



Ariel Dynamics Inc. Media Library - Video

History of Biomechanics



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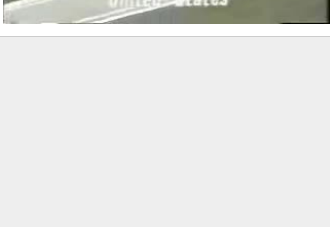
Synopsis







In 1969, the first biomechanical company in the world, CBI Inc, was established and began working with athletes. The company, led by Ariel, used biomechanical analysis to improve athletic performance. Ariel's advice helped an athlete win an Olympic gold medal and break a world record. Ariel's firm was hired by sports equipment manufacturers to improve the design of their products. Ariel also developed exercise equipment and training devices for athletes and for rehabilitation. Ariel's computers were able to project the limits of human achievement in athletics. The United States Olympic Committee announced that it would use a computer contributed by Data General to improve the performances of American Olympic contenders. Ariel's system was used to analyze and optimize the performance of athletes.








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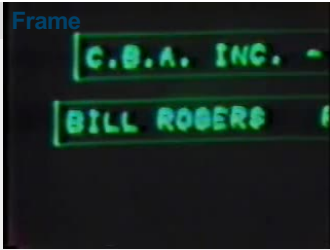





Audio transcription



Frame	#	Time	Spoken text
	0.	00:00:00	<i>In 1969, we started the first biomechanical company in the world, CBI Inc, which started</i>
	1.	00:00:07	<i>working with the athletes.</i>
	2.	00:00:08	<i>And here is the continuation of the video.</i>
	3.	00:00:11	<i>Look at this poll, as Ariel suggested, and kept both feet on the ground, as he suggested.</i>
	4.	00:00:16	<i>And not only did he go on to win the Olympic gold medal, but in the first official throw</i>
	5.	00:00:20	<i>he made after getting Ariel's advice, he threw 232 feet, shattering the old world record.</i>
	6.	00:00:27	<i>Ariel says one reason the East German Olympic team did so well last time is that their coaches</i>
	7.	00:00:32	<i>have been using biomechanical analysis, not computerized as far as we know.</i>
	8.	00:00:36	<i>But with the equipment this country has, Ariel says we should be able to do it far better</i>
	9.	00:00:41	<i>than any other country in the world.</i>
	10.	00:00:45	<i>Tennis pros have been consulting Ariel too to find out what really happens when a tennis</i>
	11.	00:00:49	<i>ball hits a racket.</i>
	12.	00:00:51	<i>After testing every kind of tennis ball, Ariel worked up a special ball, and now using special</i>

Frame	#	Time	Spoken text
	13.	00:00:57	<i>high-speed film, taking up over 10,000 frames per second, he's testing rackets to</i>
	14.	00:01:02	<i>see how they can be improved.</i>
	15.	00:01:03	<i>There too, Sir Isaac Newton turns out to be an ace.</i>
	16.	00:01:07	<i>His forehand and backhand may not have been much, but his overhead smash is famous.</i>
	17.	00:01:17	<i>Sometimes we don't recognize a good idea until it hits us in the head.</i>
	18.	00:01:21	<i>Now sports equipment manufacturers are hiring Ariel's firm to find out if there are better</i>
	19.	00:01:25	<i>ways to design and make things for athletes to wear and use, shoes, for instance.</i>
	20.	00:01:31	<i>Using a force platform, Ariel generates hundreds of thousands of bits of data, which the</i>
	21.	00:01:36	<i>records and remembers and can work with.</i>
	22.	00:01:41	<i>You take a big truck and a little Volkswagen car, and you have different tires on the</i>
	23.	00:01:47	<i>cars,</i>
	24.	00:01:48	<i>but why?</i>
	25.	00:01:51	<i>Because the different forces, the shock absorption car, police, are different for a big</i>
	26.	00:01:52	<i>truck</i>
	27.	00:01:51	<i>versus a small car.</i>
	28.	00:01:52	<i>But you take a 300-pound outlet, size 11 shoes, and 150-pound outlet, size 11 shoes,</i>
	29.	00:02:07	<i>and they</i>
	27.	00:02:00	<i>wear the same shoes, that doesn't make sense.</i>
	28.	00:02:03	<i>The reason is that nobody bothered to calculate what's going on in the shoe.</i>
	29.	00:02:07	<i>The really the shoe was not designed for the man.</i>
	30.	00:02:10	<i>Ariel is also developing exercise equipment, training devices for use by athletes or for</i>
	31.	00:02:15	<i>rehabilitation, physical therapy.</i>
	32.	00:02:17	<i>Computers will program the workload and store the information for coaches and doctors.</i>
	33.	00:02:23	<i>You can make a ball or a bat or a racquet or a shoe out of different materials, but the</i>
	34.	00:02:28	<i>materials you can't change are ones like bone and muscle.</i>
	35.	00:02:32	<i>At some point, under some amount of strain, bone will fracture, muscle will tear, and</i>
	36.	00:02:37	<i>because those are known quantities, Ariel's computers have been able to project what</i>
	37.	00:02:40	<i>the</i>
	37.	00:02:40	<i>limits are of human achievement, how fast a human being will ever be able to run, to</i>
	38.	00:02:45	<i>jump, to throw.</i>
	39.	00:02:47	<i>All forms of athletic endeavor have limits, and Ariel says he now knows what they are.</i>
	40.	00:02:53	<i>In some cases, as in Bob Beaman's Broad Jump in the 1968 Olympics, the limit has</i>
	41.	00:02:57	<i>already</i>
	42.	00:02:57	<i>been reached or something very close to it.</i>
	43.	00:03:00	<i>In others, man and woman have a long way to go.</i>
	44.	00:03:04	<i>The shot-put record is now just over 70 feet.</i>
45.	00:03:08	00:03:08	<i>Ariel projects that man is capable of throwing a 68-pound ball close to 100 feet.</i>
45.	00:03:13	00:03:13	<i>If you can tell the future, surely computerized biomechanical analysis should be able to</i>
46.	00:03:18	00:03:18	<i>settle</i>
46.	00:03:18	00:03:18	<i>some of the long-standing bar bets of all time.</i>
47.	00:03:21	00:03:21	<i>Would Jesse Owens still be a champion in today's competition?</i>
48.	00:03:24	00:03:24	<i>Ariel says he would, using today's shoes and on today's tracks.</i>

