



## Science Magazine Podcast Transcript, 25 October 2013

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### **Promo**

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### **Music**

#### **Interviewer – Sarah Crespi**

Finally today, David Grimm, editor for our online daily news site, *ScienceNOW*, is here to talk about some recent stories. I’m Sarah Crespi. First up we have a story on fire and thriving lizards. The effect of fire on certain forests has been shown to be beneficial. The hot temperatures burst open seedpods of fire-loving plants and rejuvenate the flora. What about the animals running around in these forests, how do they feel about the fires?

#### **Interviewee – David Grimm**

Well, you would think they don’t feel really great about the fires. That probably holds true overall. But this is an unusual case where actually fire may be good for animals, or at least one species of animal known as the sand monitor lizard that lives in Australia.

#### **Interviewer – Sarah Crespi**

Why would there be fires near these lizards?

#### **Interviewee – David Grimm**

Well, the hunter-gatherer people that live in Western Australia—they’re known as the Martu—and they hunt these lizards. These lizards actually make up 40% of their land-based diet. So this is a very incredibly important food source for them. The way they hunt them is these lizards burrow under ground, and in order to find these lizards the Martu have to burn bushes to expose the holes they hide in. Once they find the hole they jab a stick in the hole, the lizard comes out, and that’s the end of the lizard but the beginning of dinner. This would all seem like it’s not a great strategy for the lizards. First of all, you’re burning a lot of their habitat. And second of all, by burning a lot of their habitat you’re finding a much better way to hunt them, which should ostensibly lead to a decrease in their numbers.

#### **Interviewer – Sarah Crespi**

But that’s not what they’re seeing, right, there’s this long-term rumor that it’s actually good for them?

#### **Interviewee – David Grimm**

Yeah, right. Well, that’s not what they’re seeing, at least that’s not what researchers saw when they went out and they visited some of the sites where the Martu hunt these lizards. What they found was that there was almost twice as many lizards in landscapes that were

most heavily hunted and burned versus in plots of the land that had very little human exposure.

**Interviewer – Sarah Crespi**

So we can't really say whether or not where they hunt is maybe the most populated with lizards, but there is a mechanism that they suggest for why this might be, you know, burning is not decimating the lizard populations.

**Interviewee – David Grimm**

Right. They really don't know why this is happening but they have some speculation. One idea is that burning the land creates a patchwork of environments. You've got maybe a burned environment and a not burned environment, a half burned environment and an environment that's growing back. And this diversity of land actually increases diversity of insects, increases diversity of other animals, and all that could be good for the lizards. And, indeed, when there was a lot less of this burning going on during the 20th Century when the aboriginal people were being forced to leave the desert, there was actually a decrease in the amount of dozens of mammal species like wallabies and mice.

**Interviewer – Sarah Crespi**

So does this mean that humans aren't always bad for the environment?

**Interviewee – David Grimm**

I know, it does seem to indicate that. And actually there are places in California where there are some native tribes who also burn the land to hunt for their food, and they've also seen a loss in biodiversity when there were restrictions placed on them about where they could do their burning. So it does suggest that humans sometimes may actually be good for the environment, or at least some of the species that live there.

**Interviewer – Sarah Crespi**

Next up we have a story on innate math skills. The question of nurture versus nature never really gets old for me. In this study, researchers are actually looking at how much nature goes into our ability to do math. What kind of math are we talking about here, Dave, algebra?

**Interviewee – David Grimm**

We are not talking about algebra, calculus, or geometry. We are talking about some fairly simple math, things like addition and subtraction. One of the big questions has been are kids born with the ability to be good in math or is it something that they just sort of learn by studying, by just getting a lot of exposure to it, or maybe is it a combination of the two. And it's kind of been hard to study because when you take children and you try to test their math skills, they've already had a lot of exposure to their parents who may be teaching them math either consciously or unconsciously. They maybe even had some exposure in some early school grades. So for this new study, researchers turned to very young children. They turned to six-month-old babies.

**Interviewer – Sarah Crespi**

Okay. So what kind of math are six-month-old babies doing?

**Interviewee – David Grimm**

Well, they're not really doing math. A very simple test they gave these babies is they flashed two monitors in front of them. And what one monitor showed was a series of dots and the other monitor also showed a series of dots but there were different numbers of dots on both monitors. And the goal was to see could the babies determine whether one monitor had more or less dots than the other one? So maybe one monitor had 10 dots and the other monitor had 20 dots. And the way they do this is that infants this young, when they stare at something for a long period of time it means they think it's new, that it's interesting. So if they were shown two monitors with 10 dots on them, they probably wouldn't look at either monitor for that much longer because they both sort of look the same. But if one monitor had a different number of dots than the other monitor, the children might pay more attention to that difference, and that the researchers would interpret as an acknowledgement that these kids have some semblance of what they call the approximate number system. This is a system that goes way back in human history and other animals have it as well. It's really just a very basic skill to tell whether there is more of something or less of something. You can imagine if we're running away from a bunch of man-eating tigers we want to know if they outnumber us or not, and so this would be a very important skill we picked up early on.

