



# The Black Swan - thinking the impossible?

Speakers            **Nassim Nicholas Taleb**  
Dean's Professor in the Sciences of Uncertainty, University of Massachusetts

Chaired by:        **Matthew Taylor**  
RSA Chief Executive

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## **NB**

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**Matthew Taylor:** Good evening everybody and welcome. I'm just turning off my mobile phone, as a clue to you to do the same. I'm Matthew Taylor, I'm the Chief Executive of the RSA. Welcome to the RSA and one of our lectures, in what I think we claim rightly is the UK's largest free public lecture programme.

And we've had a number of fantastic lectures recently, but this is one I've been particularly looking forward to. We have speaking to us this evening, Nassim Nicholas Taleb, who is the author of 'The Black Swan' appearing in bookshops as we speak.

I want to say a word about Nassim, and then I want to say why I'm looking forward so much to this event. I'm going to read the first bit because I've been given it, so excuse me. It says that you've devoted your life to immersing yourself in problems of luck, uncertainty, probability and knowledge. You're part literary essayist, part empiricist, part no nonsense mathematical trader. You are currently the Dean's Professor in the Sciences of Uncertainty at the University of Massachusetts at Amherst. And your last book, the international bestseller, 'Fooled by Randomness' has been published in 18 languages. And it says here that you live mostly in New York.

So that's you, but I want to talk for a moment about the book. And I just want to say this to you. Often we have speakers here talking about books that they've written, and you sort of feel a little bit embarrassed because the person is coming with the big idea at the heart of their book. And there's a kind of sense in the room that when you've heard the talk you don't need to buy the book because you've heard the big idea at the heart of the book.

Now I don't know, I'm absolutely sure, Nassim, that you're a brilliant speaker and you will convey some rich ideas to us in the next three quarters of an hour. But I want to say to you however good you are you will not be able to capture the full importance and subtlety of this idea. And, what is more, even if you can get across the core idea at the heart of the book there are so many wonderful incidental

insights and bits of humour and challenge in the book. So I want to say to you, however brilliant the lecture is, however much you think you've got this idea you haven't really got it. You have to go out and I'm not really I'm really not on a cut, you need to understand that, you have to go out and you have to buy the book.

I'm picking out one of these many, many things, and I picked up a point that you make on page 15 of the book, where you point out that the Lebanon was, where you come from, was seen to be in an area of the world called the Levant until a war started there, at which point people decided it was in the Middle East, because if there was a war there it clearly had to be in the Middle East. I'm already simplifying your idea, but the book is full of wonderful stories that you want to go and tell people in order to get them to think in different ways.

And I will just say this, finally, before inviting Nassim to address you, and that is that this actually is a book that does make you think differently about the world. And I have found, since I read it, that assumptions - lazy assumptions which I have made about the world, I question them and that is a fantastic thing for a book to do to you. So I want to thank you for writing the book, and I want to invite you to come and speak to us.

**Nassim Taleb:** I guess you've seen the picture of the book, without a title on it. I think a brilliant idea but we'll test it as an empiricist's idea is not brilliant until it's tested and we'll see on Friday if it repels buyers or if it brings buyers, the fact that it doesn't have my name on the cover. The fact that it doesn't have my name on the cover may repel the buyers.

I'm not going to talk about my book, I'm here to talk about the main idea which I'm sure you guys vaguely already have figured out. I want to talk about the side things. It's more entertaining, and I'm bored talking about The Black Swan, so I'm going to talk about things in the book that are sort of related.

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The first thing I discuss in the book, as you can see, is Umberto Eco's library. As you can see this is Umberto Eco, this is me sitting here. I was at a dinner in Italy, after a conference, when a few students said, "You look like Professor Umberto Eco?". I asked "What"? "Yes you look like him". And then everybody agreed that I looked like Professor Umberto Eco. Luckily I had my laptop, I went straight to my room, went on Google image and realised I had to get on a diet. And I got on a diet in Italy.

But the interesting thing about Umberto Eco is that he has a library, and I start the book with the Umberto Eco library and Umberto Eco has two kind of visitors. His library has 3,000 books so two kind of people come to pay homage to Professor Umberto Eco. The first category is people who tell him, "Oh wow, how many of these beautiful books have you read"? And you have a second category of people who realise that the value of a library does not lie in the books you've read, but in the books that you haven't read. It's not interesting.

So really there's some people who use a library as a tool for self promotion or to convince themselves that they're very smart and look how much I've read. Basically people focus on what they know. Or, you can use it to humble yourself. Every morning you wake up you go down to library, you have your cup of coffee and look at it and it reminds you how ignorant you are. So this is the idea of a library.

So the Umberto Eco library illustrates this economy I have in the book constantly between two kinds of people - those who tell you what they've done, and those who focus on what they haven't done. I'm sure most of you, when you look for a job, did not have an empty resume saying what you don't have on your resume. It's pretty much for marketing or self esteem purpose. So we use knowledge for self esteem. So it's very hard for us to consider what we don't know because you use it to pump up our own ego.

Likewise this leads to problems, we're going to see later, I call the problem of confirmation. Can you hear well with this or

it's too close? Okay. The problem of confirmation. You think things that confirm your opinions naturally not things that disconfirm what you think is true. So we treat knowledge just like an ad for an apartment in New York City. I don't know how many of you have looked for an apartment in New York City but if it doesn't tell you that it has a fireplace it will have no fireplace. So if someone doesn't tell you that he knows something, he doesn't.

So anti knowledge is what we're not good at. It may have worked as we're going to see in an environment that's not very complicated, not very complex, but in an environment that's very complex it doesn't work well.

