhand made about the integral presence of an artist in his lab:

She asks questions at our meetings. She forces us to transform our basic science ideas into applications. She’s interested in trying to see how to make an app or intervention that uses the social network concept in a way that can actually help people currently, and that has pushed us, because we aren’t comfortable to talk about the interventions until the basic science is complete or at least a few papers have demonstrated the importance of the work and of the patterns we see. I’m very hesitant to support an intervention until the science has created a foundation and so the artist-patient . . . forces the scientist to think about social impact and social application quicker than we would in the natural grant-focused, publication-focused routes that we usually take [16].

The work of Dhand-Obermeyer and Rayner-Billker-Robinson offers insight into what art-science collaborations can achieve from the perspectives of both clinical practice and medical research. In Dhand’s research, Obermeyer’s mandalas helped simplify complex concepts, while her static textiles provoked him to transform his own early drawings into dynamic diagrams that evolve over time (he has since created videos showing these temporal changes in relationship networks). Meanwhile Robinson’s presence in the malaria lab illustrates a dialogue between two culturally distinct approaches to a problem. Their respective methodologies don’t—and indeed can’t—change, but their coexistence demands a dialogue that leads to a change of perception about the work being done.

There is a need, in our era of specialization, to find ways to recognize and operationalize our disciplinary interdependence, particularly in medicine, where C.P. Snow’s “two cultures” disconnect seems more gaping than ever. Art-science collaborations that address science within its context can achieve relational outcomes by broadening the lens of scientific investigation. The presence of an engaged outsider has the potential to change the laboratory culture itself. Although it is not clear that such an outsider needs to be an artist, art does have a particular potential in this setting. In Elliot Eisner’s work on arts-based research, he writes,

> It should be recognized that answers to questions and solutions to problems might not be arts-informed research’s strong suit. [The arts-based] method of inquiry may trump conventional forms of research when it comes to generating questions or raising awareness of complex subtleties that matter [17].

Supporting Eisner’s claim is biologist Mark Winston’s empathetic experience of communication among bees. Winston worked with a dance group in Vancouver and found that dancers synchronized movements without conscious awareness. This attunement of dancing bodies helped him better understand the ways bees communicate, a novel way of instrumentalizing empathy to arrive at new insights [18]. And if we can understand bees, might not dance help us understand communication among humans? Neuroscientist Jose Luis Contreras-Vidal thinks so. In his project “Your Brain on Dance,” he outfits a dancer with an electrode-studded cap to learn how movement, creativity, emotion and brain activity intersect [19]. He hopes the data he generates will open new paths to treatment through avatars and prosthetics in those with movement and communication disorders. These forays into the dance world are among many examples of the way in which art-science collaborations are evolving. Part of this evolution involves at times seemingly fanciful experiments that may or may not yield improvements in scientific innovations and patient care. But we should not underestimate the reflective insights such collaborations produce. In the words of Julian Rayner:

> It’s incredibly useful to be forced to take a step back and see the big picture. It forces you to see your work through a different lens. And that challenges you. Deborah comes...
at it from a completely different direction. She doesn’t care about the molecules; her language, her lexicon is completely different. It’s an exercise in finding common ground and seeing things from the other side [20].

As Rayner’s comment implies, an irritant reciprocity arises between artist and scientist. This phenomenon of tension is not only strictly territorial, as, for example, when one member of Rayner’s malaria team opined that Deborah Robinson’s presence was “like having a very bad PhD student who asks stupid questions and questions you couldn’t design an experiment around” [21]. Nor can this tension just be reduced to economic and political power struggles, as Mark Slouka suggested in a celebrated essay:

Nothing speaks more clearly to the relentlessly vocational bent in American education than its long-running affair with math and science. . . . They’re everything we want: a solid return on capital investment, a proven route to “success.” Everything else can go fish . . . [22].

At a deeper level, beyond professionalism or even the more encompassing socioeconomic interests of capitalism, this tension is a dialectical force relating to the salubrious fact that the encounter between art and science forces each side to examine a methodology iminical to its respective disciplinary canon.

Cross-disciplinary tension may explain the fundamental if paradoxical appeal of art-science projects. One of the most powerful explorations of the productive incompatibility of artistic and scientific perspectives can be gleaned from choreographer Liz Lerman’s Ferocious Beauty: Genome [23]. This full-length choreographed work of art-science documents a yearlong planned interaction and the resultant conversational tension between molecular scientists and Lerman’s then–dance company.

Several scenes in Lerman’s work playfully examine the structure of DNA, using zippers as well as bodies seeking their intrinsic shapes. These configurations in turn lead to an inquiry about interpersonal configurations, how humans, too, seek to find a fit with one another. Lerman’s juxtaposition between molecular structures and human loneliness may be merely associative, but the utter distance between scientific discovery and human needs allows her to show precisely what is at stake: In a later scene, a dancer cries out in pain and despair, asking how all this understanding of genes could possibly be of any use to her. How does science relieve the personal agony of breast cancer or Huntington’s disease or satisfy the need for compassion? What emerges from these scenes is the realization that science answers crucial questions while art contributes a much-needed inquiry into the shortcomings along with the uncertain societal impact of science.

The emotional power of Ferocious Beauty, however, lies not so much in the exploration of the different agendas of art and science as in a search for deeper commonalities. In one scene, Lerman choreographs Huntington’s chorea against a backdrop of floating genetic codes, signaling the inextricable and intimate connection between human suffering and its scientific cause. What we learn in Liz Lerman’s production is that in both art and science, a powerful creative drive and aesthetic awe detonate the big bang of human activity [24]. Only with the expansion of this universe does the initial expression of creative force crystallize into divergent forms—scientific attention focuses on function and structure, and artistic inquiry focuses on meaning.

True, artists’ and scientists’ different methodologies are constant reminders of the limiting parameters within respective disciplines. At the same time mutually engaging with these differences presents an opportunity well suited to our complex, interdisciplinary and global environment.

References and Notes

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8 www.youtube.com/watch?v=QXqgwOIL8wU&list=PLLfdQrZVuM NWj_kzsfLMSZ8Gr1UH6H2ca&index=2 (9:04–12:33).
10 Personal interview with Amar Dhand (2 April 2016).
12 Personal interview with Julian Rayner (22 March 2016).
13 Personal interview with Deborah Robinson (26 March 2016).
15 See Ref. [12].
16 See Ref. [10].
20 See Ref. [12].
21 Personal interview (11 September 2015).


24 Ede [7].

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