**3 Takeaways Podcast Transcript**
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(https://www.3takeaways.com/)

**Ep. 162: A World-Leading Tech Analyst Shares His Insights on AI, Job Creation, Chinese EVs, Crypto, and More**

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**INTRO male voice:** Welcome to the 3 Takeaways podcast, which features short, memorable conversations with the world's best thinkers, business leaders, writers, politicians, scientists, and other newsmakers. Each episode ends with the three key takeaways that person has learned over their lives and their careers. And now your host and board member of schools at Harvard, Princeton, and Columbia, Lynn Thoman.

**LT:** Hi everyone, it's Lynn Thoman. Welcome to another 3 Takeaways, episode. ChatGPT and artificial intelligence will change how we work, but how different are they from all the other waves of technology progress and automation we've seen up until now? Today I'm excited to be with Benedict Evans. Benedict has spent 20 years analyzing technology and I'm excited to find out what he believes is really happening in tech, why it matters and what it might mean. Welcome Benedict, and thanks so much for joining 3 Takeaways today.

**Benedict Evans:** Thanks for having me.

**LT:** My pleasure. Pretty much everyone in tech agrees that generative AI, large language models and ChatGPT are an enormous change in what we can accomplish and automate with software. There isn't much agreement on anything else, but everyone agrees there's a lot more AI and automation coming and entirely new kinds of automation. Before we talk about what's happening today, let's start with a historical perspective. What were the earlier stages of tech progress and automation?

**BE:** So the industrial revolution was sort of the beginning of this process and we've been automating things ever since.

**BE:** And so if we go back to the history, we start with steam engines that automate human beings as beasts of burden basically. And then towards the end of the 19th century, you get things like typewriters and adding machines. And typewriters let somebody produce 5 to 10 times more text in the same amount of time. And so, there's a way you can look at this, which is to say you can then, so then you have AI and people say, oh my God, this is going to destroy all the jobs. And the obvious, first year economist argument is to say, well, people always say this and it doesn't happen because you get new jobs. And the problem is that you can see the jobs that are going to go away. You can see that there won't be as many people employed doing that anymore, but the new jobs that will get created are, by definition, things that don't exist, doing something you haven't thought of. So it's always much harder to see those, than to see the jobs that are going to go away.

**LT:** Would anyone in 1800 have predicted the jobs in 1900, or would anyone in 1900 have predicted the jobs we have now?

**BE:** No. Well, so two parts to this. The first of them is that people hadn't seen that process. So, they didn't have the history of sort of knowing, or ought to know, that there will be new jobs you can't predict. And secondly no, nobody in 1800 was predicting steam engine sat all, let alone predicting that you would have a million people working on railways and that you would have people working in mass production of iron and steel because those were industries that didn't exist. Also, they were in a world that had been in a state of more or less static, you know, that hadn't had that kind of fundamental economic industrial change before. And the same thing, 1900 and 1950, what are these new jobs going to be? No one would predict those new jobs!

**LT:** Have there always been jobs in the past? What happens when new innovations like spinning wheels or farm automation happened? What happened to the people who worked in those industries?

**BE:** I'm not really an economic historian, but that sort of general observation about this stuff is, I mean, it seems to me that the core, again, this is a very naive sort of statement, but like the core of the lump of labor fallacy is to say that you are making something cheaper for the rest of the economy. So if you invent a way to make shoes with a machine for a tenth of the price, yes, you may not need all of those people making shoes. But suddenly everybody else isn't spending as much on getting shoes and maybe gets more shoes, and therefore that gain in efficiency ripples out through the rest of the economy and makes it cheaper for other people to do things and/or creates new economic activity. And so the change isn't just confined to that one thing. It's not that now you are making shoes cheaper, therefore you employ fewer people. You may not employ fewer people, maybe then you have, which is also sort of the Jevons Paradox, and you may have price elasticity, which is if the shoes get cheaper, then maybe more people will buy them.

**LT:** Let's first explore the lump of labor fallacy a bit more. So for your example, if the price of shoes drops due to some kind of technological progress or automation, you're saying that the people that are buying shoes will then not have to spend as much money on shoes so they'll have more money to spend elsewhere?

