



Switched-On Sports

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Gideon Ariel: The Future of Sports Performance

Gideon Ariel, a 39-year-old Israeli scientist, is revolutionizing the world of sports through biomechanics and computer analysis. Ariel believes that the future of sports lies in technology, and he is leading the way with his innovative methods. He uses high-speed movies to capture athletes in motion, then breaks down the film to analyze the body in segments. This detailed analysis allows him to measure and weigh everything from timing and relative speeds of limb and body segments to changes in centers of gravity.

Ariel's company, Computerized Biomechanical Analysis (CBA), is based in Amherst. Despite its modest exterior, the company is a hub of innovation, with a \$600,000 shop filled with cutting-edge technology. Ariel and his team use a range of tools, including a \$30,000 force platform, to measure different types of pressure and improve athletes' performance.

Ariel's work has already yielded interesting results. For example, he was asked to compare the golf swings of Jack Nicklaus and Gerald Ford. His analysis found that while Ford has a smoother and faster overall swing, his timing is not as efficient as Nicklaus'.

Ariel's vision for the future of sports includes biomechanical clothing, running on packaged air, and lifting weights with a computer. He believes that the current state of sports in the country is in the dark ages and hopes his work will help bring about a new era of technological advancement in athletics.

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Below find a reprint of the 5 relevant pages of the article "Switched-On Sports" in "The Boston Globe":



ON SPORTS

led at the School of Exercise Science at UMass, for his masters degree.

There he came up with the digitizer, a screen lined with 20,000 tiny microphones that, when touched with a pen, registers the information in a computer.

In 1966, he rented Darnel's timing-sharing computer and, in 1971, he founded CBA. With contracts from Spalding and Univis, to test equipment, Ariel made enough money to buy his own computers. In 1972, he received his PhD in exercise science, and the rest is history.

"I am only responsible to myself, and that is good," Ariel says, "but this country stops progress. Every time I have a new idea, I get hit with a lawsuit. There were soon too many to respond to in writing, so now I have those on the computer, too."

Ariel, a man with infectious energy and a sharp accent even though he has been here 14 years, has ideas about all sports, most of which he does not play.

On golf: "People think what makes a good swing is the follow-through. That means nothing. It's the energy released before the club hits the ball. The follow-through is only the energy left in the club."

On tennis: "The follow-through there,

ion, is a waste. When Bjorn Borg turns his racket over, it is only for show. The ball is long gone. The ball is on the racquet only four milliseconds. The difference between a good backhand and a bad one is three degrees. Racquets of the future will be wooden. Who says you need strings? The wood will be split so if you miss in that three degrees, you will still have a chance."

On kayaking: "In the United States, the athletes accelerate at the beginning of the stroke. They should accelerate at the end, like the Europeans. It keeps the tip of the bow down in the water."

On juggling shoes: "Too much shock. People will wear inflatable shoes soon; they will run on air mattresses."

On crew: "In the future, people will row at different times. The first two will be like pistons in a car, constantly moving. Much more efficient."

That is Ariel's whole philosophy. Eliminate waste, make the human body more efficient. Make life less agonizing. It costs Ariel \$100 a day to run his operation, and he refuses to operate at a deficit.

"My idea make sense," Ariel says. "It does not matter that I know nothing

about golf. The physical laws are the same. Gravity is gravity. A hip is a hip. The computer eliminates errors. Ariel builds bodies. Ariel has developed a computerized universal weightlifting machine, but he has met resistance and lawsuits from manufacturers.

"It is difficult to change people's ideas," Ariel says, "to tell them to junk a million dollars worth of junk. New companies wipe out old, that's why the lawsuits. People just don't realize that going by old standards when new are available is like wearing a raincoat in the desert. No sense."

The US Olympic organization has asked Ariel to apply his ideas to its sports. He is working in Colorado Springs, in Squaw Valley and in Massachusetts, with 20 Olympic teams.

Since 1975, Ariel has worked with discus thrower Mac Wilkins. A former Olympic, Ariel has a special affection for the sport.

Wilkins' best in 1975 was 219 feet. The world record was 228.8. Ariel told Wilkins he could throw 200 according to the computer. The second time Wilkins used Ariel's advice, he broke the world

record, eventually throwing 224 and winning the gold in Montreal.

"The hard part," Wilkins says, "is applying what he says to the body. You might hear it, you might believe it, but getting your body to do it is another story."

Wilkins and shooter Al Feuerbach are in Amherst now, dancing around Ariel's force platform. Now 20 years old, Feuerbach will listen to anything.

"This is my first time dealing with Gideon," Feuerbach says, "but Olympic athletes need any advantage they can find. When you see what the East Germans are doing, you see how technological sport has become."

It is an obvious thought. Ariel's biomechanical approach, his stick figure resembling Jack Nicklaus on a screen, his analyzer program and his some pen bear a lively resemblance to 2001.

"People worry about that," Ariel says, "about taking the art out of sport. But since the time they checked a runner or measured a high jumper, we've been headed this way. And there's still one thing I can't change so easily... God. He still plays the major role in the development."

SWITCHED.