Before I continue, I'm going to describe what I call the Supreme Law of Mediocristan. I don't know how many of you have heard of Mediocristan, but there are two kind of random variables and I'm going to illustrate the difference with this very simple story.

Imagine a scale and you select randomly from the world population 1,000 people. Make sure you have one person from Texas, not more, but 1,000 people, and then one Russian you can put him next to the person from Texas, that would be entertaining to listen to, and so you have 1,000 people. Now imagine the heaviest possible person that you can think of, that can still be called a person, and add him or her to the scale. How much of the total would that person represent? A large share? No, very small half a percent, say, on a good day you may get half a percent.

And as your sample gets even larger the role played by the exception becomes smaller and smaller - you agree? This has a name. How many of you have been to school? All right, a lot of you. Those who have been to school are taught this with something called statistics, that supposedly is there to improve your understanding of the world, but effectively is there to degrade your understanding of the world. So there's something called statistics, and this is called

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the Law of what? Sorry? Large numbers, very good. So this Law of Large Numbers works that way, as your sample becomes large the exception will not matter and you get to know what you're talking about. That is the Law of Large Numbers. It works beautifully with weight. It works unfortunately too well with weights. I consume about 800,000 calories a year, I don't know what guys in London consume, but say on a day when you have a splurge, like after this, of course we're going to have a big dinner and eat a lot, I'm going to consume how many calories - 5000, 10,000?

Not a single day is going to put a dent in my annual consumption of calories, so in other words, the very good news is that not a single day is going to make me blow up like a balloon. The very bad news is that not a single observation, not a single meal I can skip, not a single day can make me lose weight. I can't become thin on a single day. Not even Umberto Eco - not in a single day.

But now I have news for you, can you become rich in a single day? You can. Can you become poor in a single day? You can. So there you go we have two classes of randomness, two classes of random variable. What I call the Supreme Law of Extremistan pick the same people, the very same Russian next to the Texans, to just help you locate this mentally. And you have a collection of 1,000 people. Of course you're going to have some people from Botswana in your sample, and someone from the city of London.

So and try to think of the richest person you can think of who can still be called a person, or close enough. If we're thinking of the same guy in Seattle, you can call him a person, how much of the total will he represent? Close to everything. The remaining 1,000 persons would be a rounding error. And even if you increase the sample to 5,000, 10,000 it won't make much difference. There will be a bigger rounding error.

So you have two classes of random variables, very simple. It's like a liquid or gas. You can't talk about them qualitatively they're very different. One of them, the exception, doesn't matter, it doesn't matter much. The

other one, the exception matters. In other words, we can have an exception here by seeing someone, even in London, walking eight feet tall, it's possible, but not eight million feet tall.

But in finance or economic variables or in variables that are modern, like informational, you cannot rule out anything. So the second class of variables, what I call Extremistan is dominated effectively by the exception. And that's the bad news. So the thesis of *The Black Swan* (actually I lied) I'm going to tell you the thesis of *The Black Swan*.

The idea behind *The Black Swan* is that more and more of the historical events, economic events, social events - everything is dominated by the exception. If you take book sales, if your sample includes the lady from Edinburgh or not, it makes a huge difference. My friend here is trying to replicate *Harry Potter* and I was happy to inform them that this book isn't going to get there. You need something - *A Black Swan* for children version to have a crack at it.

The wars look at the First World War so basically there's a problem we have with Extremistan is that it's very severe. Number one, you can't predict easily, because the past has no prologue. Look what happened if you're trying to predict what happened in Europe in 1914, you know when you read history books you always have stories of tension, because history books are written backwards by people who don't have a lot to do and think of 'Hey we had a crisis therefore we had a war'.

They didn't realise that in 1914 people did not believe in wars. They thought that the world had become very mature, and the last crazy person to get involved in wars, really severely crazy was Napoleon. They didn't realise the world had gone a bit crazy. After 100 years of peace. And effectively the war was not predicted, so it was a large scale exception that killed, we had two wars. Not counting Stalin and stuff. So that is an exception that nominates the properties.

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If you think of companies in America we have 10,000 American companies listed on the exchanges, plus hundreds of thousands of companies that went bust, less than 100 companies sometimes represent half of capitalisation. So the exception matters in some domains. So I separate this between Extremistan and Mediocristan. That's the only intellectual thing in the book, the rest is entertainment.

So let's have some entertainment, and let's return to Umberto Eco's library. There is a very simple test, I'm not going to subject you to it, because one it's late in the evening and it's not going to be entertaining. But if I asked you, say I take this variable, medium age of US citizens according to the 2000 census to provide two numbers, one low, one high set in such a way that you believe with 98% confidence level that the truth lies somewhere in between your two numbers.

What are we testing here? Am I testing your knowledge? You can set the band as wide as you want. What am I testing? Self knowledge - I'm not testing how much you know, I'm testing - I'm doing an Umberto Eco library test, I'm testing how much you can ... what kind of feeling you have about the unread books, about what's in the unread books - how much you don't know. That's what I would be testing.

So if you think you're about 98% accurate you should not make more than 2% of the time a mistake. And this test has been repeated over and over and over again and we do it for entertainment. So effectively, if you make more than 2% mistakes it mean that's you may know a lot about your subject, but you certainly think you know a lot more than you actually do. We're testing the difference, the wedge, between what I call epistemic arrogance. The wedge between how much you actually know and how much you think you know.

What do you think the 2% error rate is typically in a population? 3%, 50% error rate, not what do you think it is? Much higher. Let me break the news. It was tried first on Harvard Business School students, it was 60%.

