

# Invisible Gorilla

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**Debbie Sorensen:** That was Christopher Chabris on Psychologists Off The Clock.

**Yael Schonbrun:** We are three clinical psychologists here to bring you cutting edge and science-based ideas from psychology to help you flourish in your relationships, work and health.

**Debbie Sorensen:** I'm Dr. Debbie Sorensen, practicing in Mile high Denver, Colorado, author of Act Daily Journal, the Act Daily Card Deck, and the upcoming book Act for Burnout.

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**Jill Stoddard:** And from Coastal New England. I'm Dr. Jill Stoddard, author of Be Mighty, the big book of Act metaphors and the Upcoming Imposter. No more.

**Debbie Sorensen:** We hope you take what you learn here to build a rich and meaningful life.

**Jill Stoddard:** Thank you for listening to Psychologists Off the Clock.

**Debbie Sorensen:** Today we are following up from last week's episode with a re-release of an interview I did about 11 years ago with Christopher Chabris about a book called The Invisible Gorilla, how Our Intuitions Deceive Us, and that's a book that was written by Christopher Chabris and Daniel Simons, who

we just had on the podcast last week. And about 11 years ago, I interviewed Chris on a different podcast called The New Books Network about the invisible Gorilla.

So I hope that you enjoy hearing a little bit more about that because we referred to it in last week's episode. And I will say, please pardon the audio, because it was 11 years ago, and so I did not have the latest technology setup. Podcasting was much newer back then. A lot has improved. I have to say that my skills as an interviewer feel a little bit, , inexperienced as well when I listen. Chris and I joked that neither of us wanted to listen to it because we were scared of what we sounded like 11 years ago. So, but I'm gonna just let go of that fear and present you with this conversation with Christopher Chabris.

### **Chabris and Sorensen:**

Okay. Well, let's start with the title of the book, the Invisible Gorilla.

Can you tell us about the Gorilla experiment that you did? How did you guys come up with that idea and what, what did you find?

Well, the title of the book comes from an experiment that my co-author Dan Simons and I did, , when I was in graduate school, uh, at Harvard, and Dan had arrived as a new faculty member.

And incidentally, my, uh, advisor, my mentor, whose lab I was working in, Steve Koslin was, on sabbatical that year out of the country completely. And Dan was around, his office, was right down the hall from me and started talking. Discovered we had some mutual interests and in particular, I wound up, uh, being the teaching fellow for one of Dan's first classes.

It was a, an experimental psychology course, and in that class, undergraduate students designed their own experiments and basically learned how to do experiments in cognitive psychology. But Dan had the clever idea that instead of just having all the students work on their own little individual projects, we would do some group projects.

And it's hard to get a project that it takes 10 or 12, uh, people to do in cognitive psychology. But Dan, cleverly figured out that, uh, if we did some experiments involving filming events, , we could have a lot, a lot of the students be actors and, um, participate in the filming and then go and, and test, uh, subjects later on.

And Dan knew about a classic experiment from um, the late Ulric Neisser . But, uh, you know, one of the, the founders of cognitive psychology and real pioneers in the field, And, uh, Neisser in the 1970s had done a, a similar experiment and we decided to do a different version of it.

I'll tell you, I guess what Neisser's version was after I tell you what our version was. In our version, we filmed the students in the class passing basketballs around, and in particular, three of 'em put on white shirts and three of them put on black shirts. And the white shirted people and the black shirt people each had their own basketball.

So there are two basketballs flying. The white shirted people passed their ball among themselves, and the black shirted people passed their ball among themselves. We did this all in sort of an empty space in the psychology building and a re floor that was being renovated at the time. And, we later on showed this video.

It was about 60 seconds long. Uh, we showed the video to. Um, subjects in the experiment and ask them to focus on the players wearing white and count the number of times they pass the ball actually count silently in their head the number of times they pass the ball. And this is basically a, a test of selective attention.

So you've gotta pay attention to what the white people are doing and ignore the people in black shirts. And this is actually somewhat taxing task. It really requires attention. You can't be doing other things while you're, while you're doing this. Uh, and then afterwards we asked them how many passes they counted and then we surprised them with a question after they told us how many passes they had counted.

We surprised them with a question, did you see anything else or did you see anything unusual? And eventually we asked them, and then they mostly said, they mostly said no. Eventually we asked 'em, did you see a gorilla walk across the screen? And it turned out that we had had a person wearing a gorilla suit walk across the screen and in one version of the experiment, stop face the camera thump her chest and then walk off the screen being on screen for a total of nine seconds out of about 60 or 65. And surprisingly, half the people completely did not see that. They reacted mostly with surprise when we asked the question and when we told 'em there had been a gorilla there, some of them said, we need to see the tape play it back.

Did you switch the tape? Uh, and so on. And it really, um, uh, it was kind of a surprising result to us. Now Neisser had done something similar earlier. He, he had filmed it with these mirrors so that everybody looked transparent. And it was though all the people in the video were walking through each other.

They looked kind of like all like ghosts and some sort of TV show or something like that. And the unexpected event was not a gorilla, but a person carrying an umbrella, a woman carrying an umbrella. So we thought, well, we'll, we'll do this again. We'll have all the action live choreographed so people can bump into each other, no transparent ghosts, no weird displays or anything like that.

And we'll make it something even more unusual. So we really ought to be noticed. Uh, you know, a gorilla. We, we thought that people would notice the gorilla. We could not believe that the effect was that large and half the people completely missed it.

Yeah, it's like someone in a gorilla costume would be pretty easy to spot, but apparently not.

Right? So the nice thing about this experiment, I think is, is twofold. One, people can miss that, which is kind of interesting that people can miss these salient things that are happening right in front of them. And more interesting to us actually as we thought about it more and more, was how surprising people found this result.

At the time, we thought we were sort of doing a fun classroom experiment for cognitive psychology, and we did write it up, as a paper and we published it in the journal perception in 1999. But then we didn't really think much of it, uh, after that. But we started hearing from more and more people that they had seen this video somewhere.

And, uh, actually Malcolm Gladwell wrote about it in the New Yorker. Uh, an article about automobile safety, traffic safety. And, uh, at that point, interest really picked up. And what surprised us looking back on it, was, um, that it really illustrated a contradiction between people's intuitions and the reality of human behavior.

