

iLUMinate Blog Transcript: Burak Eskici on AI Agents, 'Black Box' Tools, and Delegating Creativity to Generative AI
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JACK CROFT: 00:15 Welcome. I'm Jack Croft, host of the iLUMinate podcast for Lehigh University's College of Business. Today is October 29th, 2024, and we're talking with Burak Eskici about the career path that led him to Lehigh's College of Business and about his perspectives on the role of generative artificial intelligence, or AI, in business. Dr. Eskici is a teaching assistant professor in the Decision and Technology Analytics, or DATA, Department at Lehigh's Business School, where he co-directs the Computer Science and Business Program. His research interests include quantitative and computational methods; the development, application, and ethical use of artificial intelligence; systems design and optimization; and organizational behavior. Before joining Lehigh, Burak was a researcher at the World Bank, focusing on projects related to digital development and financial inclusion. His professional experience also includes serving as a research program director at the University of California, San Diego, and at J-PAL, South Asia in India, as well as a senior lecturer at Harvard University. Burak, thanks for joining us on iLUMinate today.

BURAK ESKICI: 01:34 Thanks for having me. I'm excited for this conversation.

CROFT: 01:37 Now, it seems that research is a common thread throughout your career. As I just mentioned in the intro, your path to Lehigh's College of Business faculty includes leading research projects in India, serving as a research program director for the University of California, San Diego, and working as a researcher for the World Bank. So what was it that sparked your interest in research to begin with?

ESKICI: 02:03 Absolutely. So just a little bit going back, I have a background in industrial engineering from Turkey, where I am from. And even from those years, it's always important for me to try to understand some key questions. And I always have been more interested, in coming from Turkey, the question of development, like a socioeconomic development. And the basic question was why some countries are richer than others. And then a kind of question kind of evolved into why some organizations at the aggregate level perform better or work more efficiently, and some do not. So it's kind of intersection of this organizational theory and the culture in the context of socioeconomic development. So in the first part is about this, trying to understand, creating this kind of first a puzzle, and then trying to solve, understand this puzzle. I always kind of liked it in the puzzles as well. But then throughout my studies and the PhD program, I also kind of realized that in addition to trying to understand and kind of make sense of things, I also love to be a change agent. If it makes sense, be more in the kind of real world, in addition to maybe writing papers, but being kind of application and working in projects, be on the ground. So it's more kind of an impacting on the world, working on these kind of important problems. So for me, it's always kind of the intersection of both this understanding, more kind of the scientist behind this, and also being the changes, kind of combining this with an engineering mindset, going back and creating or designing or changing things in the ground as well. So it was always kind of this tension or kind of the motivation. What took me from Turkey engineering to Ph.D. in sociology at Harvard, then going to India, then to

San Diego, then to World Bank. This is basically always kind of the common theme I feel like.

CROFT: 04:03

Right. I think it might be helpful then if you'd highlight some of the main responsibilities you had and kind of the key takeaways or most important things you learned in your research roles. And let's start at both J-PAL in Delhi, India and at the University of California, San Diego.

ESKICI: 04:23

Absolutely. So it was kind of a shift in my career. So I took this job after teaching two years at Harvard, after my Ph.D. So in front of me at that time, which is about 10, 12 years ago, going in two directions. I always loved teaching. Either I was going to go more in the teaching direction or I was going to go more on the research and policy and management. So I choose the second one for multiple reasons. But I guess this kind of research and making an impact kind of played a bigger role in that decision. So it was kind of a shift in that career. But because I wanted to work on real projects and to see the impact of my work. And another angle is also kind of to desire to see how theory plays out in practice. I was reading, I was writing about a development and policy change and things. But I was wondering how it's going to play out actually when you are on the ground working with governments, working with policymakers, working with actual people, the beneficiaries. In all of those years, I was involved with randomized controlled trials. So in the area of microeconomics or the applied micro, this is kind of like implementing a policy change in one set of villages or geographies or one group of people, which are kind of a treatment group, and not doing anything in another set, which is becoming kind of the control groups. And then you closely monitor the transition, the changes, or kind of the outcomes of your interest to measure the impact of this specific policy change. So for example, in India, I was involved with projects around technological innovation, such as digital money accounts or identity systems. And they're used in public service deliveries, such as social service programs, social welfare programs in India.

