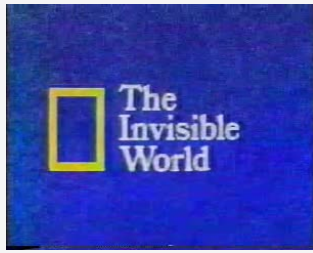




# Ariel Dynamics Inc. Media Library - Video

## Invisible World



<b>Code</b>	adi-vid-01058
<b>Title</b>	Invisible World
<b>Subtitle</b>	National Geographic Production
<b>Description</b>	...
<b>Subject</b>	Performance Analysis
<b>Duration</b>	00:06:17
<b>URL</b>	<a href="https://arielweb.com/videos/play/adi-vid-01058">https://arielweb.com/videos/play/adi-vid-01058</a>
<b>Date</b>	2003-10-21 19:12:21
<b>Label</b>	Approved
<b>Privacy</b>	Public










## Synopsis



The article discusses the evolution of cameras and their impact on our understanding of the world. It highlights the work of Edward Mybridge, who in the 1870s, invented a method to record fast movements, leading to the birth of motion pictures. His work was the first photographic analysis of physical motion. Today, high-speed cameras can record rapid motion with greater clarity. Slow motion film is now commonly used in analyzing athletic performance. However, even slow motion film cannot accurately depict the intricacies of movement. Dr. Gideon Ariel, a physical education expert, uses computers to analyze movement. Slow motion film of an athlete is projected frame by frame onto a recording screen, and the computer calculates the interrelationship of force, acceleration, and velocity in the athlete's movements. This data can pinpoint where athletic technique is hindering performance. The article concludes with an example of how this technology helped Olympic discus thrower, Mac Wilkins, improve his technique and set a new world record.

Model Id: gpt-4-0613  
Created on: 2023-09-19 01:19:58  
Processing time: 00:00:14.4990000  
Total tokens: 966

## Audio transcription

Frame	#	Time	Spoken text
	0.	00:00:00	<i>Today is never before, cameras and other instruments that see are radically expanding</i>
	1.	00:00:13	<i>the limits of our vision and knowledge, and altering forever our image of the world.</i>
	2.	00:00:26	<i>Through the specialized eyes of cameras come new dimensions of seeing, which our eyes alone</i>
	3.	00:00:33	<i>could never discern.</i>
	4.	00:00:37	<i>In a world of motion, there is infinite detail too fast for the unaided eye.</i>
	5.	00:00:46	<i>In the 1870s an ingenious photographer, Edward Mybridge, invented a way to record</i>
	6.	00:00:52	<i>movements</i>
	7.	00:00:57	<i>normally too quick to be seen.</i>
	8.	00:01:02	<i>A wager about the stride of a running horse brought Mybridge to the stock farm of a</i>
	9.	00:01:07	<i>wealthy</i>
	10.	00:01:12	<i>California.</i>

Frame	#	Time	Spoken text
	11.	00:01:20	<i>Mybridge's patron had bet that all four legs of a running horse were sometimes simultaneously</i>
	12.	00:01:25	<i>off the ground.</i>
	13.	00:01:28	<i>Stop action photography proved him to be right.</i>
	14.	00:01:41	<i>By projecting his photographs in rapid succession, the first motion pictures were born.</i>
	15.	00:01:51	<i>Much more than just a technical curiosity, Mybridge's pioneering work was the first</i>
	16.	00:01:56	<i>photographic analysis of the dynamics of physical motion.</i>
	17.	00:02:03	<i>Today, modern high-speed cameras can record rapid motion with a clarity that Edward Mybridge</i>
	18.	00:02:24	<i>could only have dreamed of.</i>
	19.	00:02:27	<i>Slow motion film is now a commonplace tool in analyzing athletic performance.</i>
	20.	00:02:35	<i>For Dr. Gideon Ariel, a physical education expert and a former discus drawer on the</i>
	21.	00:02:40	<i>Israeli Olympic team, slow motion film is just the first step in the scientific coaching</i>
	22.	00:02:46	<i>of athletes.</i>
	23.	00:02:51	<i>It is used to think that by looking on an athlete, they could tell what athlete does</i>
	24.	00:02:58	<i>right and what it does wrong.</i>
	25.	00:03:00	<i>Later on, they found out it's very complicated to start taking slow motion pictures.</i>
	26.	00:03:06	<i>But we find out, and coach is finding out, that even looking on a slow motion film, you</i>
	27.	00:03:11	<i>cannot tell what is right and what is wrong.</i>
	28.	00:03:14	<i>The reason is that in any movement, it's not what we see with our eyes that make the</i>
	29.	00:03:19	<i>difference, but the derivatives of what the IC, which is displacement, velocities,</i>
	30.	00:03:26	<i>accelerations, forces, we cannot see acceleration, we cannot see velocity.</i>
	31.	00:03:32	<i>It might appear fast or might appear slow, but the relationship of one segment to the</i>
	32.	00:03:36	<i>other in the body, we cannot see with our eyes.</i>
	33.	00:03:40	<i>Dr. Ariel has turned to the computer for aid in the analysis of movement.</i>
	34.	00:03:46	<i>Slow motion film of an athlete is projected frame by frame onto a recording screen.</i>
	35.	00:03:57	<i>Each touch of a sonic pen transmits into the computer memory, the dynamically changing</i>
	36.	00:04:02	<i>positions of the athlete's joints and limbs.</i>
	37.	00:04:13	<i>Human movement is governed by the same laws of motion that apply to the entire</i>
	38.	00:04:18	<i>physical world, and from the visual information contained in the film, the computer can rapidly</i>
	39.	00:04:24	<i>calculate the interrelationship of force, acceleration and velocity in the athlete's movements.</i>
	40.	00:04:35	<i>Computer-created images combined with a mass of numerical data can pinpoint where</i>
	41.	00:04:40	<i>athletic technique is hindering performance.</i>
	42.	00:04:47	<i>So what coaches in the past thought they can see with the eyes, we finding out you</i>
	43.	00:04:51	<i>do.</i>

Frame	#	Time	Spoken text
	44.	<b>00:04:52</b>	<i>You have to quantify.</i>
	45.	<b>00:04:53</b>	<i>With the advent of computers, we can provide the coaches with much more objective, reliable</i>
	46.	<b>00:04:58</b>	<i>information on how the body moves.</i>
	47.	<b>00:05:05</b>	<i>Dr. Ariel's computer analysis of Olympic discus thrower, Mac Wilkins, revealed that</i>
	48.	<b>00:05:11</b>	<i>useful energy which would affect his throw was being wasted on ground friction.</i>
	49.	<b>00:05:18</b>	<i>Additional force was being spent by not rigidly planting his forward leg at the moment of</i>
	50.	<b>00:05:23</b>	<i>the throw.</i>
	51.	<b>00:05:31</b>	<i>Based on this analysis, Wilkins altered his throwing technique.</i>
	52.	<b>00:05:55</b>	<i>Several months later in international competition, he threw the discus of a 13 feet farther than</i>
	53.	<b>00:06:00</b>	<i>he ever had before, and set a new world record.</i>

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