BRAIN SCIENCE PODCAST

With Ginger Campbell, MD

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Interview with Dr. Stephen Macknik and Dr. Susana Martinez-Conde, Co-Authors of *Sleights of Mind: What the Neuroscience of Magic Reveals about Our Everyday Deceptions*

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INTRODUCTION

This is Episode 72 of the *Brain Science Podcast*, and I'm your host, Dr. Ginger Campbell. Today we will be talking about the neuroscience of magic with two neuroscientists from the Barrow Neurological Institute in Phoenix, Arizona. Dr. Stephen Macknik and Dr. Susana Martinez-Conde are the authors of the new book, *Sleights of Mind: What the Neuroscience of Magic Reveals about Our Everyday Deceptions*, which is the first book to explore the neuroscience of magic.

I'm going to get right into the interview, but I do want to remind you that you can find detailed show notes and transcripts for all the episodes of the *Brain Science Podcast* free at brainsciencepodcast.com.

You can send me feedback at docartemis@gmail.com.

Today's interview is a little bit shorter than we planned, so if it leaves you wanting more I encourage you to listen to Episode 147 of *Skepticality*, where Swoopy does her usual great job. If you've already listened to that interview you won't find much overlap in this one.

Be sure to stay tuned for the announcements after the interview. I will tell you about the upcoming live event that I will be doing in London on May 11, 2011, and also make a few other announcements.

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INTERVIEW

Dr. Campbell: Steve and Susana, I really appreciate you coming on the show today. I thought that you might start out by introducing yourselves very briefly, and telling us about how you got into neuroscience. Susana, would you like to go first?

Dr. Martinez-Conde: My name is Susana Martinez-Conde, and I am the Director of the Laboratory of Visual Neuroscience at the Barrow Neurological Institute in Phoenix, Arizona. I got started in neuroscience as an undergraduate in experimental psychology in Spain. After I got my bachelor's degree I started graduate school in the field of visual neuroscience, also in Spain, at the University of Santiago de Compostela.

When I graduated from graduate school in 1996, I almost immediately after went to the US for a postdoc with David Hubel, who got the Nobel Prize in Medicine and Physiology for his discoveries on the visual system; and I was in his laboratory as a postdoc at Harvard Medical School for about five years. Then I moved to England to University College London, where I had my first independent faculty position with my own research program. And seven years ago I moved my lab from London to the Barrow, where I am now.

Dr. Campbell: Your focus is on vision?

Dr. Martinez-Conde: Yes. My training is in visual neuroscience, and that's a main core of my research program; although in recent years I have been getting more interested in both perceptual and cognitive aspects of our experience.

Dr. Campbell: How about you, Steve?

Dr. Macknik: I started off as an undergraduate at the University of California Santa Cruz, after being raised on the Hawaiian island of Maui; and I triple majored in college in psychobiology, biology, and psychology. I had a great job as a firefighter and I wanted to stay in it as long as I could, so I kept taking on extra majors in order to stay there. So, I basically just took all of the neuroscience courses UCSC had to offer, and in doing so, ended up doing a lot of research, because I had a lot of time to do homework at the fire department.

So, I ended up doing some research and publishing it, and I got into Harvard Neurobiology for graduate school, where I got my PhD with Margaret Livingstone. From there I ended up staying at Harvard Medical School with David Hubel as a postdoc, working also on visual neurophysiology. I also did a short postdoc with Zach Mainen at Cold Spring Harbor Laboratory in New York, working on the olfactory system, as well as in blood flow in microcirculation of the brain, before taking my first job at University College London, where I had my first laboratory, starting at the same time Susana did. And then, we both moved back at the same time to the United States, here at the Barrow Neurological Institute seven years ago.

Dr. Campbell: We don't have very much time today, so I'm going to just cut right to the chase. Why are you studying magic? I mean your book, *Sleights of Mind*, is the first book about the neuroscience of magic, so I've got to ask why magic.

