CRAIG: [00:00](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=0.54) Hi, this is Craig Smith, a former New York Times correspondent now focused on artificial intelligence. We started the Eye on AI podcast late last year and were frankly overwhelmed by the response. I want to thank those listeners who have offered advice and encouragement. As we begin our first full year, we would love to hear from more of you about what you think of the podcast – issues you’d like discussed or directions we should follow.

 We have some terrific guests lined up, from Rich Sutton, the wizard of reinforcement learning, to Samy and Yoshua Bengio in the frist interview the brothers have ever given together. Email us at info@eye-on.ai

CRAIG: This episode took some time to get into shape because it was recorded in a coffee shop where there was a lot of background noise. But I thought the conversation important and so, despite the compromised audio quality, wanted to bring it to you.

CRAIG: [01:07](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=0.54) If you have listened to past episodes, you’ll know that I have reviewed the state of AI research and implementation in various regions of the world: Russia, China and Africa so far. In future episodes, I plan to cover South America, South Asia and Japan among other places. This episode is about Europe, which is particularly interesting at this point in time.

 National fragmentation within Europe creates challenges for many areas of research, AI among them: pension and health insurance schemes, grant applications, and research initiatives are specific to each country, fragmenting the whole. Meanwhile, larger pools of capital, data, compute and brainpower draw many of the best minds to the U.S. and Canada.

 To counter this trend, a group of European machine learning scientists last year proposed the creation of a European Laboratory for Learning and Intelligent Systems, or ELLIS. The project intends to raise funding for a network of machine learning labs across Europe, knitting disparate national efforts into a whole, much as the European Organization for Nuclear Research, known by its French acronym, CERN, has done for fundamental physics.

CRAIG: 02:22 But Europe being Europe, it didn’t take long for controversy over ELLIS to erupt. Another group of AI researchers who see machine learning as only one aspect of artificial intelligence research, proposed the Confederation of Laboratories for Artificial Intelligence Research in Europe, or CLAIRE. According to their proposal, ELLIS should be a part of CLAIRE. This gentlemanly power struggle reflects a larger debate in the AI world between so-called old-fashion AI, based largely on symbolic reasoning, and so-called modern AI, dominated by deep neural networks. We’ll cover that debate in later episodes.

CRAIG: 03:01 To understand what’s happening in Europe, I was fortunate to speak to Bernhard Schölkopf from the Max Planck Institute in Tübingen, Germany, and Matthias Bethge, who runs an AI lab at the University of Tubingen. Both have been instrumental in the ELLIS initiative.

CRAIG: 03:18 I apologize for the poor audio quality but hope that you find the discussion as fascinating as I did.

CRAIG: 03:28 Europe, because of its fragmentation and because it doesn't have the market size of the United States or China is kind of being left behind

BERNHARD: 03:38 So, yes, in Europe, there's a number of excellent scientists in general and quite a few of the strongest people are there and quite a few of the strongest people in America come from Europe originally. I would guess that until a year ago or so, if you had to ask the public in Europe, they wouldn't have perceived any problem in us lagging behind in AI. But I just spent five months in America this summer. I didn't have the feeling that when people here think about AI and where the stuff is happening, they don't even have Europe on the map anymore. They think about America and they think about the increasing developments or the increasing threat from China, but Europe doesn't figure into that list anymore?

CRAIG: Other than perhaps DeepMind ...

BERNHARD: 04:17 … other than DeepMind. So this has changed in the last year or so. So it first changed in the UK, I'd say probably a little longer than a year ago when they started the Turing Institute. Turing Institute was initially started for data science, but then subsequently people noticed that actually AI is becoming a big topic. So now, the Turing Institute has this charter that also includes AI. So we were quite worried earlier this year that in the rest of Europe, not too much had happened and we wrote this open letter calling for something that we call ELLIS - European Laboratory for Learning Intelligent Systems. The idea was to do something like the EMBL, which is the European Molecular Biology Laboratory. EMBL brought together the community in molecular biology at a time when that field was relatively young and it was actually modeled after CERN, so people felt CERN was a great success for European science and something similar should be done in this part of modern biology and people got together and founded a society the Embo and then lobbied for the EMbl to be started and it started with only a few countries and with one lab. And then many more countries joined subsequently. Now Embl runs multiple labs in different European countries

CRAIG: 05:26 With national funding or European Commission funding?

