



Scientist blows the whistle

To learn which sport the youngster should spend his high school and college years mastering

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Scientist Blows the Whistle

In 1984, Dr. Gideon Ariel, a former Israeli Olympic team discus thrower and a two-time PhD holder in computer science and exercise science, uses advanced technology to determine the best sport for a promising 14-year-old athlete. Ariel uses a variety of tests, including bone measurements, reflex tests, high-speed photography, genetic examinations, muscle strength tests, jumping ability measurements, and cardiovascular capacity and flexibility checks. The results suggest the boy could excel in cycling, swimming, football, tennis, or discus throwing.

Ariel criticizes the slow adoption of technology in athletic training in the US, citing the example of shot put where East Europeans have outperformed Americans due to their more effective technique. Ariel's method involves creating a "cartoon" of the athlete's action using ultra-high-speed movie footage, which allows for the measurement of acceleration and force of all body parts at any given point in the action.

Despite his groundbreaking work, Ariel notes that many experienced coaches are resistant to change. Ariel has moved his Computerized Biomechanical Analysis lab to Southern California, where he plans to test Olympic athletes from around the world and offer services to improve performance in various sports.

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Below find a reprint of the 2 relevant pages of the article "Scientist blows the whistle" in "Winnipeg Free Press":

Scientist blows the whistle on coaches



Gideon Ariel says computer age techniques can

By Earl Gustkey

It is 1984. A high school coach arrives at the Coto Sport Research Centre in Southern California with a promising-looking athlete, a 14-year-old freshman.

Purpose of the visit: to learn which sport the youngster should spend his high school and college years mastering.

He spends 10 days at the centre. Dr. Gideon Ariel measures the boy's bones, tests his reflexes, photographs him running, jumping and throwing with 10,000-frame-per-second movie cameras, examines his parents for genetic characteristics, tests his muscle strength on electric weight-training machines, measures his jumping ability on force plates and checks his cardiovascular capacity and flexibility.

Tests completed, Ariel condenses a stack of computer printouts into a brief analysis that suggests the boy's best chance of sports success would be as a cyclist. Or a swimmer. Or a football player. Or a tennis player. Or a discus thrower.

It would be rushing things to say Gideon Ariel has lifted American coaches out of the Stone Age and set them down in the 21st century. Or forced them to turn in their whistles for computers. For one thing, he says, many of them prefer the Stone Age.

"It's incredible to me that the nation that put men on the moon is so slow to change its athletic training concepts," he said.

"But there are many experienced coaches who just don't like to be told they've been doing something wrong for years.

"Take the shot put, for example. We used to have three men on the Olympic victory stand. Now, none. Why? The East Europeans outcoached us, that's why.

"Computers show us the most effective way to put the shot is to use a short glide across the ring and a long arm stroke. That's how the East Europeans do it. American coaches, generally speaking, coach a long glide and short arm stroke.

"I compiled a complete report on the... containing indisputable evidence of this. It wasn't complicated. It was simply high level, Newtonian physics. Now what happened? A U.S. committee coach took it from me to my... in his drawer and told me to my... it to anybody... That's G... year-old fo... (he's a U.S... looking ath... and high s... He's a tw... science an... Today, h... ence-biome... pic Commi... Ariel's p... highspeed... performi... stick dra... and joint... "cartoon... enabling a... tion and f... given poi... "How c... javelin t... javelin w... lease?" A... can't see... tion of a... Few pe... and field... spectator... can rival... soaring 3... But to... moment li... second w... human h... eternal tr... spear.

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me to my face he wasn't going to show it to anybody.

That's Gideon Ariel, the acerbic, 46-year-old former Israeli Olympic team member who started tinkering with computers and high speed cameras 10 years ago. He's a two-time PhD — in computer science and exercise science.

Today, he's a director of computer science-biomechanics for the U.S. Olympic Committee.

Ariel's method involves taking ultra-highspeed movie footage of an athlete performing. The frames are turned into stick drawings, showing body bones and joints. Eventually, a sequential "cartoon" of the action is created, enabling a viewer to measure acceleration and force of all body parts at any given point in the action.

"How can a coach teach, say, a javelin thrower how to release the javelin when he's never seen a release?" Ariel asks. "The human eye can't see it — it occurs in a fraction of a second."

Few people on earth can see track and field like Gideon Ariel can. To the spectator in a stadium, few sights can rival the majesty of a javelin soaring 300 feet through the air.

But to Ariel, the true beauty of the moment lies in that unseen fraction of a second when the javelin leaves the human hand, when the athlete brings eternal truths of physics to bear on the spear.

Construction to start

Ariel worked seven years at his Computerized Biomechanical Analysis, Inc. lab in Amherst, Mass. But he's moved west. Ground will break soon at Coto de Casa, a private club in the foothills of Orange County, south of Los Angeles, for the multimillion-dollar Coto Sport Research Centre.

Ariel says Olympic athletes from throughout the world will be tested there. Some other projected services:

□ A golfer will be shown how to get 20 more yards off the tee (for \$1,500).

□ NFL placekickers will be filmed and yardaged. "I will guarantee them 10 more yards," Ariel says.

□ Young athletes will be directed into sports most suitable for their natural ability and potential.

□ Tennis players will be shown how to deliver a faster serve.

Ariel has personally tested a lot of noted athletes and fed data into his computers. But he also can gather data from ordinary movie films and videotapes. Here are some random Ariel

observations, based on his studies of athletes in different sports:

RENALDO NEHEMIAH, hurdler, pending world record holder — "He could win the gold medal in the 100-metre dash. His hurdles really isn't that good. It's not as good as Hayes Jones', or Lee Calhoun's. He's a tremendous natural sprinter."

WOMEN'S VOLLEYBALL — "Of America's best female athletes volleyball players, on the national team. Two of them I've could be world-class javelin throwers or high-jumpers. As for volleyball, showed them that as soon as the telegraphing their hits at them they'll start winning more international matches."

FRANKLIN JACOBS, 7-7 U.S. jumper — "Look at Jacobs' screen and what's interesting is him is not his height (5-8), his knees. He only has 90-degree flex in his knees, which means he'd have to lock his knee on takeoff driving off a structure, in effect, great advantage to him."

"By the way, the computer that the most efficient way of jumping is to approach the straight-on, instead of the side off on one foot and go over belly. Why no jumpers have tried it, I know."

VALERIE BRUMEL, Soviet Olympic jump world record holder — "Use flop, he would've jumped 7-11."

U.S. KAYAKERS — "On the first stroke, the maximum force is exerted on the second half of the stroke. Americans apply too much force on the first half of the stroke."

MARTINA NAVRATILOVA, tennis player — "She has more talent than any of the women players. She should be playing everyone else off the court. But she has too much rotary action on strokes, increasing the error margin."

CREW — "In an eight-man shell will go faster if the oarsmen in a two-two-two sequence, instead of all at once. There will be a 5 per cent average velocity. The problem is, difficult stroke pattern to coordinate."

ANN MEYERS, woman basketball player — "She has the potential to break the women's world record in high jump. She can raise her center of gravity 60 centimetres in a vertical jump."

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