Science AMA Series: I'm Beau Lotto, a neuroscientist who specializes in the biology and psychology of perception. I just wrote a book called DEVIATE about the science of seeing differently and am here to talk about it. AMA!

labofmisfits [1] and r/Science AMAs[1]

[1]Affiliation not available

April 17, 2023

Abstract

Hello Reddit! I am Dr. Beau Lotto, a neuroscientist fascinated with human perception for over 25 years now. Originally from Seattle, Washington, I have lived in the United Kingdom for over twenty years and is a Professor at University College London. I received my undergraduate degree from UC Berkeley, my PhD from the University of Edinburgh Medical School, and was a fellow at Duke University. I'm Founder / CEO of Ripple Inc, which is a NY based company which owns IP (and patents) in AR Ripple has two products: Meego and Traces. The former is a Social platform and the latter an Enterprise platform ... both in AR. I am also the Founder and CEO of Lab of Misfits Studio, the world's first neuro-design studio. The lab creates unique real-world 'experiential-experiments' that places the public at the centre of the process of discovery. By spanning social and personal boundaries between people, brands and institutions, our aim is to create, expand and apply their insights into what it is to be perceiving human. What is perception? Perception is the foundation of human experience, but few of us understand why we see what we do, much less how. By revealing the startling truths about the brain and its perceptions, I show that the next big innovation is not a new technology: it is a new way of seeing! What do we really see? Do we really see reality? We never see the world as it actually is, but only the world that is useful for us to see. Our brains have not evolved to see the world accurately. In my new book DEVIATE, and what I'm here to talk about today, is the science of perception, how we can see differently, and how to unlock our ability to create, innovate and effect change. You can check out my recent TED Talk on the subject, or poke around my website to see some optical illusions, and feel free to ask me questions about things like dressgate, and how to use perception in nature, groups, while using technology and in solitude – and how we can unlock our creative potential in every aspect of our lives. I will be back at 11 am ET to answer your questions, ask me anything! Thank you for all your questions, they were terrific — I'm signing off now! I will try to come back later an answer a few more questions. But for now, thank you.

the WINNOWER

REDDIT

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LABOFMISFITS R/SCIENCE

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Hello Dr Lotto,

Thank you for sharing your expertise. I have two questions for you.

1. If perception reflects more about how we process reality rather than the nature of the reality itself, how do we know for sure what is real vs what is strictly mental phenomena? (Is the only difference between "real" perception and hallucination the fact that multiple people share and talk about an experience?)

2 . I'm seeking an undergraduate degree in biochemistry with the goal of pursuing research in the field of perception science. Do you have any suggestions for preparing myself to break into the field? How

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can I focus my career in this direction?

littleGirlScientist

Hello ... and thanks for the questions. As for 2, you're suggesting a very interesting combination. There are many places with Neuroscience undergrad degrees, which would have a strong element of biochem. Few are linking perceptual phenomena with chemistry however. But it is a great potential combo

I have brain cancer mostly in my right temporal lobe and have had most of that lobe removed as a result of it.

Late last year I had what my neurooncologist called an inferior temporal lobe seizure. Long story short it shifted my perception of reality for about 20 minutes. It wasn't so much a visual change as it was a perception change. I could see through my skin, I could see electricity, sound waves and emotion. I saw the progression of evolution from the big bang until the development of Homo Sapiens hands. The animalness of everyone around me really popped out....The reality of our apeness was awesome.

Since then I've had an easier time of "seeing" the world through that lens. My Dr really enjoyed talking about the experience and we had a great conversation on the perception of reality.

Do you think it's more a symptom of surgery or more that I've experienced something once and now have a set of pathways that allows me to get there again without the actual seizure?

undomesticating

I'm terribly sorry for your cancer, but so pleased to hear about your positive description of what you are experiencing in terms of your insights (literal and metaphorical). I couldn't comment as to how or why you are experiencing what you are experiencing. But I agree with a number of your insights gained! We do indeed often forget how to live (including myself). And one aim of Deviate is to - in a very modest way - remind us (including me) of that point. That the brain evolved to continually redefine normality can be empowering, though it is often seen as the opposite, since we have such a strong need to be tied to certainty.