BERNHARD: it's actually, I think it's mostly national funding at least in terms of its construction. It's an intergovernmental organization. I think it was started before the EU would have been able to do things like that. So now the situation is a little bit different. We have the EU. On the other hand, we still think this is a good model because not all the countries that produce the top machine learning and AI research in Europe are actually member states and Europe viewed a little bit more broadly defined is GARBLED of top level of machine learning, computer vision research, Switzerland. Is one of the top centers.

BERNHARD: [05:59](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=154.38) Curiously, if we think about what are the top centers in Europe and some of the first places that come to mind are not in the European Union or are running the risk of leaving.

CRAIG: So Europe in the old sense, Europe more broadly and the idea is to get buy in from the individual countries and then to get funding. What's the difference between this and a conference?

BERNHARD: The difference will be that this is an actual set of labs that get funding from the countries, but in addition, because we cannot place a lab in every possible place where we currently have strong people - in addition a network of fellows throughout Europe and I could imagine that maybe the labs would be funded more by the states where they sit because they also should have a strong economic interest in creating these labs because there's a lot of economic development surrounding these centers of excellence in AI and machine learning, but the network of fellows could be throughout Europe, and I think that would be very suitable for European Union funding.

CRAIG: You have an idea of what kind of funding you'd be talking about.

BERNHARD: [06:58](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=211.42) So in our original proposal we were imagining something like $30 million per year for each of the labs and then it depends on how many countries would join the endeavor, but I think in an ideal world, if we could get 10 countries to sign on, hope between five and 10, $30 million from one site. This is the budget for a large Max Planck Institute. Max Planck institutes are publicly funded research institutes in Germany, in the German scientific landscape, the thing that works the best. So we don't have universities that are in the top 10 worldwide, kind of surprising for a country of the economic power of Germany, but we have Max Planck and if you take together all Max Planck institutes, the overall budget is the one of a large American university and the overall scientific output is really on the level of absolute top American universities - Stanford, Harvard, Yale - that order of magnitude.

CRAIG: These labs would be attached to educational institutions.

BERNHARD: So I think it would be good to have them reasonably independent because they have to be run in a slightly different way and we have to be able to pay reasonably competitive salaries. We want to be able to have a European tenure track program where people can move back and forth and a European phd program. At the same time we recognize that PhDs are awarded by universities and many of the top people work at universities. So there has to be this connection to university. There has to be the possibility for co-affiliations. So I think the Canadian model, is actually a good one. Canada, they have this Pan-Canadian AI strategy where the CIFAR, the Canadian Institute for Advanced Research, they basically designed the rules. They said we will fund three centers of excellence throughout Canada. These centers will each be a nonprofit corporation, but we'll put them in the strongest academic places and we'll talk to the universities to make sure this fits together and the universities will work together and will allow their professors to become associated with these centers.

BERNHARD: 08:45 So in the end, I think it's a win win for the sites, the universities will benefit from it as well.

CRAIG: This $30 million per site would go to funding salaries but also compute? Server farms and that sort of thing: Or would you rely on commercial options?

BERNHARD: So that's a question that we're currently discussing. It could also be interesting to set up some major compute infrastructure which is publicly funded and that's one point where we're discussing with another large AI initiative that's focused more on the traditional AI methods. They also need compute facilities. So we could combine our efforts.

CRAIG: [09:19](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=352.43) Is this CLAIRE or that you're referring to?

BERNHARD: Yes.

CRAIG: CLAIRE, if you can remind me, the acronym stands for

BERNHARD: Confederation of Laboratories for AI Research

CRAIG: Right. The other disadvantage that Europe has are privacy rules regarding data. Everyone knows data is the blood for the beating heart of AI. How do you overcome that?

BERNHARD: [09:43](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=375.36) Do you know, it might be perceived as a disadvantage now in North America and I think it has created some hiccups as these rules were implemented. At the same time, I think it's good that people are thinking about these kind of issues. We can't just let it all develop chaotically and I'm not an expert understanding all the implications. I think it's good that there is a discussion and maybe new models will emerge. New ideas will come up. There is, for instance, the idea of data trusts has arisen in Europe. I'm optimistic that we'll develop good models for that because it is a genuine trade off. Every person, of course, wants to protect their data and if I'm a patient and I want to keep that private at the same time, we will be able to build better diagnosis and treatment systems if we are able to bring together data, generate doctors, trained doctors, that have seen millions of cases rather than hundreds of thousands, then these doctors will give more accurate diagnoses. So we have to create frameworks such that people feel they can safely share their data and then we can build models from this data to benefit everyone,

CRAIG: and Mattias, maybe introduce yourself a little bit

MATTIAS: so I'm doing computational neuroscience and machine learning, so I'm also not only doing AI, but also trying to understand how the brain processes information.

