



Science Magazine Podcast Transcript, 16 February 2009

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Music

Host – Robert Frederick

Hello and welcome to this special *Science* Podcast from the 2009 AAAS annual meeting in Chicago, Illinois. It's February 16th. I'm Robert Frederick. In this short podcast we'll take an audio visit to Family Science Days: a kid-friendly annual tradition at the AAAS meeting.

Music ends

Host – Robert Frederick

When you step on to the floor at Family Science Days, you see lots of booths and kids everywhere.

[crowd noise]

Parent – Mike Anderson

Are you with Science Magazine.

Host – Robert Frederick

I am, yeah.

Parent – Mike Anderson

Oh, okay – Alright.

Host – Robert Frederick

Did you bring your kids here?

Parent – Mike Anderson

Yes.

Host – Robert Frederick

What's your name?

Parent – Mike Anderson

My name is Mike Anderson <phonetic>.

Host – Robert Frederick

Mike?

Parent – Mike Anderson

Yeah.

Host – Robert Frederick

Are these your three kids?

Parent – Mike Anderson

Yes, they are.

Host – Robert Frederick

Where are we right now? We're in front of the University of Chicago Materials Research Science and Engineering Center. What are they doing right now?

Parent – Mike Anderson

They're trying to figure out what these hands are doing (laughs).

Host – Robert Frederick

They look like they're filled with sand or something like that. Maybe we can listen in.

Parent – Mike Anderson

Yeah, let's listen in and we'll see.

Demonstrator – Eileen Sheu

Uh-oh.

Host – Robert Frederick

What's your full name?

Demonstrator – Eileen Sheu

Eileen Sheu.

Host – Robert Frederick

Eileen, what's going on here?

Demonstrator – Eileen Sheu

What we're doing is, we're pulling the air out of the sand, so we're making it jam. It's a non-equilibrium state, and it becomes really really hard.

Host – Robert Frederick

So these are rubber-filled gloves with sand, and you're pulling the air out by using a vacuum, and that makes the gloves really rigid, so you can transform them into shape, is that it?

Demonstrator – Eileen Sheu

So it jams.

Host – Robert Frederick

Have you been getting a lot of kids really interested in this?

Demonstrator – Eileen Sheu

Yes, a lot. They love this and they love all those demos, so...

Host – Robert Frederick

Yeah, very good. Thank you. Michael, is it OK if we talk to your kids?

Parent – Mike Anderson

Oh, no problem at all.

Host – Robert Frederick

Is it all right?

Parent – Mike Anderson

Yeah, no problem at all.

Host – Robert Frederick

Okay. How old are they?

Parent – Mike Anderson

They are 9, 6, and 4. This is Jordan <phonetic>, that's Kiesha <phonetic>, and that's Mianni <phonetic>.

Host – Robert Frederick

Hello. How are you?

Kids

Hi. Good.

Host – Robert Frederick

Are you enjoying yourselves here?

Kids

Yes.

Host – Robert Frederick

What are you looking at?

Child

(giggles) The string.

Host – Robert Frederick

The string is shooting in the air, and wow, you put your finger in it and it moves around your finger. [small child laughs] Have you been here all day?

Child

No, we just got here.

Host – Robert Frederick

You just got here. Is this the first thing you've seen here?

Child

Um-hum.

Host – Robert Frederick

So they're taking a Sunday to come and check out and learn about science....

Parent – Mike Anderson

Oh yeah. Every opportunity we get to come out to a science exhibit, we do that. It's amazing. I'm about to, we're about to... where would you suggest going?

Host – Robert Frederick

I would go down every single thing. If your kids like robots, there's robots at the end.

Parent – Mike Anderson

Oh man, thank you. Thank you. Hey, Jordan, get your volcano.

Host – Robert Frederick

"Get your volcano." That's not a typical expression in your household, is it?

Parent – Mike Anderson

Yeah, it has become one.

Host – Robert Frederick

Oh yeah? "Get your volcano, let's go"?

Parent – Mike Anderson

He leaves his volcano everywhere. The old vinegar and baking soda, so....

