

CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE

ENGINEERS OF JIHAD

MODERATOR:

CHRISTOPHER BOUCEK,
ASSOCIATE, MIDDLE EAST PROGRAM,
CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE

STEFFEN HERTOOG,
KUWAIT PROFESSOR, CHAIRE MOYEN ORIENT-MÉDITERRANÉE,
SCIENCES PO

MARC SAGEMAN,
FOUNDER,
SAGEMAN CONSULTING, LLC

TUESDAY, SEPTEMBER 1, 2009

*Transcript by
Federal News Service
Washington, D.C.*

CHRISTOPHER BOUCEK: Good afternoon. Thank you very much for coming out today for this discussion, which I know is going to be some really fascinating research. I'm Chris Boucek, part of the Middle East program at the Carnegie Endowment, and I'd like to welcome you all today.

Our first speaker today, Steffen Hertog, is the Kuwait Professor at Science Po in Paris, where he heads the Kuwait program, which is a Gulf-focused research center. He was previously a post-doctoral researcher at Princeton University, and currently has two books coming out.

The first is a book on Saudi Arabian state-building called "Princes, Brokers, Bureaucrats: Oil and State in Saudi Arabia," and that's Cornell University Press. The second book is the subject of today's presentation: "Engineers of Jihad," which is co-written with Diego Gambetta, who is a professor at Nuffield College in Oxford. And that's with the Princeton University Press.

Marc Sageman, who, I think, probably needs very little introduction for most of you, most recently was the New York Police Department's first scholar-in-residence. He's an adjunct associate professor at Columbia University, has a Ph.D and M.D., and probably most famously worked with the Afghan resistance, which I think most of you probably know. He is author of two great books – "Understanding Terror Networks," and the most recent one, "Leaderless Jihad."

So Steffen will speak for 20, 25 minutes to kind of go over the research he's been doing, and Marc will speak afterwards for about five, 10 minutes. I know that Marc has to leave for another engagement, so, thank you for staying as long as you can. I really appreciate that.

I just wanted to say right off the bat – I think this is a fascinating topic. And ever since Steffen and I first started talking about this a couple years ago when he was doing this research, I think it's just amazing. And the more that I have listened to him talk about engineers and jihadis, I just think there's some great stuff – especially when you think about how many connections there are and how deep the risk is. So instead of me summarizing the research, I'm going to ask Steffen to come on up to the podium. Please join me in welcoming Steffen Hertog. (Applause.)

STEFFEN HERTOG: All right, Chris, thank you very much. Thanks a lot to the Carnegie Endowment for the kind invitation. So this is run here on a very tight, nonacademic, D.C.-style schedule so I will only say one thing, and that is that I am very honored but slightly apprehensive to be commented on by Marc Sageman, who's the authority on the field of jihadis, and potentially terrorism studies, more generally. But I was briefed to have 25 minutes and 25 minutes exactly, so I'll head into in medias res.

I should say one thing, and that is that I've done this research jointly with Diego Gambetta, so a lot of what I'm saying is at least as much Diego's work as it is my own. We're just finishing the book manuscript, and we hope that the book is going to be on the shelves at some point in the second half of 2010.

First of all, where does this puzzle come from – the story that there are so many engineers among Islamic radicals? It's been a recurring anecdote certainly among Middle East scholars and scholars of political Islam for something like three decades now. And it started in the 1970s when an Egyptian sociologist called Saad Eddin Ibrahim first researched the biographies and the socioeconomic trajectories of a number of early Egyptian Islamist militant groups. And he

speculated a little bit about why there were so many technically and scientifically educated among the prisoners he looked at. He did prisoner interviews in 1970s Egypt, which is quite a feat.

And since then, the story has been around, but it's never been systematically confirmed that this is actually the case. And as far as anyone has speculated about the reasons for this overrepresentation, it's really just been that speculation. There haven't been any systematic tests of the different explanations that have been floating around.

So why is it important at all? Why is it potentially relevant? We already know quite a bit, and quite a bit of research has been done about the positive correlation between the level of education and the degree of extremism of various kinds – different from what is often said in terms of poverty breeds terrorism and so on and so forth.

There are actually quite a few cases of radical groups where the active members are from a higher socioeconomic background than the background population they're recruited from, and where they're more educated than their peers in their countries of origin.

Now, it's difficult to generalize that because more recently there has been a certain popularization, as it were, of jihad. There have been more and more groups in Morocco, in South Asia, in Egypt, of socially very marginal actors moving into Islamist political violence. But the traditional profile of the Islamic militant has been a distinctly middle class, pretty well-educated profile.

So we know quite a bit about the link between the level of education and radicalization, but we know practically nothing about the link between the type of education – so the subjects that are chosen – in one's educational biography and radical behavior.

And that is odd because, perhaps in many ways, the choice of the type of education reveals as much or more as the level of education might reveal. No matter whether you're a Marxist or a Weberian or an occupational psychologist, the choice of occupation should reveal quite a bit about a person's individual biographic trajectory and if there are specific biases in the population of radicals in terms of their education that you find consistently across different contexts.

And this might tell you something about these people. And it is also one of the very few individual data points where we have relatively good consistent information about a large number of actors. I mean, there are many other things like the precise socioeconomic background of the parents or traumatic events in youth or the precise timing of radicalization – all of which are very important and interesting – but we don't have very good systematic public sources of information about that, whereas on education, we have pretty good information.

So this might be a new kind of micro-level lever on a phenomenon that hasn't been exploited yet, especially if we find that there are specific biases. A larger story might be looming there.

