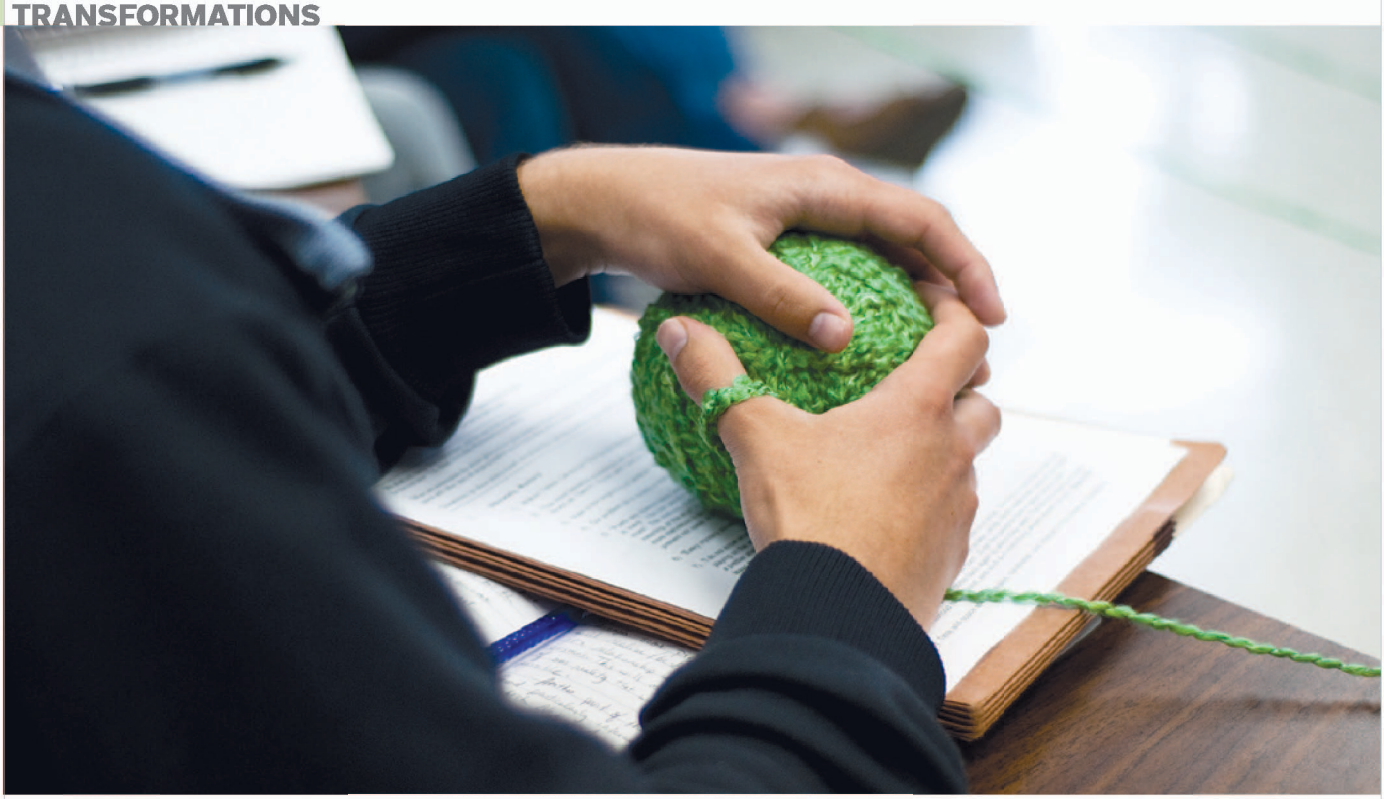

From Black Elk to Black Holes

A joint venture to integrate the intuitive and the rational By Dave Pruett

The true voyage of discovery lies not in seeking new landscapes but in having new eyes.
— Marcel Proust, French novelist

Ten years ago, with considerable trepidation, I left my academic comfort zone. To my continuing amazement and gratitude, some courageous undergraduates followed — and sometimes led — into a new dimension of intellectual exploration. For the first time I was teaching an honors course, From Black Elk to Black Holes: Shaping a Myth for a New Millennium (HON 200D). Although delighted to have the opportunity to teach a course that had been germinating for several years, I wondered whether, as a mathematics professor, I might be out of my depth.

