Connecting the Humanities and the Sciences: Part 1. "Think Different"*

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My fellow humanists,

I am deeply humbled to be here today. I know this is a standard statement to make at moments such as these, but in my case it has the added virtue of being true. There is no one on the list of Jefferson lecturers, beginning with Lionel Trilling, who is not an intellectual and artistic hero of mine, and I cannot fathom why I am part of this procession. But that makes me feel all the more humbled, so I thank you.

It is particularly meaningful for me to be giving this lecture on the 25th anniversary of the one by Walker Percy. I took the train from New York for that occasion, looking out of the window and thinking of his eerie essay about the malaise, "The Man on the Train." If memory serves, it was over at the Mellon Auditorium, and Lynn Cheney did the introduction.

Dr. Percy, with his wry philosophical depth and lightly-worn grace, was a hero of mine. He lived on the Bogue Falaya, a bayou-like, lazy river across Lake Pontchartrain from my hometown of New Orleans. My friend Thomas was his nephew, and thus he became "Uncle Walker" to all of us kids who used to go up there to fish, capture sunning turtles, water ski, and flirt with his daughter Ann. It was not quite clear what Uncle Walker did. He had trained as a doctor, but he never practiced. Instead, he seemed to be at home most days, sipping bourbon and eating hog's head cheese. Ann said he was a writer, but it was not until his first novel, *The Moviegoer*, had gained recognition that it dawned on me that writing was something you could do for a living, just like being a doctor or a fisherman or an engineer. Or a humanist.

He was a kindly gentleman, whose placid face seemed to know despair but whose eyes nevertheless often smiled. He once said: "My ideal is Thomas More, an English Catholic who wore his faith with grace, merriment, and a certain wryness."[i] That describes Dr. Percy well.

His speech twenty-five years ago was, appropriately enough for an audience of humanists, about the limits of science. "Modern science is itself radically incoherent, not when it seeks to understand subhuman organisms and the cosmos, but when it seeks to understand man," he said. I thought he was being a bit preachy. But then he segued into his dry, self-deprecating humor. "Surely there is nothing

wrong with a humanist, even a novelist, who is getting paid by the National Endowment for the Humanities, taking a look at his colleagues across the fence, scientists getting paid by the National Science Foundation, and saying to them in the friendliest way, 'Look, fellows, it's none of my business, but hasn't something gone awry over there that you might want to fix?'" He said he wasn't pretending to have a grand insight like "the small boy noticing the naked Emperor." Instead, he said, "It is more like whispering to a friend at a party that he'd do well to fix his fly."[ii]

The limits of science was a subject he knew well. He had trained as a doctor and was preparing to be a psychiatrist. After contracting tuberculosis, he woke up one morning and had an epiphany. He realized science couldn't teach us anything worth knowing about the human mind, its yearnings, depressions, and leaps of faith.

So he became a storyteller. Man is a storytelling animal, especially southerners. Alex Hailey once said to someone, who was stymied about how to give a lecture such as this, that there were six magic words to use: "Let me tell you a story." So let me tell you a story: Percy's novels, I eventually noticed, carried philosophical, indeed religious, messages. But when I tried to get him to expound upon them, he demurred. There are, he told me, two types of people who come out of Louisiana: preachers and storytellers. For goodness sake, he said, be a storyteller. The world has too many preachers.

For Dr. Percy, storytelling was the humanist's way of making sense out of data. Science gives us empirical facts and theories to tie them together. Humans turn them into narratives with moral and emotional and spiritual meaning.

His specialty was the "diagnostic novel," which played off of his scientific knowledge to diagnose the modern condition. In *Love in the Ruins*, Dr. Thomas Moore, a fictional descendant of the English saint, is a psychiatrist in a Louisiana town named Paradise who invents what he calls an "Ontological Lapsometer," which can diagnose and treat our malaise.

I realized that Walker Percy's storytelling came not just from his humanism – and certainly not from his rejection of science. Its power came because he stood at the intersection of the humanities and the sciences. He was our interface between the two.

That's what I want to talk about today. The creativity that comes when the humanities and science interact is something that has fascinated me my whole life.

When I first started working on a biography of Steve Jobs, he told me: "I always thought of myself as a humanities person as a kid, but I liked electronics. Then I read something that one of my heroes, Edwin Land of Polaroid, said about the importance of people who could stand at the intersection of humanities and sciences, and I decided that's what I wanted to do."[iii]

In his product demos, Jobs would conclude with a slide, projected on the big screen behind him, of a street sign showing the intersection of the Liberal Arts and the Sciences. At his last major product launch, the iPad 2, in 2011, he ended again with those street signs and said: "It's in Apple's DNA that technology alone is not enough — it's technology married with liberal arts, married with the humanities, that yields us the result that makes our heart sing." That's what made him the most creative technology innovator of our era, and that's what he infused into the DNA of Apple, which is still evident today.