So are engineers truly overrepresented? We collected biographies of militant Islamists – the criteria of inclusion being that they're affiliated and active in a group that is actively using political violence – from a number of sources, among them, of course, the distinguished “Understanding

'Terror Networks' by a certain Marc Sageman and then a number of other governmental and nongovernmental sources.

And those figures are actually slightly obsolete. In the book, there will be a much larger sample, but we haven't yet put together all of the tables. So we'll stick with this, which reflects roughly the same phenomena -- the same kinds of distributions -- as the larger sample that is eventually going to be in the book.

So we don't have to walk through all of those details. Just to give you a sense of the relative diversity of the sample, it includes internationally-oriented jihadis; groups starting from the 1970s until today; domestic insurgents; people with different types of Islamist militant ideologies. It includes the Arab world; it includes South and Southeast Asia. So it's fairly widely spread, and the groups are fairly diverse in terms of their ideology and strategic aims.

And this is what we've found about the levels of education of those 404 individuals in that original sample: In 78 we had no biographical information; in 42 cases we had some biographical data but no educational information; and for 284 cases, we had educational information. And among those 284, a full 196 had some kind of university exposure. So they either attended college at some point, or they got a college or a university degree. So this is a very, very highly educated sample. And for 178 of the 196 militant activists, we know the subject of study in university.

So this level of education, although the sample might be biased, indicates that the people in the sample are far more educated than the background populations they come from. A lot of them come from the Arab world; the median date of birth is in the mid-1960s, so they would have gone to university in the mid-1980s.

At that point, if you weigh the tertiary and dormant levels in the different countries in the sample by the number of individuals from different countries to calculate what the average level of education should be in the sample, you would expect only something like 12 percent of the people in the sample to have attended university, because only 12 percent of the people in those countries at that time, on average, did attend university.

But in fact, we have almost half of the total sample, and almost two-thirds of the people on whom we have educational information, who have been to university. So, that, on the face of it, seems to indicate that Islamists -- or those who ended up in our sample -- are very highly educated -- at least four times as much as we would expect if they were drawn randomly from the background population.

So what about the distribution of degrees? I think it's interesting here: By far, the dominant group is people who have engaged in engineering studies -- 78 out of 178 cases whose subject we know. And the runners-up are less surprisingly Islamic studies, and after that, medicine, business, economics, and sciences. And then a number of smaller subjects that are not listed and detailed here.

So the engineers are more than twice as large as the second-largest group. And interestingly, there are only seven scientists in the sample. And the anecdote that was around was always that people with science and technical education are overrepresented among Islamists, and that doesn't seem to be true. It's, in fact, only people with technical education; with applied science education.

Another interesting fact is that when you look at peaceful Islamic groups – and I'll go into that with a bit more detail in a minute – engineers are much less dominant, and scientists have a far stronger representation. For example, in the Islamic Action Front in Jordan; the Islamic MPs in Kuwait; the Hizb ut-Tahrir, a peaceful pan-Islamist group in Syria, and anecdotally, also, among the Muslim Brotherhood in Egypt. So there's an interesting presence of scientists among nonmilitant groups and a much stronger presence of engineers among the militant groups.

And now you could say, perhaps that is caused by one big component of your sample; perhaps in one of the big groups or in one of the big nationalities represented in your sample, there are so many engineers that it pulls the average up that much.

But if you slice the sample, first by the different groups and the different plots that were included, you see that the engineers are overrepresented pretty consistently at a comparable rate in all of the groups. And many of those groups had nothing to do with each other. So the engineers' overrepresentation is not driven just by one event, one plot, one group. It is really something that cuts across many different groups in many different contexts.

The same is true if you cut the sample by nationality. You also have a comparable share of engineers for all the different nations that are represented in the sample. We don't have to go through all those individual figures.

And we could, of course, say – and that's what we've often heard as a knee-jerk reply – well, in those developing countries, everyone's studying engineering. Those are technocratic, developmental regimes; this is just the thing to study when you get to university.

But the case is, in fact, not true. Again, if you look at the distribution of degrees in the various university systems in the countries in our sample, and you weigh them by the size of different nationalities in the sample, then you would expect something like 17 percent of the male members of the sample – the sample isn't exclusively male – to be engineers, whereas in fact, almost half of them are engineers. So they are something like three times overrepresented relative to the null hypothesis of being just as frequent as people with other degrees.

So in fact, there are not that many engineers around in those countries. There are many, many more engineers in the sample than we would expect if people with degrees in general all had the same probability of ending up in those groups.

There's one interesting exception, which I'll get back in a minute, and that is Saudi Arabia. That is the one country where we have quite a few individuals in our sample; there's another larger sample of Saudi jihadists by Thomas Hegghammer. A great deal of them have higher education but hardly any one of them is an engineer. And I'll get back to the significance of that in a bit.

We also collected data on Western-born or based extremists, or people who didn't emerge out of the Islamic world but who engage in Islamist extremism and grew up in the West. Those people turned out to be much less educated. Only 33 cases out of a sample of 259 could be confirmed as having been to university. And for only 22 of them, we knew the exact subject. So they're much more the kind of relatively socially marginal lumpen class that you would expect Islamists to be recruited from in the West.

And among those few people who have a degree, and the 22 where we know which degree they have, a full 13 are actually engineers. So almost two-thirds of Western-based radical militant Islamists turned out to be engineers.

So in a completely different context with very different levels of education, very different socioeconomic background, you again have the same overrepresentation applying, although the numbers are, of course, smaller.