CRAIG: You're an example of someone who might have been lured away by opportunities elsewhere is that right?

MATTIAS: that's right. Canada is a good, a very good option.

CRAIG: [11:07](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=458.6) What kind of community in the machine learning world does Europe have? Are there numbers that you guys are aware of?

MATTIAS: For instance, we looked at the number of publications at the NeurIPS conference and how they developed over the last 10 years and basically it was relatively constant, while in other countries it grows a lot and so that's how you fall behind.

CRAIG: And those papers you're counting are from European institutions?

MATTIAS: The numbers I just mentioned are just for Germany. Obviously if you look at the UK where, for instance, deepmind, is, so they have a rise of publications.

CRAIG: Is that plateauing of publishing from Germany because people are leaving to work in Canada or the United States.

MATTIAS: I mean the people who were there and still are there, they are still publishing but it shows that during the last couple of years, no major investment has been done in Germany.

CRAIG: That CLAIRE letter seems to want to put ELLIS as a subset of CLAIRE is there concern from the ELLIS supporters that that will limit the funding for ELLIS or limit its independence?

MATTIAS: It's clearly the concern about the independence and not the funding. After we published our open letter a few weeks later, the CLAIRE people published their open letter also referring to ours saying, this is a good idea, We need something like this, but we need it for all of AI. As you mentioned, the consider us a small part of this but um

CRAIG: [12:33](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=551.23) Is there a field within machine learning that Europe right now is particularly strong in and that ELLIS would help support? Or is this just generally to retain talent?

MATTIAS: I mean one thing that we have been focusing on for quite a while already is causality in Bernhard's case and more generally robustness, robustness of algorisms and so adversarial examples are one example of the lack of robustness, and I think this is also something, for instance, at this intersection between neuroscience and machine learning that you can study and has the potential to become very important in the next 10 years for major breakthroughs in AI.

CRAIG: IN forming ELLIS, was there much dialogue with politicians in the European countries or in the commission and do you think the political sphere understands the role of machine learning or its importance in the field of AI?

BERNHARD: [13:31](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=608.57) When we wrote the open letter, there was no dialogue. Afterwards there was a little bit of dialogue. I think it's fair to say that they haven't quite realized the relative importance and haven't quite realized what's going on in modern AI nowadays. And that's understandable because GARBLED machine learning is still relatively young, so I would think there's many more people in Europe, strong networks that focus on other parts of other fields that are related to artificial intelligence. For instance, this G7 summit that just took place in Canada and it seems like a lot of people came. Maybe that has helped educate people a little bit about what's going on in the field.

CRAIG: The debate over whether CLAIRE should be the umbrella organization or whether ELLIS should be an independent organization. Is ELLIS important to retain talent and build a competent cohort in Europe or is it important to ensure that European economies keep up with the US and China?

BERNHARD: I think these two problems are actually closely connected, so I would say it's important in both respects because in the field of machine learning and when i say machine learning, I mean it broadly - also it is that are very much powered by currently, which is most of computer vision and to an increasing extent also, parts of robotics - these things are all powered by machine learning. There's a huge struggle for talent in these fields and you can see that in the fact that so many of the companies are now opening outlets in what they perceive to be the top machine learning GARBLED throughout the world. Initially it started in America, but now it's increasingly also arriving in Europe, so if you look at Europe, there are outlets in Cambridge, in London, in Paris, in Zurich, in Amsterdam, in Israel. Now we have one GARBLED in Berlin. One of the major motivations is to go where the talent is.

CRAIG: For industry to go where the talent is …

BERNHARD: yes, and of course we need the talent, not just in industry. We need is just as much in academia because we need to train tomorrow's talent. So that's also a bit worrying and think this is happening already very much in America, but Europe is lagging a little bit behind. We will see more and more co affiliations that people share their time between industry jobs in academic jobs and in a way it's probably good that this happens because people are interested in the industry jobs they want to have impact. People do startups, work for industry labs. It's exciting to see how these methods are changing the world, but at the same time if we lose them completely to industry, we have the problem with the students and the young students nowadays. That was different when I was a student, but nowadays the students they have access to Google. They can look who's publishing where the interesting stuff is going on, but they are extremely mobile so they will go where the interesting professors work. So we have to keep them there, Even if sometimes it means we only have half time.

CRAIG: 16:12 Is industry part of the solution. In Europe, they can provide a lot of funding. They're doing that in theU , s and Canada funding institutes around universities.