Dr. Martinez-Conde: Well, magic affords us the opportunity to use very special, very powerful cognitive illusions that magicians have developed over the centuries and millennia, and take them to the laboratory. I mentioned that my background is in visual neuroscience. In the field of vision we see very often that there is this very productive dialogue between the visual arts and the visual sciences. And oftentimes the illusions that we study in the laboratory, that have not been created by scientists—they are the work of artists, painters, sculptors, and so on—they allow us to discover very fundamental neural principles underlying perception.

In the case of magic, we can establish a similar dialogue between the arts and the sciences, and look at who the artists are of cognitive illusions; and these are magicians, who artfully manipulate our attention and awareness every night, every show. And just as we use visual illusions to better understand the fundamentals of vision, we can use the cognitive illusions developed by magicians to get at the neural basis of our cognitive processes.

Dr. Campbell: In reading your book there's a lot of focus on how magicians manipulate our brain processes, you might say. So, is it just about creating illusions, or is there more to it than that?

Dr. Macknik: Well, I think that the fundamental thing magicians do for us is they make the physical reality not match the perception. So, in essence, it is all about illusion. And they accomplish illusions in multiple different ways.

So, there are different types of illusions. There are special effects. There are also optical illusions, which are like visual illusions, but they're different in that optical illusions are things that happen because of the physical reality outside. For instance, if you take a pencil and stick it in a glass of water and it looks like it bends in the middle, it's from the refractive index of the water vs. the air. It's an

optical effect; it's not something happening in our brain. Even a camera would perceive it the same way.

So, we see optical illusions as being different from visual illusions, where visual illusions are incredible percepts that happen that don't match reality, that are due to the way our brain processes visual information. And by extension then, cognitive illusions are those cognitive illusions that happen because of processing in the cognitive circuits of our brain.

So, that's really the different types of illusions that you can have. And magicians use all of these all at once—various types of sensory illusions and cognitive illusions, and gimmicks, and special effects—in order to achieve a specific effect in a way that is very difficult to defeat, from the audience's point of view.

Dr. Campbell: I got the impression from reading your book… The story of Richard Feynman stuck out for me. Obviously, he was a genius. And you had one story about him trying to figure out a magic trick. And every day the magician would show him a different way, and so, the next day he would think he had it figured out. And, of course, they would change the way they did it—which is a classic trick that magicians do. But I was left with the feeling that, based on the way some of the magic tricks work, are smart people actually more vulnerable?

Dr. Martinez-Conde: It's a very good question. Some magicians think that's the case. James Randi—'The Amazing Randi,' one of the main magicians that we have been collaborating with in the last several years—he thinks that the people that are most vulnerable to magic are those with PhDs. I'm not sure if that's true, but that seems to be the anecdotal evidence that a number of magicians have: that basically the stronger your expectations are about the world, the more these expectations are going to be played with by the magician.

And I guess it's also partly that if you think that you're very smart, you may end up feeling a bit too smug, and just relying on your wits a bit too much; whereas, in fact, we're all hard-wired in the same way, and we're all of us just as likely to fall for magic tricks, no matter what the IQ is.

Dr. Campbell: Yes, I was just thinking in terms of the importance of pattern recognition and prediction, and how those work in magic, and how those are also important—at least for certain kinds of intelligence.

Dr. Macknik: Well, certainly it's true that magicians play on our expectations. Now, those are still illusions, because what they're getting you to do with expectations is pay attention to specific things, and predict that certain things are going to happen. So, you're paying attention at a certain place and at a certain time because you think something's going to happen, due to your expectations. When you're doing that, you're suppressing everything else; which means you can't pay attention to the secret move that the magician is introducing in order to achieve the effect.

So, certainly our expectations come into this, and magicians are these masterminds of human behavior, and have this incredibly powerful intuition about what our expectations will be at any given time in a given situation. So, they can basically lead everybody in the audience down the same garden path at the same time.