I'll just, at the end of this empirical section, tell you about another, very generic, survey that we have done. We have looked at non-Islamic militant groups throughout the 20th century, throughout the whole world, to see what the distribution of different degrees is. I haven't included all the numbers here, but the take-home line is that in leftist groups almost all over the world, you have practically no engineers. The Red Brigades in Italy, the Japanese Red Army, the Red Army faction in Germany, the urban guerrillas in Latin America – no engineers.

Rightwing groups – Nazis; fascists; neo-Nazis; millenarian, right-wing Christian supremacists in the United States – a good representation of engineers. Not as strongly as among the Islamists, but still a very distinct presence.

One exception to the absence of engineers among leftists: There has been a good smattering of radical engineers on the left in two Middle-Eastern countries. And that is in Iran and in Turkey. And I'll go back to the significance of that. But otherwise, there's a very clear pattern of engineers on the right; no engineers on the left – cutting across very different historical and country contexts.

So why could that be? What could that tell us? There are essentially four different groups of hypotheses that could explain the overrepresentation of engineers among Islamists.

The first could be that movements were just started among engineers, and because those movements are clandestine and are built up through small networks, the next people who get recruited into those cells are also more likely to be engineers. It would just be a contingent network effect. If you are on an engineering faculty and you're recruiting people for a radical group, then there are more engineers likely to end up in your group than other people. So it could just be this kind of path-dependent network effect. It started with engineers and it spread among engineers.

It could secondly be selective recruitment. It would be that they're recruited for the technical skills and, most bluntly, that they're supposed to be good at making bombs; they're good at organizing communications technology that is needed for organizing clandestine militant cells.

Thirdly, there could be some kind of bias on the cognitive or psychological level. Some cognitive traits could be more frequent among engineers than among other people on average – when we're talking about averages, here – that might draw them, attract them, to certain types of ideologies or certain types of activism.

And fourthly, there could be something specific about the social position of engineers in Islamic countries that would make them more likely to radicalize than other types of graduates. And there, the hunch would be that they might have suffered from particularly harsh socioeconomic deprivation, particularly harsh forms of mobility closure or social frustration.

So I'll quickly dismiss the first two. The network explanation – I think you'll probably hear more about that from Marc Sageman, and I'll be very curious about what his take on the matter is. Networks do obviously play a role in the way those groups are set up and the way people are recruited into smaller cells, but they cannot explain the scale and the shape of the phenomenon as we have found it in our data. And that is because we have a lot of different clusters of groups that were set up independently of each other.

There are at least five clusters that were set up completely independently of each other and in all of them, engineers are overrepresented. Some of them were started by engineers, other were not started by engineers. And those not started by engineers, by the logic of the network argument, should not have an overrepresentation of engineers once they've taken their full shape. Engineers also very strongly represent among very broad-based groups that are not necessarily recruited through personal network mechanisms anymore. Hamas has a very strong representation of engineers and it's a large – it's a vast political movement, it's not a clandestine small cell anymore that relies on a few select personal links.

So all the networks certainly have an inference on the composition of those groups – the overall shape of the data as we've found it cannot be easily explained through network effects, through network past dependencies. So our engineers could be making bombs. It's the kind of intuitive explanation you get from everyone when you first tell them about the research puzzle. Well, there's really no good evidence for that. There's no direct evidence – or not much direct evidence to say that technical skills are the primary recruitment criterion for most groups.

They look for other things in their recruitment manuals for certain personal characteristics -- perseverance. Sometimes they look for higher levels of education, but this will not affect whether you're a lawyer or an engineer or a scientist. Bomb-making and the technical stuff that is done in most groups is performed by very few people, so you don't need, if you have a large group, 40 or 50 percent engineers. You just need a few guys to put together the bombs. So the scale of the overrepresentation, especially in the larger groups is not easily explained.

The technology used usually is pretty simple and the real challenge is to get your hands on guns or explosives. That's usually harder than actually using or operating them. And in fact, it's not clear that engineering studies really confer the kind of technical knowledge you need. You're much better off, probably, with an ex-army officer or with an electrician than with, you know, a civil engineer or a chemical – perhaps chemical engineer would make some sense.

And then also, if that recruitment argument obtains for the Islamists, why would it not obtain for other groups? Why would the Red Army and the Red Brigades and everyone else – why would they not have recruited people with technical education? So – and finally, in the groups like Hamas, engineers are prominent rather in management positions than in technical positions. So technical skills really don't seem to cut it and that's when I get in the most relevant and also the most speculative part of our attempt to explain the engineering overrepresentation.

And that is that some – some kind of individual level, psychological or cognitive factor or a bunch of factors on that level could explain why engineers end up more frequently than other graduates in those kinds of militant groups. But we can't pin down what exactly it is. We don't have

the data to do that. We would need to probably have to – would have to do prisoner interviews, psychometric tests with individuals.

With the kind large-end data set we have, we can only speculate, but that's what I'm going to do in the next minutes and it gives us, perhaps, some leverage on future research when we can go into more depth on individuals and sort out different types of psychological or cognitive traits. So what could it be about engineers that makes them attractive or that makes them, on average, a better match for Islamist radical ideology?

It could be searching for unambiguous truth, and that is something that is actually, in passing, mentioned in Marc Sageman's book when he describes the high share of people with technical education in his sample.

There's some evidence from psychology, both from the – for example, the study of autism where it's been show that autism is just partly heritable, is something that's much more frequent among families of engineers and autism is a trait that is – and I'm speculating here – just want to preface this carefully, autism is linked to a strong intolerance of ambiguity, a strong need for cognitive closure, for predictability, for clear roots, for a very, very structured life.