People think they're gonna notice that, and that's why it's so surprising to them that they don't notice it. It really sort of points out a flaw in their own thinking and not because they're, you know, uh, unintelligent or uninformed or anything like that. There's something about human nature that gives us the wrong

impressions about our own cognitive abilities, and I think that's what this experiment vividly points out.

Well, we're gonna be talking about a quite a few of those, because that's a theme throughout the book is how sometimes we're just very wrong about estimating our cognitive abilities.

That's true.

so this one is really about paying attention and, and the illusion of attention.

What does the experiment tell us about attention? Tell. One thing that tells us about attention is that, um, for one thing, uh, attention is good in that it enables us to do cognitive tasks that we couldn't do without attention. You can't do the task of counting these passes of this little object flying around at pretty high speed without paying attention.

So we're good at focusing attention, and that's a good thing. What we seem to be unaware of is the extent to which when we focus attention on one area or aspect or stream of events in our visual world, we don't notice things that are happening elsewhere or in other objects or events. We expect that we're gonna notice unexpected things or important things sort of no matter where they are in our visual field.

What happens when we pay attention is that our chance of noticing those things goes down. And this is not the only experiment that shows this. I mean, not only has this experiment replica been replicated many times, but this general phenomenon of inattention blindness that we can be essentially blind to things we aren't paying attention to was known before this experiment and it's been shown in many, many forms.

Well, you mentioned traffic safety a few minutes ago. Could you tell us how something like finding about attention might apply to driving?

Yeah, that's really a key. It's sort of like the one most basic takeaway from this research is that when you are concentrating on a primary task which in our experiment would be counting the passes of these people with the basketball you are much less likely than you realize to notice other things or to be able to react to other things that are outside of the primary task.

So the classic example of this in traffic safety is people who are talking on the phone, or even worse of course, texting or emailing or, you know, playing

Angry Birds or something like that on their phone while they're also driving and they have the illusion. In my opinion that because they are looking outside the windshield and looking at what they normally look at and taking everything in, they have the illusion that they're actually noticing all the important stuff.

And the illusion comes in part from the very sort of fluid and automatic processing that goes on during driving. You know, we feel like we're having a rich visual experience. We don't sort of feel like we're not seeing things. And also the lack of feedback, because we actually rarely do have accidents when we're talking on the phone.

It's not as though every second time you talk on the phone, you crash your car into something. If that's what would happen, then you would learn that it's a really bad idea. But it's, you know, if someone swerves to miss you, you may never have noticed that and you don't get any feedback about how badly you're actually driving.

You basically don't know what you're missing is one way of putting it. You know, as long as you keep missing it and, it doesn't run into you, then you don't get any feedback about how bad your attention actually is. And the experiment, in fact, Sort of gives people that feedback.

It does sort of give them an instant lesson in a sense in how much they can be missing.

Yeah. We like to fool ourselves into thinking that, you know, this isn't a problem, but it is. Do you have any other examples of how the illusion of attention or those blind spots can, affect our daily lives?

Yeah. This hasn't happened in a lot of different areas. I heard an interesting story when I gave a talk actually. Sometimes people ask is there such a thing as inattentive deafness? And the answer is yes, although it doesn't really go by that name. But it certainly is possible to, to miss otherwise salient sounds and words and sentences and, other things like that when you're paying attention to one conversation or one particular stream.

I mean, you only have to think about sort of like a little kid like concentrating on Spider-Man on TV or something like that. Completely oblivious to what you're saying to them. Someone asked me in a talk once that, they had been, uh, playing some sport or something like that, and it was, I guess it was a pretty rough and physical game.

I don't remember what sport it was. And only half an hour later after he was done, did he look down and notice that there was a big cut in his leg and blood had been coming out of it. And he didn't feel it at all, didn't feel the cut, didn't feel it afterwards, and, , sort of ascribed that to concentrating so much on what he had to do.

And maybe it was soccer or something like that, that didn't even think about that sort of in intentional numbness is one way of thinking about, is one way of thinking about that. I've never seen that term in the literature, but maybe that's a way of a way of putting it. I think it's not just a visual thing, it's a general feature of our sensory systems.

Uh, and it's probably also a more general feature of cognition also. If you sort of don't pay attention to information or events, you may not realize that you're not paying attention to 'em. You're not taking into account. You may think that you're taking into account all the information you need when making a decision, but in fact, you're not.

There are many other examples in, in safety. There's a famous case where a US nuclear submarine surfaced into a Japanese fishing boat off the coast of Hawaii, basically split the, the poor boat in half and, and caused several deaths. And the captain of the submarine had done a periscope sweep before he went and did this maneuver, and he didn't see any boats around.

At least that's what he says afterwards. And nobody else saw any boats, uh, around, and then he surfaced right into this thing. There have been other incidents with airplanes that could be ascribed to in intentional blindness. And it's really a, a much more ubiquitous phenomenon than we realize, and, and I think, you know, most people in, in everyday life, human nature is not to notice these limitations exactly because they have to do with things you don't see or don't feel or don't hear or don't think about. Right. So how by definition, how do those things come to your attention? How do you find out about those things? Um, so this is happening a lot, I think, and it's, it's an interesting feature of the design of the mind that we have these wrong impressions about how well our sensory and cognitive systems are performing.

Yeah. It's kind of funny cuz you think the ability to concentrate on something is usually considered a good thing, but there's a downside when you're concentrating so hard on one thing, you're missing a lot of other, there's just so much information out there, you're missing a lot of other information.

Yeah. And I think the ability to concentrate is a good thing. I mean, people say, well, how can I learn to, you know, spot the gorilla? How can I be the person who doesn't see the girl, you know, who doesn't miss the gorilla, who actually sees the gorilla in everyday life. And

I was sort of worried that even if there were some magic way of doing that, it would have to, uh, it would have to result in some kind of depletion of your ability to concentrate on the main task. And I think people shortchange the value of concentrating on one task. It's harder nowadays to concentrate on one task because just the volume of potential distractions is higher.

