The art of medicine

Knowing, seeing, and telling in medicine

Today, we are witnessing a new permeability between the arts and the sciences. Scientists are urged to promote transformative creativity in their trainees. Nobelists credit surprise and the imagination for their insights. The health professions have incorporated the humanities, social sciences, and arts into their curricula to teach relational, cultural, and creative dimensions of health care. Whether artists or scientists, investigators strike out from what is known to brave the unknown in acts of creative discovery. The salient divides may come to be understood not as the ones that separate artists from scientists but rather as the ones that separate creative thinkers from formulaic thinkers and those who can tolerate doubt from those who cannot.

Think of artists and scientists as users of three modes of discovery: knowing, seeing, and telling. We are all seeking knowledge—epistemologists who question what we think we know, how we come to know it, whether we can prove what we think we know, and what it means to be a knower or a doubter. Simultaneously, we are all seers—aestheticists who confront what we perceive in natural and created appearances, using human capacities to interact with and interpret the material and symbolic world. Finally, we are all tellers and listeners—narrativists who tell about what we have found and listen to the findings of others. Instead of bifurcating arts from sciences, we can recognise that rigorous epistemological standards reside alongside disciplined aesthetic methods in the day-to-day work of all investigators, all of whom use narrative actions to transmit the known and the seen to others.

To learn of the creative springs of today's science, I have interviewed leading scientists at my university for the US National Institutes of Health (NIH) Narratives of Discovery project. I draw on excerpts from three of these interviews here, for the thoughts shared with me illuminate the interconnections among the modes of knowing, seeing, and telling in the medical sciences.

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Epistemology is the branch of philosophy that has probed, from Greek antiquity to the present, the routes to knowledge, the paths to certainty, and the ethical consequences of knowing. Epistemologists distinguish between rationalists' a priori knowledge (truths that can be asserted) and empiricists' a posteriori knowledge (findings that must be demonstrated experimentally). They ask how individuals assess their own knowledge, how the knowing alters the knower, and what it might mean to consider oneself a knower. The answers to these questions are as apt to come from philosophers such as Georg Wilhelm Friedrich Hegel and Ludwig Wittgenstein as from novelists like Henry James, Virginia Woolf, and James Baldwin, whose works examine the consequences of knowing, not knowing, and doubting oneself. 20th-century epistemological discourse examines distinctions between objectivist and constructivist models of the world. Objectivist, or naturalist, methods accept the real world as an externally accomplished, ultimately knowable entity whose nature and meaning lie external to and independent from human observers. Constructivist, or interpretive, methods recognise that individual observers are influenced by their race, class, gender, ability, culture, time, and the intersection of all those factors. Observers do not report a static reality but contribute subjectively toward its emergence. Both methods are used in the sciences and the arts and in qualitative and quantitative research. Thomas Kuhn's contrast between a "normal science" and a discovery science that achieves a new paradigm through interpretive risks of the investigator captures the differences between the two, while contemporary fiction shows the creative dividends of representing multiple characters' perspectives that add up to the whole. In what he calls "the archaeology of knowledge", Michel Foucault reminds us that "the world is covered with signs that must be deciphered…To know must therefore be to interpret".

The epistemologist's attention to knowing resonated in my interview with physicist Andrea Califano about his precision-medicine discoveries in cancer biology. Founding chair of Columbia's Department of Systems Biology, director of the Columbia's Sulzberger Genome Center, and co-founder of DarwinHealth, Califano has been modelling new, powerful processes within tumours that control their growth. He told me about his theories of scientific investigation:

> "If the rules that you set are based on an underlying reality, then you can actually start simulating things that are fairly complex and then are predictive of what you would get in an experiment."

He was surprised when I wondered aloud if he was quoting Karl Popper's *Conjectures and Refutations*. How did I know, he asked, that Popper was his favourite philosopher? Califano's philosopher–physicist mind is the creative ground that combines objectivist and constructivist approaches to discover new treatments for cancer:

> "How is it possible that mutations are so heterogenous but the cancer state they induce is so homogenous? In normal cell physiology the reason why cells are able to maintain the stability of their state is their remarkable homeostatic control. So we thought that in cancer there must be an equivalent piece of homeostatic control machinery."