2% error rate was 60%. That tells you that why you go to Harvard Business School to learn to get the illusion of knowledge.

If you look across professions it's extremely acute among one profession, what do you think it is? I don't know about climate people, but weather forecasters, they're the most humble you can find in a sample. I don't know about accountants. Doctors are not good but not the worst. Typically people have this mental impediment, this disposition to think they know more than they know. The worst by far are security analysts. The wedge between how much they know and they think they know is great for security analysts. And, of course, economists come next. But again sometimes they're neck and neck.

So we have this problem with knowledge. Now of course, now that I showed you there are two domains, Mediocristan and Extremistan, you realise that we're calibrated for Mediocristan, sort of, not great but good enough, but we're horrible with Extremistan. That's where we make the mistakes and we don't know it. So one other thing bringing to the table that distinction and that psychological impediment, that epistemic arrogance.

Now let's get some entertainment by looking at the effect. Basically, we have this mental disease called tunnelling. Tunnelling is projecting the future as if it were some simplified version of the past. And to invent names, people take you seriously when you invent names, by the way, I used epistemic arrogance because it has epistemic - it's Greek and as doctors know whenever you have a Greek or Latin word automatically people take you seriously, it's learned. So, of course, Plato brought Plato in, platonicity. I call it this idea where I wanted to zoom in on the neat to well defined objects. In other words, simplifying the world.

One other effect here is that I realised it hit me when I was writing the book you discover your ideas when you're writing the book or riding a bicycle - two things. I prefer to ride the bicycle but you

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figure it out. I would say, "What is it all about"? Well it's all about one problem that we've had in western thinking since the enlightenment. That people think that theory is an active thing, that producing a theory is a good deed, it's good work.

But effectively the way it works is the opposite. Withholding judgement requires a lot more effort, and a lot more courage. Producing a theory is a default, it's automatic in our brain we just produce theory. So any theory will do provided it's a theory. Any cause, any causation it works.

So once you realise that it makes you look at the environment with blinders on, you don't quite understand how it works you have a lot of theories, and whenever you have a theory you're going to be blinded by it. So effectively, we tunnel and I call that the tunnelling disease.

Let's look at one simple effect here, the tunnel disease, of course you have these gentlemen here sitting there around the table, I'm going to see them again if I have time at the end, you know what these people are? You have President Bush there and then you have Counsellor of Economic Advisors, you know what they all have in common? What do they all have in common? No there's something they all have in common - it's visual look at it. Suits, they all wear suits. I'm sure those of you who are wearing suits today are wearing them just accidentally, you don't always wear suits.

But we're going to heuristics in the book you have heuristics that people typically who wear suits have some problems. But effectively, no jackets are okay. But effectively, you notice ... suits and ties that's what I meant. This is where when you look at the Iranian Government they all wears suits but without ties, have you noticed with open shirts. They may be aware of the problem.

Collectively we're going to look now and compare their empirical track record to reality during the book. It looks like the gist of my message that these people don't know more than others about anything. And how you can test it from their predictions, they

know a lot how to express themselves, but they think they know a lot more. So they have a lot more epistemic arrogance, and this is where they can get dangerous. So it's like someone driving the car thinking they have a lot more control of the car than they actually do.

So, how are we driving this car? This is the Sydney Opera House and I picked it as a nice story. The prediction is a small portion of the book, but I'd rather talk about it now, because it's easier to talk about, because the newspapers think I talk about predictions so I'm not going to contradict them.

So this is the Australian Opera House, and why did I pick the Australian Opera House - because it was projected to open in 1970 and cost AUD8m approximately. How much do you think it ended up costing? Yes something like the low hundred trillion dollars strip down version and I'm sure they cooked the books to look good. So it's very rare to have a project unless you're dealing with Mediocristan, which is an environment that's very simple, typically it's in a complex environment where it's very hard to have a project that is delivered on time, and within costs. That's from epistemic arrogance, people underestimate the value because of tunnelling. You're good at perfecting the ordinary but did you think (?) don't happen. But among this project was a book called The Black Swan, that typically because of the chapter on prediction that the author delivered 15 months late. You can understand that.

Another thing to play with is, I don't know if many of you have Bloomberg, but if you look at Bloomberg everyday there's one thing about these people who forecast and wear suits that effectively they are not conscious of their track record. There's something on Bloomberg that tells you that everyday you have a number that doesn't mean anything, it's for entertainment but nevertheless people produce estimates of what it's going to be. And you can compare, you have two variables, you have last variable. You have estimated variable - projected, and

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you have actual. So you can measure actual minus estimated, on average in absolute value is smaller than actual minus last. And what do you think, which error is smaller the past or the economists? The past has smaller error is a lot better. A lot more humble doesn't wear suits nothing.

So effectively, it's very easy now what I don't understand half my book of *The Black Swan* is some kind of someone called it (?) and I started getting in a state of anger how come we don't realise that we're very bad at some things. So it's much more an introspection of our psychological mechanisms that seem to hide the truth from us rather than effectively describe the mechanism.

This is very interesting. I was invited to go to Washington, we had a room full of people like this, and I came to talk. They were all Civil Servants in Washington. I was invited by the Rank Corporation and they wanted to do two lectures, very nice. The second lecture I'm still waiting for three years later. And of course I'm persona non grata in Washington now, and of course most of them wore suits.

The key here is what happened was 2004. These guys had predicted, their policy people had predicted oil prices in January 2004 to be \$27 a barrel for 25 years down the road. They produced 25 year forecasts. Now six months later, a little before my lecture, they adjusted their forecast to \$57 a barrel, so they had to double it. It went, of course went up to \$80 something.

