

Center for American Progress



SPECIAL PRESENTATION

“MIND WARS: BRAIN RESEARCH AND NATIONAL DEFENSE”

MODERATOR:

**P.J. CROWLEY, SENIOR FELLOW AND DIRECTOR OF
NATIONAL DEFENSE AND HOMELAND SECURITY,
CENTER FOR AMERICAN PROGRESS**

PANELISTS:

**JONATHAN MORENO,
AUTHOR, *MIND WARS: BRAIN RESEARCH AND
NATIONAL DEFENSE*; SENIOR FELLOW,
CENTER FOR AMERICAN PROGRESS**

**PROFESSOR JENNIFER BARD, PROFESSOR OF LAW AND
DIRECTOR OF THE HEALTH LAW PROGRAM,
TEXAS TECH UNIVERSITY**

**PAUL ROOT WOLPE, PROFESSOR OF PSYCHIATRY AND
SENIOR FELLOW, CENTER FOR BIOETHICS, UNIVERSITY OF
PENNSYLVANIA**

**12:30 PM – 2:00 PM
THURSDAY, DECEMBER 07, 2006**

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MR. P. J. CROWLEY: Thank you for coming. I'm P.J. Crowley. I'm a senior fellow here at the Center for American Progress and I'd like to welcome you to this afternoon's program. I think there's probably a little bit of irony in the fact that we gather on the 65th anniversary of Pearl Harbor and the entry of the United States into a world war, to talk about a different concept of war and the provocative and timely work by my colleague, Jonathan Moreno – and they are for sale outside and we hope you'll purchase one as you leave.

The issue of neurosecurity, as Jonathan phrases it, is vitally important and emerges at a time where the United States is still trying to sort through the implications of 9/11 and the threat of extremist networks and how we protect the United States, and this is fascinating and I think scary stuff and rightfully so. Within the past year, we've learned of secret programs of terrorist detention and eavesdropping that clearly violate our values and in all likelihood our laws. These programs were approved not in the routine conduct of governance, but by the president and a small group of advisers, who I'm sure have the national – believe they're pursuing the national interest, but claim inherent powers outside the system of checks and balances. They claim that even public discussion of these issues is dangerous.

However, as Jonathan outlines in his new book and will discuss with us momentarily, we are certain to see tremendous advances in neuroscience in coming years that without question have applications that can improve and enrich our lives. Just as clearly, these advances have important applications for national security. Again, many of them constructive: improving the interaction between humans and technology, increasing the skills of our soldiers, and perfecting methods of lie detection. They also pose risks in terms of the nature of scientific research and the legal and moral implications of dual-use technologies. Our abilities to do remote interrogations of enemy combatants may eliminate the potential to commit the kinds of abuses that we saw at Abu Ghraib, but on the other hand, remote interrogation of American citizens as they prepare to board an airplane almost certainly threaten our civil rights.

Where is neuroscience heading? What are the responsibilities of scientists who are working in these fields? How do we create an ethical framework to guide these applications? How do we inform the public and intelligently debate these developments? And we're pleased to have a truly expert panel here today to try to help us debate and perhaps answer some of these questions. Let me introduce them. And first to my right is my fellow senior fellow, Jonathan Moreno, who is the author of *Mind Wars*, the new book and is the David and Lyn Silfen University professor and professor of medical ethics and history and sociology of science – that's a long title – at the University of Pennsylvania. Dr. Jonathan Moreno.

To his right, Professor Jennifer Bard who's a professor of law and director of the Health Law Program at Texas Tech University, and perhaps the primary candidate in the country or one of the candidates in the country for neuroscience would be Bobby Knight I suspect. (Laughter.)

MR. CROWLEY: And then to her right is Dr. Paul Root Wolpe, the professor of psychiatry and senior fellow at the Center for Bioethics, also at the University of Pennsylvania. We're grateful to have you coming. Our normal process here is to hear from our panelists, perhaps toss a couple of issues around among the panel and then open it up to your questions, including questions from any journalists who are here. So Jonathan, why don't you begin the conversation?