Greetings Doctor! I'm 17 this year and ever since I was twelve I've had derealization, which is a chemical imbalance that makes everything seem like it's fake or 2D. I've had it go away a few times for a few minutes, but I've had it for so long I'm scared that it will never go away and I barely remember what reality felt like or looked like before. Is there any way to change it back to the way it was before without meditating for hours on end? My psychiatrist has told me that it goes away eventually but I'm really interested in what I can do and if there's anything in your book about it.

Fred_72

Your question strikes me.

send me an email

Thanks for the AMA.

This is not my field so please forgive the simplistic nature of my question.

Do you have any ideas why some 'discoveries' or 'revelations' can instantly and somewhat permanently change our perception ("blow our minds") while others have little to no ability to affect us?

And what can be done in the way of an intervention to create permanent change?

Pm_me_womens_bums

This is such an important (and non simplistic) question. Or rather it is beautifully simplistic - as many of the best questions are. The answer is complex and complicated ... and largely unknown. My suggestion is that it has to do with the 'cost function', as opposed to pure frequency of experience. When something has a huge potential impact, these often alter perception more saliently than those that don't. Also, it has a lot to do with what is being impacted: a perception that we have from evolution, vs one that is more recent - e.g. a consequence of our own personal experience.

Hello, i wonder what your take on how some individuals are able to see things differently to the rest of the population. For example artists, and creative people (those with high openness) . A study was carried out which showed they viewed the world differently.

http://nymag.com/scienceofus/2017/04/people-with-this-trait-literally-see-the-world-differently.html

Do you think that this is innate? And how would an average joe learn the best way to see the world differently?

Wagamaga

It's a very good question. Each of us will see the world according to our history of experience. But there are many aspects to our history: Personal, culture and evolutionary. Each is a different way to shape the brain according to its trial and error process of interacting with the world. Which means we do come into the world with certain ways of engaging with it. But equally, our personalities shift not just in time, but with context. A person could be more open in one situation, but closed in another. With that said, those who are open can be more willing to see the same stimulus in a multitude of ways ... possibilities, and can be more comfortable in doing so. A simple description is that of children, who are quite happy with illusions, as the seeming impossible is quite possible for them.

Fellow perceptual scientist here. Do you think the impending changes to the statistical structure of our visual world will have a large impact on our attentional allocation and development? Im thinking of the previous change from a natural to a carpentered world, and the current change from a carpentered world to a digital one.

Reggaepocalypse

Hello ... yes ... I think it will. But at which level of process I'm not sure. We have a clear sense that the statistics of natural images has had strong impacts on the evolution and development of the functional structure of the brain (e.g., Steven Dakin's work and many others). But often what statistical analysis misses out (e.g, in Bayesian formulations), is less about the image and more about what Dale Purves and I call the 'empirical significance' of the data. While the brain can more efficiently encode the statistical structure of images (from a natural or carpentered world), more efficiently encoded information is still ambiguous with regard its behavioural value.

What are you doing differently than Kant?

From your description of this AMA, it seems like you are basically just agreeing with Kant's formulation that we as humans are only able to interact with things as they appear to us rather than interacting with things "in themselves." It's been a few years since I studied Kant closely, so I can't be exactly sure on

the proper terminology, but I can do some googling and elaborate if this question isn't clear enough...

Obviously you are approaching this topic from a psychological/perceptual perspective, but I'd be interested to see how inspired you were by Kant and/or how much your argument(s) offers substantive new insight.

thisisrealitynotreal

I am DEFINITELY not the first person to raise the question of whether or not we see the world accurately. Nor am I the first person to suggest that we don't ... thank goodness. Indeed, quite apart from Kant, every child has ask themselves this question. The suggestion is that Deviate provides a different process of exploration, and focuses on why it must it be the case - from the perspective of neuroscience. More than this, the aim is to provide a narrative that enables one to explore the personal and social consequences of having a brain that is necessarily shaped by experience. When it comes to change, it's not simply enough to say it - or to know that others have have questioned or doubted whether we see the world accurately. That is definitely a necessary first step. The hard part is applying it in action ... and knowing why one should

What's one mystery you wish we knew about neuroscience?