ESKICI: 06:13

The kind of the cycle was first you come up with the design of a policy intervention. You pilot this, collaborating with a government agency, and then test this. If it works out, then create a large-scale kind of evaluation program, implement this in, let's say, 10,000 villages, and then closely monitor the process and do kind of a collect data through the impact evaluation. If the intervention seems to be working in terms of outputs, and if it is cost-effective, then work with the government to scale this up. So it was overall kind of what I was involved in. And there's kind of a multiple fronts. For these kind of projects, it's including the World Bank projects as well, you need to come up with the idea, what kind of a policy intervention, what kind of an inefficiency you would like to tackle. And then you need a team to be able to do this, and you need money, funding for the research, and collaborating with the mostly government in a large-scale project as well. So in that sense, my role kind of involved combination of which stakeholder management, collaborate with the government, design smart interventions, convince them this is worth trying, and then do the evaluation. It involves team building and kind of team management, which we had teams of 15 to 20 people, mostly young kind of fresh graduates who are research associates, research managers, as well as 200, 300, depending on the size of the project, a person team of survey operations to collect data. It involves like a technical quality, making sure the data we collect makes sense. It is unbiased. The surveys we design are good. The sampling strategy is kind of meaningful and representative sample at the end, as

well as after we collect data, data cleaning, data analysis, and making sense of this data and to be able to do the conclusions.

ESKICI: 07:57

And the last bit, of course, the funding relations, raise money for these projects, convince the funders it is worth spending money to learn these specific projects. So in that sense, it was almost like a second Ph.D. for me. I spent three years in India, two and a half years in UC San Diego, and about two and a half, three years in World Bank, all kind of a similar line of work. Which was actually seeing every work I studied in the PhD program being in kind of in action and on the ground and how it kind of plays out in the ground, which was a tremendous learning opportunity for me.

CROFT: 08:30

You mentioned the World Bank there. So what did your work there entail?

ESKICI: 08:35

Similar, so the World Bank has this digital public infrastructure, which is, again, technological innovation and creating infrastructures for social service delivery, foundational infrastructures. For example, I was enrolled in a project in Nigeria. There was a \$400 million loan to build the national digital ID system. So which involves kind of creating the hardware, creating the software, procurement, process, and project implementation. So I was in the more on the monitoring and evaluation part, which is collecting data, making sure the progress is on time, we can release the funding, as well as after the project kind of goes in certain milestones. If the impact is on the right track in terms of gender equality, in terms of inclusion, exclusion, all kinds of the project metrics as well. I was also involved in similar kind of, I said in India, project with the World Bank, technical analysis of the financial inclusion, especially in the rural areas of India. And I was involved in a couple of projects in Ethiopia and Morocco.

CROFT: 09:42

You talked about getting your master's and Ph.D. at Harvard, and then you went on for a couple of years to serve as a senior lecturer there. What were some of the main things you learned from that experience?

ESKICI: 09:54

I was completely coming out of sociology. I had degrees in Turkey, in industrial engineering. But I always into this idea of, as I said before, organizations, culture, their role in development. Then I decided to go a completely different path. And I said, "I want to study this in more deep." And I applied to like 10 sociology programs, Ph.D. programs in the U.S. And I got rejected from seven of them. So it was not an easy journey. But I got accepted from three of them. And Harvard was one of them. And I came in 2008. And the first couple of years were struggling. I was struggling for the transition from engineering to sociology. I was struggling to read and write in English, in social sciences, which I had a very kind of a weak background, actually. But at the same time, it was equally challenging and rewarding because I was learning a lot. I was kind of developing my understanding of the world. So in that sense, Ph.D., my Ph.D. or the graduate studies were both challenging and rewarding. I ended up doing the dissertation more with the qualitative methods. But at the same time, I became more proficient in quantitative methods and social sciences. And in those years, I knew that I was not going to go like maybe pure research or tenure track job. Either I was planning to go more on the policy side, such as the World Bank or the policy implementation, or I was going to go teaching. My teaching was always good. I always loved teaching, and it was a passion. And I was offered this Harvard College Fellowship, which is a senior lecturer position for two years. And you teach classes and continue your research. It was very rewarding. After those years, I taught with the Faculty of Arts and Sciences, taught at the business school, taught at the

Extension School, with different modes. It definitely sharpened my understanding and how I can teach these complex concepts to different audiences.

ESKICI: 11:52

And of course, being at Harvard was always rewarding with the students, with the faculty, with the colleagues. And that was kind of a culmination of all of my entire career from, again, engineering to sociology. But at the end, I also had the offer to continue as a senior lecturer. But at that time, we didn't have kids with my wife. We thought it was kind of too early to settle in Boston at that time. So we decided, actually, to travel a little bit, take another path, maybe like test this policy research path a bit, which I did. And then came back to Lehigh, which is kind of coming to full circle. I'm coming back to teaching, which is one of my core areas.