MR. JONATHAN MORENO: Thank you, P.J. And let me add my voice to P.J.'s and welcome you to the Center for American Progress. It's always a pleasure to do so, and particularly the new faces here. And I want to thank in advance, before they criticize me, Jennifer and Paul, my friends and colleagues, so far, for coming to Washington and being part of this event. And I want to thank the people at the Dana Press for making a nice cover for my *Mind Wars*. That's not always so easy.

So there are a number of threads and motivations for writing the book, but those of you in the room who are not familiar with the field of neuroscience. Let me just give you a sense of the vigor of neuroscience. When I was going to the neuroscience meetings last year – they were in Washington – I got out at the Gallery Place Metro and I was walking through Chinatown and I could barely walk on the sidewalk, there were so many people. And over at the convention center it turned out that there were – count them – 40,000 people at the Society for Neuroscience meetings. This is not an arcane field – neuroscience – and it is by at least some lights the fastest growing field of science. Some people think that neuroscience is for the 21st century what genetics was in the 20th century.

So part of the argument of the book is that there is a lot going on in neuroscience that needs to be of more general public interest. And as you probably know, in the field of bioethics, there's a lot of talk about neuroethics issues. Jennifer and Paul both work on many of these issues, but I'm not going to be talking about these. I'm putting them on the screen so you can get a sense of the shape of this area. I'm going to be talking about some things that relate to some of these issues, some of these topics – topics that I was surprised often to read in the popular literature and the lay press on science and the technical neuroscience press that often have the potential for what – the term P.J. already used, dual-use; that is to say, there are a number of technologies and applications that neuroscientists are very complex, (multi-field?) are working on that have interesting possibilities for military as well as civilian applications.

And when I started to talk to people I knew in the neurosciences, people I would rub elbows with, organizations I'm part of, tell them I was writing a book and ask them for an on the record interview about some of the philosophical issues around dual-use in neuroscience, I found it very difficult to get people to talk on the record, particularly

people who currently have contracts to do research for the National Security Agency. And I think there are a lot of reasons for that, but one important reason is, I think, as I highlight the bottom of this slide, that it's one thing to push around electrons and neutrons and protons, it's one thing to mess around with free agents and microbes. It's another thing when you start messing around with the brain.

The brain is really personal, and I think that for many neuroscientists it was not a welcome notion that somebody like me would be writing a book about dual-use in neuroscience because the topic is already vexed. In part it's vexed by a history of conspiracies or conspiracy theories, and it's remarkable to me how many people not only in the United States, but around the world are quite certain that their brains are being scanned by the CIA. I get a call from these people – perhaps some of you do, too – pretty regularly, and I'm sure I'm only aggravating that problem with *Mind Wars*, but the fact is that to many of these urban legends there is a kernel of truth, so let me just offer a political science framework to get started: the notion of a national security state.

This is a statement from the NSC in 1950. P.J. probably knows about it, but the general notion here is that coming out of the Second World War, unlike the way that we basically disarmed ourselves after the First World War, it's very important for the United States in the beginning of the Cold War not to make the same mistake – to continue and to establish what a political scientist called the national security state. This idea is essentially that in the national security state every element of the society, every asset and resource of the society needs to be available to protect the country. And in particular science and technology have an important role to play.

So for example, many of you know Allen Dulles, the first director of the CIA, had a particular concern about the news that was coming back during the Korean war that our men were turning against us, that they were making treasonous statements, and the term that was being used at that time of course was brainwashing – that they were somehow being brainwashed. The regulars in the CIA thought that there was some oriental secret that we needed to learn about, how they were doing it so effectively. Dulles hired two very distinguished Cornell University neurologists, Wolff and Hinkle, to analyze what happened to our men over there. Their conclusion: there was no particular oriental secret. They were just really good at it.

And partly as a result of that report, Dulles got interested in the hallucinogenic experiments as possible ways of leaning the truth about what was going on in these places when people were confined; perhaps is a truth serum, perhaps is a way of disorienting enemy agents and so forth. I'll come back to that in a moment, but it needs to be pointed out that the relationship between academia and the national security establishment in the '40s and the '50s was not marginal. It was deep. One political scientist estimated that about a third of the major researchers at places like Harvard and MIT were supported by National Security Agency contracts in the '40s and '50s. One of them happened to be one of my father's best friends – my father was a psychiatrist – Henry Murray, the father of personality theory, and Murray developed the TAT.

