Stanford student gaining cult status for rethinking NBA philosophy

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Muthu Alagappan arrived at Stanford University with his heart set on attending medical school, and he still hopes to become a doctor someday.

Revolutionizing the NBA is just his hobby.

Somehow, though, goofing around with basketball stats after work one day led to a discovery that has made Alagappan, 23, a cult figure in the growing field of sports analytics. "If Moneyball revolutionized baseball," GQ Magazine wrote, 'Muthuball' could mark a new frontier for the NBA."

Two years ago, Alagappan was an intern at Ayasdi, a Palo Alto-based startup company, using the company's proprietary software to tackle complex problems such as cancer research and accelerated drug discovery.

On a lark, he asked his boss if he could see what the software would do with basketball stats. Within an hour, the program spit out clusters of color-coded notes that Alagappan now calls "the true positions of the NBA."

His discovery has opened up a whole new basketball debate - a Pandora's box-and-one, if you will. Alagappan argues that basketball's traditional five positions are as outmoded as James Naismith's peach basket, insisting instead that there are at least 10 distinct positions.

And he has the topological data analysis to prove it.

"The positions are kind of the alphabet by which everything around basketball revolves," Alagappan said. "If we can redefine the alphabet in terms of these 10 or 13 positions, then we can hopefully change all of the strategy that the game is built on."

Alagappan first proposed his discovery at MIT's Sloan Sports Analytics Conference in 2012. The presentation captured first prize, as well as the attention of NBA executives and the national media.

Forbes magazine selected Alagappan to its "30 Under 30" list of influential sports industry figures last year, putting him with LeBron James, Usain Bolt and Sidney Crosby. Alagappan's work has also been dissected in The New York Times, ESPN, The Wall Street Journal, Wired and (in a negative review) Slate.

Two NBA teams have secured a formal partnership to hear more: the defending champion Miami Heat and the Portland Trail Blazers. During these playoffs, a representative from the Heat checks in with Alagappan before each series to help compile a data-oriented scouting report.

Beyond the box score

The Warriors have no official partnership with Alagappan, but Golden State's assistant general manager, Kirk Lacob, has had dinner with his fellow Stanford grad to hear the kid out.

"It's interesting because I think it caught a lot of people off guard when he first presented this idea," Lacob said, referring to the MIT conference.

"But Muthu really went an extra mile and proved what a lot of people

were starting to think. He put it down on paper more succinctly and more exactly what people were thinking while others were just throwing things at the wall.

"I don't really know how much stock NBA teams have put in it, but certainly it's another example of where basketball-and sports in general-have gotten in analytics. They're starting to look at things past the regular box score. It's a cool time to be in sports."

Alagappan is hardly the first person to crunch the numbers in basketball. Houston Rockets general manager Daryl Morey, most notably, is an MIT MBA who grew up reading Bill James' "Baseball Abstracts" before becoming one of the first NBA executives to value analytics. Alagappan is proud to point out that Morey's former executive vice president of basketball operations, Sam Hinkie, earned his MBA from Stanford.

Hinkie left Houston to take over as the general manager of the Philadelphia 76ers.

Other scientific-minded hoops writers, such as Ken Pomeroy of kenpom.com, have opened new portals of debate. Alagappan is just trying to hasten the evolution.

Scheming with precision

During a recent meeting at the Ayasdi offices in Palo Alto, just before he headed off to class, Alagappan sat down to lay out his vision for the NBA future. Armed with slides and a methodical, academic presentation, his message was essentially the same one he delivered MIT, as well as subsequent speaking gigs at South by Southwest and the TedX in Spokane, Wash.

Alagappan likes to open with a parable about medicine, noting that

almost 2,000 years ago the Roman physician Galen theorized that all illnesses could be classified under one of four bodily fluids. As science evolved, doctors grew to understand that diseases and their cures were much more complex.