Frame	#	Time	Spoken text
	49.	00:03:28	Would Secretary at Beat Man of War?
	50.	00:03:31	Ariel says he can tell.
	51.	00:03:33	The theoretical possibilities are fascinating.
	52.	00:03:36	Charles Osgood, CBS News, Amherst, Massachusetts.
	53.	00:03:41	Tremendous amount of publicity was written about us, and a special article in sporty
	54.	00:03:47	was illustrated, brought us a very nice fame, where they call it Gideon Ariel and his magic
	55.	00:03:53	machine.
	56.	00:03:54	Dr. Daladek heard it and say, can we use it for an Olympic Training Center?
	57.	00:04:00	And I say yes.
	58.	00:04:01	Now coming up in a few moments, we'll also have a report on the latest member of the
	59.	00:04:04	Olympic team, a computer that analyzes the performance as a great athlete, and then some
	60.	00:04:09	not so great athletes.
	61.	00:04:10	We'll see what I mean in a few moments here.
	62.	00:04:14	Fifteen and a half before the hour now, the United States Olympic team is about to take
	63.	00:04:22	a long jump into the computer age.
	64.	00:04:24	It's getting a new team member, and it's a computer.
	65.	00:04:28	The United States Olympic Committee is announcing today that it's going to use a computer contributed
	66.	00:04:32	by a company called Data General to improve the performances of every American Olympic
	67.	00:04:37	contender.
	68.	00:04:39	With us this morning is Colonel Don Miller, he's Executive Director of the Olympic Committee,
	69.	00:04:43	and Dr. Gideon Ariel, he's a sports scientist, a former Israeli Olympic athlete who has developed
	70.	00:04:48	the system that we're about to show you.
	71.	00:04:50	Let's begin with you, Colonel Miller.
	72.	00:04:51	How much could a computer do for an athlete?
	73.	00:04:54	Very much, Tom.
	74.	00:04:57	I think it's a tremendous benefit to assist our athletes in perfecting their skills technique.
	75.	00:05:04	Athletes in other parts of the world are already using the system to analyze what they're
	76.	00:05:07	doing right and what they're doing wrong, I gather.
	77.	00:05:09	Yes, such as the East Germans are using the system, however, they do not have the sophistication
	78.	00:05:17	in their computer systems that we have in ours.
	79.	00:05:20	They cannot manipulate the maximum data that we can.