It might be something like elective affinity to certain types of lifestyle in certain groups – certain Salafi groups where your life is highly, highly ritualized. And that is an interestingly testable prediction because then you would have to find engineers also among peaceful Salafi groups, which is something I want to try to find out in the future.

Engineering is an applied rather than a foundational science, so perhaps it attracts people looking for clear answers rather than people looking for the quest for more foundational knowledge that are willing to engage more with epistemic openers and the uncertainty of science. They might be less adept at dealing with the confusing complexity of the social and political world where clear answers are very, very difficult to find. And that might explain and affinity to the kind of corporatist, hierarchically ordered, morally unambiguous vision of society that is propounded by radical Islam.

There are many other variants of these kinds of hypothesis that I could engage with but – that shall suffice for now. There are some indirect evidences that some kind of mindsets – psychological level mechanism or set of mechanisms might be at work. But first, only engineers are overrepresented in the sample but not scientists, so that gels with some of the things I engaged with in the previous slide. Secondly, engineers are present among right-wing groups worldwide but hardly among left-wing groups.

And really, the further spread the phenomenon is, the more different contexts you find it in, the less likely it is that a context factor – that a context variable can explain it, the more likely it is that the explanation is really linked to the individuals themselves. You have certainly an affinity of Islamic social conservatism with the kind of right-wing ideologies associated with – with the groups in our non-Islamic sample and when individuals – when engineers have a choice between different movements in the Islamic world between leftist movements on the one hand and Islamist movements on the other.

So when you can hold context factors constant, as it were, to some extent, then they seem to choose the right-wing, slash, Islamist option. So in Palestine, you have many more engineers in Hamas than you have in Fatah, although those people grew up in the same society and at least for some period in history, would have had a choice of choosing either the one or the other. But they systematically seem to go for the Islamist option.

So here's a nice quotation that bears, I think, reading out at length. I mean, this is completely anecdotal but it's beautiful. This is the Iranian president Ahmedinejad talking to academics in a speech about the possibility whether the U.S. would attack Iranian nuclear facilities. That was 2 years and he is trained as an engineer and he's very proud of that. And here's what he said:

“In some discussions, I told him, ‘I am an engineer and I am examining the issue.’ They do not dare wage war against us and I base this on a double-proof. I tell them, ‘I am an engineer and I am a master in calculation tabulation. I draw tables for hours. I write out different hypotheses. I reject, I reason. I reason with planning and I make a conclusion.’ They cannot make problems for Iran.”

So talk about dislike of ambiguity. The idea that with certain simplified explanatory models and ideological models you can gain control of the world and you can control social world, this is certainly a nice example for that. And then he goes on about saying that essentially, God told him that Iran would be okay so that's the second part of the double-proof. So I briefly wrap up here and I think I stick to the mindset side of things because it is the most interesting.

If there is really some kind of general bias among engineers, we should be able to observe that kind of psychologically cognitive bias independently of radical behavior. They should have more radical attitudes in general and some – in some fashion and they should join radical political groups more frequently in general.

Well, the second seems to be the case – as far as right-wing groups are concerned but not as far as left-wing groups are concerned. And the first, we've tried to test through looking at poll data on political attitudes of engineers. The best data we've found is from the U.S. Unfortunately, it is not from the Islamic world, but it turned out that engineers are something like more than twice as likely to be both conservative and religious than people in any other field of study.

So the next most conservative and religious are scientists and then the runners up are social scientists, arts, humanities and law. So there seems to be, at least in the U.S.-engineering population, a very distinct bias to be right-wing, conservative, and to be religious. We've found the same, although more weakly, in a not-as-well defined sample of non-U.S. engineers in the West who are currently working on Islamic-world data to see whether the same bias applies there.

So there might be – although, of course, when you know that someone is an engineer, it essentially tells you nothing, because political and religious attitudes are distributed very, very, very widely. But if you think about averages and you – if you think about the statistical distribution and you just shift the average a little bit into one direction, a little bit to the right, then perhaps the tail end of the radical few in that group could become, in fact, a lot larger.

So even if the average engineer is totally fine and we can't make any prediction on the basis of that about the average engineer, there might be a still minute but marginally bigger group of people with radical attitudes among them who are more easily recruited into those kinds of groups.

And just to anticipate some of the questions I'm going to get, there is still another bit of the explanation, and that is that engineers in the Islamic world are members of a status elite. It's a very high-profile degree. So since most of the countries in the Islamic world have experienced severe developmental failure since the 1970s, the kind of relative socioeconomic deprivation that they've gone through has been particularly pronounced.

And that is really the other half of the explanation. That will explain that even against their putative right-wing inclinations, they would appear among some leftist groups in Iran and in Turkey in the 1970s. And it would explain that they do not appear in Saudi Arabia, for Saudi Arabia is one of very few Islamic countries where, as an engineer, you actually have very, very good labor-market chances and would not experience the kind of frustrations that other degree holders or engineers in poorer countries like Egypt or Jordan would experience.

Thank you very much. (Applause.)

MR. BOUCEK: Thank you very much. It's fascinating stuff, Steffen.

I think we're going to go straight into Marc to – for some comments, and then we'll have some – a question-and-answer discussion.

MARC SAGEMAN: Thank you. Thank you for inviting me. And Steffen, I don't really disagree very much with your data. The only question that I would put is that you actually have to contextualize your claims. And so you have to really kind of draw clear boundaries around the claims that you are making. Within those boundaries, I think you're probably right, but you have to expand it a little bit.