Now I went in and started asking them, "Didn't it hit you there's something messed up about producing forecasts for normal citizens as if you know it was something real. And not realising if you have to double your forecast, your 25 year forecast six months into its life, didn't you have to stop and introspect a little about your method of forecasting, there's something wrong with it?" "No". They aren't aware of the error rate.

There's nothing wrong about the stock projection, what is wrong is something without an error rate, because the error rate is vastly more informational for decision making than

the forecast itself. Let me give you an example. If you're going to Nice, France to have pastis and have garlic, you're going to go there you're going to pack. Your suitcase is going to be much ... if I tell you the temperature forecast to be 70°, your suitcase is going to be much thinner than if you have to go to Chicago where it's also going to be 70°, I mean Fahrenheit, plus or minus 30°. And definitely your suitcase is going to be considerably larger if I tell you temperature on Mars is 70° plus or minus 1000°. So the size of your suitcase is far more of a function of the variations in the weather, and as that was not just the forecast but the error rate than the forecast itself. This is one problem we have there.

Another couple of things, I became friends with him Phil Tetlock, effectively ascertained that if you're a professor at some real university, they call themselves real universities - it means some hotshot university, publications on Afghanistan in so-called top journals, your ability to forecast what's going to go on in Afghanistan or whatever your specialty is, is inferior to that of a regular person who reads the *New York Times*. That's pretty much what he ascertained.

But of course that was established years ago and just confirm it the thing to do it try to figure out why do people think they're better than they actually are and that's a mechanism. My thing is a distinction Mediocristan Extremistan is quite crucial because we're not good with Extremistan but we're good with Mediocristan.

And let me give you another example. The gentlemen here is called Robert Trivers, he's a massively impressive fellow. He's the only non African American member of the Black Panthers (I don't know if you've heard of them) he was in jail and stuff. But he just got the Crafoord Prize which is the equivalent ... he's probably a great living biologist. You've heard of Dawkins? Dawkins' *'The Selfish Gene'* was a popularisation of his idea of selfish ... he invented the selfish gene Robert Trivers.

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So Robert Trivers has a theory of self deception. And he effectively figured out that we are very good with pillaging. We can forecast very well the outcome of pillaging I don't know how many of you get into pillaging, but if you ever get into pillaging it's (the balance of partials?)) immediately. So you can figure it out and the accuracy of the raider is very good. He who raids first and then tries a little refinement, they go in and kill all the males, less difficult - pillaging we're good at it.

The problem is wars we're not good at. One is Mediocristan one is Extremistan. Wars - we're horrible at wars. Horrible at predicting the outcomes of wars and we don't know it. Every war you get dragged into it's the same instinct of self deception that kicks in. Self deception, why, because he saw the mechanism, he said once you start raiding you can no longer hesitate. So you have to convince yourself now, in the beginning you look hey I have 51% chance of winning, 60% chance of winning but once you get involved you convince yourself you have 100% chance of winning. Otherwise you'd waiver, you cannot waiver when in battle.

And effectively our mental mechanism is self serving to make us do things that we used to do. And, unfortunately, with the wars like we do pillaging with the same mental method and same forecast errors, and of course, 1914 war was no different from the war that people are talking about now. People thought it was going to be a picnic and they're rushing to get to the front to watch before it ends. And we know what happened.

So this is something to suggest that next time you want to invade countries, I don't know what's in the plans, but next invasion or something like that, please just consider that argument about the predictability of wars.

Two more things. The first one is the effect - this is the Caravaggio picture that actually was here in London. And it has something quite peculiar, and you know what it is? She's looking at him in the eyes, of course, she's talking to him about the future, but what's she doing? She's stealing his ring. So effectively there's always been and always will

be suckers of people who talk to us about the future.

Finally in this section, this a soufflé I don't know how many of you are capable of making soufflé, but if someone can produce a soufflé, you know for sure the person is an expert. I don't know how many of you are dentists but if someone visits his dentist and comes out and still has a jaw, you touch it it's still there, you know he can't be incompetent. In other words, incompetence for a chef or incompetence for a cook, incompetence for a taxi driver, incompetence for a pilot, incompetence in some domains, shows immediately.

There are domains in which incompetence, which we'll call the four expert domains, doesn't show immediately. In the earlier book 'Fooled by Randomness' I said, "All you need to be able to trade is say 'buy' or 'sell'" which basically if you can fry an egg you can trade no problem. Or if you can wear a suit ... so decision making a complex environment is fraught with these problems because we don't know if the person's an expert. All you have to do is sound convincing. So what you need to do is just narrate.

If you narrate, so for example, we don't know the gentleman is an expert, he can narrate. So is there the gentleman and (?) I don't know, but I'm sure that ... or I know I don't want to talk about it. I don't want to be sued, but one thing another problem we have is it can get worse when you see this gentleman here and then you wonder if there's a difference between him and this (?). From an empirical record standpoint don't know. We really don't know if he knows what he's talking about. He talks well but we don't know from predictive abilities if the decision ... so this is in a complex environment things don't repeat themselves, you don't watch the same thing, it takes a long time to figure out what's going on and you don't really know the consequences of your actions. Like when you invade countries in a complex domain you don't know.

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I'm saying it has to be more cautious, using different standards which genetically are programmed to feed all experts the same way. Someone who's supposedly an expert about federal reserve is just as much of an expert as the soufflé maker, particularly if they can talk. Another problem we have phoney mathematics, but I'll skip that because I get tired of mathematics when I have jetlag.