Frame	#	Time	Spoken text
	80.	00:05:24	Therefore, we are very confident that we will be much further ahead than the East German,
	81.	00:05:31	some of the other countries using the computer system in the very near future, if we are
	82.	00:05:35	not already ahead of them.
	83.	00:05:37	All right, Dr. Gideon Ariel is a man who developed the system, he's going to tell us
	84.	00:05:40	about it this morning.
	85.	00:05:41	First of all, you want to change the analysis from eyeball to hard scientific judgment,
	86.	00:05:45	I gather.
	87.	00:05:46	That's why you went ahead and did this.
	88.	00:05:47	Well, the human eye actually cannot see a performance because what performance is all
	89.	00:05:52	about is manipulation of forces in the body, and you cannot see forces, you can see movement.
	90.	00:05:58	The computer can give us the data to see forces and to be able to optimize performance.
	91.	00:06:04	Well, we're going to show you now some performances, one spectacular and one of what you make
	92.	00:06:08	your own judgment, because the other day, marathon champion Bill Rogers, the premier
	93.	00:06:12	runner in the world, he and I went out to run in Central Park and Dr. Ariel came along
	94.	00:06:16	to film us.
	95.	00:06:17	It was really a very simple and quick process, as you can see, I arranged to run first so
	96.	00:06:22	I could always finish ahead of Rogers as Dr. Ariel filmed this using an ordinary 16 millimeter
	97.	00:06:27	camera.
	98.	00:06:28	He shot it in slow motion.
	99.	00:06:30	We ran at various speeds, and then Dr. Ariel took the film back, processed it, and what
	100.	00:06:36	did you do with it after that?
	101.	00:06:38	Well, we fed or scanned actually your body segments into the computer, and the computer
	102.	00:06:43	can calculate displacement, velocity, acceleration, and from that calculate forces, and actually
	103.	00:06:48	to be able to compare you to Bill Rogers or to the horse that we also took.
	104.	00:06:53	All right, let's show some of that film now and some of the system that you used on the
	105.	00:06:56	computer, so we can show just what Dr. Ariel is talking about, changing from just an eyeball
	106.	00:07:01	analysis of it, to putting it on the computer that you can see in front.
	107.	00:07:05	Is that me running?
	108.	00:07:07	This is you running, actually, in the marathon place, and basically you see that you're landing
	109.	00:07:16	on the hill, which is deficiency, because most of the forces transmitted to your body,
	110.	00:07:22	and people that are running like they're 10, 15 miles, obviously, are going to have
	111.	00:07:26	some problems.
	112.	00:07:27	So the style of running is very, very important.
	113.	00:07:29	It was a composite picture of your leg motion.
	114.	00:07:33	Now, what am I, and we're talking about the center of gravity there, just for a moment,
	115.	00:07:36	have I be back to the center of gravity?

Frame	#	Time	Spoken text
	116.	00:07:38	Well, what we found out that you have a lot of waveform, your central gravity going up
	117.	00:07:43	and down, where when we compare it to Bill Rogers, that you see right now on the screen,
	118.	00:07:47	he's leaning forward a lot more.
	119.	00:07:48	Not only is leaning forward, but the central gravity does not displace up and down.
	120.	00:07:52	This is a critical factor in running.
	121.	00:07:54	And he lands more on the ball of his foot.
	122.	00:07:57	The best runners are landing on the ball of the foot.
	123.	00:08:00	It's enabling them to be more efficient and absorb some of the shock.
	124.	00:08:03	I see.
	125.	00:08:06	Bill Rogers, who is the premier Olympic, premier marathon runner in the world, and he's our
	126.	00:08:11	greatest hope, of course, for gold in the Olympics in 1980.
	127.	00:08:16	Can you do this not just with runners, but with distance with weights, men, and with
	128.	00:08:22	broad jumpers and pole boulders as well, long jumpers?
	129.	00:08:25	In fact, the system is much more efficient when you're doing it with power events, such
	130.	00:08:30	as throwing events, like in a discus or in the shot, and we have a lot of success in
	131.	00:08:33	that.
	132.	00:08:34	But aren't you afraid of tampering with a style of someone like Bill Rogers, who's at
	133.	00:08:37	the peak of his form and winning everything that he's involved in these days anyway?
	134.	00:08:40	No, because we basically found already some problem with his running where we can help
	135.	00:08:46	him even to be better.
	136.	00:08:49	Also the uniqueness about our technique that it's not invasive, in other words, we don't
	137.	00:08:53	touch the outlet.
	138.	00:08:54	We don't manipulate that.
	139.	00:08:55	We don't utilize external means.
	140.	00:08:57	You just suggest things that he ought to be doing, or she ought to be doing.
	141.	00:09:01	That's correct.
	142.	00:09:02	One of the things that you learn is that women often can shorten their stride and become
	143.	00:09:05	more efficient.
	144.	00:09:06	Yes, in fact, for a long time, people say, open you stride for a more efficient run.
	145.	00:09:11	We found out that that's not necessarily true, because you have to land with a sense of mass
	146.	00:09:14	of your body just above the feet.
	147.	00:09:16	So if you open your stride, you have a force that is the turn to the progression forward.
	148.	00:09:21	And will everyone have access to this Colonel Miller so that all American athletes will
	149.	00:09:25	have the same crack at it?

Frame	#	Time	Spoken text
	150.	00:09:26	<i>Yes, they will.</i>
	151.	00:09:27	<i>We have located the capability in both of our training centers in Squaw Valley and also</i>
	152.	00:09:33	<i>in Colorado Springs.</i>
	153.	00:09:35	<i>Our computer center will be located in Colorado Springs under Gideon's supervision, and all</i>
	154.	00:09:42	<i>athletes will be given an opportunity to optimize their skills, techniques through the</i>
	155.	00:09:49	<i>biomechanics system.</i>
	156.	00:09:51	<i>Colonel Miller, Dr. Gideon, thank you very much.</i>

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