You know, what with the internet, tv, just the general complexity of society and number of demands on our time and so on. So I think sometimes people have tried to flip that into a virtue. Well, maybe, you know, they'll try to say, well, I'm, I'm good at multitasking. I can do multiple things at once.

It's good not to pay too much attention to any one thing, but in fact, performance goes way down when you do that and the, the inability to focus or the tendency not to focus, I, I don't think is, is the right solution to this problem.

Right. We have enough multitasking as it is Facebook, you know, all that Twitter.

Exactly. Yeah.

Another experiment that I thought was really fascinating was the person change experiments. Um, Could you tell us a little bit about that?

Yeah. So, these experiments were started by Dan Simons and his colleague Dan Levin, who, he was in graduate school together with at Cornell.

And, they came up with this idea for, almost a, a candid camera kind of experiment. It turns out Candid camera had done something similar years earlier or some, some sort of show light, candid camera. They actually sent an experimenter out to the quad at Cornell. And again, this has been repeated in many other situations, you know, so this is not sort of a one-off this, this really works.

I sent an experimenter out to the Quad at Cornell, and he would just ask unsuspecting passers by for directions to some building like the gym or something like that. And as the passer by who is now a subject in the experiment, although he doesn't know it yet, as he's giving directions to the



experimenter, two other experimenters walk down the path and rudely cut between them while carrying a large door, um, on its side.

So the effect of this, if you can visualize it, is that while the door is passing between them, one of the people carrying the door is able to switch places with the experimenter. So the experimenter now is going off carrying the door, but both of the people carrying the door have their, are behind the door.

So the subject in the experiment can't see the switch happening. So once the door passes by the subject in the experiment, now sees a person who continues the conversation as though he was the original person who was there. And surprisingly, half of the people in this experiment did not realize they were talking to a completely different person after the door went by and, you know, they were both, white males, dressed like students. But they differed in height. They differed in the sound of their voice. They differed in what they were wearing. They had different color jackets or something like that. I mean, there were some significant, some significant differences, um, between them.

And when you put them side by side, they look like completely different people. So this phenomenon was described by Dan Simons and Dan Levin as changed blindness, meaning, a blindness or an inability to notice significant changes that happen to your visual world. Usually when your attention is distracted and put on something else.

So, you know, if, uh, the subject is talking to the experimenter and the experimenter just sort of like walks off and gets replaced by another experimenter, of course it's gonna get noticed every time because your attention is drawn to the moment of the change and you see one person being replaced by another.

But if your attention is distracted, it seems like you're very unlikely to notice these changes, or at least much more unlikely than you would think going in. So people have described these experiments to other people and said, what if you were a subject in this experiment would you notice? And almost everybody says yes, they would notice.

So again, people sort of overestimate their ability to, to notice these changes. Here it's more of an issue of memory because you, you're sort of not comparing the memory you had of the person you were talking to before the change event to what you're looking at right in front of you now. It's not the same exact thing as in intentional blindness, but it's related.

But it's more a fun phenomenon of memory rather than of attention.

Mm-hmm. Yeah. So, so we would overestimate that thinking that we'd be pretty good at that, you know, knowing when a person changes into another person. And yet again, we're, we're giving ourselves too much credit there, at least in this kind of situation.

Yeah. We think we're keeping track of more information in our experience than we really are. We did this study, again, a, a different version of it at Harvard when Dan was a professor and I was a grad student there. The ethics committee at Harvard didn't want us to run the study the same way that Dan had at Cornell.

And the problem was that we were basically approaching people and making them subjects in the experiment without revealing this to them. And so we, we came up with a way around that. We actually had people go into the lobby of the psychology building which is, uh, you know, a tall. I think it's about 15 stories tall.

And they were recruited for an experiment in the lobby and then said, told to go up to the eighth floor. And when they get to the eighth floor in the elevator and they come out, there's a sign that says, experiment here with a counter. And they went to the counter and they, there was an experimenter standing behind the counter and handed them a form and said, okay, fill out this consent form, and then the experiment will start.

So the subject fills out the consent form, just like they always do. Maybe they read it carefully, maybe they didn't. They sign it and hand it back to the experimenter, and then the experimenter ducks down behind the counter and another experimenter pops up to replace him and now gives some other instructions, like, take this piece of paper and go down the hall.

And that was the change right there. So technically it happened after they'd filled out the consent form, but before they really realized they, the experiment had started you, they were expecting to be told, okay, now go down the hall and the experiment will start down there. Um, so in this case, again, many people did not, did not notice the change.

And even some people who had come directly from a lecture elsewhere in the building that had talked about change, blindness happened to stumble into this experiment. And even they did not notice the change. So, just purely being aware of it doesn't mean your cognitive system suddenly resets so that you expect this to happen all the time.

Just knowing about these things or having heard about them once doesn't change the way you experience the world and change the way your attention and memory work. Unfortunately, I wish it, I wish it were that easy.

Oh, yeah. And I, I've read your book now. I'm kind of expecting that I'm gonna not make this kind of mistake anymore.

Not true, huh?

Well, I mean, you, you're, you're better off than if you didn't write, than if you didn't read it. I'll never say that it's a bad thing to read my book. Everyone should read it and, and buy three copies each, of course. But, uh, give two to your friends. Um, but, you know, it's one of those cases where it's good to read and it's good to be aware of this, but then you have to think, well, what do I do in my life that, uh, reflects the illusion?

So he, we call this one the illusion of memory. What we've just been talking about is the belief that we're encoding, and remembering events in our lives much more accurately and permanently and objectively than we really are. You have to think about what, what are you doing in your life that reflects this illusion. For example, I mean, one thing people do is they argue with other people over who said what, you know, two or three weeks ago in some conversation or something like that.

And unfortunately, memory research suggests that the most likely situation there is that neither person is right in the argument. And the, the one who wins is not gonna be the one who, you know, whose memory was closer to the truth or anything like that. It's just gonna be the one who doesn't give up.

And right, And that argument is a complete waste of time and probably makes things worse in, in whatever relationship you have with this person. Especially, you know, if you're, you're married to them or, you know, related to them or somehow, um, memory is just not that perfect. But the, the more important problem is that we don't realize it's not that perfect.

