Harnessing the Neuroscientist, Author and TV Star: Mark Changizi, PhD

by Alan Marnett on June 7th, 2012

As scientists it’s easy to fall into the trap of focusing so narrowly on our projects that we lose sight of how we fit in to the world around us. Luckily for us, there are folks like our friend Mark Changizi, PhD, neuroscientist and author, who tackle the questions that are so big (Why do we see in color?) we often miss them. In his most recent work, Harnessed, Changizi proposes that music evolved to fit our brains, not vice versa. In fact, just as we’re keenly aware of in nature—like the sounds of humans moving in our midst—serve as the building blocks for music. We listen to the sounds of nearby humans to determine whether someone is coming or going, threatening or peaceful, near or far—oes we’re keenly aware of in nature—like the sounds of humans moving in our midst—serve as the building blocks for music. We listen to the sounds of nearby humans to determine whether someone is coming or going, threatening or peaceful, near or far—

Having been designed from those sounds, elicits an instinctual emotional response, which helps explain why throwing a loud, fast-paced speed metal album on tends to make us alert and aggressive, while delicate classical music may put us at ease.

We recently interviewed Changizi to get his thoughts on the book, the process of developing great hypotheses, and the sexiest theory he can’t pursue.

Harnessing has been out for nearly a year giving supporters and critics plenty of time to make their thoughts known—what has been the general response from the public and academics to your new theory of music?

For music sounding like humans moving evocatively in our midst—that’s the theory I provide evidence for in the book—ideas very similar to this are very old, going back to the Greeks and popping up over and over again in the 20th century. So, it’s really not that radical (not that being radical is a bad thing). And when lay people hear it, with its obvious connections to dance and choreography, they often say, “Well, duh!” What I did that’s new is carry out and test a large suite of predictions, checking in more than forty ways whether the patterns found among the sounds of humans moving are also found in the patterns across music. (And also whether the patterns sounds found in speech are also found in the sounds of solid-object events.)

The response from most people and academics has been favorable, finding intrinsically compelling that human movement sounds may underlie that deeply evocative sort of stimuli we call ‘music’, and appreciating the parsimony that human movement sounds can predict such a wide variety of structures found in music. That kind of simplicity and breadth is the sort of thing theorists like me strive for, and so I was enthusiastic when, for example, theoretical physicist and Nobel laureate Frank Wilczek wrote, “His proposals are impressively specific: basic speech sounds derive from the sounds of impacts among solid bodies; the basic symbols of writing derive from recurring features of natural scenes; the basic elements of music are abstracted from the natural sounds accompanying human (or ape) movements. . . . I’d be amazed if everything he says is right; but at this point I’d be even more surprised if his main ideas, which crack open niddles that have annoyed me for years, aren’t on the right track.”

We noticed that in the book you didn’t reference perhaps the strongest evidence to be published supporting the idea that music can control emotion and behavior: Strange Brew. In the classic 1983 film, the McKenzie brothers foiled the plans of an evil brewer who was doping beer with a chemical that put unsuspecting beer drinkers into a trance where their actions were fully controlled by organ music in a hockey rink. Heavy stuff... Barring any chemical influence, which of the five senses—now that you’ve written books on two of them—do you think is the most effective at influencing human emotion?

Attack of the Killer Tomatoes also has deep morals for music.
Given the facial expressions, emotional color modulations, and bodily gestures which we see, I’d have always speculated that it would be vision that is the most evocative sense. But few of us would be interested in looking at visuals of these things all day long, especially without sound (to keep it unimodal).

But on the auditory side there’s music, something most of us are willing to listen to all day long — even to sleep to! And we like it because it’s evocative. So, maybe the auditory sense wins … at least when pitted against vision. (… even saying aside speech.)

As for the other senses, hmmm. Imagine a massage machine that could give you massages all day long, wherever you go, akin to headphones for music. Would we like this even more than music?

Both Harnessed and Vision Revolution suggest our senses are finely tuned to nature around us. Of course, if readers take a quick 360-degree inventory of where they are, they’ll probably be hard-pressed to find a tree with 100 yards… Are our bodies actually underperforming their potential as a result of the modern urban environment?

In some cases, the facet of ‘nature’ that matters for understanding some human phenomenon is no longer much with us in our modern urban environment. For example, in my memory I’ve provided evidence that forward-facing eyes (and the big binocular fields we get) evolved not for 3D vision, but rather, for seeing better in cluttered forested habitats. Now that we’re no longer in forests, sideways-facing eyes would be better. Too bad for us.

But in most cases, the notion of ‘nature’ that drove our adaptation is still with us today. For color vision, what matters in nature was other people’s skin and the hemoglobin visible through it — that’s still with us. For illusions, what matters in nature was the optic flow regularities from forward movement — that’s still with us. For understanding how looking at things affects our preference toward them, what matters were fundamental probability principles — that’s still with us. For the origins of writing, what matters in nature was that it is a terrestrial habitat with opaque objects strewn about — that’s still the case. For the origins of speech, what matters in nature was that it was a terrestrial habitat with solid objects — that’s still the case. And for the origins of music, what matters in nature was the sounds of people moving in our midst — still the case. You get the idea.