Once Califano imagined the presence of a never-before-seen molecule, his team discovered what they called master regulator proteins in cancer cells:

> "A lot of ideas end up being very, very simple-minded in hindsight. [But] it's very difficult to foresee whether simple-minded ideas will pan out or not in the end. There's nothing magical about what we do. It's just that nobody had kind of thought of cancer in this way."

Unlike the epistemologist's attention to knowing, the aestheticist probes the experiences of seeing: perceiving and interpreting natural and created appearances. What do we undergo physically and emotionally in viewing material objects such as rivers and bridges and metaphorical or sensual worlds like poems and symphonies? Aesthetics studies both the creation of works and the beholding of others' creations, including works of art, natural landscapes, and built structures. Teachings from Greek and Roman philosophers such as Plato, Aristotle, Cicero, and Seneca provided the fundamental concepts of art: mimesis (representations of the seen or imagined); poiesis (the creative act of the maker); and aesthesis (the consequences in the witness of undergoing the work). Martin Heidegger combines all three in his suggestion that "art is truth setting itself to work".

Early aestheticists found that epistemological foundations in rationality and objectivity eclipsed the experienced world of subjective, emotional, and sensory phenomena. Rather than ideas about the world, aestheticists wanted to face the material world itself with all the capacities of the embodied, conscious, unconscious, and mortal human being to see, hear, feel, and imagine. The eruption of phenomenology into the world of philosophy influenced both the developments of epistemology and aesthetics. The pioneering works of Hegel, Edmund Husserl, and Heidegger illuminated the human experience of existing as an embodied, unique human being within an objective and subjective universe, poised to make relational contact with one another. Pragmatist John Dewey insisted that aesthetic moments are not acts of neutral observation but are experiences themselves, and that one undergoes a work in a potentially transformative act. The artist is not the impersonal observer gathering data but is the unique seer expressing the sequelae of the act of seeing itself.

My interview with tissue engineer Gordana Vunjak-Novakovic exposed the creative powers of aesthetics in the practice of a scientist. Columbia University Professor, professor of biomedical engineering, and director of research for stem cell and tissue engineering at Columbia University, Vunjak-Novakovic investigates means to replace damaged cartilage in joints, restore jawbones destroyed by tumour, and rebuild ailing parts of infarcted heart muscle. The goal of her teams is to build human organs from biological antecedents. Leonardo da Vinci is her hero. Inspired by his dazzling simultaneity of thought, she has travelled the world in search of pages from his notebooks. His pluripotency is the model for her own layered life in science and art. She told me how it was Lawrence Durrell's novel *Alexandria Quartet* that gave her the idea of her work as "sliding planes":

> "Each of the sliding planes is an entity, a body of knowledge in some way. Then they sort of travel past each other, and… somehow get into sync and connect with each other…[In *Alexandria Quartet*], there were three sliding planes that are three different [characters'] perspectives…And then the fourth plane was the time. That is how the book was constructed, I believe, and this is how we live. This is how we do science."

Her scientific teams are widely interdisciplinary:

> "This accidental, unexpected sort of new experience, it happens, I believe, more often if you work at the interfaces of disciplines. If you are in a very well-established, old scientific field…there is much less chance that you can go off tangent in a new direction. Many of us live outside our zone of comfort most of the time. And then you hear a little thing that inspires you to try something completely different, so it's much easier to slide down this path into something surprising."

Later in the interview, she mused:

> "The world is so beautifully connected, everything is connected to everything. You just need to find a way to say it."

Knowing and seeing require connections between the internal world of the seer or knower, the external world of the seeable and knowable, and the world of witnesses who receive what becomes seen or known. These connections, what I call "telling", are achieved through narrative acts. Sound, speech, text, performance, physical contact, music, and visual images are some of the many narrative forms through which telling occurs. Were there no telling or listening, each individual would be isolated in their cosmos. The only exit would be a shared language. Wittgenstein hopes that his "language is not a 'private' one. Someone else might understand it as well as I." Telling entails a transfer, whether the transmission is a sonnet, a mathematical equation, or a published scientific paper. Telling creates a network, bridging from neuron to neuron, person to person, culture to culture, or time to time. To call it communication belies its mystery. It

Further reading

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is, more fundamentally, the way towards relation, the bridge of contact between people and groups. Without narrative, there is no friendship, no learning, no culture, no taking care.