Dr. Campbell: Right. Susana, can we return to the issue of vision for a minute? Are you able to actually study the neural correlates of visual illusions?

Dr. Martinez-Conde: Yes, absolutely. Illusions, in fact, are wonderful tools to get at the neural correlates of experience, because with a visual illusion, by definition, you have a dissociation between the objective reality that is out there and the subjective experience that you perceive. So, when you're trying to

determine what the neural correlates of experience—of awareness—are in the brain, what you want to do is you want to be looking for neurons and circuits and brain areas in which their response matches their subjective experience, rather than the objective reality. If a neuronal response matches the objective reality but not your experience of that reality, then you can pretty much conclude that that neuron or circuit or brain area, by itself, cannot sustain awareness.

Dr. Campbell: And it turns out that the processing of what we see—that is, it getting changed from what actually hits our eyes, to what we think we see—starts really early on in the process.

Dr. Macknik: Oh, absolutely.

Dr. Martinez-Conde: There are all sorts of visual illusions, and sensory illusions affecting other senses than vision, and cognitive illusions. There are some visual illusions that are very basic, very fundamental, that happen already at the level of the retina; whereas, other types of illusions that are more cognitive in nature—for instance, involving attention—those will be happening for the first time at the cortical level. So, it just depends.

Dr. Campbell: OK. So, Steve, I was going to ask you to take this into the area of the cognitive part of the illusion, which is at the higher levels; and talk a little bit about how the cognitive illusions differ from the pure visual illusions.

Dr. Macknik: Sure. Basically we have these cognitive processes that rely on the same or similar circuits as to what the visual system is using to process visual information. And that means that when we're processing cognitive types of information, they're susceptible to the same types of fallibility that you would have in the visual system.

So, for example, a type of cognition that magicians use all the time to trick us is our memory. Or they can use our attention; they can manipulate how we pay

attention to things, in order to achieve misdirection. They can misdirect us with choice blindness. They can do a number of different cognitive effects in order to achieve the feeling that something that isn't possible is actually happening.

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Dr. Campbell: To me, one of the stranger discoveries of neuroscience has been the fact that normal people can fail to see things that are right in front of them—which, of course, magicians use to their advantage all the time. Could you talk about that? For example, change blindness.

Dr. Macknik: A couple of different effects that magicians use are called 'change blindness' and 'inattentional blindness.' Change blindness, in the cognitive realm, has been really led by the group of Dan Simons at the University of Illinois. This is one of the experiments that have been worked out in the laboratory that has actually been directly stolen by magicians and brought to the stage; for example, illusions that Derren Brown does in London. And what change blindness is, is when there's a disruption where you're doing a task. There can be a change that is not directly related to the task you're trying to achieve, and then you won't notice that that change happened, when the disruption is over.

So, for example, what might happen in one of Dan Simons' experiments is that they'll approach an unknowing professor on a campus, and they'll be videotaping it from far away. A student will approach this professor and say, 'Can you please give me directions to whatever hall it is that I need to find?' and the professor will start giving directions to take a left around that building, and then go right, and then head down the walkway.

And while the professor is involved with pointing and giving the directions, a work crew will come and walk right between the two of them on the sidewalk,

carrying a door between them. And what will happen behind the door is the student will actually grab the door and continue to carry it, and a different student, who was carrying the door up to that point, will release it and then start talking to the professor as if they were the original student in the first place, asking the questions.

And often what happens is that the professor doesn't notice that the person changed. It happens about half the time—maybe even more—that the person who's giving the directions doesn't notice that the person they're giving directions to has completely changed. And you can change a lot of things—race, height, gender—and they may not notice, as long as you stay within the category of the person who was asking the question in the first place, and that person continues to respond in an appropriate way, as if they were the one who originally asked the question.

So, that would be an example of change blindness, because we're focused on a given task, a disruption happens, and then we don't notice a change. And so, in a way, change blindness has to do with the fallibility of memory, because across a disruption you don't remember correctly, or at least you don't notice the difference between before and after the disruption, for something you're not actually engaged with directly.