Host – Robert Frederick

Well, thank you.

Parent – Mike Anderson

I appreciate it.

Host – Robert Frederick

Enjoy!

Parent – Mike Anderson

Alright. Definitely.

Host – Robert Frederick

The kid's favorite toy is a vinegar and baking soda volcano. Well, here's a little editorializing and I hope, dear listener, that you don't mind, but that's awesome.

J. K. Han

Hello, everybody. I'm JJ Han, and I'm an engineer at a robotics company. This is located in Korea. At this time I show you some fascinating and amazing robot dance. Do you want to have your own robot like this? Yes? Yeah.

Host – Robert Frederick

It's a moving car that transforms into a dancing robot. And back again. The kids are entranced. Absolutely entranced.

[music, applause]

Walking around, there are, of course, lots of science-based toys at Family Science Days. But there are also lots of demonstrations of what seem at first to be magic tricks. And then the demonstrators explain the science behind them, and then give the kids a try at it, too. But, at least in one case, the demonstration was built by kids. And I'm heading there now.

Demonstrator – Jared Sagoff

Rob good to see you.

Host – Robert Frederick

Hey, good to see you.

Demonstrator – Jared Sagoff

How are you?

Host – Robert Frederick

Are you doing this?

Demonstrator – Jared Sagoff

The Rube Goldberg? Yeah.

Host – Robert Frederick

Yeah. I thought I'd just, you know, get a little sound.

Demonstrator – Jared Sagoff

Oh, fantastic. Okay, yeah. Hi, I'm Jared Sagoff, I'm from Argonne National Laboratory. These kids here are from Wilmington High School. Argonne runs a competition to make Rube Goldberg machines. Those are very complicated machines that do very very simple tasks. This year the task is changing a light bulb. In previous years, the task has been to build a hamburger out of a patty and some vegetables, or to squeeze some orange juice. So, this year we had 11 different teams at the competition. And this team, Wilmington

High School from central Illinois, won the competition, and they're here presenting at the AAAS conference their machine at the Family Science Day. So, their machine has 26 separate parts. It started with just a ball bearing going down a tube. And it goes around, it hits mouse traps, levers and cantilevers and counterbalances and wheels, and all sorts of different simple machines, and eventually an incandescent bulb is swapped out and a light-emitting bulb is swapped in.

Host – Robert Frederick

So a very complicated way, as you say, of changing a light bulb. Would this have any practical application whatsoever?

Demonstrator – Jared Sagoff

Probably not. I can't imagine that you'd want to store a machine that's about 6 feet by 3 feet by 3 feet in your fuse box or in your ceiling. I can imagine that wouldn't really go over so well.

Host – Robert Frederick

But the kids are really learning a lot nonetheless? What in particular are they learning?

Demonstrator – Jared Sagoff

I think they're learning sort of the value of stick-to-it-iveness as it comes in a research setting. And it's really turned a lot of kids on to engineering, which, you know, when kids can see their dedication to a scientific endeavor pay off in something that's complicated and – though it may not look beautiful to the naked eye – the physics behind it truly are gorgeous.

Host – Robert Frederick

What are some of the physics lessons that they are learning here? Is it simple levers, simple machines, or something more complicated?

Demonstrator – Jared Sagoff

I think it's just trying to build an entire system to see that any physical system, no matter how complicated it looks, can be broken down into a number of more understandable constituent parts. And I think that's going to stand them in good stead in the long run.

Host – Robert Frederick

OK. *[turns to another person]* Hi!

Demonstrator – Zach Van Duyne

Hi. How's it going?

Host – Robert Frederick

What's your name?

Demonstrator – Zach Van Duyne

Zach Van Duyne

Host – Robert Frederick

Zach Van Duyne. And you are one of the creators of this machine?

Demonstrator – Zach Van Duyne

Yeah.

Host – Robert Frederick

And what are some of the various parts that are going into this? What will we see once this machine gets going?

Demonstrator – Zach Van Duyne

When it gets going, actually it's going to roll down this ball well here, and it will trigger yet another...