And now let me discuss a few more things ... my opinion about ... how many I have - I have 15 minutes to squeeze in my idea that is the most disturbing. So far I've been just teasing you guys, now I'll start disturbing you.

So effectively in the complex environment, we think we're in control we have no clue, and let me show you the evidence. Pretty much when you look at people have ... now there's Dawkins talking about evolution and somehow he's convincing. But some people have trouble looking at a horse and saying this is the result of an undirected random process. Undirected random process in which nature picks somewhat what's good and rejects what's bad. So that's according to Dawkins, that's what happens.

But the very same people who accept that have difficulties accepting that this computer is the result of a far worse random process. One is Mediocristan and one is Extremistan, far wilder and much less predictable. You can actually predict what horse you're going to have in a given environment. This you can't predict. The modern world, modern technology is unpredictable.

And let me give you a few examples. Medicine is a prime one. We have now, thanks to a gentlemen who wrote this book 'Happy Accidents' which came out three weeks before the last one. So I decided on The Black Swan so I'm talking about it now. And this gentlemen somewhere in the book didn't realise he had the best controlled experiment I'd been looking for half my life. And you know what it is? We have directed research where we think we're planning and directing and projecting

what we're going to do, versus random discoveries. The best case is cancer.

Somehow in 1973 President Nixon, who's supposed to be a bad president or something, a time of impeached president. Nixon decided that there was a disease called cancer, and then of course we're going to wipe it out immediately. So they started something called National Cancer Institute with this war on cancer. They went systematically testing 130,000 compounds to see if they worked - systematically top down directed research testing. Meanwhile, they found nothing - less than random.

The biggest discoveries in cancer, the first one was chemotherapy which came out of the side effect of mustard gas, and of course a lot of things, was one thing. A lot of firms seemed to be searching for cancer cures and they seemed to be good at discovering things that are not cures for cancers but a cure for other things. Like micro regeneration is a result of search for the ? type cancer research led to micro generation drugs. I don't know how many of you know where Viagra came from but it was not like the company decided this is what old men will need, so therefore let's come up with it. It was just a hypertension drug. But the patients in the clinical trials seemed to be happier than other patients.

And then you have a list of things, so it looks like penicillin of course was discovered here, and you always have some kind of cover up that the food and drugs administration seems to be discovering now, is someone goes into a clinical trial looking for something and then changes the story right after they find something else, because you're ashamed of saying I was not looking for this. Because you have attribution error, it's always our intelligence and design.

So it looks like really dealing with the future almost everything is black swans. This qualifies as a black swan. Now what is a black swan? At some point I've got to tell you. It's an event with three properties. It's unpredictable, it's very consequential. Before the fact it doesn't have prospective

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predictability, but after the fact - well it's so obvious. It has no prospective it just has retrospective predictability. It's so obvious it was going to happen. And this is why we don't learn anything about black swan because we think it was part of a designed proper plan. So it's quite disturbing.

And there's an argument brought by the gentlemen Karl Raimund Popper. So Popper had this very nice argument about discoveries. He said they've have to be black swans... first of all he's not very good looking so I have to also fix his story a little bit. You guys know what this is that was discovered, has been discovered for a while. Now what is this? A wheel.

So let's say that you're sitting 4000BC sitting down somewhere in Asia Minor, near the Levant, not quite the Levant but near Asia Minor, not in Asia Minor further across and planning on what's going to happen later. So you're going to have to predict a lot of things. The first one is going to be the wheel. Of course, you're going to have to predict other things that like that very collection of middle aged men looking at each other in a room, all wearing things to constrict their blood flow. You have to predict other things, but let's say the main one is going to be this.

Now if you can predict the wheel, what do you have - the wheel. So logically if you can predict the wheel you have the wheel. So necessarily there's so much of the future that remains hidden from us. Completely tucked away from us, necessarily because if you have it, so it looks like we're like sleep walkers stumbling on things and then inventing stories. And effectively in *The Black Swan* I talk a lot about engineers, by saying that engineers are not motivated by a thirst for discovery - the people get bored, so they go and play with things and sometimes they find a toy.

If you look at what was discovered, the three main technological inventions that affect us the last 50 years are what? Laser - it was invented by someone who for ten years nobody knew what to do with and they blamed him for spending and wasting money to satisfy his ego for splitting a light beam. And you

know what happened, we had visual revolution, eye surgery and stuff like that. The second was the internet. Nobody knew that the internet they didn't design it for love letters now it's word processing, that's the main function. And the third one is ? at the computer. And the third one the internet was not designed for chat rooms and hate mail or spam or what's this thing called 'flaming' where you send insulting letters to others to satisfy your hunger for aggression, whatever it is. It was not designed for that, it was designed as a military application.

So everything we see is a black swan so when you predict the future you have to think in terms of black swans it's almost impossible. What to do I say in the book, it's chapter 13.

Now let me talk about the hero of hero of hero of hero of heroes Monsieur Professor Henri Poincaré he is a hero, hero, hero, hero of this book, of everything. And he figured out something. He figured out the following. I don't know how many of you play billiard balls, I'm going to simplify, but if you are playing billiard balls and you're trying to predict the trajectory at the second bounce, it's complicated because you have some linearity, some complexity. A small error in the angle multiplies but someone with a good degree, a cup of coffee or friendship with Paul Wilmott here can figure out, no? Or you call Paul and you get no problem. You can pretty much predict the second bounce.