And so it is now with basketball, Alagappan says, arguing that the oversimplified constructs of point guard, shooting guard, small forward, power forward and center should be replaced by a more sophisticated list of positions as varied as "low-usage ballhandlers," such as Trevor Ariza and Courtney Lee, to "midrange big men" such as Brandon Bass and Glen Davis.

Even youth league coaches know that the traditional positions are just rough sketches and that, say, some point guards are pass-first while some are eager shooters. But Alagappan says Ayasdi's software offers a chance to identify precise or even undetected differences, and to therefore scheme with more precision.

Founded in 2008 by Stanford academics, Ayasdi makes sense of complicated data sets by arranging them in shapes, using topology. Gunnar Carlsson, a Stanford mathematics professor and company co-founder, explained to The Wall Street Journal earlier this year that topology helps researchers look at a set of data and think about its similarities, even when some of the underlying details might be different.

Understanding the blend

To demonstrate how topology can apply to hoops, Alagappan puts up a slide showing the topological networks of two contrasting NBA teams from the 2010-11 season. This is from his original MIT presentation before he had whittled his proposed 13 positions down to its current 10.

Both graphics connect every player on the roster with lines. Dense groups form clusters wherever players have similar statistical profiles.

The slide showing Team A was a visually balanced concoction of "scoring rebounders," two "paint protectors" and a variety of ballhandlers with complementary skills. This was the NBA champion Dallas Mavericks

Team B was a lopsided mess with a preponderance of ballhandlers but zero scoring rebounders. GQ once described this graphic as looking "wrong, like a car with three wheels about to tip over." This graphic represented the last-place Minnesota Timberwolves.

General managers who better understand the blend might have a better chance of creating what now is loosely defined as "chemistry."

"We're trying to develop new ways of playing basketball that have never been tried before," Alagappan said. "We might not be Hall-of-Fame coaches, but we're using software that's really, really intelligent. It can predict things that you might be able to try."

Alagappan resists trying to explain the Warriors' playoff success, warning that the sample size is too small. But asked to explain how the team could withstand the loss of All-Star power forward David Lee, he speculated that giving the bulk of Lee's minutes to small forward Draymond Green, a three-point shooting threat, might have opened up the floor and allowed the Warriors to capitalize on penetration and ball movement.

Lee, he said, would be classified as a "scoring rebounder," a position the Warriors already had in abundance with Andrew Bogut and Carl Landry. As Alagappan wrote in an email: "Thus, a combination of spreading the floor, increasing shot selection versatility, and reducing positional

redundancy are likely reasons for the Warriors improved play."

'Going to get pushback'

Not everyone is impressed. Alagappan's critics argue that most coaches-from the youth league on up-already understand that basketball's current five positions are merely rough sketches of skill sets. Former Warriors coach Don Nelson, to name one, earned a spot in the Hall of Fame with an innovative approach to positions; he was known to unleash a lineup of small, quick players to torment a plodding opponent-traditional definitions be damned.

Slate, sizing up Alagappan's list of proposed positions, concluded that there was nothing new, at least in terms of concepts: "NBA teams already approach the question of positions with greater nuance than the box score does. General managers look for defensive-minded bigs, volume scorers, wing defenders and other player-types that are not listed in the box score."

Alagappan, a fan of the data-driven "Moneyball" philosophy that has kept the A's a small-payroll contender, said he expected to hear from critics.

"Any time you're putting out a new idea that either challenges the existing paradigm or threatens people currently doing a job because of the current paradigm, you're going to get a lot of pushback," he said. "We've actually been lucky in that it hasn't been that bad."

Alagappan said that his data's value is in quantifying what, for lesser coaches, had merely been a hunch. Moreover, he said, clarifying what a player brings to the court can help front offices put together more efficient rosters as well as identify undervalued players.

"Some coaches - obviously the best ones - get paid to do this and (Gregg) Popovich and a lot of the best coaches are doing this kind of analysis in their head," Alagappan said.

"But the limits of the human brain exist. With this technology, we can do what the best coaches have been doing in their minds for years and kind of give that to everyone, not just the Popoviches and the Phil Jacksons of the world."