CROFT: 12:37

That brings us to Lehigh here, where you were started as an adjunct professor in the business school, I think it was starting in the spring of 2022. And as I mentioned in the intro, you're now on faculty as a teaching assistant professor and the co-director of the Computer Science and Business Program. So what should people know about the Computer Science and Business Program?

ESKICI: 13:01

It is one of the four intercollegial programs. Lehigh is unique in that sense. One of the few universities offering these very well-crafted and designed intercollegiate programs. And I was actually very excited to be offered with this co-directorship position because when I was adjuncting, I had a couple of students from the CSB program. They were phenomenal. And I am very excited to take on this role too. So CSB, or the Computer Science and Business, is a single degree program which is combining computer science and business and recognize both as an engineering and a business degree. So in that sense, it's quite unique. And it is not kind of watered down CS. The CSB, the seniors are as good as any CS major in terms of computer science skills. But they also have under their belt all the major classes from the business school, and they can specialize in different areas as well. So the program is quite rigorous. It requires 136 credits to complete. But at the same time, it's flexible enough. Some of students are ending up with computer science and having multiple classes from the finance department and becoming more finance kind of the heavy curriculum. Some of the students are taking more of their electives in the computer science and they end up that we call them capital CS and small B. And some of the students are taking more accounting classes and they go towards the kind of degrees or the career path towards auditing and accounting. So overall, it gives a solid 360 foundation, both in business and computer science, and enables students to kind of focus on different areas if they are willing to. And it is reflected on the demand on the job market side as well. Our alumni is getting quite paid well. They were able to find multiple job offers at the end of senior year. And we are very happy to kind of take this forward and make it better and better in the upcoming years.

CROFT: 15:08

One of the courses you teach at the business school is Foundations of AI for Business. That kind of takes us to a topic I'd like to explore a little more in depth with you because there has been considerable controversy over the development of generative artificial intelligence in particular. So from what you've seen, how is generative AI already changing the landscape in business? And let's start with, being optimistic, for the better.

ESKICI: 15:38

Absolutely. So so far, the AI, one thing is it is developing so rapidly. I designed this course on the Foundations of AI for Business throughout the summer. And when I designed some of the topics, for example, agents, AI agents, were not possible at that

time during summer. We were kind of discussions. Is it possible or not? Is it going to come in a year or two? But now we have AI agents within three months. So the development is kind of exponential. So this is why most of the benefits in terms of productivity are most on the personal level at the moment. So we are using generative AI to maybe draft our emails, draft some documents. We use generative AI to personally write some code, debug or fix our code, do some data analysis. These are definitely helping at the individual level to save some time and come up with better quality product as well. The issue at the business side is we haven't figured that out yet at the organizational level how to transfer or kind of convert this personal level gains into organizational or enterprise gains as well. So there's a big race, and this is kind of the big shift, I believe it's going to happen in the upcoming years. Some businesses, some companies are better in that sense, trying to develop these enterprise level gains.

ESKICI: 17:02

But at the moment, people are gaining some productivity efficiency gains at the individual level. But this might result in the company level efficiency gains or more productivity, but we don't know how it's going to play out in that part as well. And the second part is we are still at the level of assistance-level AI. As I said, for example, we are asking AIs or the generative AI tools to assist us in some of the jobs that we are doing, some of the tasks we are trying to tackling. But with the agent agentic systems, or the AI-based agents, are coming into play, it will be a big kind of a paradigm shift. Then we will be able to say, "This is the data, this is the file, this is the topic, go and work on this report for me." And then we are doing on other things that AI agent is going to be able to search the web, download some stuff, look at the data analysis, and come back with the first draft. So this will be a kind of a big shift when we have these kind of agents, which is already some tools are available as of a couple of weeks ago. And we are going very fast in that direction as well.

CROFT: 18:16

Things are obviously moving, I think exponential was a good description of how rapidly it has been changing. So what are some of the downsides or potential downsides you've seen? And particularly, I guess in the area of ethical issues that are being raised.