**BE:** Yeah, well, so I think that there's probably two parts to this. The first is, yes, the people who were buying shoes now get shoes for less money, so they can afford to spend that money on other things. Also, of course, for people, particularly if you go back to 1800, a lot of people couldn't afford to buy shoes. A lot of people went barefoot, or they wore old and terrible shoes or worn out shoes. And so there's an increase in wellbeing, an increase in welfare. So you have people who previously couldn't have shoes, that get them. You have people who have expensive shoes that now have much cheaper shoes. And so all of that resource can be directed to somewhere else. The lump of labor fallacy is the idea that there is a fixed amount of work to be done. And so if you take that work that was being done by 10 people, and now do that work with one person plus a machine, the other 9 people won't have anything to do.

**BE:** And the reason it's a fallacy is that the thing that they were making is now cheaper for

everybody else. And so that resource can get used for something else. It's a little bit like you kind of look out of your window and see people using a machine to dig a hole in the ground and you say, that machine has put 10 people out of work. What we should be doing is spending much more money and paying 10 people to dig the hole. Well, no, maybe we should just have the machine digging the hole and have those 10 people doing something else more productive. You have those resources tied up in that activity. Those resources then become freed up for other things. And the fallacy is to look at this and think, well, those 9 people won't get any more work.

**BE:**Because you don't see that the resource that was being used to pay them can now be used for something else.

**LT:** And the people who were buying whatever that service or product is, will now have more money to spend on something else.

**BE:** Exactly.

**LT:** What is the Jevons paradox and can you give some examples?

**BE:** Jevons was a 19th century British historian, and at the time the Royal Navy was not just the largest in the world, but larger than the next two navies in the world combined. And the Royal Navy runs on coal and Britain is basically made of coal. There's an observation that Britain is sort of the Saudi Arabia of the 19th century. But people kind of look at the accelerating consumption of coal and ask well, what's going to happen when we run out of coal? And then other people say, yes, but the steam engines keep getting more efficient, so we'll use less coal. And Jevons says, no - if the steam engines get more efficient then they'll be cheaper and we'll use more coal. And so we will accelerate our consumption of coal rather than the opposite. And if you go back and look at the numbers, that's more or less what happened.

**BE:** But you could apply this very exactly to what's happened with computing in the last a hundred years, if you look at things like typewriters and adding machines. But I was looking at a report from the US Census of US employment from like 1830 to 1930 and obviously all the expected stuff happens - your agriculture goes down and factories go up. Railways appear as a category. But in second half of the chart, you have this thing called “clerking professions”, which also grows. And it grows right through the period that you have this invention of typewriters and adding machines. So you've got this machine that says one clerk can do 5 or 10 times more. And what happens? Clerking employment doesn't go down, it goes right back up to the end of the time series, right up to the last 20 or 30 years.

**BE:** [Microsoft] Excel completely transforms the amount of work that an analyst or an accountant or a clerk can do. What's happened to the number of CPAs in the last 30 or 40 years? It's been basically flat to up. And there's a sort of presumption as we look at AI, well this will automate tasks, this will make it more efficient to do things. So does that mean that you have far fewer people doing the same amount of work, in which case the lump of labor fallacy applies, or at least you have to ask if the lump of labor fallacy applies, or does that mean you have the same number of people doing much more, which is the Jevons paradox, which is if you make it cheaper and more efficient to do something, you might do more of it.

**LT:** So interesting. What's different about tech progress and AI this time? How is this time different?

**BE:** If we go back to the beginning, you can imagine your exchange of use. So somebody says AI is going to destroy all of your jobs. And the answer is no. Because new technology always destroys jobs and we always have new jobs. And the lump of labor fallacy explains why it's not just, it's always happened because it's always happened. This is why it happens - because you have this release of efficiency that generates new demand, new prosperity, new jobs. So then the reply to that is, the counter argument to the lump of labor fallacy, is to say what's been happening for the last 200 years is we've been automating higher and higher level human functions. So we start by automating legs and then we automate arms and fingers and you'll kind of get to the top. You're going to get to a point that the machine can do everything that people can do at which point they won't be a higher level thing left for humans to do, to have as a job.