The premise of the course was to view the universe from vastly different perspectives — from a mythological perspective of Native Americans on the one hand and a modern scientific perspective on the other — and then to look for resonances between these seemingly disparate and possibly irreconcilable worldviews.

Humans have two primary ways of knowing. Let's call them head knowledge and heart knowledge. The Black Elk to Black Holes course was born in the recognition that most humans, particularly in the West, struggle to effectively integrate these two modes of making sense of the world. For me that struggle was acute. On the one hand, I had majored in engineering, loved mathematics and science, was a child of the space race, and had worked for NASA. On the other hand, I have a "poet nature" and had learned over the years to listen carefully to the still, small voice of intuition. These two sides — the rational and the intuitive — often seemed in conflict. I had begun to suspect that the roots of the conflict were societal and universal.

There were no guarantees that a course so conceived could or would work, and in the first weeks I experienced considerable anxiety over it — until one fateful day. We were preparing to discuss our first text, *Black Elk Speaks,* an American classic about the life and wisdom of a Lakota ("Sioux") holy man. In Lakota mythology, the four cardinal directions — north, south, east and west — are personified by four benevolent "grandfather" spirits. When Rebecca, one of the discussion leaders, inquired before class "Which direction is east?" I knew it would be a good day, and it was. The four student leaders, of their own initiative, assumed the roles of the four grandfathers. The resulting discussion was riveting. It was, in fact, the best day in my teaching career.

With uncanny synchronicity, just a few weeks before the second student-led discussion, a magazine arrived in the mail bearing an article titled "The Great Initiation." It remains to this day the single most enlightening article I have read, and it afforded clear-eyed context for what the course was trying to accomplish. In it, cultural historian Richard Tarnas summarizes the Western dilemma:

> In a sense, the modern soul's allegiance is to Romanticism, while the modern mind's allegiance is to the Enlightenment. And science rules the outer cosmos and the objective world, while the Romantic aspirations of our poetry, our music, our spiritual yearnings rule the interior world of the modern soul. That's the schizophrenia all of us grew up with in

PHOTOGRAPHS BY MIKE MIRIELLO ('09M)

the 20th century. There is no easy congruence between those two radically different worldviews — yet, to use Faust's term, they are somehow forced to 'cohabit within our breast.'

In short, Westerners are afflicted by a kind of collective "schizophrenia," torn between conflicting allegiances. In the individual psyche, this manifests as disharmony between mind and spirit. At the cultural level, it manifests as animosity between science and religion.

Prior to the publication in 1543 of Copernicus' *De Revolutionibis,* truth was to be found in religious authority, and meaning in religious mythology. Both placed the human squarely at the center of the universe, literally and figuratively. The Copernican revolution, a revolution in cosmology, ushered in a paradigm shift of monumental proportions. First, Copernicus' heliocentric theory of the solar system dethroned the Earth and its inhabitants from the center of the cosmos. More broadly, Copernicanism launched the Age of Reason, in which the locus of truth shifted from ecclesiastical authority to direct experience in the form of scientific inquiry. Big Bang cosmology and the deep-space images of the Hubble Space Telescope are but aftershocks of the intellectual seismic waves that Copernicus unleashed 450 years ago.

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While the Copernican Revolution was yet in mid-stride, a mild-mannered biologist named Charles Robert Darwin scandalized Victorian England in 1859 with the publication of *The Origin of Species.* Freud observed later that Darwinism was the "second blow to human narcissism." Darwin upset our biological sense of place as unceremoniously as Copernicus had upended our physical sense of place. Fearing the firestorm of controversy his theory would unleash, Darwin delayed publication for 20 years. As continuing controversies over genetic engineering, embryonic stem-cell research and intelligent design attest, Darwin's fears were well-founded.

Science and religion tell compelling but conflicting stories about our origins. The scientific story speaks to our rational selves, but is largely devoid of meaning. The religious story speaks to our intuitive selves and our need for meaning, but it often denies the facts. Each story, although compelling, is incomplete. In Einstein's most famous aphorism, "Science without religion is lame; religion without science is blind." And so the Western psyche is faced with a choice between competing mythologies, neither of which leads to wholeness. In the words of eco-theologian Thomas Berry, "We are in trouble just now because we do not have a good story. We are between stories."