So you know, in a sense, in some part of your talk you polled the data, and by polling the data you kind of – you lose the context of the data. But then, you know, you regain it by, you know, trying to decide what data to – again, and there, I think, the type of reasoning that you display is – you know, must be applauded, because that's a way to do research.

A second aspect is that I think your data is actually fairly old, and I'll – and biased. And by the bias, I mean it's very much biased towards things that are relevant to the West. And so the Egyptian Islamist is somewhat were relevant to the West. Al-Qaida strikes against the West.

But, you know, a big gap in your data is the Algerians that really absolutely dwarf any other type – in Algeria; not Algerian expatriates, but Algerian Algerian. And there you will see that engineers are not overrepresented. And, you know, the Algerians are probably the largest movement, killed over a hundred thousand people over 10 years. So it – by – it was by far the largest of all the jihadi movements. Now you see the Moroccans, which are also very similar.

So in that sense, the data, the bias of the data, has to be accounted for. Now, if you kind of look at the newer type of data, people who have been arrested after 2003, like Edwin Becker's (sp)

data, you'll see that your claim is not true; engineers are not overrepresented. Even though within those educated, they may be a little bit, but still, overall they're not.

Okay.

STEFFEN HERTOOG: But that's the only claim I'm making, is that they're overrepresented among people with degrees. That's the only thing. That's what the paper's predicated on.

MR. SAGEMAN: Right. But that's because Becker also slipped in some of my data in his, and I think it's probably due to all the expatriates who are actually studying in Europe, as opposed to the European gang members.

So in terms of the context, there have been, you know, many terrorist movements, and some of whom engineers are overrepresented, some of whom are not. And you hinted at it, even though I don't think that you've expanded very much on it.

Modern terrorism really started with the Russian anarchists. And this movement started at the faculty of engineering and medicine in Zurich in 1872. They're not Islamists. And so, is there something – and it's kind of left-wing anarchists, in a sense. And they became very famous.

And if you actually keep on going with the anarchists, you realize that they kind of lost that and, you know, again there's a degradation of the type of education, such as the anarchists in France between 1892 and 1894; nobody with a university degree nor engineers. And the same with the group that caused the Red Scare here in 1919 in the United States; namely, the Luigi Galleani group, all anarchists, nobody with an education, and therefore, underrepresented as well there.

Then you can look at all the anti-colonialist movements, you know, the independence movements and so on. And here engineers are not really overrepresented. Actually, there you have lawyers. And I'll come back to lawyers later on.

Then the leftists, you're right. I think that sociologists and psychologists, like psychiatrists, are overrepresented in leftist movement, but not engineers. And then in terms of the Islamists, yes, the Egyptian are overrepresented. I just told you the Moroccan and Algerian, no. But they are overrepresented in terms of Middle Eastern expatriates in the West, as you proudly pointed out. But no longer.

Now, so here we kind of come to some kind of real question. How come lawyers are underrepresented? And they are underrepresented. Now, you know, most lawyers would tell me, say, well, that's kind of obvious, because we can't charge for our time while being a terrorist. And, you know, I take that, yes.

But the answer is that people actually argue that lawyers are all talk and no action. And this is something that you have not taken into account, and I think you should; namely, that engineers are action-oriented. They build things. They do things. They just don't talk, like the scientists. And here you kind of would distinguish scientists from engineers. Engineers build things. They do things. They're action-oriented. Scientists probably are not. And if you're a terrorist, you're kind of action-oriented. So that's kind of an element that you might have forgotten.

All right, so let's kind of go back. Now, why would engineers be overrepresented in some sample but not in others? I would argue that any kind of wave of terrorism starts, as with almost any good and bad ideas, at universities. And in that sense, I think at the beginning of a terrorist wave, engineers would be overrepresented for the reason that you mentioned. And I think that's probably mostly true for religious right-wing groups, for the various reasons that you mentioned, and I kind of agree with those. But then, as the appeal of the idea behind terrorism fades, then engineers are no longer overrepresented and they are – the percentage of engineers really declines over time, which is why Edwin Becker's data shows no real engineers –

MR. HERTOOG: Among those with high education – (inaudible, off mike) – engineers are dominant, almost – (inaudible).

MR. SAGEMAN: No, I understand, but those were expatriate engineers, if you actually look at the names. And he also – the data is actually – you have to go name by name in this data, and you kind of realize that it's a little bit – it's a strange database. But, you know, overall, the aggregate kind of shows that those guys arrested after 2003 are very different from the guys arrested prior to 2003.

So those are kind of some of the things that I have to say.

But also, the other, just as an aside, is that in May when I was in Saudi Arabia and I was – I visited various – like, you know, like the King Saud University, KSU, over there, you realize that all the buildings and the social science and humanities are two little shacks on the side, whereas, you know, the engineering buildings, they have, you know, electrical engineering; you have mechanical engineering, you know, and they have, you know, this huge mansion. And you can see the disparity in the Middle East, mostly because of the status and the need. So that's basically all I have to say.

Now, about the autism, very interesting, because I cannot agree with you on that one, that perhaps more engineers are autistic. I think that probably will be the case. But the other thing is that autistic kids are also on the Internet far more disproportionately. And this may actually bode poorly for the future. We already have seen some autistic kids turning to violence without having any kind of face-to-face interaction with other terrorists, like Nick Reilly in Britain. And this, I think, may be a potential danger in the future.

But otherwise, I like the work. I think it's good. I just think that you have to bracket it a little bit more strongly, that's all.

MR. BOUCEK: Marc, thank you very much. I really appreciate you – your comments.