For me, it still boggles me how we don't concretely know why we sleep. Sure, we have tons of theories, but nothing as sure as knowing that we eat because of the way we need to digest nutrients. What's yours?

sendmefrenchfries

wonderful question ... love it ... thinking ...

What are some of the most common misconceptions people have about their perception of reality that everyone should be aware of?

theraidparade

That they are always right

Hey Dr. Lotto, love your work and almost especially your ability to communicate. I've used your optical illusions talks in many of my high school English classes to expose my students to your ideas regarding perception, but also to witness the clarity, eloquence and coherence of a truly gifted communicator.

Question: What is your vision of/for humankind in the next 100-200 years and how will "perception" as you understand it inform and influence the lives of global leaders and citizens?

synanimate

Thank you! Very kind.

My vision? Maybe simplistic ... we will have more courageous, open doubt and compassion. Imagine each of us entered conflict with questions instead of answers, doubt instead of certainty. That is truly the only way to learn and grow. Perception tells us that we're ignorant if we don't ... (hence the principle point of Deviate of knowing less at the end of it than you think you knew at the beginning).

Would there be science without consciousness? (Medicine,technology). Do you think the way we evolve our own vision now is similar to the way our vision evolved (eye)?

iamuman

Great question ...

In your studies, did you experiment with language? Specifically things like emotions, which are comprised of social definitions but also the individual's past experience.

twiersy

In our studies, we've not looked into this directly. But emotions for me also fall into the category of perception. In doing so it helps to make explicit how all perceptions are 'about' seeing the meaning of data, not the data. Pain is a very good example. Pain is obviously not a physical aspect of the world, but a manifestation of our interaction with it. So too are emotions.

What's an example of seeing differently? Can I learn to do this if I read your book? How much practice does it take?

I notice the Kindle book has a large file size...does the book have color plates essential to getting the point, or would a Paperwhite be fine?

ItsAConspiracy

Seeing differently various from the trivial (learning how to get somewhere) to the fundamental (seeing yourself completely differently). My hope with Deviate is that you will better understand the principles (how and why) of seeing differently. Whether you apply them, and how you apply them enables you to have ownership in your own perceptual changes. It's necessarily a process of discovery.

Hi Dr. Lotto,

Congratulations on the book!

I study weight perception in parents of preschoolers, and we have found that most parents are highly inaccurate perceivers. (In other words, we asked the question: "Can parents of preschool-aged children tell their children are overweight?" And the answer is definitely NO. Most parents think their children are normal weight.) So we are tasked with trying to find a way to correct perception.

My question to you is, do you think there is a chance we can change perception on a population scale? What are the fundamentals of perception that we should know about before tackling this question?

Thanks so much for doing this AMA! I will be following with great interest!

kaytayhay

We typically perceive our own lives to be normal ... it's one of our deeper biases / assumptions. It's just a statistical inevitability. Interestingly we can include our perceptions of others who are closest to us in this regard too. The perception of 'normality' can be a tremendous barrier to change, since to step away from normality (to literally Deviate - hence the title of the book) is to step into uncertainty, which so much of our behaviour evolved to avoid.

We do need perceptual changes at a population level. I'd suggest the most significant change needs to

be in our perception of openness. This is not about liberal vs conservatives (since liberals can be incredibly conservative in their views, and conservatives very liberal. Since for me liberal is more defined by whether or not someone is open to change, and less about where they are changing from). Openness to change requires courage since it requires accepting that one knows less than they thought (which is in fact understanding more). So change requires doubt and less certainty. It requires good questions. Ironically, we too often don't even teach children in schools how to ask question, much less what defines a good question. Instead we focus on remembering the 'right answer' ... we focus on efficiency more generally at the expense of creativity, when living well requires both.