So we wind up arguing with people over whose memory is more accurate. And of course we have criminal trials over, um, you know, issues largely determined by memory. So if you're ever on a jury or you're ever involved in a, a, you know, heaven forbid a crime, , or a serious situation like that where guilt or innocence or liability turns on memory, you've gotta be aware that people's memories are not nearly as good as they think they are.

And your fellow jurors or other people, if you work in law enforcement, the other people you work with may have an incorrect theory or an incorrect belief about how good memory is. And, you know, the truth may not be served by having this illusion that, uh, we're gonna remember things much more accurately and objectively than we really are.

Well, speaking of which, uh, September 11th, you mentioned this in your book, and I think I can remember very vividly my personal experience on that day, you know, when the news broke and, and I remember where I was. And, um, these are flash bald memories. Mm-hmm. For, you know, when the, when these big real traumatic events happen, these really emotionally charged events happen, um, how likely do you think it is that my memories of that day are accurate?

I wouldn't wanna put a percentage on it right now, um, especially after you've read the book. Maybe you've, you've gone back and done some research on this to check on your memory. But I can say for myself that I have a very vivid memory of what I was doing when I heard about nine 11.

And, I think as, as we mentioned in the book, , I was in graduate school at the time, so I was kind of on a little bit of a a sleep late calendar. , when I woke up, I actually, I believe heard about this by listening to Howard Stern on the radio of all things. And, uh, I was alone at home, you know, and, and and so on.

And I have some other recollections of what happened that day. And it does seem very vivid to me. I obviously don't remember what I was doing on September 10th or September 12th or any of those other days around there, except in the most, you know, vague and general terms.

And you're not alone. So you're not alone in having this experience. In fact, in the book, Dan, we wrote about Dan's memories. Dan wrote out a detailed memory of, how he experienced nine 11, and there were various people in his memory. So fortunately since, um, he was a professor and the people in his memory were his graduate students at the time who are now still in contact with him, he sent the mini an email and said, send me back your recollection of nine 11.

And, it turns out that there were significant discrepancies among all of these recollections that they have. Several of which pointed to Dan not being right because he remembered people being there, that nobody else remembered being there. And then there was someone else that was there that, that Dan didn't remember, but the other people did.

But nobody was completely correct about it. They couldn't have all been completely correct about it because there were too many discrepancies. Uh, and this, if you think about it, this is for a salient event that everybody has, as you say, a flash ball memory for a feeling as though, you know, a flash photograph was taken and it's imprinted, uh, and your memory will never go away somehow. Um, Ulrich Neisser, the same, researcher who had done the gorilla Experiment did really the definitive experiment on flash ball memories. And, uh, it was a genius maneuver. He and his co-author after the Space Shuttle Challenger exploded in 1986, had their students, uh, fill out a form indicating, what they had experienced, I believe it was the day before.

So at this point, they probably hadn't had too much time to distort this memory. It was still very fresh in their minds, and then came back to them about two years later before they graduated, and asked them to recall their experience again and found many, many, many discrepancies between them. But, uh, they also found that the people believed completely that their memories were accurate.

And in fact, one, they mentioned that one student was shown his handwritten answers from two years earlier, you know, the day after the explosion. And he said, yes, that's my handwriting. But I don't remember it happening that way. That's not how it happened. You know, I, I admit that that's my handwriting, but that's not how it happened.

The distortion in memory that had happened over those two years, not a deliberate distortion or anything like that, just the natural changes that happened to our memories, um, was so powerful that even being shown what he originally wrote it, it didn't sort of like snap that memory back into place or anything like that.

He still felt more strongly in the memory in his head than in his own documentary evidence. So, you know, like you said, and think of the implications for criminal trials and how much weight people place on, on memory, um, versus other kinds of information and just in your own daily life, how much you pay attention to your memories.

And one thing people don't realize is that we actually are leaving now with all these computers and devices and so on around us. We're leaving more and more paper trails. They're not really written on paper anymore. But one thing I did after writing up that chapter for the book was I went back to my, um, email actually, and years later I still had my, my inbox, my save messages and my sent

mails from that day and found some things, about nine 11 that I had not remembered.

Um, but they were sort of noted there as a result of emails I had sent that day or I had received.

Hmm. So I probably remember September 11th better than say September 8th of that same year. But I might be overestimating how accurate. I think I might think I'm more accurate than I actually am in my memory.

I'm not sure you're even remembering September 11th Better than better than September 8th, huh. Um, so people have done, uh, studies like that where, uh, that was the, that was sort of the, the next generation, these flash ball memory studies, sort of, they, they come along kind of episodically because usually they depend on an event happening that sort of everyone is aware of and has an emotional impact on everyone.

Right. So the space shuttle explosion in 1986 was one, nine 11 is another one. There aren't that many sort of, you know, universally, uh, familiar events. The original ones that were studied were the Lincoln assassination, believe it or not, in the 19th century. And then the jfk uh, assassination.

So presidential assassinations fortunately are, are few and far between and national disasters are as well. So when nine 11 came around a couple of researchers whose uh, names allude me right now, but we do mention 'em, mention 'em in the book, um, had people write down their memories for, , I think either the day before or the day after.

And then for nine 11, and again, they did this within a day or two of, of the actual event. So those things were written down, you know, on nine 13, let's say, as the truth. And then followed up, a year or two later to see, um, what had changed.

And they found that the memories had distorted just as much. So the, the memories of nine 10 were just as, uh, inaccurate as memories of nine 11. But the confidence in the memories of nine 11 was extremely high, whereas people realized that they weren't too sure about nine 10, they thought they were really sure about nine 11.

So in the book we say, in instead of a sort of a flash ball memory, um, what it is is really sort of like a, a belief device. What the flash bulb does is it makes you believe that you've recorded a permanent memory.

Mm-hmm.

Um, it makes you very confident in your memory of that day, but it doesn't really, uh, actually make a permanent, imprint the way we think it does.

Hmm.

All memories are subject to distortion. Even the ones you, you think are, are, you know, are the most perfect.

Yeah. We may construct some pieces of it after the fact.

Yes. whenever we recall a memory, what we're doing is constructing that memory by assembling different pieces of experience from different places.