Now, I think when Steffen started out and said, you know, this kind of question of why engineers are so common among jihadi groups, I mean, this is a question I think so many people have been thinking about, and it's kind of been this puzzle. And I think one of the great things about what the work that Diego and Steffen are doing is that it's trying to answer some of these things.

And I think some of the points that came out – and I really appreciate this is a much kind of truncated version of a larger research puzzle. I mean, I think it's – I think there's great stuff — to

kind of dismiss and discount some of the reasons that we have been thinking might be possible, especially the recruitment for technical reasons or things like that.

But I think, you know, some of the things that really kind of struck me and came out was, you know, the overrepresentation in the West and throughout all of these different regions, if it's Middle East or South Asia or Southeast Asia – you know, the prevalence within other radical groups. I think I would love to hear more about the affinity towards a certain lifestyle. And I think this whole question of autism kind of fascinates me, and how that works. And that's so much beyond my – what I should be talking about intelligently. But I just – I – (chuckles) – I think it's so fascinating. I think this is a great area for more research.

I also think this idea of conservatism and the – not only of religiosity but also conservatism – but also when you look at, you know, the other groups – and I think one of your slides went through this about right-wing groups as opposed to left-wing groups – but I think this is, you know – I think there's so much data and so much kind of mining that can be done with all this.

Marc, I think you picked up on some great points, you know, about the contextualization, you know, and the issue of being relevant to the West. The Algerians is interesting. I had never thought about that. When I think about other groups, you know, so many incidents kind of come to mind, these kind of anecdotal incidents, if it's Mohamed Atta or Nurideen Topp (ph) or, you know, the Afghan – you know, it's probably the engineering faculty at Kabul University – (chuckles) – I would think that, you know, in the '70s a lot of this stuff came out of originally.

And I think this point that you were making towards the end about being all talk and no action or all action and no talk, I think kind of – something that, you know, I think – and Steffen kind of touched on this, this mindset about problems having solutions. This is what engineers do. Engineers, you know, fix problems. And if they don't fix problems, then they're not problems, right?

So thank you very much for a fascinating presentation.

Marc, I really appreciate it. I know you're going to have to run. But thank you for sticking around as long as you can.

I'd like to open it up to questions. And I would just ask that you please, you know, state your name and affiliation. There will probably be a microphone that will come around. And also just to remind everybody, turn off your phones while we do this.

Thank you.

Q: I'm Pam Hess with AP. And I've talked to all of you at various points, I think.

Have you looked at the population at Gitmo to test your theory? And I know that most of the hijackers on 9/11 were Saudis. But I wonder if you've looked at the networks that supported them and see if this follows your theory.

MR. HERTOOG: Yeah, we did look at the Combatant Status Review Tribunal material that was available. And actually, we didn't find much good data there. And we – in the end – at the end

of the day, we decided not to go into the Gitmo data because of various reliability issues. What is interesting in Gitmo is that levels of education are lower than our sample. And there were so few cases with higher education, though, that little conclusions could have been drawn in either case.

And 9/11 really encapsulates the story of the paper in – in a kind of synecdochic way, in that you have 25 people who were directly involved, out of whom I think 15 were Saudis. Eight of the 25 were engineers, but only one engineer was a Saudi. So it really shows that a lot of the guys who were involved from the Middle East were engineers, but as soon as you added Saudis to the picture, you didn't add any additional engineers.

I was – I just wanted to add one very brief footnote to one of Marc's very useful remarks. And that is the under-representation of lawyers I think has a lot to do, at least in some Arab countries, with the status hierarchy of degrees, because in Egypt about the worst thing you can study is law, and engineering is about the best thing you can study. So that there's a real surfeit of lawyers, hundreds of thousands of them, but they're not on top of the pecking order.

MR. BOUCEK: I think that's a great question because I think, you know, at Guantanamo I don't think they've done any research on autism – or so many other things; but which is a – you know, is a whole other story.

Sir? Yes, there's a microphone.

Q: Ted Kattouf, I'm president of an organization called AMIDEAST, that's helped students from the Arab world for over 50 years come to the United States for higher education. Done English-language training and the like; but earlier, I had a career as a diplomat in the Arab and Middle East – Arab world and Middle East.

I agree – you know, based on just my own experiences, I'm well aware of this sort of phenomenon. But – and often people say, well, that's – those are great things that AMIDEAST is doing because education, and higher education, is the key to combating the radicalism that's around. And my answer is, the right answer is liberal education; that in the Middle East particularly, you have very authoritarian structures and institutions, from the family to religion to education to the governments. And people are not given the opportunity – are not encouraged to do a lot of critical thinking at a young age. They're not – it's not woven into the texture of the institutions.

So I'd like you to comment on this idea, that maybe one of the reasons the engineers are more represented, besides the reasons you mentioned, that they're looking for formulae that can be applied and – you know, and are true, that they want absolute answers to – also, the idea that they've had very little exposure to critical thinking and liberal thought.

MR. HERTOOG: Well, actually, that's a very interesting question because it touches on the underlying question of whether people's minds get bent, as it were, by studying engineering, or whether they start studying engineering because they already have a slightly bent mind. So is it a selection effect, or is it a socialization effect?

And the data we have seems to show that in fact it's a selection effect. So people go into certain types of degrees already with a certain *forma mentis*. And we base that on whole data on

freshmen in engineering programs, who are every bit as right-wing and religious as the faculty and the students in the higher years.

So against that background, perhaps the kind of social engineering idea, as it were, of making people – making people more critical thinkers through a different type of education, it might – it might work; but it might also be that people just – that it's not the engineering education itself that causes anything, or the shape of engineering education, but that certain people who are around anyway just get selected into those programs and show up in those kinds of programs.