It used to be common for creative people to stand at this intersection. Leonardo da Vinci was the exemplar, and his famous drawing of the Vitruvian Man became the symbol, of the connection between the humanities and the sciences. "Leonardo was both artist and scientist, because in his day there was no distinction," writes science historian Arthur I. Miller in his forthcoming book, *Colliding Worlds.*

Two of my biography subjects embody that combination. Benjamin Franklin was America's founding humanist, but he was also the most important experimental scientist of his era. And his creativity came from connecting the two realms.

We sometimes think of him as a doddering dude flying a kite in the rain. But his electricity experiments established the single-fluid theory of electricity, the most important scientific breakthrough of his era. As Harvard professor Dudley Herschbach declared: "His work on electricity ushered in a scientific revolution comparable to those wrought by Newton in the previous century or by Watson and Crick in ours."

Part of his talent as both a scientist and humanist was his facility as a clear writer, and he crafted the words we still use for electrical flow: positive and negative charges, battery, condenser, conductor.

Because he was a humanist, he looked for ways that his science could benefit society. He lamented to a friend that he was "chagrined" that the electricity experiments "have hitherto been able to discover nothing in the way of use to mankind." He actually did come up with one use early on. He was able to apply what they learned to prepare the fall feast. He wrote, "A turkey is to be killed for our dinners by the electrical shock; and roasted by the electrical jack, before a fire kindled by the electrified bottle." Afterwards he reported, "The birds killed in this manner eat uncommonly tender."[iv] I think that I can speak for Dr. Percy and say that we Southerners ought to honor him as the inventor of the first fried turkey.

Of course his electricity experiments eventually led him to the most useful invention of his age: the lightning rod. Having noticed the similarity of electrical sparks and lightning bolts, he wrote in his journal the great rallying cry of the scientific method: "Let the experiments be made."[v] And they were. He became a modern Prometheus, stealing fire from the gods. Few scientific discoveries have been of such immediate service to mankind.

Franklin's friend and protégé, and our lecture's patron, Thomas Jefferson, also combined a love of science with that of the humanities. The week that he became Vice President in 1797, Jefferson presented a formal research paper on fossils to the American Philosophical Society, the scientific group founded a half century earlier by young Benjamin Franklin. Jefferson became president of the organization and held that post even as he served as President of the United States.

My point is not merely that Franklin and Jefferson loved the sciences as well as the arts. It's that they stood at the intersection of the two. They were exemplars of an Enlightenment in which natural order and Newtonian mechanical balances were the foundation for governance.

Take for example the crafting of what may be the greatest sentence ever written, the second sentence of the Declaration of Independence.

The Continental Congress had created a committee to write that document. It may have been the last time Congress created a great committee. It included Benjamin Franklin, Thomas Jefferson, and John Adams.

When he had finished a rough draft, Jefferson sent it to Franklin in late June 1776. "Will Doctor Franklin be so good as to peruse it," he wrote in his cover note, "and suggest such alterations as his more enlarged view of the subject will dictate?"[vi] People were more polite to editors back then than they were in my day.

Franklin made only a few changes, some of which can be viewed on what Jefferson referred to as the "rough draft" of the Declaration. (This remarkable document is at the Library of Congress.) The most important of his edits was small but resounding. Jefferson had written, "We hold these truths to be sacred and undeniable…" Franklin crossed out, using the heavy backslashes that he often employed, the last three words of Jefferson's phrase and changed it to the words now enshrined in history: "We hold these truths to be self-evident."

The idea of "self-evident" truths came from the rationalism of Isaac Newton and Franklin's close friend David Hume. The sentence went on to say that "all men are created equal" and "from that equal creation they derive rights." The committee changed it to "they are endowed by their creator with certain inalienable rights."[vii]

So here in the editing of a half of one sentence we see them balancing the role of divine providence in giving us our rights with the role of rationality and reason. The phrase became a wonderful blending of the sciences and humanities.

The other great person I wrote about who stood at the intersection of the sciences and humanities came at it from the other direction: Albert Einstein.

I have some good news for parents in this room. Einstein was no Einstein when he was a kid.