Now, inattentional blindness is similar. That's where you would actually have something happening to you as you were paying attention to something, and you don't notice it at all. The most famous version of this — I want to give a spoiler alert: Once you hear this you're going to never experience this illusion again. And so, I don't want to ruin it for people. If you don't know about the 'Basketball Illusion'—also called 'The Monkey Business Illusion'—then you may want to stop listening for just one minute while I explain what happens, so that you can

experience it yourself. And you can see this on our website[1]: it's sleightsofmind.com.

But the way that the illusion would work would be you'd have two groups of basketball players, and they're passing a ball around. And one group is wearing white shirts and one group is wearing black shirts. And the subject's task is to count the number of passes between the players in white. So, they're busy counting the basketball passes, and at the end of the task they're asked how many passes there were. And the answer is 13, or 14, or 16, or whatever it is.

But the fact of the matter is that wasn't really what was interesting. Because what happened while they were counting the passes was that a gorilla—a person in a gorilla suit—walked into the middle of the game, and pounded its chest, and then walked off the other side of the screen. And half the time or so, people who are doing the task well do not notice the gorilla—even though it's this gigantic animal walking into the scene. They have no idea that a gorilla just pounded its chest.

So, this is a case where the person is so ensconced in their task of counting the passes that they don't notice anything else that's going on—even big obvious things. And this has to do with the fact that when we're paying attention to something, we have tunnel vision on what we're paying attention to, and everything else is suppressed.

Dr. Campbell: That's the reason why multitasking is really impossible, right? Or, a reason.

Dr. Macknik: That's right. When we're doing a task, what that means is that we're paying attention to that task and we're suppressing everything else. And that's a good thing. When you're driving a car, for instance, if you're paying attention to the road and you're not doing anything else, that's good. Now, if you

[1] Numerous videos and other resources are available at http://sleightsofmind.com.

start doing something else while you're driving—like texting—that's where the problem comes in; because you can't do both at the same time.

It's not possible for you to multitask. What actually is happening is that you're switching from one thing to the other, and while you're paying attention to the texting, obviously you're not paying attention to the road, and emergent conditions can occur that can cause personal harm. So, you shouldn't do anything but drive the car when you're driving.

Now, other people who seem like they're doing multitasking—for instance, someone like a surgeon, who's doing things very quickly, and doing a lot of things seemingly at once—is not really multitasking. What they've trained to do through their expertise and training is to switch between different tasks very quickly, that are known, and in specific conditions where they do it over and over and over, over time. And so, you can learn to switch your tasks very quickly, with a lot of training, and it may seem like you're multitasking; but you're not. You're really just doing one thing at a time, and just sharing that time as you switch around—much like a computer's operating system.

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I need to take just a minute to mention our sponsor, Audible.com. Many of the books that we've talked about on the *Brain Science Podcast* are available from Audible.com as audiobook downloads.

Today's book, *Sleights of Mind*, is also available, and if you aren't already a member you could get it free by going to audiblepodcast.com/brainscience.

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Dr. Campbell: Since we ended up not having so much time today as we had expected, there are lots of things we haven't had time to talk about. So, I want to

give you both a chance to tell me what is the most important thing you have learned from the time you've spent studying magicians, so far.

Dr. Martinez-Conde: Well, I think probably the most important is the neural basis for the attentional spotlight, and what applications that has for everyday life. The concept of the spotlight of attention is something that we use, both in neuroscience and that magicians use in their art. They actually both refer to the same thing: that when we focus our attention on something, that part of the visual scene gets enhanced and becomes more salient, and everything else around it gets suppressed, at the same time. Now, this is a concept that is relatively novel in neuroscience, but, as it often happens, magicians knew about it for a very long time.