It's not too much to say that the field of personality psychology would not have existed in the '50s had it not been for this support. Another example, one of the great heroes of my field, human research ethics, Henry Beecher – he used LSD as an anesthesiology research in the '50s at Harvard, essentially as a control drug. And his interest in LSD extended through the decade. I believe actually that Beecher published his work on human research ethics in the '60s partly as a way of apologizing, consciously or not, for the LSD research that he did in the 1950s. Kurt Lewin, the father of modern social psychology, another OSS CIA adviser on psychological warfare. Again, this was not marginal.

I like to say to my junior colleagues in academia – more and more of them are junior I find these days – that it's very important to appreciate that today we have a kind of two-cultures problem between the academic world and the military research world. That was not the case in the 1950s. The country was still winding down from mobilization of pretty much everyone, so it's not surprising – it shouldn't be shocking that the kind of research programs people started in the '40s and '50s were continuations from their period of service of the whole country being mobilized in the Second World War to their return to the university in the '50s.

This extended also to some stuff that we would, I think probably agree is pretty marginal. J.B. Rhine, the great ESP researcher who founded the term psyops, was supported by the CIA starting in the early '50s. Interesting question that I talk a little bit in the book is: what was this really about? Was this real or was this disinformation? Were we trying just to get the Soviets to spend a lot of money on psyops? Was it all a big distraction? I think it's layer upon layer. Nobody really knows what was going on here, but we do know that Rhine was supported by the agency. Of course, Sidney Gottlieb – kind of a – an odd kind of cultural anti-hero, our version of Q. My disappointment, by the way, with the new James Bond movie is that there's no Q, but that's another – that's the talk on film studies. (Laughs.)

Sidney Gottlieb tried to, as you might remember, get a poisoned cigar to Fidel Castro and was responsible for the MKULTRA program, the program in which the CIA did experiments loosely called on lots of Americans, basically dropping LSD into their drinks, and the Army also engaged in these experiments, as you may know, in the '60s. It's part of a much longer story that we can talk about in the discussion if you like.

So the point of the first part of this little presentation is essentially that the national security state's interest in the brain is not new. And we shouldn't be surprised that as we enter a new kind of war, a war on terrorism, that very much the same sentiment is expressed at the highest levels of government. That is to say, again, one of the great advantages we have over our adversaries is our science and technology complex. These assets need to be brought to bear in the new war as they were brought to bear so successfully in the Cold War. So some examples of how this is working – and when I get to this point in the talk I always like to explain to people that although in the past I've had a security clearance that it had no relevance at all to the examples that I'm about to give you that I use in *Mind Wars* because nothing that I write about is classified, and yet it's

possible if you just cull the published literature and go on the web to find all sorts of interesting examples.

So here's a two-page contract that was let by the Army Research Laboratory to Penn State University – excuse me, the (unintelligible) Penn State University by the Marine Corps Research University. I'm not sure how many other people, by the way, other than P.J. in the room know there is a Marine Corps Research University, but there is. This contract was dated 18 September 2001, just a week after 9/11. And, again, this is on the web. This is the top half of the contract. Notice the title is "A Technical Assessment of the 81mm Non-Lethal Mortar Munition." So when I saw this, I called one of my friends at Ft. Dietrich and I said, "What's a non-lethal mortar weapon? What would that be?" (Laughter.) And he paused for a moment, then he said, "I think it would be something that put you to sleep."

So this is the bottom half of the second page. I believe this is still on the web, thanks to Project Sunshine. They put this stuff up. And you notice what's interesting here is they refer to in military-ese subject matter experts who are supposed to be part of the team that Penn State will create for this project, their subject matter experts on the effects of human testing of the non-lethal mortar weapon. They don't say that they're going to do human testing as part of this project, but they say that the people who are going to be on this team need to know something about the human effects of testing such weapons.