Often we fill things in because we think that's what should have happened, or because, um, what we recall in lieu of the truth satisfy some other motives we have. So, Hillary Clinton, for example, in the presidential election when she was running against Barack Obama for the Democratic nomination, she told a story about being under sniper fire in Bosnia.

And which was untrue because she, there video came out later of her landing and there was a nice welcoming ceremony and no one was, you know, ducking and covering and um, and so on. And she didn't, probably just didn't toss this out in casual conversation. She was running for president against someone she viewed as much less experienced, especially in the area of international affairs.

So the memories she created, just like the memories we all create all the time, were somewhat consistent with her motives and beliefs um, at the time she was more experienced in international affairs, um, and that was a strong suit of her campaign. And that's why that's part partly explains in my view why she said what she said.

Interesting. She probably completely believed it and.

I bet at the time, yeah, I mean, there's no, we, we, unfortunately, I wish, I wish there were a good enough cognitive psychologist that I could get inside Hillary Clinton's head or anyone else's head and figure out exactly what's the truth and what, and what's not the truth.

It's not really even clear to me that the truth is in there somewhere.

Yeah.

You know, the things that happened that distorted our memories may be in a sense, permanently changing, um, the originals. I don't think it's the case that the truth is sort of down in there somewhere and we just have to uncover it, that that's more kind of personal opinion.

But I do suspect that Hillary Clinton, when she told that Bosnia story, actually believed that that's what happened to her and just thought she was telling a story. And, you know, uh, maybe when those news reports came out, you know, we don't know. But when the news reports came out, she might have said, well, that's true.

That's, that's a video of me. But that's not the way I remember it. So I don't know though. We never got the chance to ask her.

Not yet.

Not yet. Yeah. Maybe, maybe someday.

Well, tell us about the illusion of confidence. How sometimes we maybe tend to be a little overly confident in our estimation of our abilities.

So the illusion of confidence is the third illusion that we talk about in the book. And in the book we call these things everyday illusions. The idea being that they are illusions about our own minds that affect us every day. At least one of them. And probably, you know, many of them are affecting us every day in all kinds of decisions we make.

And confidence is, is one of the most important ones. They're actually two there. There're really two illusions of confidence. One is the illusion that, um, our own skills and abilities are better than they really are. So we have too much confidence in our own performance, and we pay too much attention to confidence in other people which is in a way, uh, you know, sort of a, a corollary.

So if people are overconfident in their own abilities, we really shouldn't be paying that much attention to how confident people are. But we do pay a lot of attention to how confident people are. Um, the classic example is, you know, the witness, uh, on the stand in a criminal trial or let's say testifying before Congress or some other, you know, a body, um, or a deposition or something, the witness who seems poised, confident, self-assured, smooth remembers



everything with complete clarity and conviction is going to be a much more convincing witness and people are gonna believe her, uh, much more.

Now, it's not the case that a confident witness, the, the confidence means nothing confident eyewitnesses, researchers showed are more likely to be correct than eyewitnesses, but, we tend to think that their confidence is a better reflection of their accuracy than it really is.

So, um, for example, uh, confident witnesses are right 70% of the time. Unconfident witnesses are right 30% of the time. But that leaves still for a confident witness who's right, 70% of the time, they're still wrong 30% of the time. So, Uh, 30% is probably enough for a reasonable doubt. So that, you know, probably a criminal verdict based on just one confident witness, uh, is a little bit shakier than we realize.

And that's just for eyewitness testimony. There. There are many other, um, many other areas where we pay too much attention to the confidence of, of other people.

You know, you wrote about how we prefer experts who think they know a lot and, and one area that this happens is in medicine and how we, how we rate our doctors.

And it's, it's funny cuz just the other day my mom was telling me that she found a new doctor and the only thing she said about the doctor was that the doctor seemed nervous. And I thought of your book because, you know, well, tell us about how this might apply to medicine.

Yeah. There, there's some areas where you don't want to see nervousness, right?

Like, you don't want to, you don't wanna walk on the airplane and look in the cockpit and see that the pilot looks nervous. Uh, you know, that should be unsettling, right? And, and the doctor who looks nervous while they're about to sort of, you know, start surgery on you or something like that, you know, ought to be a little, ought to be a little unsettling.

Um, but an experience I had which turned out later on to be, um, actually, there was a research study on this I didn't realize at the time, but again, when I was in graduate school, I had these flu symptoms and I had this weird, uh, rash on my back of my leg, and I hadn't seen the rash, but I, I went into the, uh, clinic, um, the health services and they said, well, it's a flu.

You know, get, drink lots of fluids and take, take aspirin, and so on. But then the next day I saw this weird rash and I went back and I said, Hey, look at this thing down here on my leg. I didn't notice this before. And then the doc at that point, the doctor who was on duty, did something I'd never seen before.

She left the room and came back with a book and opened it up and compared the picture in her book to what was on my leg. And she said, Hey, look, you know this well. She didn't say, Hey, look, a little bit of an embellishment there, but she said this, uh, this is a classic, uh, Lyme disease rash. Uh, you know, you've been bitten by this tick and gotten Lyme disease from it, and your rash looks exactly like the one in the book.

Uh, you know, and I said, okay. Um, that was a little bit unsettling. You know, Lyme disease can be scary. and then she did, she did it again. She went and got another book and looked up the treatment and, uh, the treatment is a certain course of antibiotics. Then she prescribed it.

And I, you know, and I left. And I had never been in, you know, an encounter with a doctor where they had looked things up in books. And this happened twice in the same, uh, medical encounter. I thought at the time that that was a little bit odd. Now, I did follow the prescription and everything got better and I was, you know, back to normal.

But, uh, It's not that unusual for people to pay attention to sort of the confidence and the quickness and, and so on of, of the doctor, um, uh, more than they should. Someone did a research study, where they actually sort of showed videotaped encounters with doctors to, um, subjects who were potential patients and had them rate, how much they, they liked the, um, they liked the doctor, and the doctors who consulted reference materials got the lowest ratings of, of anyone.