BERNHARD: I expect that can be part of the solution. We see some of this happening, for instance, in and we have this sense of cyber value activity and a number of industry companies are part of that, but also an American company like Amazon, so I think it can be a part of the solution, but also in that case there's maybe a little time delay in that. In America you have industries that are data driven to a stronger extent than the European industries, especially if it's a company that's about software. They can translate machine learning into applications much faster than companies whose business model is built on hardware, but now with topics such as self driving cars, certainly AI and machine learning are arriving in the hardware domains, so I expect there will be an increasing interest also in the more traditional European industries to get involved in this.

CRAIG: [17:10](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=0.54) The future of Europe in this global playing field. I mean it's very clear that China is going to be a dominant player if not the dominant player. The United States, It has tremendous research universities and will maintain its role in basic research. What role do you see for Europe? Is it simply to maintain a presence and have a stake in the game or is there some sort of a leadership role? I mean there was some talk at one time about Europe leading on the ethics of AI for example.

BERNHARD: I think that's certainly a topic that benefits from the cultural diversity that we have in Europe. A lot of different perspectives come together. I wouldn't want to limit it to just that because I think we also need pure core technological development. Although ethical issues such as fairness and maybe to some extent also privacy, they are closely connected to the fundamental research problems. So I think we need fundamental research. I think everywhere in the world, the top places, also, in terms of industry and startups, have a core which is academic excellence. Right now, maybe that's a little bit of a challenge for China because they don't have institutions that attract the international top professors. And as long as they can't do that, they will also have a hard time to attract the top international students. Now China's is a big market and if they can get the top Chinese students that will go a long way. Europe has a very strong academic, traditional with the oldest and many of the most famous academic institutions and that's not going to go away. So we can build on this academic excellence in Europe. We also have something like the Max Planck Society, which is not as old but has an outstanding reputation because it's really one of the very few institutions that believes in free basic research and gives researchers total freedom and what they want to do.

BERNHARD: So I think we have a lot going for us and a lot of strengths that we can build on. We have to bring all these things together. Also, ELLIS has to build on the strength in terms of the kind of industry that we have there. Because in the end as AI is conquering the real world is not all just about software, but it also requires companies building real stuff and I think Europe is very strong in some of those fields.

CRAIG: 19:18 I don't hear so much about the startup ecosystem in Europe as I do in China and the United States. Is that because there isn't this one market pan-European focus on machine learning or is my perception wrong.

BERNHARD: I think your perception is probably fair. There are some places in Europe where this has changed. I think London, Cambridge, it's quite impressive in terms of startup. Switzerland is impressive.

BERNHARD: Israel, Israel is impressive and then other places are coming up like a Paris, and Berlin, etc., but of course compared to America, it's on a relatively small scale and that's certainly one thing that we would like to change that we should change.

CRAIG: [19:56](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=991.821) Is the weakening of the European Union a concern or relevant to this issue?

BERNHARD: It is a general concern. I think it's a bad idea, but I think even more in such a setting, we have to make sure that we continue to work together with our colleagues in the UK, so I think activities such as ELLIS that also involves the UK, involves Switzerland and Israel. I think that's exactly what Europe needs. Europe cannot be just driven by politicians who don't get along with each other, but it has to come from the grassroots scientists working together. I think that's one great way because we all speak common language.

CRAIG: [20:27](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=0.54) Where does ELLIS stand right now? The proposal has been made. Are there talks with national governments? Are there talks with the commission?

BERNHARD: There are talks with national governments. They are not talks with the commission yet, so that's a space where we are not well represented at this point in time. But we have of course the strongest researchers in this field all through Europe. Many of us have good connections to the local governments, so we've been talking in Germany and we have buy in from our local government and there are several other places where this is going to happen. At this point we cannot say anything, but we're confident that first we will have funding for a network of fellows and we're confident that we will also have funding to start some actual labs. We want to make sure that we start not with one but in multiple places.

CRAIG: Well, thank you. I really, really appreciate you ruining your breakfast on my behalf.

CRAIG: [21:20](https://www.temi.com/editor/t/fltHqGPRglxWksV3w8hmL_U3CLCFjZFb2N1Lbn9w0mR_7BGFQ19O2DaLv_yCe4BlVNXp9WB-uJ-fsDf15waoGOQL9dU?loadFrom=DocumentDeeplink&ts=0.54) Well, that's it for this episode. For those of you who want to go into greater depth about the things we talked about today, you can find a transcript of this show in the program notes along with a link to our Eye on AI newsletters. I encourage you to subscribe, let us know whether you find the podcast interesting or useful and whether you have any suggestions about how we can improve.

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