In my research, and Steve's, with our colleague, Jose-Manuel Alonso at the State University of New York, we had the opportunity to look into the neural basis for the attentional spotlight. In fact, we found that this enhancement and suppression of attentional effects at the center of the spotlight and in the periphery are controlled by two different populations of neurons, and that this happens very early in the visual pathway, at the level of the primary visual cortex; which hadn't been known before. This links with what Steve was talking about: the difficulty of the task. When the task that you're carrying out is difficult to perform, the more your attention is enhanced at the center and the more it is suppressed in the periphery.

This is important from a neuroscience perspective, but it also has a very real application for life; and it's in the field of decision-making. So, when we are faced with having to make a complex decision—whether you should hire or fire somebody, or accept a job offer, or marry this person—there are often very many different factors, some of which seem very rational, and others are more like gut feelings. And it's often hard to know which facts to go with.

Well, knowing what we know about the neuroscience of attention, the recommendation that we make in *Sleights of Mind* is that you simply make a list of all the facts—both the rational facts and the intuitions; all of them, no matter how small or how trivial they may seem at first sight—and then what you need to do is, one by one, focus your attention on one specific fact. Just for a couple of minutes at a time, concentrate on that piece of information; then move down the list, and so on. And your attentional spotlight will naturally enhance that fact and suppress everything else that may be a distraction. When you reach the end of the list you will have the fullest picture you can have, and be able to make the most informed decision.

Dr. Campbell: Thank you. That's a great example of how neuroscience is important to our everyday life—which is why I do this show!

Dr. Martinez-Conde: Absolutely!

Dr. Campbell: What about you, Steve?

Dr. Macknik: Well, I think that one of the things we really discovered from the magicians, and that they knew all along—really have the corner on that market, in terms of brain research—is that they realized a long time ago that there's a very strong tie between our emotions and attention, and the way that we pay attention to things. So, for example, magicians often use humor in their acts; and it's not just for the entertainment value. They'll actually cause humor—the feeling of humor or mirth—to happen in the audience at very specific choreographed times during an act, for the specific purpose of suppressing their attention while they're trying to do a secret move.

Because they know that if they can get the audience to laugh, or to feel filled with humor, that at that very moment they can get away with magical murder, because nobody's paying attention to anything. That seems very intuitively easy to believe

—from everybody's point of view, I think. But the fact is that we really don't know much about that—if anything at all—in neuroscience: about the relationship between humor and attention, specifically, but also, in a grander scale, between our emotions and attention.

And this is really important if you think about the fact that there are a lot of cognitive diseases—such as Alzheimer's disease, and other types of cognitive diseases that have an emotional component—where emotions play a very important role in understanding the relationship between attention and the cognitive decline that these patients are undergoing. And how this interacts with their emotional life would be really important to the way that we treat them and the way that we could potentially ameliorate their problems. So, I think this is something that we discovered about magic that we realized was really important for neuroscience to start paying attention to much more closely; and it's something that they really brought to the table for us.

Dr. Campbell: OK, so that's at least two things. Do you have any particular experiments coming up in the near future that have been inspired by the magicians?

Dr. Martinez-Conde: Yes. We're beginning to set up an experiment in which we're trying to determine these particular interactions of emotion with attention. Counterintuitively, some magicians—particularly Juan Tamariz in Spain, who may be the most important magic theorist alive—he believes that humor is special in its interaction with attention, more than the other emotions. Now, this seems counterintuitive to us at some levels, but we have learned from our collaborations with magicians that when they have strong insights such as these, we should really put them to the test. So, we're looking into this carefully, and hope to have some results in the next few months.

Dr. Campbell: How about you, Steve? Are you working on this together, or is that Susana's project?

Dr. Macknik: Well, the way we do our projects is that one of us leads any given project. We often collaborate on things—especially related to magic—but she's leading that project. I'm very interested in understanding more about how visual illusions work in magic. There's one particular visual illusion that we're studying, that's related to the cups and balls illusion that Penn and Teller made famous by doing it with transparent cups.