The doctor who got the highest ratings was the one who immediately wrote out a prescription and, and said, uh, you know, go on your way. Even while admitting that they weren't sure whether that was, whether it was necessary. Um, so, uh, I think, um, uh, we have this tendency as, as you say, to to assume that if someone's acting quickly and decisively and so on, that, that must mean they know what they're doing.

And if someone consults, reference materials or hesitates or consults, other experts, um, that that's a bad sign. But in fact, the reverse might be true. I'd sort of rather have someone who looks up the diagnosis and confirms it than

someone who is so confident that they don't need to because that person who's so confident might be wrong and not even realizing.

Right. They might completely miss it.

Yeah.

They might completely miss it, but you'll never know. Yeah. Because they thought they were a hundred percent correct and they just, you know, handed you a prescription and off you go. But if they actually discuss with you some of the considerations and the alternatives and the reasons for their decision and so on, you should then be more confident, I think.

**Chabris and Sorensen:** So if you mentioned that even experts in a field can be way off the mark. Sometimes they think they know more than they actually do about things. This is the, the illusion of knowledge. Could you tell us how that might apply to something like investing?

Yeah, so, investing is a great example of a field, at least investment advice, let me put it that way.

And, and also I think a lot of investing, a field that is basically owes its existence to the illusion of knowledge. And the illusion of knowledge is, um, our tendency to believe that we understand complex things more deeply and correctly than we actually do. It's not the same as the illusion of confidence.

Confidence is sort of confidence are in our own abilities or our own, um, memories or our own skills. Whereas the illusion of knowledge is the belief that our knowledge is deeper than it really is. A prime example happens with the stock market. There's a whole genre of books that you can buy with titles like, you know, Dow 30,000, Dow 40,000, Dow 100,000.

These are all actual books that were actually published and actually sold. Um, which have this explain this very simple theory explaining why the value of the Dow Jones Industrial average is gonna hit 40,000 within a certain number of years or whatever. And they, they give you, you know, an investment, you know, plan to follow based on this.

And, and there is no way that these people writing these books know as much about the stock market as they think they do. Uh, incidentally, all those books,

you know, are now out of print or, you know, selling for, you know, 5 cents each or something like that, on Amazon. There's a great temptation to, uh, reduce a complex system and, and the, the global financial markets sort of in a way, the ultimate complex system.

You know, what the Greek government is doing at any one point in time affects the bottom line of, of everybody in the rest of the world now, in terms of the value of their, of their, um, of their financial assets. It's a incredibly complex system to think that that can be reduced to a simple model that you can then act on and, and successfully make money that that other people aren't making, is a prime example of the illusion of knowledge.

One, one reason why it persists is that surely some people do make more money than others in the stock market, and some people make, make a lot less money. Some people lose all their money, some people make fortunes. But we underestimate how much of that is due to randomness, uh, chance, luck, um, you know, accidental, good timing.

They, they just happen to in, have money to invest when the stock market happened to be on its way up. Or, just lucky picks. Um, you know, all kinds of other reasons why some people win and some people lose besides actual knowledge of the system. And yet the people who win wind up writing the books and giving the advice and they go on TV and, you know, every night they'll say, buy this, sell that, buy this, sell that.

And they can't possibly know things with as, as much depth or confidence for that matter as they, uh, as they display.

Hmm. If only, if only it was that simple.

And actually, you know, it, it's, it's funny, it's not just complex systems. I mean, if it were just a matter of, well, we'll, we'll just sort of not make predictions about complex systems and we won't worry about those, but people even overestimate their knowledge of simple things.

There's a great study by a British researcher who asked people how well they thought they understood how a bicycle works. And they would rate this on a scale of one to seven, sort of one would be, I have no idea how a bicycle works to seven being, I have a very good understanding of bicycles.

And then she surprised them by asking 'em to draw a bicycle. And I wish I could show you in a, you know, an audio interview, what these pictures look

like. But they would do things like have the chain connect both wheels of the bicycle. So for example, if you think about it, if you're riding a bicycle and the chain connects both wheels, anytime you turn, anytime you try to steer or turn, you're gonna be bending the chain and the chain is gonna snap right off or the bicycle's gonna fall down.

There is no possible way to ride that bike. So what's going on here? Well, people think their knowledge is higher, and that's evidenced by their ratings than it actually is. But of course, they can ride the bicycle perfectly while they know how to ride a bicycle. And if they looked at a bicycle, they could probably explain.

Oh yeah, if the chain connects both wheels, then it can't possibly work. The chain needs to connect the pedal to the back wheel, and that's how you power the bike. And then the front wheel needs to be free to move and so on. But they don't think of all that stuff. When they're asked to rate their own knowledge, and these are the questions that we, people don't ask themselves when they invest, right?

They don't say, well, do I really understand whether Apple is gonna go up from being worth 550 billion or down? What do I really understand? How much do I understand about Apple's competitors, Apple's products, everything else in the global computer and internet industry and music industry and so on.

They don't really, they don't really ask those questions. They form an impression based on an intuition which doesn't really match reality.

Wow. Uh, tell us about the, the illusion of cause and effect.

So the illusion of causes is kind of related to those last two illusions, and the idea is that we believe that we understand cause and effect better than we actually do.

One way we do that is by, uh, generalizing from single experiences, especially experiences where one thing happened and then something else happened. And we tend to assume that the first thing that happened caused the second thing. If there's any kind of logical connection we can come up with between the two.

So a classic example is, uh, vaccination. As most people know nowadays, it has gotten a lot of publicity. There are beliefs that autism has increased in prevalence over the last 10 or 20 years because vaccines can cause autism as a side effect. And, uh, people have sort of formed that belief, on the basis of either

hearing celebrity commentary about it, um, hearing celebrities talk about it and espouse those beliefs.

Or maybe occasionally some, some doctors also who, who say them or maybe experiencing themselves that their child started showing some symptoms of autism shortly after receiving one of their vaccines. Typically, the, uh, measles, mumps and rubella, the MMR vaccine, which happens around age two or so.

And, uh, you know, it's not completely illogical. You know, some needle is put in and some foreign substances, you know, in injected, and then your behavior starts to change at some point after that. It's, it's not an illogical connection to make. The problem is sort of twofold. One, we're very good at making those connections.