When all is said and done, Black Elk to Black Holes is about crafting a new story. It is an opportunity for individual and collective mythmaking. This is not merely an academic exercise. Our mythology shapes our future.

What form will the new story take? Foremost, to speak to our rational and our intuitive natures it must synthesize modern scientific knowledge with time-honored wisdom. As a model, a particularly hopeful synthesis of scientific and religious thought can be found in the writings of the French paleontologist, priest and mystic Pierre Teilhard de Chardin. As a man of the cloth and deep faith, Teilhard

Mathematics professor Dave Pruett (above) leads a discussion during his honors course. A ball of yarn is used as a "talking stick," and a web of connections is formed as students connect to each other, connect ideas, and connect rational and intuitive modes of knowing.

Dave Pruett credits the use of a ball of yarn during student-led discussions to former 2004 student Colleen Gorman. The yarn web symbolizes several intentions of the course: connecting ideas and individuals.

wished to die on an Easter Sunday, a wish granted by a massive heart attack on April 10, 1955. As a paleontologist who carried a geology hammer on every outing, Teilhard embraced evolution to the core of his being, believing that "evolution is a light illuminating all facts."

How did a man of such faith arrive at so bold a view of evolution? By the simple recognition that the nature of nature is to change: this indeed is the central message of both the Copernican and the Darwinian revolutions. Keenly aware of 20th-century developments in cosmology, among them that the universe is expanding, having originated in a "primordial atom" (to use fellow scientist-priest George Lemaitre's original term for the Big Bang), Teilhard grasped that evolution applies not just to biological processes but to the universe as a whole. The universe, as he experienced it, is continually unfolding. For this process he coined the beautiful term "cosmogenesis."

The more one views the universe through the wide-angle lens of cosmogenesis, the more resonance one finds between scientific understanding and traditional wisdom. The revelations of modern science — Darwin's tree of life, wave-particle duality, quantum entanglement, even the space-time web of general relativity — all have mythological counterparts if one is willing to grant oneself a certain poetic license.

For their final writing assignment, my first honors students crafted personal "myths of meaning" from the strands of the course. These were written as brief letters to a beloved grandchild from the hypothetical perspective of old age and near death. At our last class meeting, we shared those myths while seated in the "sacred hoop"— a circle. I was overwhelmed by the wisdom in those letters, and after reading them in private following that last class meeting, I wept for a long time at their beauty and power. There is hope for the world if these students are its future.

A decade later, Black Elk to Black Holes is in its fifth offering. It is no longer experimental, which may mean it is destined to be around for a while longer. I hope so. The subtitle is now Tales of a Mysterious Universe. But it is still about the story of the cosmos and our place in it.

In the preface to one class text, *What is Life?,* the author, quantum physicist Erwin Schrödinger wrote: "The very name [*university*] given to the highest institutions of learning reminds us that, from antiquity and throughout many centuries, the universal aspect has been the only one to be given full credit." That original and noble calling of higher education has largely been lost to the explosion and subsequent fragmentation of knowledge. At few major institutions of higher learning would a holistic course such as Black Elk to Black Holes have seen the light of day, let alone be celebrated. I cannot adequately express my gratitude to the JMU community for the inspiration of students and the support and encouragement of colleagues. I look forward to continuing this journey with future undergraduates. m

About the Author *Dave Pruett, JMU professor of mathematics, is the first recipient of the JMU Mengebier Endowed Professorship. Pruett joined the JMU faculty in 1996 and holds an undergraduate degree in mechanical engineering from Virginia Tech and M.S. and Ph.D. degrees in applied mathematics from the Universities of Virginia and Arizona, respectively. He has nearly a decade of aerospace-related experience at NASA Langley Research Center. He earned the 2004 Distinguished Teaching Award and 2008 Madison Scholar award from the College of Science and Mathematics and the 2008 Provost's Award for Excellence in Honors Teaching. Pruett is writing the book* At the Dawn of the Third Copernican Revolution, *which is based upon themes from the Black Elk to Black Holes course.*