I think perhaps they can be fixed, quote-unquote, through a different type of education, but on the face of it, I wouldn't – I'd be skeptical about it.

Q: Clay Ramsay, Program on International Policy Attitudes. I have a general question and an applied question.

The general question is, have you thought about the possibilities of using this, to consider how the importance of engineering and engineering frames of mind might shape the way an emirate is structured, if such a group does get a hold of one? And the applied question – an emirate. That is, if they could get a polity that they can develop according to the rules that they envision.

And then the applied question is the concrete case of Afghanistan under the Taliban, which I think is – was a situation with much lower possibilities of higher education. But I wonder if there could be any reference, between what you're finding and at least how the Taliban planned to run Afghanistan, had they had more time.

MR. HERTOOG: That touches on the interesting question I guess of what Islamists imagine the Islamic society and the Islamic state to look like. And I think it is more interesting to look at the theoretical writings and the imagination that draws people towards that ideology, rather than the practical attempts to create those kinds of systems.

Because the Islamic political thinking is very, very underdeveloped. There's very little about concrete political institutions about, you know, concrete questions of whatever, political representation or how to build up a state apparatus and so on and so forth.

And so as soon as Islamists came to power, in the few cases where they did, they really started improvising wildly. So they didn't have in that sense a good blueprint for what they're doing. And I think what came out in the end had less to do with the ideological vision of society they had than just with the exigencies of, you know, regime survival and staying on top of things.

In the case of the Taliban, I mean, those guys were just so uneducated that we can't really test for whether, as it were, they would have been engineers if they had had the chance. But there is – there is evidence that the warlords of the 1980s and many of the mujahedeen, who still had a background in higher education, many of those guys were engineers, as Chris has mentioned.

The engineering faculty in Kabul was a recruitment ground for the Islamists. Hekmatyar, I think, is an engineer. I think Rabbani might also be an engineer; Mehsud. So there it would show up again.

But then to look at the actual politics, the day-to-day strategy that those groups pursue, that's probably something that's more easily understood through a political context and the imperative of survival, rather than any grand scheme. Because they've never really had the chance to implement any grand schemes.

Q: (Inaudible.) Carnegie Endowment.

The – you gave us a set of very compelling figure about your representation of engineers. But what if you start running percentages in a different direction. That is, how many of the engineers in a country actually become radicals?

And I think then you'll find probably a very small percentage. I don't know what it is. But, and that essentially goes against an explanation in terms of mindset, because it does not mean that there is – you know, it means that mindset may exist but it really only affects a very small percentage of the universe, if I can put it that way.

So I just wanted sort of to point that out.

MR. HERTOOG: No, I think that's a very valid point, and I'm not saying – or we're not trying to say, and I hope it didn't come out that way – that, you know, the average engineer has a high probability of ending up in those groups.

But the point was that if you have a certain bias, even if it's just a slight bias, towards a specific ideological direction, say the right, then in the total population you will also proportionally have more people at the very, very radical tail end. And that can be a very, very small group. And that – but the size of that group would still be affected by where the mean lies – you know, where the average lies, because you would just shift the whole distribution a bit in a slightly more radical direction.

Of course, many, many other factors have to intervene before someone joins a radical group. He must have access to the right networks, to the right media, perhaps personal frustration, and opportunities. The cost structure in terms of what you give up, your job, your family and so on and so forth, all these things play into the decision. So your mindset is just one component.

The idea would just be that all those other factors affect all other graduates to the same extent. And so the great overrepresentation of engineers must then be explained by something specific, individual-level. And there we can't come up with anything better to really cut across the whole sample there than something that's in some way psychologically based.

Q: My name is David Sprague, and I am retired from USAID, and I worked almost 17 years on education in many of these countries, Islamic countries. And maybe this goes to the contextualizing. It – there's almost an implicit assumption that the students are choosing to go into engineering, whereas the secondary school leaving exam determines not only whether they get into a university but what they study in the university.

But what is important is what you said: that engineering is the highest, most prestigious, most lucrative field for them to go into. And so I guess one hypothesis could be that the reason there are more engineers is because they're the smartest that are in the country.

MR. : (Off mike.)

Q: No. Well, maybe – I think in – of Egypt and Jordan, some of these countries that are – that are much – it's much further down the line.

MR. HERTOOG: I think this is – very, very important point, and one that would shift the explanation more towards the, you know, socioeconomic context, frustrated mobility, the kind of point I alluded to towards the end.

But even then, I think there is a certain choice, a strongly restricted choice, but still a certain choice among a number of elite subjects. And I would include medicine, I'd include pharmacology, probably; in some cases, some of the sciences. In more recent years in some countries, business studies would also qualify as an elite degree.

And so yes, if you got a 95 percent on your A-levels in Egypt, you probably will not join the law faculty. But – I hope there are not too many Egyptian lawyers in the audience today. But you might still follow your personal predilections to some extent in choosing between medicine, pharmacology and engineering. So there is still some element of personal choice.

And even if your choice was, say, completely determined by the ambitions of your parents and by your school results, then there are still many results that beg explanation and that can be only accounted for with some kind of individual-level factor. That's, namely, the results on right-wing and left-wing groups worldwide, on Western-based Islamists and on some other groups which we've also included, like separatists, anarchists and so on and so forth.

And we do, in fact – just to get back to what Marc Sageman said, we do have data on anarchists. We've got about 70 of them with known subjects of study, and five of them are engineers. So there are some, but they're under-represented, relative to what you'd expect in the total graduate population.