The basic idea is you've got three cups, they're usually done with opaque cups, and there are balls under them. And as you move the cups around in a shell game, what happens is, as they lift the cup, there'll be one ball under it, or then none, and then three, and then it's a lemon. And all these amazing things start to happen. And you don't see them changing the position of the balls under the cups; though, of course, that's exactly what they're doing, but they're able to do it by manipulating your attention.

And there's one particular move that Teller was playing with one night when he was sitting at a Midwestern diner, with a diner glass and a rolled-up napkin. He noticed that he could do this one move where the glass was upside down, so the ball was on the bottom of the glass, and when he poured the glass so that the ball just rolled off into his other hand, he surprised himself, because he found that there was another ball under the glass.

What had happened was that he's so expert at loading these balls, and paying attention to one thing while not paying attention to others, in order to draw other people's attention away from the correct thing, he actually misdirected himself, and he loaded a ball under the glass without himself noticing it, even though the glass was transparent and the ball was perfectly visible on his retina—presumably.

And so, he realized when he did this, that this meant that if it works for him, doing it to himself, it will work with an audience; and he could do the entire cups and balls routine with transparent cups, instead of opaque cups. So, that's exactly what Penn and Teller do—they redo the cups and balls, but they do it with transparent cups, and it still works. And so, one of the things that we're testing is how well it works, what is the difference between transparent and opaque cups, and how it is that this specific move actually draws your attention. We're really interested in that right now.

Dr. Campbell: That sounds like a very interesting question. I know you guys have got to go to a meeting, but I do have one last question I'd like to ask you before we sign off. My traditional closing question for scientists is to give advice to students that are thinking about studying science or neuroscience. Susana, would you go first?

Dr. Martinez-Conde: Yes. My advice would be to do what you're interested in doing. I had hesitated quite a while, when I was a teenager, between studying psychology or studying medicine—becoming a doctor. And actually, my mother was disappointed that I decided to go into psychology instead. At the time I was thinking of becoming a clinical psychologist, but then I became fascinated by experimental psychologists instead, and I followed through. And I don't think that I would have been that great of a doctor, because my heart was not in it. So, if you follow what you like to do, you're much more likely to succeed, and to have fun doing it.

Dr. Macknik: My advice is much more practical. If you're planning to go into science, a lot of people go into science because they're good at math. I see it all the time. And when people say 'good at math,' they generally mean bad at writing. But that's a fallacy that you should go into science if you're bad at writing. What you should be doing if you're going into science, you've got to remember that science is about discovering things, to be sure; but it's also about

communicating those discoveries to the public—which is all too often not done well. In fact, it's mostly not done well in science.

And I think that one of the things I've discovered in my career and the trajectory it's taken—where now I'm doing much more writing for the public, with our column in *Scientific American*, and our book, *Sleights of Mind*—is that we now do a lot of writing. And all scientists do. All scientists write grants, they write papers. That's what it's all about, is to communicate these discoveries. And so, I would say that you really need to bone up on your writing when you go into science. And it'll make your life a lot easier, because you're going to end up spending more than half of your time writing, for sure, if you become successful—which is exactly what you want to be. So, that's my advice.

Dr. Campbell: Well, that sounds very practical. Is there anything else that you would like to share before we close—either one of you?

Dr. Macknik: One thing that I wish I had said in my discussion about humor is I didn't really talk about what that meant for real people. So, it's not just that humor is useful to magicians. But the reason that all of these tricks work is because we're doing these things to each other all the time. And magicians have basically just picked up and become expert at manipulating brain processes and behaviors that we do to each other all the time.

There's nothing magical about it; they're not isolating specific weird things about the brain that you never see anywhere outside of a magic show. No, they're actually doing exactly the same thing that we do to each other every day. And the same is true with the humor. And magicians use humor and empathy to lower your guard; and if you sympathize with the magician, you'll enjoy yourself more, and be less vigilant about catching the secrets behind their magic, perhaps.