The third bounce you're going to have to take Paul Wilmott out to dinner. It's far more complicated, so you may have even to bribe him to help you with the equation. So it needs really some world class mathematician already or engineer. The ninth bounce look how it degrades. The ninth bounce the gravitational pull of every single person in the room needs to be taken into account. The 53<sup>rd</sup> bounce and it's a simple billiard ball table, I'm talking about the world, the 53<sup>rd</sup> bounce every particle in the universe needs to be in your equation. 10 billion years is big enough to accommodate 10 billion light years every

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single one of them all the way there. So you're going to have a very long equation and even Paul Wilmott I'm sure can't get there, even him.

So you realise the complexity of how the degradation of your forecasting ability was time. Just on that example alone because what we call convexity. Why convexity - because small error multiplies.

With this I tried to explain to those civil servants, I'll bring back that picture, it was very frustrating for me to have all these people sitting in front of me, I'm trying to explain to them that for goodness sake, do you realise that a 25 year forecast is several trillion times harder than a one year forecast, because of that and other things. So there are things we should understand about the world that when you project the future it's not going to look like what you have in mind, it never looked like what anybody had in mind and it's getting worse.

So that's my idea. What to do visibly what to do is this gentlemen if nobody knows anything, but if you know that you can do a lot. If you consider instead of focussing on knowledge, and here I'll come back I have played on it at the beginning I now have Marx. I don't know if you guys know it, he used to live around here. He no longer lives around here but he used to. So Marx's idea was, his central idea was he was going after philosophers by saying you guys are important, misery of philosophy. He said I want to be able to use philosophy to turn knowledge into action. And what I'm trying to do is the exactly opposite. Turn ignorance, lack of knowledge into actual decision making. This is what I'm trying to do.

So visibly I'm going against the guns, I'm alone, it's very entertaining I have some friends. At least 10% of you guys are favourable to my thesis, that's good enough that's sufficient motivated. But I'm facing a whole world of that platonification of wanting to think that we understand the world a little more than we do.

And so this is pretty much the story of the book and now I'm pretty much done. I don't want to cause more anxiety, I think if you

read the book you'd have a little more anxiety, and then it gets easier. Reach chapter 13 and it gets easier. But the thing is entertaining, supposedly. I made it entertaining so you can swallow some of the stuff.

So thank you very much and we're going to take questions now. Thanks a lot.

**Matthew Taylor:** Okay. Nassim's going to stand for your questions. I'm going to keep my suit jacket off. You didn't do why Balzac was lucky. I liked why Balzac was lucky, so maybe I'll ask the question about why Balzac was lucky.

**Paul Wilmott:** Paul Wilmott. What is the relevance of The Black Swan to global warming?

**Nassim Taleb:** That's a question I'm getting about three of four times a day, honestly. And let me tell you I have no clue. I know what I don't know. I know nothing about the climate first of all we have no ... when they say evidence, the burden of evidence should not be in favour of us ballooning, don't disturb a complex system, do no harm. So on the one hand I say I'm hyper-ecologist don't harm the system because you don't know what it can lead to.

On the other hand, I don't know if these projections are entertainment or for real because it's all marred with what I call ? fallacy. So in a way conservatives hate me for the first answer and the liberals for the second answer or vice versa. But I'm saying two things, I'm saying that the equations are bogus. The science is bogus, but let's not harm the system, the environment, that's all I'm saying. Because we don't understand the consequences of harming the environment, we don't know. So the burden is on us not harming the environment rather than the other way round.

**Paul Wilmott:** Al Gore when he was presented with various facts that went for and against global warming was once famously quoted as saying that facts were a kind of pollution. Was he agreeing or disagreeing with you?

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**Nassim Taleb:** I tell you honestly I don't read the papers, so I have no clue about global warming. So I can't answer. I tell you honestly I have no clue, I let other people talk about it. All I'm saying is don't harm the environment.

**Tim Brackett:** My name is Tim Brackett, I'm President of Garsu Holdings. My question is actually related to the Cold War. I've read some books on the Cold War and, of course, this is history and you have to take it with a grain of salt, but during the Cold War it seemed that, at a pivotal point where Khrushchev and Kennedy were facing each other in the Cuban Missile Crisis, they were aware of the black swan in a way, because they knew the consequence of their action was so great that they decided to pull back.

**Nassim Taleb:** Okay, you're scaring me even more than I was, because all it would've taken was a change of mood on the part of someone and a bad negotiation. It came close, that's all I'm saying is it came close. One thing about the black swan that people don't understand that I insist is that black swan doesn't mean being aware of being scared of remote events. It means understanding what you don't know, because sometimes people tell me 'yeah I'm real conscious of black swans' I say, "Why"? They say, "You're right I am protected against terrorism". "What do you mean"? I mean our brain is such that we like to focus on few sources of very large uncertainty, but not on the sources of uncertainty in general. And I have the experiments if you try to sell someone terrorist insurance they'll pay a lot more than if you sell them some general insurance that includes terrorist.

So people overpay for black swans, like people pay up for lottery tickets where they have, what they think about they pay for. But effectively the book goes deeper than this and it's a little more anecdotal, here I was trying to look serious - it's the first time here so I have to. The book has a lot of anecdotes about people calling me for me to predict black swans.

And guess what it even happened to me again, there's a show called Fox News, these

guys - when I wrote 'Fooled by Randomness' they say this is phenomenal it's wonderful, we love it. Can you come on our show and by the way - on the show you have to come up with three stock recommendations that fit your ideas. I didn't want to go because but now I regret I should have gone and pulled a hoax.

Now they invited me and guess what? They want three predictions that nobody else is predicting. It's going to be entertaining.

**Matthew Taylor:** You should've included in your book the joke of the two guys talking to each other and one of them says "I wish I knew where I was going to die", and his friend says, "Why"? And he says, "Because I wouldn't go there".