Q: Dieter Dettke, Georgetown University. One of your charts said that you couldn't find any evidence between bomb-making skills and recruitment. Now that sounds almost counter-factual to me, because look at the 1993 bombing of the World Trade Center. It failed. And jihadists learned, of course, a lesson, which was that you have to figure out how to blow up a building, right, and they didn't – this crew was unable to figure out that the amount of dynamite you need in order to blow the building from down below, from the basement – there were transportation issues; you couldn't get that much dynamite into the building without breaking barriers and all that.

So they learned their lesson, and there was a clear demand for engineers to be able to elevate the level of destruction, for instance, to use private – no, commercial planes as cruise missiles.

So for me, there is a clear demand for engineers in order to be able to, you know, develop a higher – much higher level of destruction. So wouldn't you have to reconsider your point?

MR. HERTOOG: But – it's an interesting observation, but in fact in the 1999 group you already had at least five or six engineers. So they were there for the World Trade Center – one – for the first bombing of the World Trade Center. And apparently they blundered, just like the engineers

who were trying to blow themselves up in London and at the airport of Edinburgh. Those were all engineers, and they all did not manage to set off their explosive charges.

So I'm sure that some relatively small subset of those groups is recruited for skills with explosives. But I'm not sure that those guys are necessarily engineers. You would usually go for people with military experience. Those have the best hands-on skills in terms of blowing things up.

There are very few engineers who are trained really in bomb-making. We've got a lot of civil engineers in our sample. I mean, short of, you know, blowing holes into mountains to build tunnels, I'm not sure which exposure you have as a civil engineer to explosive technology.

Q: Hi. My name is Fatima. I'm from the embassy of Yemen. I'm having a hard time trying to just, you know, digest your analysis, being a Muslim woman engineer from Yemen. (Chuckles.) So –

MR. HERTOG: I think women are safe. There are no women in our samples.

Q: (Chuckles.) But one thing that I liked is towards the end you made the link about employment and, you know, recruitment. And it's true; it's – you could definitely see that most of these people graduating don't have a future. I know when I graduated – (chuckles) – you know, I joined the Foreign Service because you can't do anything as an engineer. So it's – I mean, this is one thing to look at.

But the other thing is also the quality of education. I mean, does an engineer really mean anything? Like, for example, if you have a degree from a place like – with all due respect, for example, to universities in Cairo and whatever, but the quality of education isn't that much. And also, being there for a whole year in an engineering faculty in Cairo, knowing that professors are often not available in the lecture rooms, so that was another thing I was thinking about.

The other thing is also the hierarchy of these engineers within the organization. I mean, are they more evident? For example, do you see them in the top positions? Or are they your usual suicide bombers, et cetera?

Thank you.

MR. HERTOG: Thanks a lot.

The last question in particular leads me on to present you a very interesting fact. And that is on the top level of Hamas, most of the guys are engineers. The guys who try to get to Israel, to blow themselves up, mostly have degrees in Islamic studies.

So there's a clear division of labor between the elite engineers, as it were, and the kind of cannon fodder with lower-prestige degrees, at least according to the data that we have.

I would agree that the overproduction of engineers – I mean, there's a book called – there's a book by Clement Henry about engineering in – the history of engineering in Egypt. And I can't remember the title. But the subtitle is "Egyptian Engineers in Search of Industry."

And according to some counts there, there are more engineers than plumbers in Egypt. And if there's any policy conclusion to draw from that, then it's that certain degrees – certain types of degrees should not be overproduced in a national economy that can't digest them and that might be in need much more of qualified manual labor.

I don't – I'm not too qualified to comment on the quality of training in those countries. What I have heard repeatedly though and not only with regards to engineering is that a lot of the teaching is very strongly based on rote learning.

And then some people, especially non-engineers, in the Middle East tell me, yeah, it's just because those people learn things by heart. And it's a very mechanical way of thinking. And that then leads them – that has the natural affinity to a radical ideology with easy answers.

But again that probably applies to most faculties. I guess that even in literature, English, probably there's a lot of rote learning involved in Arab universities.

Q: (Inaudible.) From the Egyptian Embassy here.

I was wondering about the data you have collected concerning the relationship of social status – between social status and the different degrees. Where I come from, I took my first degree from the American University in Cairo in management. And then I pursued a second degree in law actually. And where I come from, and I wanted to know also whether or not your culture sensitivity and time sensitivity was taken into consideration in this research?

MR. HERTOOG: That's a good question. We can't contextualize for all of our countries an example for all times with absolute precision.

But it is a recurring feature of the literature on the educational system, in all these places, that engineering is the – or one of the most – highest-status degrees and that medicine is also up there.

And then the rank order of the rest of the subjects tends to vary from country to country and from time to time. But the degrees that are on the very top, they don't change. They seem to have been stable over the decades.

I mean, I mentioned, for example, business and economics have become more prestigious degrees - 19 - in a place like Egypt over time. And in the case of Egypt, there is in fact – there is in fact poll data from the early-'90s about the perceived status of different degrees. And at that time law was perceived to be a relatively low-status degree.

But of course – but of course it depends on whether you join a state university or a private university, study overseas, and things shift again. But we've tried to account for that by controlling for who studied abroad and what the shares of different subjects of foreigners studying in that country abroad were, and so on and so forth.

MR. BOUCEK: If there are no more questions, I would just ask you to please join me in thanking Steffen for sharing his research and for coming out today. (Applause.) And I'd like to thank Marc in his absence. I'm sorry he couldn't stick around, but I'm glad he was able to come out for a little bit.

Thank you very much.

MR. HERTOG: Thank you.

(END)