**BE:** And there's three problems with this. The first of them is the AI systems that we have today actually have not got to the top, and in fact, have not got anywhere close to the top. They're just another slight step forward in the way that Excel was a step forward. And therefore there's no a priori reason looking at the systems of today to say there won't be new kinds of jobs. This would be like looking at computers 50 years ago, 75 years ago and saying, well, you've automated away all of the bookkeeping clerks, so what will the new jobs be? And the answer will be, there'll be other new jobs that we haven't automated yet. That's clearly what happened. There's a second answer which is to say yes, but you've got close enough to the top that you know, only people with postgraduate degrees will have the degree of intelligence that these machines don't have, which is sort of a variant on that.

**BE:** But again, it's kind of not clear that we've kind of got everything. It still feels like we've got another category of white collar work, rather than all the white collar work. And now, at that point, people can kind of also turn around and say yes. But if we go to AGI [artificial general intelligence], which is the whole live conversation within computer science at the moment, if we go to artificial general intelligence, if we have a machine that was intelligent as a person in every sense, and then there's a suggestion that maybe if we had something that was as intelligent as a person, then give it 10 x more computing power, it would be 10 x 20 x 5 x more intelligent than a person. And so at that point, you really would have something that could do literally anything that a person can do and probably more. Then you really could automate all of the jobs. But at the moment we don't have that. And it's not clear that we would have that. Without that, what we have are computers that can do another category of things that they couldn't previously do, and there remain many categories of other things that they can't do.

**BE:** Fascinating. The changes seem to be happening much faster now. Will the frictional pain of new job creation and people starting in new jobs be much greater?

**BE:** Yeah, regardless of the AGI thing, even if we never get that, and even if you agree this is the same kind of change that we had before, it's happening much quicker than the changes we had before. I can see that. And that's on the one hand, a sort of moment when you have this explosion of possibility and generative AI was this sort of interesting research idea November

last year, when Open AI released ChatGPT 3.5, everyone goes, oh my God, this is amazing. And because we already had all of the infrastructure of cloud computing and all the existing machine learning and we had all the data sets and we had the GPUs, and you don't need to wait for consumers to buy a device like with the iPhone where you actually had to wait for people to buy a $600 device and we don't all go and do that at once.

**BE:** It happens much quicker with this [AGI], as it's just a website. So in principle it can happen a lot more quickly. The counter-argument to that is there's a big difference between the mind-blowing technology demo and the carefully considered and kind of fully tooled and implemented and tested piece of software that a big engineering company can use. So it's sort of one thing to say, oh my God, ChatGPT is amazing. It's another thing to say, how does a large industrial company integrate this into automating the design of a new and more efficient nationwide railway signaling system? And like that doesn't take three months, that takes two years to think about it and then another two years to test it and then a bit longer beyond that. And so yes, it will not take twenty years, but it will also not take six months.

**LT:** So interesting. Benedict, how do you see the timing and impact of AI as compared to earlier tech advances such as, for example, the personal computer or the iPhone?

**BE:** There's two ways to think about this. One of them is that we can sort of remember how big a deal the iPhone was and how much it changed. I don't think we really have internalized now what a big deal a personal computer (PC) was and how much the PC changed. Dan Bricklin created the first computer spreadsheet in the late 70s. He has these wonderful stories of showing people a spreadsheet on a screen. And of course, a spreadsheet was originally something in paper. You buy pads of spreadsheet, pre-printed paper with a grid, and he would show accountants a spreadsheet on a computer and they would just be flabbergasted and they would say, you've just done in 30 seconds what takes me a day. And early users would do a month's worth of work in two days and then go to the beach and people think they were amazing.

**BE:** And today it's invisible. Today it's just become absorbed and we don't see this. It's like the way light has become free and we forget that light used to be expensive. So I think that's one side of the answer is we kind of forget how transformative previous waves of technology were. The other answer is that PCs took a long time. The Apple 2 was announced in 1977. Even by the mid 90s, when the consumer internet was kicking off, there were less than 100 million PCs of every kind on earth.

**BE:** And there were only 10, 20, 30 million consumer PCs on the entire planet, depending on how you count it. For most people, there was no reason to own a PC. And the same thing with smartphones. It didn't take quite as long. Apple announces the iPhone in 2007. They basically didn't sell any. Smartphone sales don't really take off until 2010. Annual sales didn't get over a billion until 2015 or 2014. So it took 5 to 10 years to get to the point that billions of people had a smartphone. Whereas with Chat GPT, it's just a website.