**John Adams:** John Adams, University College London. Are Bill Gates and Warren Buffett clever or luck or both?

**Nassim Taleb:** This comes back from an earlier book, and the question keeps haunting me. And every time I have to answer it. I have no idea, all I can say that if A has more money than B and they're in the same profession, that A is probably more skilled. But the confidence I have in that more and the quantification of the distance and skills between them is quite uncertain. That's all I'm saying. I'm saying that odds are he is, but it's not necessarily all skills, just like it's not necessary all luck. If he made a soufflé you saw the picture of the soufflé, if they were in the soufflé business then there would be no problem figuring out their skills. You just could guess how many flukes they have, because you can flunk a soufflé you know that. You count how many times they flunk it.

But obviously if they're in the dental industry great but saying ... because the methods a fallacy you have to figure out how many people tried a lot of crazy ideas and after the fact ? it back. So this is why I don't know Warren Buffett.

With Bill Gates I am certain there's a great amount of luck, and what I said in 'Fooled by Randomness' which is a complete different story than this, is that if you work

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hard and if you wear a tie and if you have eyes and what other - ability to read and write, and work very hard you definitely will attain some form of success. So the distance to move a few sigmas to talk in ? terms, is mostly skills. But to go to the stratosphere you need a lot of skills but at the same time an immense amount of luck.

So maybe that brings me to a Balzac question. His question is, was Balzac lucky and did Balzac know it. He knew that he was lucky, because Balzac realised the following, and I have that in my book. You know how many people in the book business succeed - any book that sells definitely has some kind of skills. But the skills differential is very hard to ascertain. Why? Because we have thousands of unpublished books. And Balzac realised that from his days. If you went to a printers shop, it was printers - they had no publishers, lucky thing. They had no press so they had printers and the printers in the back of the stores had novels that were unpublished, waiting to wake up.

So what happened is that a lot of people wrote a lot of novels, to succeed a novel needs to be good but people, by some mental impediment, confuse that if A means B, B doesn't necessarily mean A. So I am saying that A means and implies B, but B doesn't necessarily imply A. This is a mental problem that I discuss a lot in The Black Swan of the simplification of statistics. Of thinking that if all the members of the Smith family are tall, not every tall person is a member of the Smith family. If I express it this way, you understand it. If I express it in logical terms we don't understand it. It doesn't sink in. We've talked about if every single person who works hard becomes rich, doesn't mean every single person that becomes rich has worked hard, or has skills.

**John Farrago:** Fellow of the RSA. You had a beautiful picture of a tunnel here and I've been reading about chaos, uncertainty, unpredictability for many years now. Many of us are in the business of building tunnels or something like that, and how does all this

unpredictability actually help us to build things and to do things which we want to happen?

**Nassim Taleb:** That's a good question. I actually answer it in the book because its convincing but what to do next. My point is if I've convinced you, you already will know what to do next, you just have to internalise the idea.

First of all, I made the difference - domains. The first domain Mediocristan don't worry we have talent in Mediocristan. Identified domains, let's call it domain identification, if that domain dominated by the extreme, if it is then don't worry about it. If it's not, don't worry about it. Very simple, that's the first thing.

The second one same thing with pseudo experts, listen to some experts, not others. Experts on soufflé you can listen to all day.

The third trick is there's some things we don't know. We have no clue of the risk of a market crash. And anyone who computes it is either a fraud or someone on drugs. I don't know, because we don't know the probability of a market crash. They tell you one in ten million, and we have X years of data. So we don't know these small probabilities. We have no idea where they come from. The more remote, the less we know about it, it's very simple just be protected. In other words, don't listen to risk measurements that deal with tales, but listen to risk measurements that are immune to tales. That's one thing.

Another one is figure out if you're in a domain that's black swan positive or black swan negative. As a writer I'm in a domain that's black swan positive, in other words what can happen to my book. Either you sell a lot or it flops. A flop is nothing - you can always use the copies to give them to your friends when you invite people for dinner.

So it's not like the cost. So a bank and insurance companies, for example, have the opposite problem, anytime the chairman of the bank needs to be woken up at 2:00am

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you know it's bad news. You know they take a hit. And effectively if you look worldwide, if you look at three industries where people got poor it's banking, American banks lost 100% of money ever made in the history of banking on one single episode, August 1982. And of course they did the same thing ten years later.

Insurance companies you'll have heard what the asbestos did to Lloyds of London. It took years of building wealth for these people to lose it all in one episode. So there are some domains where the exception, the black swan hurts you and some domains, like research where the exception helps you. So identify what domain you're in and focus on the second domain. And effectively if you look at wealth accumulation or success or anything, everything came from the second domain. Where you wake up in the morning, you go look at Google News and jump up for joy. It's not like anything that's unexpected is going to be rather good for you. Oil exploration ... or sometimes there's some hybrids like, I don't know if you know this gentleman called Donald Trump, he had a brilliant idea. He took all the upside and gave manufacturer all the downside. So he kept the positive black swan and gave them the negative black swan, and effectively they went almost bust. And he got rich.

So you have what I call optionality for those of you in finance, but it's very asymmetric typically to the black swan, some optionality is positive, some is negative. So this is sort of the rules like thumb like that in about every domain. But if you're in Mediocristan you don't have to worry.

Insurance, for example, companies are very good with their Mediocristans. But reinsurance companies don't make any money. Why? Because every once in a while they lose and we haven't had San Francisco. We haven't had a big problem yet, hopefully it will never happen, to the contrary. Let me repeat this question, he's saying if you focus your decision or you don't know rather what you know will it not lead to an action – no, because I then have a catalogue of robustness to what I don't know.

