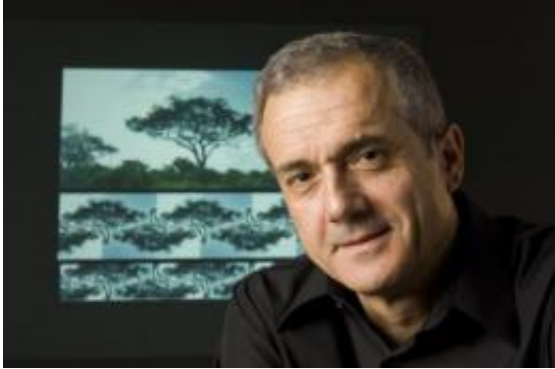


# Is March Madness always the same?

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This is Adrian Bejan of Duke University. Credit: Duke University Photography

Why is it that the same teams seem to dominate the annual men's collegiate basketball tournament? For that matter, why does the same small group of institutions seem to top annual best-college rankings?

According to a theory developed by a Duke University engineer, these hierarchies are not only natural, but predictable. Just as continually growing streams flow into a larger river, or smaller and smaller branches grow out from a single tree trunk, examples of these hierarchies abound in the natural world.

Whether it is a river or [basketball](#) rankings, there can only be a few at the "top" of the hierarchy, while there are many below. Once this pattern is established, like a river digging a wider and deeper bed over time, it is difficult to change it, said Adrian Bejan, engineering professor at Duke's

Pratt School of Engineering.

These hierarchies can be predicted by the [constructal law](#), which Bejan developed 15 years ago and has been using to describe and predict man-made and natural phenomenon. The theory is based on the principle that flow systems evolve their designs to minimize imperfections, reducing [friction](#) or other forms of resistance, to flow more easily in time.

The best players will tend to choose winning programs, and these programs send higher percentages of athletes to the NBA, which in turn attracts the best players, said Bejan, who was a member of Romania's national select basketball team in the late 1960s and a starter on a club team that competed internationally.

The successful programs get the blue-chip recruits with less "effort" than lower-ranked schools, Bejan said. The same proves true in academia, he added, since universities with reputations like CalTech or MIT will naturally attract the brightest scientists-to-be with less effort.

The results of Bejan's analysis were published online March 1 in the *International Journal of Design and Nature & Ecodynamics*. The research was supported by the National Science Foundation and the U.S. Department of the Navy.

Though the academic and athletic rankings may seem similar on the surface, they are completely different flow systems existing in the same space: a college campus, Bejan said.

"Academic excellence and basketball excellence are two different flow [hierarchies](#) in the same place, like the spread of early man across the continents or river basins on the landscape," Bejan said. "Together they show how the evolution of sports allows us to witness biological evolution."

Athletic competition is an ideal medium to study evolution because its outcome is so simple and direct – an athlete or team either wins or loses. No other factors come into play. Bejan has already shown in [previous studies](#) that athletes have grown bigger, taller and faster over the past 100 years. Their growth is almost three times that of average people over the same time frame.

"The science of sports evolution is a significant step in evolutionary biology, where the accepted view is that evolution is impossible to observe because of its long timeframe," Bejan said. "With sports, we can focus on a particular population of athletes and witness 'live' the evolution of the design and performance of this selected group."

Universities, on the other hand, have multiple objectives with their individual measurements.

"While in sport you just have to win, a university must cover a much wider spectrum of pursuits, from engineering, literature, the arts and so on," Bejan said. "Had the two rankings been related, sports and academics, you would see more of the same universities at the top of both rankings. Most of the universities appear only in one of the [rankings](#) -- they seem to separate themselves into two different worlds."

Bejan believes that the term scholar-athlete may be a misnomer.

"When educators and sports announcers refer to college players and scholar-athletes, they misrepresent both worlds," he said. "A more accurate name would be 'basketball students,' just as engineering students are those who study engineering. This stresses the idea that the global flow of education is a superposition of evolving vasculatures associated with the various disciplines that are a part of the university's mission."

Provided by Duke University

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