ESKICI: 18:36

To begin with, for the ethical issues, all of these large language models or these generative AIs have been trained with existing data sources, the text, whatever we have on the internet, existing books, Wikipedia, anything you can think about this. And this has lots of legal disputes, who owns the rights and everything. I will just put that aside. But whatever is the human kind, we have biases, some prejudices, or anything that in existing baked into the existing data is actually in the generative AI tools. So whatever we have as a humankind, we have biases, everything is reflected whatever we are getting from the generative AI tools as well. So it's a big deal. It's a big problem. At the moment, we are using this as an assistance technology. We still are the decision makers and everything, but the moment it shifts, we don't have maybe have more power or control to the AI assistance, then it will mean more bias at the level, whatever we have in the existing data, which is kind of a big problem. The second one is these tools are kind of a little bit black box. Explainability is a big issue in the AI at the moment. Now, because of the technical kind of details, the deep learning models, this large language models, it is really hard to interpret why it is giving the exact output. So we cannot go back and fix it very easily. This is why this black box part is quite challenging to use it in any decision-making process or other parts.

ESKICI: 20:14

The third part is I think it's kind of dangerous enough that these large language models are working very well right now. Maybe in terms of quality, in terms of kind of accuracy, especially, they are performing, let's say, at 90%. When they are at 95%, for example, it will be enough. It will be sufficient for us not to pay attention to quality of the output or the accuracy of the output, right? So then when we stop paying attention, the accuracy and the quality, then we will end up lots of wrong results or difficult kind of problematic outputs that we will be using in corporate decision making, personal decision making, and so on and so forth, that this quality assurance of the large language models or the generative AI is going to be a bigger problem in the near future. And unfortunately, we don't have a policy kind of framework at the moment. The technology is developing so fast. And there is a mismatch in terms of who is developing technology and who is supposed to provide the policy infrastructure. They don't speak the same language. This makes a big problem how we will have a good policy infrastructure that will enable responsible use of AI or responsible development of AI is a bit concerning, actually.

CROFT: 21:40

And I think that does get at a policy area, which is part of your background, obviously, but it's that question of how we as a society manage to encourage the benefits, the good things that you've talked about, and reduce the potential harms and the ethical problems that arise?

ESKICI: 22:02

In this case, for example, one thing I see in my students or in myself as well, I no more kind of draft something from scratch. This is concerning in the sense that, because when we think about something, when we try to write something on a blank page, it is the moment we struggle. It's a challenging task. But that kind of challenge also pushes us to think deeply, try to come up with better ideas. This is the kind of process of creating something new. The moment we delegate this to a generative AI or a computer program, slowly, slowly, maybe fast, I don't know, we will lose our kind of skill to write something good or creative. Similarly, I kind of suspect in a couple of years, people stop writing emails or stop doing anything, which is going to be concerning at one hand. And I don't know how it will impact, how it will kind of play out in the near future. Because I gave this example, it's similar to when calculators came out, right? The mathematicians or the mathematics teacher protesting, and they were not kind of, "You shouldn't use calculator." They were concerned about people are not going to be able to perform mathematics. It didn't turn out that way. It was kind of very useful for a certain extent, I believe. So it can also turn out in that way as well, but it is a little bit kind of it can go in both ways, I feel like.

CROFT: 23:28

Now, there's also the question that's arisen at every university and college, probably around the world at this point, of how do you incorporate generative AI in teaching? And perhaps even more importantly, what do students need to know about GenAI? One, for their coursework while they're in college, but at least equally, if not more so, to be prepared for the rapidly changing workplace that they're going to have to enter after graduation?

ESKICI: 24:03

There are two parts to this, I believe. The one is I think every student should have a good understanding of how these AI models or large language models actually work, how it kind of came from, the evolution of the AI models, because AI is not a new thing. The term was coined in 1956. And in the second part of 20th century, there were lots of research and good research on one type of AI, actually. So it is important for students to understand these foundations of AI, how it works, because it is key to be able to understand what is possible with these models and what is not. So it's

important to understand this possibility set with this existing technology. It's a very important, very powerful technology, but there are certain things it cannot do well. So it's really important to have this conceptual understanding about the ability of AI or kind of the limitations. I think this is kind of the first thing. And the second thing is more hands-on experience working with these products, which are built on top of large language models for text generation, for specific purposes, for data analysis, for data visualization, for anything you can think of that might be relevant to their career. And try to kind of work with these along with whatever they are building or their existing tools.