Narrative phenomena emerged in Neanderthal cave paintings. They later flourished in Indigenous oral traditions and cultural origin stories like the *Book of Genesis* and Homer's *Odyssey*. Whether transmitted by bardic recitation, classical drama, or written text, the exchanges between artists and spectators have created the broth of culture that nourished, challenged, propagated, and shaped the emerging civilisations. Narratology matured in the late 19th century in literary studies, semiotics, and linguistics. Anglo-American concepts of close reading and French structuralist studies in the mid-20th century expanded narratology's breadth. By the 1980s, historians, social scientists, psychoanalysts, film-makers, lawyers, and physicians discovered the narrative dimensions of their work. In all these fields, narratologists pose socially urgent questions about collectivity and individuality, imagination and fact, and memory and speculation. Digital narratology, cognitive narrative studies, rhetorical narratology, narrative law, and narrative medicine have all become generative facets of this discipline.

My interview with Nabila El-Bassel confirmed the necessity of listening to all "telling" voices. A Columbia University Professor in the School of Social Work and Director of the school's Social Intervention Group, El-Bassel is an international leader in studying some of the most intractable global health problems: opioid use disorder, HIV infection, mass incarceration, domestic violence, misogyny, and racism. In high school in Yafa, Israel, she read 14th-century historian Ibn Khaldûn's *Muqaddimah*, which insists on combining science with culture to understand and improve the human condition, and has followed his tenets ever since. Funded by NIH for a project to reduce opioid overdose deaths, she breaks new ground in quantitative and qualitative means of confirming and applying her hypotheses:

> "[We] create a coalition within each county that consists of people with lived experience with drugs or family members who have lost people because of drugs and also policy makers, health care professionals, scientists, local government officials, clergy, communication and media experts to come up with best strategies to be implemented to solve the issues."

She incorporates systems science quantitative and qualitative modelling and frontier analytical approaches to understand how complex systems work:

> "Systems science [is] a powerful tool for community engagement and advances equity by incorporating voices from all stakeholders, including those frequently marginalized, and permitting identification of the community-specific drivers of inequities through the use of local data."

El-Bassel and her interprofessional teams are listeners, seekers of their subjects' lived experiences, making sure that incarcerated individuals, people suffering intimate partner violence, sex workers, drug users, and people living with HIV—from New York to Kazakhstan—are seen, heard, and valued. She declared at the close of our interview that:

> "In order to solve social issues, you need to bring the voices of the people into the solution."

Recognising the fundamental roles of epistemology, aesthetics, and narrative studies in medical research and practice circumvents costly and outmoded oppositions between arts and sciences, between quantitative and qualitative research, between engagement and objectivity in clinical work, and between evidence-based population science and narrative-based accounts of the individual patient. Conceiving of scholars, artists, clinicians, and investigators collectively as knowers, seers, and tellers who all rely on creative acts of imagination as well as on empirical replicable findings could open paths toward new powerful alliances. Such clinical challenges as maternal mortality, obesity, or trauma-related syndromes can be addressed with sliding planes of knowledge from arts and sciences, including the critical consciousness to address the social, political, and environmental determinants of ill health so as to advance health equity, effectiveness, and justice. Simultaneously, bioscience deepens its commitment to bring surprise and creativity into the lab.

In health care and beyond, knowing, seeing, and telling orient our thought and action. Agendas for justice, health, and survival are guided by our unconditional commitments to health equity and to racial, gender, and class equality. The resources of epistemology, aesthetics, and narrative together can guide collective actions necessary for the planet and its inhabitants to equitably survive. Knowing, seeing, and telling come together as clinicians and scientists care for individual patients and communities and are simultaneously the ally of the patient and the contributor to the scientific knowledge of health and disease. With all three discovery modes engaged, clinicians and scientists gradually recognise why suffering matters, how delicate is the balance between sickness and health, and how urgent is medicine's mission. Not fractionated but whole, health care's response to disease could then encompass the quests to comprehend phenomena deep within the cell and to confront social injustices vast across the Earth.

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