One fundamental is the fear of uncertainty. And being outside a group is very difficult for us. Hence the need to build a group that others can shift towards. A culture of Misfits :)

Does perception influence sight or is sight universally equal and perception is raw "processing power"?

As a trained man tracker, I can spot "sign" (footprints, smudges, etc) at a glance that I can point out and others can't "see". What's going on here? Does my training in perceiving these visual queues influence what I'm actually seeing or is it all in how my brain processes this imagery? It's something I've always wondered while training others.

wears_Fedora

You can see what many others cannot. In the same way those from Sweden can hear sounds of 'a' that non Swedish speakers literally can not (including me). It's a wonderful thing. Congratulations.

What is happening in your brain? If only we knew. But in general, your brain has leaned to see the meaning of certain stimulus relationships (correlations in data). Seeing this meaning is obvious to you. For the rest of us, we are blind to these correlations (but highly aware of others).

Hello! Short ask- how can a recent grad get involved in neuroscience? How did you get started?

Context- it was my undergrad major at a pretty top school in the US, and I absolutely loved it. I had a perception professor who was fond of starting each class with "what you are seeing right now may or may not be real" in an ominous tone, and the concrete science behind that absolutely geeks me out.

I've known I never wanted to become a doctor, despite an interest in biology/physiology. The intense schooling didn't appeal to me, in addition the the idea I've had that I want to make an impact on the medical community in a bigger way than direct patient to doctor interaction.

However, I've found opportunities to be sparse. I'm in healthcare consulting now and gearing towards public health, but I would love to actually use my neuroscience degree and continue to study the brain. Do you have any recommendations?

I'm not opposed to more schooling, just didn't want to be a physician. Are there clubs, extracurriculars, societies out there that you'd recommend beyond the slim job opportunities? I'm based in be DC area, if that helps.

Thank you!!!!

sendmefrenchfries

Hello ... I think neuroscience has huge potential to impact many, many different fields - at least my view of neuroscience does, which admittedly is not a normal view (as I take a more general view of what neuroscience is than most do). So in thinking about your degree in neuroscience, think about WHY it's of interest to you (we often forget to ask why?). In my case it's because I'm interested in how systems

adapt. What is amazing about perception (and the brain more generally) is that we can actually 'look through' the adapting network. What is more, we can use the principle of an adapting system to help ourselves and others 'see differently' in their lives. Might you combine neuroscience with public health? Indeed, much of our health issues are deeply perceptual (but by no means all of course)?

When it comes to colour vision, we have a good handle on the wavelengths different animals can pick up due to the various types of cones present in their eyes. But to what extent do you think the neural interpretation of the different wavelengths, and the resultant colour, is consistent between different species?

What do you make of the idea that the colours different species see are individual to the species, despite being the same actual wavelength, or the idea that colours can vary even within human interpretation to the extent that my red is your blue?

Bearing this discussion in mind, if aliens have also evolved to distinguish colour variance within the visible light part of the EM spectrum, in your opinion, how likely would they interpret the same wavelengths to be the same primary colours as us?

HerbziKal

Great question. It's something I've often thought about. I think it could be possible that the colours are specific to each species. Consider for instance a different quality of light that other living systems can see, but to which we are blind: polarization. It too is detected by the receptors in the retina, using the combination of our three cones. So that when a bird looks at what for us is a uniform blue sky, for them it is full of polarizing patterns. What do they see!!??

What do you know about deja vu? Not sure if it applies to your field but if you have any theories or ideas about what it is and what causes it I'd love to hear them!

phoenix7778

I know too little about it ...

What are the broader individual and societal benefits of being able to shift from certainty to uncertainty- from dogmatism to wonder? What are possible negative consequences?