He was slow in learning how to talk. "My parents were so worried," he later recalled, "that they consulted a doctor." The family maid dubbed him "der Depperte," the dopey one.[viii]

His slow development was combined with a cheeky rebelliousness toward authority, which led one schoolmaster to send him packing and another to amuse history by declaring that he would never amount to much. These traits made Albert Einstein the patron saint of distracted school kids everywhere. But they also helped to make him, or so he later surmised, the most creative scientific genius of modern times.

His cocky contempt for authority led him to question received wisdom in ways that well-trained acolytes in the academy never contemplated. And as for his slow verbal development, he thought that it allowed him to observe with wonder the everyday phenomena that others took for granted. "When I ask myself how it happened that I in particular discovered relativity theory, it seemed to lie in the following circumstance," Einstein once explained. "The ordinary adult never bothers his head about the problems of space and time. These are things he has thought of as a child. But I developed so slowly that I began to wonder about space and time only when I was already grown up. Consequently, I probed more deeply into the problem than an ordinary child would have."

His success came from his imagination, rebellious spirit, and his willingness to question authority. These are things the humanities teach.

He marveled at even nature's most mundane amazements. One day, when he was sick as a child, his father gave him a compass. As he moved it around, the needle would twitch and point north, even though nothing physical was touching it. He was so excited that he trembled and grew cold. You and I remember getting a compass when we were a kid. "Oh, look, the needle points north," we would exclaim, and then we'd move on — "Oh, look, a dead squirrel" — to something else. But throughout his life, and even on his deathbed as he scribbled equations seeking a unified field theory, Einstein marveled at how an electromagnetic field interacted with particles and related to gravity. In other words, why that needle twitched and pointed north.

His mother, an accomplished pianist, also gave him a gift at around the same time, one that likewise would have an influence throughout his life. She arranged for him to take violin lessons. After being exposed to Mozart's sonatas, music became both magical and emotional to him.

Soon he was playing Mozart duets with his mother accompanying him on the piano. "Mozart's music is so pure and beautiful that I see it as a reflection of the inner beauty of the universe itself," he later told a friend.[ix] "Of course," he added in a remark that reflected his view of math and physics as well as of Mozart, "like all great beauty, his music was pure simplicity."[x]

Music was no mere diversion. On the contrary, it helped him think. "Whenever he felt that he had come to the end of the road or faced a difficult challenge in his work," said his son, "he would take refuge in music and that would solve all his difficulties."[xi] The violin thus proved useful during the years he lived alone in Berlin wrestling with general relativity. "He would often play his violin in his kitchen late at night, improvising melodies while he pondered complicated problems," a friend recalled. "Then, suddenly, in the middle of playing, he would announce excitedly, 'I've got it!' As if by inspiration, the answer to the problem would have come to him in the midst of music."[xii]

He had an artist's visual imagination. He could visualize how equations were reflected in realities. As he once declared, "Imagination is more important than knowledge."[xiii]

He also had a spiritual sense of the wonders that lay beyond science. When a young girl wrote to ask if he was religious, Einstein replied: "Everyone who is seriously involved in the pursuit of science becomes convinced that a spirit is manifest in the laws of the Universe – a spirit vastly superior to that of man, and one in the face of which we with our modest powers must feel humble."[xiv]

At age 16, still puzzling over why that compass needle twitched and pointed north, he was studying James Clark Maxwell's equations describing electromagnetic fields. If you look at Maxwell's equations, or if you're Einstein and you look at Maxwell's equations, you notice that they decree that an electromagnetic wave, such as a light wave, always travels at the same speed relative to you, no matter if you're moving really fast toward the source of the light or away from it. Einstein did a thought experiment. Imagine, he wrote, "a person could run after a light wave with the same speed as light."[xv] Wouldn't the wave seem stationary relative to this observer? But Maxwell's equations didn't allow for that. The disjuncture caused him such anxiety, he recalled, that his palms would sweat. I remember what was causing my palms to sweat at age 16 when I was growing up in New Orleans, and it wasn't Maxwell's equations. But that's why he's Einstein and I'm not.

He was not an academic superstar. In fact, he was rejected by the second best college in Zurich, the Zurich Polytech. I always wanted to track down the admissions director who rejected Albert Einstein. He finally got in, but when he graduated he couldn't get a post as a teaching assistant or even as a high school teacher. He finally got a job as a third class examiner in the Swiss patent office.