What are they talking about? Well, here's an image again from Project Sunshine of a non-lethal mortar round. What this probably is is an opioid called fentanyl. Now, many of you may recall that fentanyl was used by the Russians in the tragedy of the Moscow theater a few years ago in which Chechen terrorists took over 700 people hostage. The Russians handled it in their typically agile way. They punched a hole in the side of the building. After a couple of days pumped in this aerosolized compound fentanyl, and they put everybody to sleep. And there were dozens and dozens of ambulances and emergency medical technicians waiting outside the theater for the hostages to come out. Unfortunately, the Russians didn't tell the emergency personnel what they had used, and therefore the very common antidote was not available. A hundred and sixty-seven people – most of the children – died in this episode. So a so-called non-lethal weapon doesn't need to be non-lethal.

What is perhaps not the best moment in the history of the national academies back here at home – this very day that that happened, the national academies issued a report in which they recommended the creation of centers of excellence in non-lethal weapons, including fentanyl and other opioids for non-lethal purposes. A lot of what I write about of course goes to DARPA. I want to say right now – I'm not a DARPA basher. I actually in the book surprise people I guess, because I turn out to be pro-DARPA because I consider pragmatically what the alternatives are. DARPA actually is not a spy agency. It is a science agency. They only handle about \$2 billion, which is more than P.J. Crowley makes at the Center for American Progress here, but still, it's a considerable amount of money.

Much of DARPA's work has been on neuroscience and I said to you that I – to do the research, I didn't need to have a classic security clearance because – and I actually lived in fear for a year. I didn't tell anybody I was writing this book for a year because I thought that somebody eventually was going to do what I did to do my research for the book. To get started on that research, I Googled – and I invite you to do this when you get home – DARPA and neuroscience. And you find that there is a lot of public information about what DARPA is interested in, so I used that as a guide to much of the book.

So, for example, one of the areas that DARPA is interested in this developing a head web: basically a cap that would incorporate all of the techniques for brain imaging, brain scanning that are technically available. You can imagine that this might be very useful. Again, this is a dual-use device. It could be very useful for keeping track of people with neurologic disorders at a distance. Also very useful for perhaps seeing how the brains of special operations personnel would react in a training situation. If you try to screen people for an especially stressful assignment, what kind of neurotransmitters are they secreting and when? Or if you want to simply watch soldiers in the field in a combat operation, how much information are they getting, are they being overstressed, what's going on in their brains.

What always comes up at this point is the question, "Well, is this mind reading?" And so I don't know exactly because I think we have a language problem. I'm not sure that mind reading or mind control – that old language actually works anymore. I think we have to develop a new vocabulary in light of the science. For those of you who can't see it, this Dennis the Menace cartoon the caption is, "I don't hear anything, Joey. Are you sure you're thinking?" with a stethoscope on Joey's head. (Laughter.)

So other kind of DARPA projects that we can talk about – that I talk about in the book involve using the sensory capacities of other species like honeybees or dogs to improve our capacity to perceive in battlefield conditions. There's a big program called Enhanced Human Performance. Part of the program of continuous assisted performance can make soldiers combat ready more than 19 or 20 hours a day. So, for example, one of the areas that they're breaching is the idea of augmenting cognition. There was actually an AugCog convention, the first one in Las Vegas last year – big convention. I didn't make it, but I think the idea of augmenting cognition in Las Vegas is probably suitable. (Laughs.)

So here the idea is to, again, in a sensory rich environment like a cockpit, the pilot is getting a lot of information, a lot of digitized information increasingly as we go forward with cockpit design. We don't want to overload the pilot with too much information, so how do we manage – how do we see what's going on in the pilot's brain, and then perhaps remotely manage the kind of sensory input – the kind of information that the pilot is getting to avoid sensory overload?

Dual-use goes both ways: modafinil, provigil, the so called anti-sleep drug was not developed by DARPA, but is now being used by the Air Force according to reports as a possible replacement for poppers or amphetamines. Provigil is of great interest to my medical students. So far NIH has found that you can keep somebody awake and alert for dozens of hours using modafinil, branded as provigil. I have to say, by the way, I don't have any interest in this drug financially, that I'm (unintelligible) in the company. Probably I made a mistake not buying a few shares, but I had an undergraduate at UVA a few weeks ago telling me that she has already used provigil, given to her by her father, by the way, who is a physician. Not an over the counter drug, but you're going to find it on campuses. I'm sure this is the next drug of abuse because what law student wouldn't like to be able to stay up for a few days at a time before they have one of Professor Bard's lectures and exams. (Laughs.)