We’ve never listened to what’s in the Baltimore Ravens’ notoriously intense linebacker Ray Lewis’ headphones before a football game, but I’m pretty sure it’s not Enya. If we’re about to give a talk at a committee meeting, international conference or job interview, what music should we play on our iPod to maximize our performance? And what should we play for the audience?

He’s probably listening to Strauss’s Blue Danube. And, actually, having that sort of song visually paired with raucous football violence seems intrinsically comical, perhaps due to the contrast between the gentle music and harsh menfolk.

As for designing music to better affect your own or other people’s behavior, I’ll refrain from speculating. Instead, I’ll point out that this music-sounds-like-people-moving framework is rich enough to begin answering these questions. The question is not what music to play to affect someone’s behavior in some particular way, but what human behavior would affect someone’s behavior in that way. Once one figures that out, then the idea is to play music wherein the mover is exemplifying that behavior. (. . . or exaggerations of that behavior.)

A recent poll of our readers found that nearly 40% of scientists believe journals will no longer be the primary mechanism of publication within 10 years. While you also publish in the primary scientific literature, Harnessed contains a significant amount of unpublished supporting data. How do you decide where your data is best presented — book or journal? How do you see scientific publishing evolving?

Certainly, when earlier in one’s career I wouldn’t — even today — suggest publishing one’s results first in a book. Had I all the ideas and data in Harnessed much earlier in my career, I suppose I’d have tried to publish them in some massive 100-ish page journal article. In fact, I did do that with several of my earlier works (e.g., on illusions and on the riddle of induction), although that can be a difficult endeavor, for there are very few journals where you can do that (and imagine being a poor referee for it!). And this work in Harnessed is considerably longer to describe than any of those older very-long pages of mine. So it would probably have been difficult or impossible to publish. And publishing it piecemeal wasn’t a good idea, because it requires the full case to begin to convince. Really, then, this sort of grand idea is good for either a dissertation when you’re really early, or for a book when you’re a little older. At the moment it can be difficult to do this sort of thing in between. … which is unfortunate.

I see scientific publishing changing on the edges, but not fundamentally changing. … despite all the constant hoo-ha about it. Journal articles will still be around, and people will still publish books — just as we’ve been...
While gathering data can be unpredictable, at best, how long does it take on average from the time you select a new hypothesis until the time the book comes out? What's your process – do you work on multiple books simultaneously or is it a more linear process?

Much of my research hasn't appeared in any of my books, of course. And nearly all of it appeared in journals before appearing in any book. In the case of Harnessed – the only case where the research went straight to a book – the time was about two years between the hypothesis and the writing up. Although, it was more parallel than that. Once the “speech sounds like solid-object events” part of the research was done I began writing that chapter while simultaneously working through the “music sounds like human movers” part.

One of the most difficult criteria for settling on a hypothesis is to move forward on is whether there are data that I can get to test it. Most of my ‘really cool ideas’ in my notebooks end up left there forever because I can think of no way of getting data for them. In some cases it might require that I spend a lifetime to get the data; other times it would require a whole community of researchers a lifetime; and in some cases the problems are even more severe. So one moves on – maybe some of these ideas might be worth a blog post, although I haven’t thought to do that thus far.

In our previous interview, you mentioned you were more of a “Carl Sagan kid”, meaning you found yourself fascinated with the big, romantic what-does-it-all-mean questions. As you’ve said, the key to identifying a good hypothesis is making sure you can actually collect data to support it. Is there a tantalizing idea that you’ve always wanted to tackle, but felt the ability to gather data was just a little out of reach?

Sleep. I’ve spent probably a year over the years building a theory of sleep which explains, for example, the rate at which bigger animals sleep less. It emanates from my work on how brains change as they get larger. But there are lots of data I need, for example, concerning extracellular and interstitial flow rates across species, but haven’t been able to find (they almost certainly don’t exist). So, I’ve had to abandon that sexy idea.

Speaking of next projects, what’s cookin’ in the Changizi kitchen?

I’m working now on the origins of emotions, trying to derive from first principles the full suite and structure of social emotions we possess. I’m not sure it will all work out, but if it works as I kind of sort of see it, then hopefully there are, in addition to being a unifying theory of emotions, applications to better understanding how these emotions work in making us as intelligent as we are, and applications for artificial intelligence. It will be the second half of a book on emotions tentatively titled Making Faces.

The other half of the book concerns the evolution of the shape and structure of the primate face, and the design features in the face aiding it at its task at being an expressive facial expressive system. Can’t say too much more about it, though, at this point.

Mark Changizi, PhD, is the Director of Human Cognition at zAI Labs and writes on science at Forbes, WIRED, Discover, and the Atlantic among others. Mark is also the science host of the new Discovery Channel show Head Games. Keep up with his latest thoughts on Twitter.