Um, we're very good at finding patterns in our behavior and in our environment. Um, and, uh, two, we're fairly unaffected by hearing about scientific evidence against those beliefs. So if this were true, you'd expect people who have gotten, um, mmr uh, vaccinations to have a higher rate of autism than people who haven't.

And people have actually gone and looked at this and, and data sets covering hundreds of thousands or millions of children. There's actually no difference in the likelihood of autism. Between people who've had vaccinations and people who haven't. And this has been settled, you know, over and over again in many, uh, medical journal articles.

And there there's really no, um, serious debate over that point. But, uh, one of the sort of foibles of the human mind or one of the illusions that we have is that, um, sort of abstract data on hundreds of thousands of people in medical studies doesn't penetrate our thinking and our beliefs as much as a single good story from a celebrity, from a friend, from ourselves, um, uh, or whatever.

So, uh, that's the, that's the illusion of cause is that the tendency to sort of believe in cause and effect when we don't have evidence for it. And maybe to, um, discount, you know, evidence that really would, uh, be valuable in explaining it.

And in this case, isn't it the case that the onset of the symptoms of, of autism are first usually detected around that same time?

So it's more of just a coincidence in timing, isn't that?

Yeah, so, um,

the case

If something happened five years later, then we'd be much less likely to ascribe cause and effect. So we tend to sort of pick the cause that is most logical and easy to connect to the effect. And in, in this case, um, if the cause is close in time before the effect, the, the supposed effect, I should say, and is plausibly somehow related and, you know, an injection of something you know, could change your behavior, that makes sense, right?

Um, then we're much more likely to make the connection, than, you know, most kids probably get red goodnight, moon. You know, around the same, you know, around the same time. But, you know, nobody's saying, saying the goodnight moon causes autism. It's not logical that it could, there's some logic to an injection.

Mm-hmm.

Being able to cause autism. But it's the coincidence, the temporal coincidence that it happens to happen around the same age as autism symptoms first become detectable, that, uh, and, and then autism first gets diagnosed, um, that causes people to make this connection. I think also that the fact that there are, that celebrities who believe in this connection sort of repeatedly get a platform in the media is a part of the problem also that people might not necessarily believe something because Jenny McCarthy believes it, but Jenny McCarthy gets to talk about her beliefs to Oprah and Larry King and others over and over again.

Whereas, people who explain the reality of vaccines and and autism, um, are not as popular as celebrities. They don't get as much of a platform and they just don't draw as much attention as celebrities do. Interestingly, why we pay so much attention to celebrities is another interesting. Why the human mind.

There's really no logic there. There's really no logic as to why Jenny McCarthy should know anything more about parenting than the average other, you know, mother, new mother in the country. But, uh, people pay attention to her when she talks about it. That's a whole interesting question of human nature right there that I haven't figured that one out yet.

But I think there's, there's something interesting to that.

Me either, well, maybe that could be your next book. So people might be disappointed if, uh, they read your book to find out that sometimes we think some activities will make us smarter, you know, like listening to Mozart doing crossword puzzles. But tell us about that.

Is that really true? And what, what's the, what happened here with the Mozart effect?

So people may remember the Mozart effect, actually it's been almost 20 years now since the Mozart effect was first discovered or at least announced in an article in nature, the prestigious scientific journal and the researchers who discovered it claim that if you listen to Mozart's music for about 10 minutes, then you will then do about eight or nine points better on an IQ test that you take right afterwards. And that therefore, Mozart's effect has sort of a short term enhancing effect on cognitive ability. Uh, and there was a result of this. People started doing things like playing Mozart's music in libraries, and more importantly, buying CDs of Mozart's music to listen to, or, buying, uh, the music to play to their newborn babies on the logic that if this works on college students who were the subjects in the original experiment had a lot of work even better on, you know, newborns who are ready to soak up whatever, whatever the, you know, nature, whatever the environment provides for them, they were actually.

Hence a multimillion dollar industry on of baby Einstein and that kind of thing, right?

Yeah. The, the Baby Einstein company, which is now a brand that is inescapable for new parents. There are baby Einstein toothbrushes, there are baby Einstein, everything. But it started out as a, a DVDs and that company was started in the wake of the Mozart effect. Um, you know, news report, this idea that somehow, you know, early enrichment with classical music or other things seemingly associated with geniuses like Mozart, Einstein, Bach, you know, so on, um, would be a big booster to people's brain power was very popular. And, and in the book we, we argue that this reflects something we call the illusion of potential, which is sort of our, our recurrent belief that there gotta be some easy way to make ourselves smarter. And it's not just, it's not just smarter. Of course, this often applies to health and beauty and, and other areas.

We, we sort of have a, have a tendency to sort of, Believe or hope that there are quick and easy ways to achieve really dramatic results. You know, thin thighs in 30 days or whatever, you know, there's always, there's always some, you know, there's always some, usually the things we wanna achieve are achievable, right?



Like we, we can get smarter. In fact, we put our children through, you know, 12 plus years of public education, not just to get them out of the house, but because we think it's actually gonna make them smarter, right? There's something about going through the educational system that gives you more knowledge and skills and abilities and vocabulary and, and, you know, all kinds of other stuff.

But that takes 12 years and it's very expensive. It's much nicer if we could do it in 10 minutes or maybe an hour or two hours or something like that. But basically the summary of all the literature that has looked at these sort of get smart quick schemes has found that they don't work. At best what they do is they make you better at doing the thing that you're doing.

So, um, you know, you do a lot of crosswords, you get better at doing crosswords. You might learn a few words along the way, but you're not generally gonna make your brain bigger. Or, you know, boost your brain power and so on. Playing, um, video games, especially those brain games, um, that Nintendo and other companies have sold, make you better at playing the games.

But so far there's no good evidence that they make you better at anything else. Like, you know, doing memory games, um, on your, uh, handheld computer or your smartphone or whatever, won't necessarily make you any better at remembering where your car is in the parking lot or remembering where your keys were when you can't find 'em, or any of those things that I think are the reasons why people are motivated to do this.

There was a TV commercial from one of them where someone runs into an old friend on the street and can't remember his name. And the implication is that if you would only play our, our brain games, then you would, you know, not have these kind of senior moments happen to you at age 45 or whatever the guy.