Among the patent applications Einstein found himself examining were those for devices that synchronized clocks. Switzerland had just gone on standard time zones, and the Swiss, being rather Swiss, deeply cared that when it struck seven in Bern in would strike seven at that exact same instant in Basel or Geneva. The only way to synchronize distant clocks is to send a signal between them, and such a signal, such as a light or radio signal, travels at the speed of light. And you had this patent examiner who was still thinking, What if I caught up with a light beam and rode alongside it?

His imaginative leap — a thought experiment done at his desk in the patent office — was that someone travelling really fast toward one of the clocks would see the timing of the signal's arrival slightly differently from someone travelling really fast in the other direction. Clocks that looked synchronized to one of them would not look synchronized to the other. From that he made an imaginative leap. The speed of light is always constant, he said. But time is relative, depending on your state of motion.

Now if you don't fully get it, don't feel bad. He was still a third-class patent clerk the next year and the year after. He couldn't get an academic job for three more years. That's how long it took most of the physics community to comprehend what he was saying.

Einstein's leap was not just a triumph of the imagination. It also came from questioning accepted wisdom and challenging authority. Every other physicist had read the beginning of Newton's *Principia*, where the great man writes. "Absolute, true, and mathematical time, of itself and from its own nature, flows equably without relation to anything external." Einstein had read that, too, but unlike the others he had asked, How do we know that to be true? How would we test that proposition?

So when we emphasize the need to teach our kids science and math, we should not neglect to encourage them to be imaginative, creative, have an intuitive feel for beauty, and to "Think Different," as Steve Jobs would say. That's one role of the humanities.

Einstein had one bad effect on the connection between the humanities and the sciences. His theory of relativity, combined with quantum theory that he also pioneered, made science seem intimidating and complex, beyond the comprehension of ordinary folks, even well-educated humanists.

For nearly three centuries, the mechanical universe of Newton, based on absolute certainties and laws, had formed the psychological foundation of the Enlightenment and the social order, with a belief in causes and effects, order, even duty. Newton's mechanics and laws of motion were something everyone could understand. But Einstein conjured up a view of the universe in which space and time were dependent on frames of reference.

Einstein's relativity was followed by Bohr's indeterminacy, Heisenberg's uncertainty, Gödel's incompleteness, and a bestiary of other unsettling concepts that made science seem spooky. This contributed to what C.P. Snow, in a somewhat overrated essay with one interesting concept, called the split between the two cultures.

My thesis is that one thing that will help restore the link between the humanities and the sciences is the human-technology symbiosis that has emerged in the digital age.

Endnotes

[i] Walker Percy interview, *The Paris Review*, Summer 1987. This draws from a piece I wrote on Percy in *American Sketches* (Simon and Schuster, 2009).
[ii] Walker Percy, "The Fateful Rift: The San Andreas Fault in the Modern Mind," Jefferson Lecture, May 3, 1989.
[iii] Author's interview with Steve Jobs.
[iv] Benjamin Franklin to Peter Collinson, Apr. 29, 1749 and Feb. 4, 1750.
[v] Benjamin Franklin to John Lining, March 18, 1755.
[vi] Thomas Jefferson to Benjamin Franklin, June 21, 1776. This draws from my *Benjamin Franklin: An American Life* (Simon and Schuster, 2003).
[vii] See, Pauline Maier, *American Scripture* (New York: Knopf, 1997); Garry Wills, *Inventing America*, (Garden City: Doubleday, 1978); and Carl Becker, *The Declaration of Independence* (New York: Random House 1922).
[viii] Albert Einstein to Sybille Blinoff, May 21, 1954. This draws from my *Einstein: His Life and Universe* (Simon and Schuster, 2007).
[ix] Peter Bucky, *The Private Albert Einstein*, (Andrews Macmeel, 1993), 156.
[x] Albert Einstein to Hans Albert Einstein, Jan. 8, 1917.
[xi] Hans Albert Einstein interview in Gerald Whitrow, *Einstein: The Man and His Achievement* (London: BBC, 1967), 21.
[xii] Bucky, 148.
[xiii] George Sylvester Viereck, *Glimpses of the Great* (New York: Macauley, 1930), 377. (First published as "What Life Means to Einstein," *Saturday Evening Post*, October 26, 1929.)
[xiv] Einstein to Phyllis Wright, Jan. 24, 1936.
[xv] Albert Einstein, "Autobiographical Notes," in Paul Arthur Schilpp, ed. *Albert Einstein: Philosopher-Scientist* (La Salle, Ill.: Open Court Press, 1949), 53.

[Note: This essay version has been partitioned and subtitled by the editors in order to facilitate student interaction. It may not conform in all details to the spoken lecture or transcript.]