If there's things I don't know, for example, if you invest in a venture capital firm you don't care about what you don't know. It's robust. You're not going to go bust on investments that are very complex. You have robustness to what you don't know. If you invest in a bank you don't have a lot of robustness because the banks nobody knows probably the banking crash. And those who know, give them a drink and tell them to go on TV, because nobody knows. And nobody has known. So you can deal with robustness.

And actually I was talking to a regulator, and an extremely smart regulator, they understand it, they say, "Okay here we have Bank A, Bank B, Bank C, Bank D, see which one is more sensitive to negatives tales". It's not how volatile they are. You can rank them. To give you an idea, which country is more volatile politically Saudi Arabia or Italy? Italy is very volatile politically. Which one do you think is more black swan prone? Saudi Arabia, there you go. So you see how you play robustness.

So this is why when people are trying to sell volatility, those option traders you understand that you've got to sell volatility, but not sell black swans. So this is so like my paradigm, in other words, don't be shy of volatility. And I'll explain the story of banks by saying the banks have one attribute, this is why you should worry about banks but not hedge funds. Because banks ... I don't know how many of you are bankers, but in my days when I was a banker, so they would find the most dull people they could find and they make you even duller, so to look conservative and safe and effectively they're sitting on time bombs, the banks. Whereas hedge funds seem volatile but effectively, they don't have the risk of banks. So it's an argument in favour ... if you happen to be a regulator go favour this intermediate whatever you want to call it, by having more hedge funds because you have a more diverse ideology and less concentrated architecture of banks where everyone ends up trading with JP Morgan in the end.

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So these are small things you could do called robustness. There are a lot of things you could do - I'm not interested anymore in this, I mean in ... I've been writing about it I want to take some vacations and go and look at black swans in New Zealand supposedly. But I am sure someone is going to write about it because I've seen some research been started.

**Nassim Taleb:** Yeah I think first I was saying is I'll go to that Basle thing and fire everyone. You can do society a favour, the regulators usually create more risks than they ... I'm a libertarian, I'm so anti government - I think governments need to be treated with some adult supervision, and academia as well. So I looked at a catalogue of who created black swans, sometimes regulators create more risks and sometimes they help out. So you have to be more cautious along these lines.

The other thing, I would shut down economics departments, non Austrian economics departments, I would shut them down to help society, and they can probably do something with their lives to help them as well. These are the things I would do to lower the risk on society. I was in San Francisco two days ago and someone asked me a similar question, he said, "How can you write the first thing"? I told him the first thing the two ways I can figure out a fraud is if someone's wearing a suit who doesn't have to. So this was somewhat heuristic. And the second one if he's talking about greater uncertainty principles. Because it's not uncertainty.

So it's my problem is so many resources have been channelled to the wrong kind of uncertainty. Because it's not uncertainty, it's Mediocristan - quantum mechanics does not lead to uncertainty. So this is what I would do is move all this funding and research in idiotic projects and more of consciousness of true uncertainty. We don't know what's going to happen in Iraq, that is uncertainty, it's not some idiotic particle that you can't see, and that cumulatively, just like Mediocristan, cumulatively disappears under aggregation. So we have one more.

**Anne James:** Anne James and it is a woman's question. I'm really interested in your

examples. I actually think we're really quite good at dealing with unpredictability, and I'm thinking of the biggest things that we do in our lives are black swans. And that might be about getting married, it might be about getting pregnant, it might be about having a child, it might be about sudden death. And these are part of our everyday lives, so we actually do that all the time. And it seems to me that what we're quite good at is, balancing those kinds of black swans with trying to put some rationalisation into the process.

And I'm interested in your examples because you're using examples from the world of men and business particularly, and I'm interested in why some people may use unpredictability models more than others, maybe women do, I don't know. And maybe people who have less control over their lives also actually handle unpredictability much better. And I'm thinking of people who get sent to war and so on, rather than people who make the decisions. I'd just like your observations on that really.

**Nassim Taleb:** One observation, I want to make this quite central here is that we effectively are good at dealing with rare events that are part of our heritage as genetically because we're programmed to deal with some risk of death, it's stuff like that, it's not a big deal, because if I die it's not a big deal there's something worse, the death of my family or other members. So we are trained to deal and understand the risks and the odds of these events that are a routine part of our heritage.

The black swan I'm talking about is this world we did construct, it's what I call a constructed world. If you notice economics is constructed, wars are constructed. This constructed world that we built that we need to understand no control. And this is what worries me. People who live in a world we don't understand. That's sort of like the idea, that world we don't. We understand love and all that stuff, but not the rest.

**Matthew Taylor:** Brilliant. I can predict one thing. Am I allowed to predict one thing? I'm going to predict that over the

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next few weeks you will keep thinking about these ideas in the shower, on the tube or whatever and trying to work out whether you agree with Nassim, whether you don't agree with him, and that's the value, I think, of a great book like this. And thank you, Nassim, for your fantastic talk.

I hope that as many of you as possible will join us in The Vaults downstairs. You have to go through those doors, and you'll go down to The Vaults and you can have a drink down there.

And I just want to say, finally, before asking you to thank Nassim for his speech tonight, just to say that the RSA Lecture Programme is paid for and supported by our Fellows, who pay for all our work. So if there are Fellows in the room, thank you very much for supporting our work, and if you're interested in becoming an RSA Fellow then go to our website and look at how you can do that. So thank you to the Fellows for paying for tonight. And thank you, in particular, thank you to Nassim Nicholas Taleb for a fantastic talk. Thank you.

**Nassim Taleb:** Great, thanks a lot.