ESKICI: 25:28

For example, in my teaching, I use this and I make it very explicit. So from a teaching perspective, of course, we have this plagiarism, whose work this is, you cannot submit just the output of a large language model. These are definitely important to keep the kind of integrity of our learning experience. Because writing a paper is an important part of the learning experience. So what I do usually is, for example, I'm teaching a programming class, object-oriented programming using Java. And I ask students not to use generative AI in the first half of class while we are trying to build understanding and skill about what's programming, how to program as well. Because the moment you start asking ChatGPT, give me the Java code of this problem, and you can use the submit the assignment, but it hinders the kind of-- it inhibits the learning process for the student. But then when you have a good understanding of programming, how programs work, and you can evaluate the output of an AI model, then it's a very important and good and useful tool for to use. You can brainstorm with a large language model. You can ask about new ideas. So it becomes very, very effective as well. So overall, I think in a nutshell, the one is foundational understanding what's behind these technology, and then hands-on experience on specific products. Because every day, we have a new product based on AI. So it is going very, very fast in that direction.

CROFT: 27:04

Going back to the research experience you've had, what's your perspective on the role that generative AI in particular will be able to play in actually enhancing research efforts?

ESKICI: 27:18

I mean, I strongly believe, especially in the research area, I am very bullish on AI. If you look at, for example, this year's Nobel Laureate from Chemistry is actually the co-founder of Google DeepMind. And he's a computer scientist. He has almost nothing to do with chemistry. But with their work, AlphaFold protein networks using AI, they received the Nobel Prize in chemistry this year. So from traditional models, traditional computational powers, it was almost impossible to come up with this tool. It became kind of available only after the AI. And I strongly believe with combining different ideas, especially the idea generation phase, the AI models are very strong, very powerful, because it has access to almost every piece of information, piece of paper, every kind of thing. And it can make connections across different fields. So in that sense, especially creating research in the early stages, discussing or brainstorming about ideas, research papers, research areas, generative AI tools are extremely, extremely useful, and it will help us a lot to move forward. And it will enable very different research. And on the optimist side of the AI, people are expecting to find cures to some diseases and some answers to very key problems, such as kind of the energy and other things. And I strongly believe it will help a lot in that direction in the near future.

- CROFT: 28:58 Now, we're just about out of time, but we've covered a lot of ground here, but there's obviously an awful lot more to cover. So I just want to give you an opportunity at the end to whether there's something that you think of key importance that listeners should know about generative AI that we haven't talked about.
- ESKICI: 29:19 Absolutely. So maybe in addition to all of this, of course, this is a very fast developing area. So this is the area that I am interested. I am spending a lot of time reading, following people, following with new products and companies. I kind of recommend to all of my students when I discuss, my colleagues, everyone should have some kind of a process that will keep them on top of developments in AI. Either this can be a podcast, it can be Substack. It can be, for example, Ethan Mollick from UPenn. He's a great kind of a scholar working in this. He has a book called Co-Intelligence. So having this kind of a process or people to follow on social media, on Twitter, or X, and following their kind of output, just to make sure you will be on top of what's happening, what's the latest development because you don't need an expertise in this. It's a very new technology. I am almost equal to my 5-year-old kid about AI. We are using AI to create generate stories and bedtime stories every night. He talks to AI. For him, it's kind of another almost human being. He asks kind of a very interesting question. Who is inside? Is there a real person or not? How can we understand if it is not a real person or so?
- ESKICI: 30:41 So it's such a technology that it's kind of leveling the field, if it makes sense. Anyone here with a Ph.D., lots of years of education, or very minimal education, they are kind of starting at the equal in that one. So in that sense, AI has this kind of an equalizing factor. So to be able to kind of utilize this, I strongly recommend everyone to follow the developments, have a process or some tools to be able to follow what's happening, and play with this technology. It is something that there is not much science how to use it. It's more of an art. You try, it works, you try something else, it doesn't work. It's more kind of a trial and an error than become better and better using these tools. And you will see how the future is going to break. But I am quite excited, equally anxious about the kind of potential risks. But hopefully, as humankind, we will figure out to use this in a responsible way.
- CROFT: 31:38 Burak, thanks again for joining us on the iLLUminate podcast today.
- ESKICI: 31:43 Thank you very much. I appreciate the conversation.
- CROFT: 31:46 Burak Eskici teaches courses in AI, computing, data science, and quantitative methods at both the undergraduate and graduate levels. This podcast is brought to you by iLLUminate, the Lehigh Business blog. To hear more podcasts featuring Lehigh Business thought leaders, please visit us at business.lehigh.edu/news. You'll also find links there to follow us on your favorite social media platforms. This is Jack Croft, host of the iLLUminate podcast. Thanks for listening.