Host – Robert Frederick

Something is happening right now.

Demonstrator – Zach Van Duyne

Yes. The BBs are pouring into our cup, they're triggering our power source, a switch. We had to go from an in-parallel circuit to an in-series circuit. The parallel will power the LED and the series will power our incandescent light bulb because it takes more energy. And those are our 9-volt batteries there. And we've got a lot of different parts in this machine, we've got a bike wheel, as you can see. And this right there, I designed it, it's a series of weighted swings, and it actually rolls down one ramp and the swings will spin and hit it back up another ramp. I like one that a lot.

Host – Robert Frederick

Yeah. So how long overall does this process take?

Demonstrator – Zach Van Duyne

Actually it only takes about 30 seconds. I mean, we actually qualified for nationals Friday, so we're gonna try to beef it up a little bit and add some more time onto it, build it up. But so far it's been good. It's running good.

Host – Robert Frederick

Is this the first time that you've been in this competition, or have you done it before?

Demonstrator – Zach Van Duyne

I've actually, this is my third year. So I started when I was a sophomore in high school. This is a lot of their first years. We have a couple of second-years on the team.

Host – Robert Frederick

The other people here that are... helped you work on the machine?

Demonstrator – Zach Van Duyne

Yeah. But I'm the veteran, I guess, the only person that's been on here for 3 years.

Host – Robert Frederick

Sophomore, so you must be a senior now. Are you headed for college next year?

Demonstrator – Zach Van Duyne

Yeah, I am actually.

Host – Robert Frederick

And what are you thinking of studying?

Demonstrator – Zach Van Duyne

I'm going to U of I for engineering, mechanical engineering actually, so.

Host – Robert Frederick

Here in Illinois then?

Demonstrator – Zach Van Duyne

Yeah.

Host – Robert Frederick

Yep, very good. Well, very good luck with that. Did this experience help in persuading you toward a career in engineering?

Demonstrator – Zach Van Duyne

Definitely. My first year, I realized that this is what I'd like to do for the rest of my life. And that's why I actually picked mechanical engineering. It's so I could design parts, actually see them work successfully, and just be able to say, "I designed that." It's pretty cool.

Host – Robert Frederick

I suppose though in college, you're going to be going for the more-efficient design, rather than the less-efficient design of the Rube Goldberg machine.

Demonstrator – Zach Van Duyne

Oh yeah. Oh yeah. I learned that. I learned that, definitely.

Host – Robert Frederick

Okay. Well, thanks so much for talking with me. I really appreciate it.

Demonstrator – Zach Van Duyne

Thank you.

Host – Robert Frederick

So Jared, back to Jared: Is this a program that has inspired people like Zach. I mean, have you seen this kind of transformation in students, saying, "Oh, I did like science, now

I really like science.” [sound] – Oh, there are the BBs again – “And I really want to make a career out of this.”

Demonstrator – Jared Sagoff

I have seen that. And that’s entirely what, in addition to its scientific mission, Argonne is all about. We, that’s what we strive for. We have a bunch of educational programs at the laboratory to inspire students like Zach and the other kids at Wilmington to pursue careers in science and engineering because we need scientists and engineers in the future, because in order to restore America’s competitiveness in the world economy, that’s ultimately where it’s going to come from is these kids’ resourcefulness and intellect and stick-to-it-iveness to build machines like this that take four months to build and 20 seconds to run. So, my hat is off to them, definitely.

Host – Robert Frederick

Jared Sagoff, thank you very much,

Demonstrator – Jared Sagoff

Thank you so much.

Music

Host – Robert Frederick

Thanks for listening. This is the last special *Science* Podcast from the 2009 AAAS annual meeting in Chicago, Illinois. If you would, please take a moment and give us your input. Write us at sciencepodcast@aaas.org or please fill out our online anonymous survey at www.sciencemag.org/multimedia. This show is a production of *Science* and of AAAS – the Science Society. Jeffrey Cook composed the music, and I’m Robert Frederick. On behalf of *Science* magazine and its publisher, the American Association for the Advancement of Science, thanks for joining us.

Music ends