JustMeRC

Great question:

Probably the biggest benefit of shifting from certainty to uncertainty is the opportunity it affords in conflict. It's mainly in conflict that we have the chance to learn - by conflict I mean entering a situation which is different from what you expected it to be. Often only then do you have the opportunity to see differently. But so often (I'd suggest too often) out aims is to win a conflict, not learn from it. Winning requires a very different strategy: entering with answers, with certainty, with confidence, since your aim is to convince the other person that they are wrong and to shift them towards you. Learning requires entering conflict differently: with questions, with listening, with respect and humility. Indeed, these are the roots of creativity itself. One can only enter conflict in this way IF they embrace uncertainty.

What are the potential negative consequences? They are vast, which is why evolution evolved our brains - ironically - to avoid it much of the time.

Since I was about 13 or 14, I've used psychedelic/dissociative or otherwise psychoactive plants and chemicals both recreationally and as a sort of self medication through different forms of meditation and self exploration enhanced via these substances, they've certainly enhanced and altered my perception.

Where do you see the place of these substances in the coming decade? MAPS is moving with speed towards getting drugs like MDMA (ecstasy) & Psilocybin/Psilocin (shrooms) back into the medical world for issues like PTSD or Cancer Related Depression. Though our president doesn't seem to be about progression or freedom it looks like it may be rocky but the evidence is undeniable, psychedelics are powerful tools and part of nature... part of life itself.

How long do you think it is before the silly taboos developed over failed drug laws fade and we go back to being a society that has more control over its self and its perception?

RaoulDuke209

This is a great area for asking questions and for research on perception, as it necessarily challenges many embedded cultural, personal and scientific assumptions. I don't of course know where it will lead. The current research suggests that such substances can increase the connectivity of the brain - at least for a period of time. This can be beneficial, but not always. As I say in my talks, if a bus is coming at you, efficiency - i.e. getting out of the way as fast as possible - is a very good strategy. What isn't a good strategy at that time is ... "hmmm, I wonder if there's a different way I could see this?'. Context is everything, and so I think this too will apply to such substances. Hence, some studies have shown therapeutic benefits at relatively low dosages. There are of course many things we don't yet know (consequences of chronic use, etc). But we never will unless we are willing to ask the question - which requires challenging assumptions.

Regarding Dressgate, I've read that the brain automatically adjusts to "subtract" the color contribution of light sources, helping us to perceive the true color of objects. We evolved this to accurately see color saturated in sunlight out in nature. And apparently some people's brains "compensate" in this way more than others, hence the black/blue vs gold/white.

But why is this different from person to person? What is it about someone's brain that made them more likely to compensate more or less intensely? Could it have to do with lifestyle/environmental factors at all (e.g. one person spends way more time indoors/darkness and doesn't "flex" that sunlight-filtering part of the brain), or is this unlikely?

shigydigy

Context is everything with colour - and indeed all perceptions. It's not necessarily that the brain is 'subtracting out' the influence of illumination to see the 'surface', which is called 'colour constancy', since the brain seems aware of both influences simultaneously. Rather, it's generating a perception that was useful in past behaviour. Why do some people cue on different aspects of context is a fascinating question, to which I don't have an answer in this instance. There are illusions, however, where the explanation is seemingly more straightforward. For instance the dolphin illusion where adults see a couple making love, where as young children see ... well ... dolphins!

Hi! Interesting field to be sure. Do you touch upon autism in your work?

Vaigna

Hello ... while I'm aware of the literature, I don't directly work on the perception of those with Autism,

but there is a large number of people who do. There is a good deal of evidence that their brains use context differently.

Thank you for doing this AMA doctor. I love neuroscience and that is something I want to pursue as my career. In the field of neuroscience, and especially neuroscience of perception, what are the greatest challenges that we are yet to overcome? And what breakthrough improvement(s) could possibly see us making meteoric advancements in the field?

lightningintheicysky

I'd ask the question a different way ... which is the one I ask my students / postdocs before they join the lab.

'Why did you wake up this morning?' 'What do you care about?'

Those are some of the greatest challenges facing neuroscience

What's your opinion on LSD use for a spiritual use and for helping addicts become sober?

[deleted]

see above