**Interviewer – Sarah Crespi**

So this is the ability to say look at a pile of five pennies and say five without actually going one, two, three. You're not counting, you're just kind of evaluating the size.

**Interviewee – David Grimm**

You're not counting, right.

**Interviewer – Sarah Crespi**

So they were able to see in these infants a difference between their ability to detect novel numbers—or not numbers necessarily but novel amounts—and then they looked again at about three years out. What kind of comparisons were they able to make?

**Interviewee – David Grimm**

And it was the same children. They brought them back about 3-1/2 years later, so they were about four-years-old actually at the time of the study—3-1/2, 4 years old. And what they found was that the kids that had done well on spotting the different numbers were also better at some tests of basic arithmetic, things like addition and subtraction. So it does suggest that some of our math ability may be something that we're born with.

**Interviewer – Sarah Crespi**

And so how strong was this connection? I mean, is there other factors that need to be taken into account for math skills?

**Interviewee – David Grimm**

Well, it's a good question. And what the researchers found is actually that this approximate number ability was not completely predictive for how well the kids did in math a few years later. And that suggests that other things are also important, things like experience, education, and motivation.

**Interviewer – Sarah Crespi**

Math motivation.

**Interviewee – David Grimm**

Right.

**Interviewer – Sarah Crespi**

Finally, we have a story on golden leaves. As summer turns to fall the leaves on the trees change from green to gold, but some leaves are really made of gold to a very minute extent.

**Interviewee – David Grimm**

Researchers have actually found gold in the leaves of trees, so money does actually grow on trees. The real question has been how is that gold getting there in the first place? Is it just sort of blown by the wind and then it sticks to leaves, or are the trees actually sucking this gold up from the ground and then depositing it in their leaves?

**Interviewer – Sarah Crespi**

So this is something they've suspected for a while, as you say. How did the researchers try to find out definitively whether or not the trees are actually growing gold leaves?

**Interviewee – David Grimm**

Well, the first thing they did is they went out into the field and they looked at eucalyptus trees whose roots can actually go down 40 meters or more. And they looked specifically at a group of eucalyptus trees that were growing over a known gold deposit in Western Australia. This deposit is about the size of a football field and it's 30 meters below the ground, but at today's gold prices it's not really worth excavating, there's just not enough gold in there. But the interesting thing the researchers found was that the trees that were growing over this deposit had about 40 times more gold particles in their leaves than the trees that were growing a couple hundred meters away from the deposit.

**Interviewer – Sarah Crespi**

So were they in the leaves and how do they know how they got there?

**Interviewee – David Grimm**

Well, the gold deposits are actually in the leaves, which suggests that this wasn't just gold dust that was blown up from the ground. But to really confirm that the gold was actually getting into the leaves via transport through the roots, the researchers went back to the lab and they grew some seedlings in greenhouses that were insulated from any airborne dust, and they watered them with gold-laced solutions – that was some maybe pretty expensive water. And what they found is that the trees actually pick up this metal

from the soil and deposit it in their leaves. The trees are actually kind of like a conveyor belt bringing gold up from the ground and putting it in their leaves.

**Interviewer – Sarah Crespi**

So how much gold is actually getting into the leaves of these plants?

**Interviewee – David Grimm**

Well, you wouldn't want to mine these trees, you're not going to get very much out of them. In fact, most of the gold that exists in these leaves is about 8 micrometers across, which is about half the diameter of the finest human hair, so you're not going to be building a whole lot of watches and jewelry out of this gold. But what the researchers say is really cool about this is it's becoming harder and harder to find gold deposits in today's world, we've sort of hit all of the low-hanging fruit. And so gold prospectors could go out into the field, take some samples of some tree leaves and know where to start digging.

**Interviewer – Sarah Crespi**

There's gold in them there trees.

**Interviewee – David Grimm**

There is.

**Interviewer – Sarah Crespi**

Okay. So what else is on the site this week, Dave?

**Interviewee – David Grimm**

Well, Sarah, for *ScienceNOW* we've got a story about why if you're allergic to bee stings, that might actually be a good thing. Also, a story about the farthest galaxy ever found. For *ScienceInsider*, our policy blog, we've got some stories about the aftermath of the government shutdown in the U.S. and the impact it continues to have on science, even though the shutdown is over, including the impact on Antarctic research and the impact on NIH peer review meetings. Also, we've got a story about a call to break down scientific borders in Europe. And finally, for *ScienceLive*, our weekly chat on the hottest topics in science, this week's *ScienceLive* is about the science of spinal cord injuries, what new techniques are being developed to combat paralysis. And next week's *ScienceLive* tie-in to Halloween will be all about the science of fear. Why do we like to be scared? So be sure to check out all of these stories on the site.

**Interviewer – Sarah Crespi**

Alright. Thanks, Dave.

**Interviewee – David Grimm**

Thanks, Sarah.

**Interviewer – Sarah Crespi**

David Grimm is the editor for our online daily news site, *ScienceNOW*. I'm Sarah Crespi. You can check out the latest news, our upcoming live chats, and the policy blog, *ScienceInsider*, at [news.sciencemag.org](http://news.sciencemag.org).