MR. : Ritalin.

MR. MORENO: Ritalin. (Laughs.) So I promised the interns at American Progress that I would talk about this. This is a DARPA funded project at Duke University which really quite fascinating. It's part of a brain machine interaction program. Preview ideas: you put a Rhesus monkey in front of a computer monitor where you have the joystick, they get a shot of orange juice in their mouths when they move the joystick, but they also have electrodes in their brains. Every time they move the joystick, they move the cursor on the monitor. After a while they figure out that with these electrodes in their brains, they don't have to move the joystick to move the cursor. All they have to do is think "I want the cursor to move" or whatever it is the monkeys think, and it moves. What they don't know, of course, also is that they're also controlling wirelessly a robot arm, a prosthetic arm in the next room.

Now, my mother, I want to say at this point, is a 50-year survivor of a (kind of?) sarcoma in her arm and shoulder. She's an amputee of her arm and shoulder. She's never been able to wear a prosthetic arm. It would have just hung at her side. This obviously has fantastic implications for people like my mother – any amputees or people with a (locked-in?) syndrome, to actually be able to control the movements of these prosthetic devices. So this is a terrific thing that these people are working on.

DARPA, though, is not in the first instance a medical science agency, a medical research agency. DARPA's interest is in the robot army of the future: the idea of having a guy in a bunker in Colorado being able to control through instant feedback from a device in a combat situation thousands of miles away, different kinds of automata.

So a different kind of version of this notion is the robo-rat. Some you may remember this experiment. It was done at my former medical school at Downstate in Brooklyn, which I thought was – I don't know – rats in Brooklyn, it's too easy. (Laughs.) But this is a very simple idea: three electrodes in the rat's brain with a little battery pack. Looks like the robo-rat is on his way to school, doesn't it? (Laughs.) Very simple concept: the middle electrode controls the pleasure center in the rat's brain. When somebody pushes a button on the laptop, the rat is stimulated to go forward. The left

button is the left whiskers. The right button is the right whiskers, so after a few minutes they were able to train the robot to go through a maze, to clamber up a wall as you can see in the photograph. This is the robo-rat.

What do you use the robo-rat for? Well, perhaps mine clearing operations. You may be able to do that with dolphins in the water, there are lots of things you might be able to do if you control a rat this way. Nobody cares about rats. Some people care about dolphins a lot, though, so there's a question about how far you can go up the evolutionary tree. And, of course, there's some interesting questions about whether any of this could be workable in human beings and whether you can try it.

Got to raise the cyborg question. Interesting issues here not only about control, but also about memory, including downloadable memory. Would that be a good thing? I'm not sure we want to remember more than we already do. Evolution has screened us so that we don't remember all that we could, which is a good thing.

Interesting ethical question for people who sit on research ethics committees: once you start changing somebody's personality at a level like this, is it the same person who's agreed to be in the experiment? Can they still agree to withdraw from the experiment? What are the personal identity issues here? Raises very interesting questions for human research boards.

So you know that there are interesting experiments going on now with the use of beta blockers for posttraumatic stress disorder. I raise the question whether if you could give this kind of a drug prophylactically before a soldier went to combat, perhaps you could control the consolidation of long-term memory with emotions like regret and guilt and shame. Would you want to control guilt? Would you want to create a guilt-free soldier if the price for that person might be a lifetime of posttraumatic stress disorder?

Some people are talking about trying to give oxytocin, which we secrete when we're in trusting situations, trying to give it as a way of softening somebody up in a hostage situation. It's not clear that you can do that with oxytocin. Some neuroscientists don't believe that it could cross the brain/blood barrier. Other people I have spoken to – there's actually one published study that says you can do that, that it has worked. There's debate about this. But again, would we want to do that?

