



Ariel Dynamics Inc. Media Library - Video

CBS Morning News



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Synopsis



In the world of sports, computers are now being used to enhance the performance of athletes. Gideon Ariel's company, Computerized Biomechanical Analysis, uses computers to analyze athletes' movements and suggest improvements. One of the athletes Ariel worked with was Olympic champion Mack Wilkins, a discus thrower. Ariel's analysis helped Wilkins break the world record. Ariel's firm is also hired by sports equipment manufacturers to improve the design of their products. Ariel is developing exercise equipment and training devices for athletes and for rehabilitation and physical therapy. Ariel's computers have been able to project the limits of human achievement in sports. Ariel believes that with today's technology, Jesse Owens would still be a champion and Secretariat would beat Man O' War.

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Audio transcription

Frame	#	Time	Spoken text
	0.	00:00:00	On the CBS morning news exactly 13 minutes before the hour.
	1.	00:00:05	In this age of instant replays and electronic wizardry, it should come as no surprise to sports fans that computers are now being used to make mediocre athletes less mediocre and to make superstars more super.
	2.	00:00:20	But what is surprising is just how many ways a computer can be used in the sports world.
	3.	00:00:26	In any sport, whether you're throwing something, or hitting something, kicking something, or trying to out-lift, out-run, or out-jump somebody, there are certain laws to be obeyed.
	4.	00:00:47	Not those laws laid down by Abner Doubleday or Pete Rozelle, but those laid down a long time ago by Sir Isaac Newton.
	5.	00:00:55	They are the basic laws of physics, expressed in equations having to do with mass and weight, speed and acceleration, force and torque.
	6.	00:01:03	Most athletic coaches are not into Newtonian equations, but Gideon Ariel is.
	7.	00:01:09	Ariel's company, Computerized Biomechanical Analysis, studies the way athletes do what they do, and with the help of computers, analyzes their moves, projects how well they ought to be able to do, and what they might do differently to realize their potential.
	8.	00:01:23	Olympic champion Mack Wilkins, the discus thrower, was one athlete Ariel worked with.
	9.	00:01:29	Ariel, a former Israeli Olympic shot putter himself, took slow motion movies of Wilkins doing his stuff last March.
	10.	00:01:36	Then, frame by frame, he fed into the computer the movement and position of certain joints. Those were read out as coordinates on a graph.

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	11.	00:01:44	<i>With certain known factors, such as Wilkins weight and size, the length of his limbs, the mass of those joints, the computer was able to come up with the thousands of calculations necessary for Ariel to tell Wilkins how he could do better.</i>
	12.	00:01:56	<i>Mind you, he was doing pretty well as it was. He was throwing the discus 218 feet, and the world record was 226 feet.</i>
	13.	00:02:04	<i>But Ariel's analysis indicated that by doing certain things differently, he could do better than that.</i>
	14.	00:02:09	<i>He's more lifting up than actually pulling the discus. So one of the comments that we told him, we didn't have to go to Mack and say, you will result in forces at 75 degrees.</i>
	15.	00:02:21	<i>But we told him, Mack, try to pull the discus at that location and bring your chest as much as possible forward rather than upward.</i>
	16.	00:02:31	<i>Wilkins pulled, as Ariel suggested, and kept both feet on the ground as he suggested.</i>
	17.	00:02:36	<i>And not only did he go on to win the Olympic gold medal, but in the first official throw he made after getting Ariel's advice, he threw 232 feet, shattering the old world record.</i>
	18.	00:02:47	<i>Ariel says one reason the East German Olympic team did so well last time is that their coaches have been using biomechanical analysis, not computerized as far as we know.</i>
	19.	00:02:57	<i>But with the equipment this country has, Ariel says we should be able to do it far better than any other country in the world.</i>
	20.	00:03:05	<i>Tennis pros have been consulting Ariel, too, to find out what really happens when a tennis ball hits a racket.</i>
	21.	00:03:11	<i>After testing every kind of tennis ball, Ariel worked up a special ball, and now, using special high-speed film taken at over 10,000 frames per second, he's testing rackets to see how they can be improved.</i>
	22.	00:03:24	<i>There, too, Sir Isaac Newton turns out to be an ace. His forehand and backhand may not have been much, but his overhead smash is famous.</i>
	23.	00:03:37	<i>Sometimes we don't recognize a good idea until it hits us in the head.</i>
	24.	00:03:41	<i>Now, sports equipment manufacturers are hiring Ariel's firm to find out if there are better ways to design and make things for athletes to wear and use.</i>
	25.	00:03:49	<i>Shoes, for instance.</i>
	26.	00:03:51	<i>Using a force platform, Ariel generates hundreds of thousands of bits of data, which the computer records and remembers and can work with.</i>
	27.	00:04:00	<i>You take a big truck and a little Volkswagen car, and you have different tires on the car.</i>
	28.	00:04:07	<i>Well, why? Because the different forces, the shock absorption characteristics are different for a big truck versus a small car.</i>
	29.	00:04:13	<i>But you take a 300-pound athlete, size 11 shoes, and 150-pound athlete, size 11 shoes, and they wear the same shoes.</i>
	30.	00:04:21	<i>That doesn't make sense. The reason is that nobody bothered to calculate what's going on in the shoe.</i>
	31.	00:04:27	<i>Really, the shoe was not designed for the man.</i>
	32.	00:04:29	<i>Ariel is also developing exercise equipment, training devices for use by athletes or for rehabilitation, physical therapy.</i>
	33.	00:04:38	<i>Computers will program the workload and store the information for coaches and doctors.</i>
	34.	00:04:43	<i>You can make a ball or a bat or a racket or a shoe out of different materials, but the materials you can't change are ones like bone and muscle.</i>
	35.	00:04:52	<i>At some point, under some amount of strain, bone will fracture, muscle will tear.</i>
	36.	00:04:57	<i>And because those are known quantities, Ariel's computers have been able to project what the limits are of human achievement,</i>
	37.	00:05:02	<i>how fast a human being will ever be able to run, to jump, to throw.</i>
	38.	00:05:07	<i>All forms of athletic endeavor have limits, and Ariel says he now knows what they are.</i>
	39.	00:05:13	<i>In some cases, as in Bob Beeman's broad jump in the 1968 Olympics, the limit has already been reached or something very close to it.</i>
	40.	00:05:20	<i>In others, man and woman have a long way to go.</i>

Frame	#	Time	Spoken text
	41.	00:05:24	The shot put record is now just over 70 feet.
	42.	00:05:28	Ariel projects that man is capable of throwing a 16-pound ball close to 100 feet.
	43.	00:05:33	And if you can tell the future, surely computerized biomechanical analysis should be able to settle some of the longstanding bar bets of all time.
	44.	00:05:41	Would Jesse Owens still be a champion in today's competition?
	45.	00:05:44	Ariel says he would, using today's shoes and on today's tracks.
	46.	00:05:48	Would Secretariat beat Man O' War?
	47.	00:05:51	Ariel says he can tell.
	48.	00:05:53	The theoretical possibilities are fascinating.
	49.	00:05:56	Charles Osgood, CBS News, Amherst, Massachusetts.

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