**BE:** So you don't have to wait for everyone to buy a device. You don't have to wait for the hardware to catch up and to get GUIs and to get inventor mouse and everything else. You're standing on the shoulders of giants 'cause you have all the cloud computing. You have all the

infrastructure. You have the GPUs. You have vast data sets already. And so once you have the idea, kind of suddenly it works. However, there is a huge difference between, my God, Chat GPT is amazing. And General Motors switching their FPNA function or their accounts payable function from running on Oracle to running on Chat GPT.

**BE:** That's going to take a little bit longer and it will take five years to work out how that works.

**LT:** What are other interesting insights and trends that you're seeing in tech now?

**BE:** There's a lot of sort of cascading things around AI. So there is obviously the fact that the semiconductor industry has become strategically interesting for the rest of tech, which it sort of hadn't been for a very long time. That's partly TSMC [Taiwan Semiconductor Manufacturing Company] in China. It's about GPUs and Nvidia. If you were in the tech industry for the last 20 years, you really didn't need to think about chips at all. That was somebody else's problem. That was Apple and Google's problem. It was not your problem. Now suddenly semiconductors has become interesting and important in lots of ways, also geopolitically as well. So that's an interesting nexus. I think the emergence of Chinese EV [electric vehicle] industry is going to be really interesting. And there's certainly a view that this is going to look a bit like the emergence of the Japanese car industry in the 80s, that you're going to have this wave of new brands bursting into the global markets and challenging the position of the incumbents.

**BE:** There's a question around how is the EV market going to evolve and how much does that unlock the arrival of the emergence of Chinese manufacturers? So that's an interesting conversation. What else is happening in technology? There is sort of the VR and crypto conversation, which bracketing them both together because those are both things that had a huge amount of hype and are now in a winter.

**BE:** But the underlying technology remains very interesting and will probably come back in three, four, five years time once it's actually ready to be used to build products. VR and AR on the one side, crypto, blockchain on the other side. Blockchain in particular has just an enormous amount of nonsense and scams and con artists and noise around it. But the kind of core technology remains kind of interesting. So that's sort of a thing to just to kind of keep on the back burner and still maybe kind of scratch your head a little bit about. Most of the tech industry is making something sort of boring and useful that isn't in the headlines and doesn't get all of the attention.

**BE:** It's like the Milton Friedman, no one knows how to make a pencil thing. Most people are making the grinding machine that makes the blade that goes onto the machine tool that works the lathe that makes the lathe that makes the pencil. That's most of the tech industry. And so most of it is just getting on with deploying ideas from 2010.

**LT:** Fascinating. What are the three takeaways you'd like to leave the audience with today?

**BE:** Yes, I think about this when you mentioned it, obviously as a former consultant, everything has to be three bullet points. First bullet point is that you have a lot of people in tech thinking about stuff that's going to happen in 5 to 10 years time. And so that is generative AI, but it's also

crypto and maybe VR if those happen. It's also things like quantum and so on. So what's going to come in the future of the near predictable future? There's a second bullet point, which is most of what the actual tech industry is deploying, and building, and the companies are doing, are ideas from sort of 2010.

They're ideas like SaaS and cloud workflow, automation, communication, collaboration, unbundling, digital transformation, moving people from main frames to cloud. This is all stuff we were talking about in 2010. This is actually how long it takes to get this built and get it deployed. Cloud is still only 25% of enterprise workflows, and it's an idea from 2000. The third bullet point would be most of the rest of the economy is being destabilized, overturned, disrupted, challenged by ideas from around 1995 and 2000. There's nothing going on at Disney that is not stuff that we were talking about in 1998, 1997. People watch video on the internet and you'll get your TV shows directly from the movie studios. Yeah, here we are. It took a while.

LT: Thank you, Benedict. This has been great.

BE: Great. Thank you.

**OUTRO male voice**: If you enjoyed today's episode and would like to receive the show notes or get new fresh weekly episodes, be sure to sign up for our newsletter at https://www.3takeaways.com/ or follow us on Instagram, Twitter, LinkedIn and Facebook. Note that 3Takeaways.com is with the number 3, 3 is not spelled out. See you soon at 3Takeaways.com (https://www.3takeaways.com/)

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