In Amherst, Gideon Ariel is putting athletes' movements into computers and coming up with ways to improve performance. The applications of technology to games is apparently the wave of the future, and, to Ariel, the future is now.

By Lesley Visser
Club Staff

According to Gideon Ariel, people one day will wear biomechanical clothing. They will run on packaged air and will lift weights with a computer.

Nothing is so outrageous that it cannot be discussed. Most things of this nature, in fact, have made the 20-year-old Israeli scientist rich.

"Sport in this country is in the dark ages," Ariel says, "and most coaches are witches."

Whether it's one of his favorite words, the simultaneous dismissal of athletic equipment, most athletic techniques and almost all dietary habits in this country, jargon-juggling doesn't escape his disgust.

"I run 3 miles a day," he says. "I know the danger to the joints. We'll be the healthiest cardio-respiratory society be-

How can the eye tell if the shoulder is turned a degree too far to the left? A coach can maybe guess right, but that's all."

Ariel has set up his \$400,000 shop in Amherst, between Eric Galt Doherty and Dutch Boy past store. Like through the looking glass, the Computerized Biomechanical Analysis (CBA) operation seems unduly modest from the outside.

Inside, though, director of research Ariel, president Alan Perry and fellow programmer Alan Blitstein climb over wrestling mats to plug in components, wires and synthesizers. Ariel is arranging a \$100,000 force platform. It will measure four kinds of pressure: vertical, forward, sideways and twisting.

"But this is just a dust with no food," he says, jumping on the force platform. "It is hooked up to a half-million-dollar bullet."

Ariel is wonderfully metaphorical. In an effort to help the layman understand, he will reduce Isaac Newton's laws to simple stories.

"For more acceleration, you must have enough deceleration," he says. "You can go quicker through a windshield when the car is stopped by a tree. It's the same principle when you drive a dress."

Ariel is interested in the relationship between an athlete's moving parts. He says the biomechanics of all sports, throwing, kicking, hitting or jumping, is a coordinated summation of forces.

To analyze the separate parts frame by frame (for example, shoulder, upper arm, forearm, wrist and hand), Ariel traces the movements with a Graf Pen digitizer, then hooks the information on a Data General Nova computer that plays the information on a screen.

This summer, Ariel was asked to compare Jack Nicklaus' golf swing with Greg Norman's. He found that President Ford actually has a smoother and faster overall swing than Nicklaus but his timing is not as efficient. Ford's cart's map better club.

"We measured their centers of gravity," Ariel says. "Ford shifts his center of gravity from a position 30 centimeters behind his left foot to 10 centimeters behind it, a displacement of 11 centimeters. Nicklaus' center of gravity moves only three centimeters."

It took Ariel almost 10 years to complete the programming and development of his company, now partly owned by former manufacturing executive Larry Graham. After Ariel graduated from the University of Wyoming in 1966, he stud-

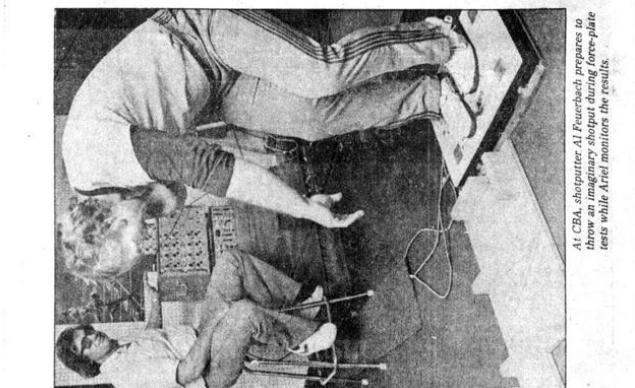
ing in wheelchairs."

Who is this careful character with the voluminous facts and unguarded opinions? He is Gideon Ariel, king of biomechanics as applied to athletics and a sensation-skilled man who has taken on the world of sport and is waiting for the rest of history to catch up with him.

Ariel's expertise is computer analysis of athletes after he has taken high-speed movies of them. He captures the athletes in motion, then breaks down the film to show the body in segments.

The performance is analyzed into timing, relative speeds of limb and body segments and changes in centers of gravity. Everything is measured and weighed. From the results, a thick computer printout, techniques are modified to improve an athlete's performance.

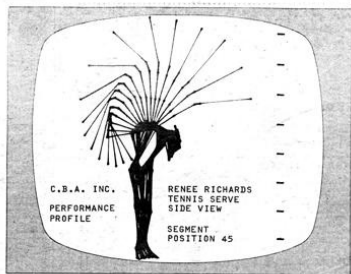
The human eye cannot quantify human movement," Ariel says. "Exterior movements happen too fast to follow.



At CBA, shooter Al Feuerbach prepares to throw a shot put while Ariel monitors the results.



To Gideon Ariel, the brains behind Computerized Biomechanical Analysis, nothing is so outrageous it cannot be discussed. His ideas are proof of that.



What the tests come down to is something like this: The computer's breakdown of the tennis serve of Renee Richards.

Discus thrower Mac Wilkins, left, coach Paul Ward, center, and Arvid examine the results of a test on an oscilloscope.