Now, by now many people identified me as a paranoid schizophrenic when I'm talking about these things, but I was really benefited by something the Navy published a month and a day ago. I sent this to P.J. when I saw it. This is a new Naval instruction on how you can do ethically human subjects research in the Navy. Most of it just repeats what people in human research ethics regulation know is the common rule, the interagency rule for doing human subjects research, but when you get down to page nine, and I invite you to look at one – what is that, 2a, they actually have an authorization process now in the Navy – you will be happy to know – for severe or unusual intrusions as a part of an experiment, either physical or psychological, on human subjects, such as consciousness altering drugs or mind control techniques.

Now, I'm not sure that the Navy chose the best language to characterize this possibility, but the point is that there is thought being given to these questions. It seems to me that neuroscience now is sufficiently complex that we as a larger society can begin to think about these questions. I suggest at the end of the book about how to do this systematically.

It seems to me that some of the answers that we are familiar with from fields, for example, like nonproliferation in the nuclear field. Those answers don't work quite as well because neuroscience presents such complicated, diverse possibilities that we need to think in new and creative ways about how we want to manage these kinds of devices and technologies and the context in which they may and may not be used.

So with that, I'll thank you very much and look forward to hearing from Jennifer and Paul.

MS. BARD: Thank you.

MR. CROWLEY: Thank you.

MS. BARD: Well, good afternoon. It's just a pleasure and an honor to be here. Thank you, Jonathan, for inviting me here, and P.J. and what an honor to be here between two men who I hold in just the highest respect and who are just wonderful people and (mensches?), so what an opportunity. I am the lawyer on the panel and I'm also a law professor, which means I'm not going to tell you anything. I'm just going to raise a lot of questions. (Laughter.) I thought about this and I thought, well, what would you want to know, you know, squeezed between these two great philosophers and thinkers on this topic?

And what I wanted to talk about was to give you a sense of what a vast terrain of law is covered by the topic of essentially messing with people's brains. And I want to give you an overview and let you know that this is a big issue in law today – dozens of law review articles being written on this, a lot of thought being given, and I wanted to give you a legal overview – sort of a taste – to see what you're interested in. You have to start somewhere, and I am starting with the concept of the law – of all the various mind control and mind reading things, I'm going to be talking about a machine that Jonathan talks about in his book, and I know that Paul knows a lot more about it than I do, which is called Functional Magnetic Resonance Imaging, which is essentially a real super MRI which just takes amazing pictures of the brain in real time.

And suffice it to oversimplify: a lot of experiments and work is being done to tell if it's – while you are looking at someone's brain in this machine, and you ask them questions and they give you answers, can you tell if they are – the simple way of saying is, are they telling the truth or not? If you show them a picture, you show them Osama bin Laden: have you seen him recently? You show them a place where a crime was

committed: have you ever been there? And the theory being that they're working on is to work on that.

Now, the questions about whether this works or ever works are huge, but I only need to give this as a paradigm. Some of these mind techniques and mind looking and mind altering things do work, but just for the sake of argument while I go through the law let's assume this thing works. What are the legal constraints on its use? And it's really the same answer for anything where you're intruding on someone's brain.

Well, very different legal structure whether you're talking about research or application. As Jonathan just said there is a very well developed structure of law on the kind of research you can do with humans. It all started in Nuremberg after the Nazi so-called experimentation in the Holocaust – and that would be a very different talk, but essentially there's a lot of regulation. There's a lot of regulation interestingly enough apply to what you can do during research on soldiers. After many abuses that have been well documented by Jonathan and others, there's a lot of care in using soldiers as willing and overly available guinea pigs, so it's not the case that you can just do anything with a soldier.

So are we talking about research? Well, if we're talking about application, though, which sort of another – really the other fork in the road, you can't really think about this legally unless you're talking about – unless you have a clear idea what is the factual situation at hand. What are you doing? Are you using this as a weapon? Are you trying to pacify somebody? Are you trying to stop them in their tracks? Are you trying to change their behavior – make them happy, make them agreeable? What are you trying to do? Are you using it as an interrogation method or are you using it as a surveillance tool, difference being – you know, are you using it while you're questioning – and who is really the next question – who are questioning? But are you questioning somebody or is it set up somewhere in an airport or some other location where you're just surveilling the crowd? So that's a key question: what are you doing with it?