Whatever the guy was. Um, the, there are, it, it turns out there are ways to, to improve those skills and abilities. You practice the skills and abilities you want to improve. It's kind of obvious advice. And you get your general health in good shape, especially your aerobic fitness because it probably is the case that improving blood flow to the brain is sort of like the single best thing you can do for your brain power.

The brain relies on blood, which carries glucose and oxygen and all kinds of other things that the cells in the brain require. And if you can improve the flow of blood to your brain, that's probably the one best thing you can do. So that's aerobic. You know, that's the same thing that improves the flow of blood to your rest of your body, aerobic conditioning.

And there have been some credible studies on that, that show that that has an effect. But, uh, unfortunately I, I wish it were as easy as doing crossword puzzles and so on cuz those things are fun.

Yeah, I think we'd all like to think that, uh, we could skip the gym and. You know, play a few games or listen to some music instead.

But yeah, not unfortunately, there's, I guess, no shortcut like that.

Yeah. In the case of Mozart, by the way, um, there have been many studies on the Mozart effect because it was so startling that people figured, well, we've gotta go try this in our own lab if this really works. You know, this is tremendous.

And the, the net result of all of those studies in which there have been dozens now, um, is that either there is no Mozart Effect, or what the Mozart Effect really comes from is that when you listen to something that puts you in a good mood or slightly arouses you, not arouses you sexually, but arouses you cognitively, so you're sort of more alert and attentive right afterwards, then you're gonna do a little bit better on cognitive tests than you do after that.

So it's a good idea to sort of put yourself in a good mood, in a slightly aroused mood before a test or before an important meeting or something like that. But that doesn't mean you're boosting up your iq, you know, by any significant amount or anything like that. It's just sort of good preparation to perform at your peak.

So as we're kind of wrapping up this interview here, I'm wondering if you can think of any overall, I guess, suggestions from your research and from the book. How can we use this? So, so now we've kind of learned that we have all these, um, you know, illusions and some shortcomings cognitively. any suggestions for how we can use this in our lives?

Y yeah, I think being aware of how your mind really works is of tremendous value. I try to put this stuff into work myself and into action myself. And one thing I do is I, I'm very sorely tempted now that my phone can do anything a computer can do. I'm very, very sorely tempted to use it while I'm driving.

I should be paying attention to other things. So one thing you can do is, you know, zip it up in your, in your briefcase or purse or backpack, and then put that thing in the backseat so you can't even unzip it and, and access it while you're

driving. So change your environment to make you less prone to fall victim to these illusions.

In the case of the illusion of cause, don't read bad science and advice books that are based purely on people's personal experiences. Um, don't pay attention to celebrities. I mean, I probably didn't need to tell people, you know, this, do not pay attention to celebrities.

But celebrities, the celebrities are different from you and me in so many ways. You know, they've all got personal trainers, they've all got, you know, chefs, you know, and, and so on. Anything they suggest to do to improve their lives is, is not what's really working for them. Um, when in the case of memory, Think about, um, how accurate memory really is the next time you get into any kind of dispute that's in, involved in memory.

And, and think about the different ways that you could check your own memory. If there's something important that you're opining on and you're doing it from memory, think about whether there's any way you can check it. How many of us ever go back in our calendar, you know, our calendar program on our computer, or, you know, our filofax or whatever.

How many of us ever go back and look at what we really were doing on some date or go back to our saved mail or our sent mail and look at what we said to people in the past? Maybe we can, we actually have records of a lot of stuff that instead we rely on our memories for don't trust people who say they have a perfect memory of something.

Don't trust people who say they're absolutely certain of things. People, people who say they're absolutely certain of things are almost by definition overconfident. Don't trust people who give you such one-sided or, um, automatic advice and so on. They're probably suffering from the illusion of knowledge.

And of course, don't waste your money on, on brain games and so on, unless you just enjoy playing them. But, don't think that it's gonna actually make you instantly smarter. And one thing I tell my students is look for examples of this in your own life or in the news or whatever.

And if you start looking at the world sort of through the, the lenses of these illusions, you can start to get a lot of insights into other people's behavior and understand why other people are, are doing things. In the case of Hillary

Clinton, if everybody had realized the way memory works, they wouldn't have all just started calling her a liar.

I mean, she might have gotten out of that episode of, of the Bosnian snipers and so on. If, if it hadn't been that people were writing editorials saying, well, she's either a liar or she's mentally ill, or whatever. If people wrote an editorial saying, well, that's the way memory works, sometimes people get it wrong, memory's constructive and so on, uh, things would've been different.

I think the world would be, uh, a little bit better place if people understood this stuff more.

Mm-hmm. Absolutely. So what are you working on now, Chris?

Well, we're doing, actually doing some follow up studies to some of the ideas in the book that writing the book was actually kind of inspirational for me.

And I think Dan also in thinking about, um, you know, new research we can do. So we're working on some stuff like that. And, I also research in several other areas. So one of the interesting ones that I've been working on lately is on, um, uh, collective intelligence. So collective intelligence is the idea that groups of people can be surprisingly intelligent if they pool their abilities in the right ways.

They can not only be smarter than individual members, but, um, in the, in our the case of our research, we've found that some groups are sort of systematically smarter than other groups. And by groups I mean, may sort of like teams of three, four, or five people working together on projects. And, and not just because the smarter groups have smarter people in them, actually two groups can have people, individual members who are just as smart.

But, uh, groups whose members are better at perceiving emotional expressions and who do a better job of taking turns and sort of sharing the, the floor and discussion. And interestingly, I have groups with more women, um, in them tend to have higher collective intelligence and tend to outperform other groups.

We've been working on sort of understanding what collective intelligence is, how we can measure it, and then thinking about sort of what we can do to enable groups to be smarter. So this is sort of a new area, you know, of research that I've been working on, in the past few years. Uh, and, I'm, I'm pretty excited about that.

Well, that sounds great. Very interesting work. Well, I wanna thank you and Dan Simons for writing this really fascinating book. I really recommend that people read it , and also I really enjoyed talking with you. I had a good time. Thank you. Thanks.

Take care.

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