What this means in our real lives is that if you're negotiating interpersonal, professional, or business relationships, you should do as the magician does, and disarm with charm; that is, basically get your interlocutor to sympathize with you, and you will have an easier time negotiating everything in your life. So, this is a very practical everyday kind of take-home message that we glean from the magicians.

Dr. Campbell: Susana?

Dr. Martinez-Conde: Another thing that we learned from the magicians—they're always ready. First off, they're continuously practicing. Also, we've noticed in our interactions with them that whenever they enter into a room, or a restaurant, or a new setting, they may not look like they're doing it, but they're always looking around and paying attention to their environment to figure out what elements are out there that they may use for an impromptu magic trick. They may not do the magic trick, or they may do it, but if the occasion arises they're always going to be prepared. And this is something that I find very admirable, and that I wish I did more often in real life: be always prepared, think of what opportunities may be out there, and be ready to grab them if they come up.

Dr. Campbell: Another good piece of advice. And I just wanted to tell you both how much I enjoyed your book. It presents so many different basic principles of neuroscience that have come up in the last four years that I've been doing the *Brain Science Podcast*. So many of these ideas appeared in your book in a way that I think will really help people to understand them. So, I hope that your book will reach a large audience.

Dr. Macknik: Thank you so much.

Dr. Martinez-Conde: Thank you very much.

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I want to thank Stephen and Susana for taking the time to come on the *Brain Science Podcast*. I especially want to thank them for taking the time to drive across town to have dinner with me last month when I was in Phoenix attending a medical meeting.

I highly recommend their book, *Sleights of Mind: What the Neuroscience of Magic Reveals about Our Everyday Deceptions*. Not only will it give you a new appreciation for the skills of the most talented magicians, but it also provides a great review of many of the concepts we have discussed over the last four years.

It's a great way to introduce neuroscience to someone who thinks they don't like science. If you know someone who doesn't like to read but likes videos, send them to the website, sleightsofmind.com.

Now for a few closing announcements: First, I want to remind you to visit brainsciencepodcast.com, where you can get detailed show notes, free transcripts, and links to everything else, including our newsletter, our Facebook Fan page, Twitter, the Discussion Forum, and even our Flickr group.

I want to say something about the newsletter. If you haven't already signed up, you might like to do so, because it will be a great way to get the show notes automatically.

With the show coming out every other month, you can be sure with the newsletter that you won't miss new episodes. When you subscribe to a show that doesn't come out on a regular schedule, it's really easy to miss new episodes. So, please sign up for the newsletter.

Now, the Discussion Forum has been fairly inactive for a while, and I've been thinking about discontinuing it. But I got an idea from one of my favorite podcasts, *The Sword and Laser*; and they are using the website, *Goodreads*.

So, I've decided to move the Discussion Forum to *Goodreads*, which is a book-oriented website that allows you to set up groups. This will move the focus of the forum or the group to discussing the books that have been featured on the *Brain Science Podcast*.

It will also give you an opportunity to talk about other neuroscience books, and it will give me an opportunity to share other books with you that don't make it on to the show. If there is enough participation, we might even eventually be able to use it as a mechanism for choosing books for future podcasts.

The thing I'm most excited about is that during my upcoming visit to London, I'm going to be doing a live event for Skeptics in the Pub on May 11th. I will be posting the details about this in the near future, but if you want to learn more about *Skeptics in the Pub*, there will be a link on my website, and you can also find it by Googling 'Skeptics in the Pub London.' You don't have to be a member of this group to attend the event, so I think it's a great way for us to have an event that is both social and allows a little bit of brain science.

The next episode of the *Brain Science Podcast* will be coming out in March, 2011. I'm still working on who the guest is going to be, so I can't tell you that yet.

Don't forget to send me feedback at docartemis@gmail.com. Or leave voicemail at 205-202-0663.

Thanks again for listening. I look forward to talking with you soon.

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Transcribed by Lori Wolfson
All errors or omissions responsibility of the transcriber