Second question is, who are you doing it to? American soldiers, making them better, making them smarter, making them faster, seeing who's afraid to go into battle. Maybe you could cull them out before they go in. Who's the weak link in the division? American civilians? Are you talking about foreign soldiers? Are you talking about foreign civilians – potential terrorists, criminals here in the United States, persons with important information? Where is the ticking bomb? You really have to have – step number two is who are you doing this with?

And the third question, which is really very important is where are you going to do it: in the United States, in a court room, in a police station, in an airport? Are you going to do it in a foreign country? If you're in a foreign country, are we at war? Are we not at war in a foreign country, but is it somewhere where we have a specific interest? We went into Somalia to rescue some soldiers. The military often has very limited missions where they going in and sort of essentially rescue people. They have a very limited goal. So that's the where question – very important.

And then the fourth issue, the journalism concept, why? Why are you going to do it? Do you want to enhance law enforcement or security? Do you want to intervene in a dangerous situation? Are you doing it to get needed information? And obviously there's some overlap, but you want to be able to answer – you need to be able to answer these questions before you can start saying, well, what's the law and what are our constraints?

Starting with enhancement, in the context of law and law enforcement – this is obviously a huge ethical issue, but from a legal point of view the law does not see much difference between something that you can do with the naked eye that is enhanced by technology, and the example I'm going to use for that is surveillance.

If you're looking for marijuana plants – and this is really just sort of a line of case law – if it would be legal for you to look over the fence, it's legal for you to fly a plane over and have it do infrared scanning. There's nothing magic about eyes. The question is: is there an expectation of privacy, yes or no? And if it's no, then you can use any available technology. It's really – it's not a technology based issue.

Now, very elaborate body of law for use of non-lethal weapons, and I've put up a couple of really just a selection of recent law review articles, which I assume can be available to you on the slide if you want to look at it, but a lot of people thinking about this and writing about this sort of gives a sample of the legal thought.

And the other thing that's going to come up when we talk about this is of course U.S. constitutional law. Now, U.S. constitutional law is an interesting sort of fact. The whole point of the Constitution is to keep the government off of people's backs, so the Constitution protects individuals against unwarranted government intrusion. Now, the amendments that we would be talking about here – and I'll talk about privacy in a minute – are essentially the Fourth Amendment, unlawful search and seizure; the Fifth Amendment, self incrimination; and the other amendment the people talk about a lot is the Eighth Amendment, cruel and unusual punishment. Very important to understand these amendments to the Constitution and there's good stuff in the body of the Constitution, too. First of all, the question is – again, we're back to who?

So we're talking about applying these principles. Primarily in law enforcement, you're talking about applying them to Americans in America. Many of the international treaties to which the United States is a signatory have provisions that say the U.S. will comply with this treaty to the extent of American constitutional law. Usually what they mean by that is we have the death penalty here and it's okay, because if we don't say that, then any treaty we do sign, if we were to put it up to international scrutiny would immediately conclude that the death penalty could not – would be some sort of crime against humanity. So we have to put this in all the treaties, but it also means – excuse me – it's a frog in my throat. It also means that you will hear people doing Fourth and Fifth Amendment analysis as sort of intrusion or surveillance. What would we do here?

A couple of important things: the goal of these amendments is admissibility of evidence in court. If you mess up on a search or a seizure, the punishment is – the stick is you can't use the evidence in court, but if your goal isn't to get evidence to use in court, you really just want the information, then it's really not any kind of barrier. So what? If you want to know something – well, we can't use it in court. And then the Fifth Amendment is much less than it looks because when you have a right against self incrimination and what that means is a right against making a statement that incriminates you that will be used against you in court, what you do if you're a prosecutor or a congressional committee, you simply give someone immunity. And then that right goes away, and then if they don't testify you put them in jail. They're in contempt. So that Fifth Amendment is not much of a barrier if what you're looking for is not evidence, but rather information, so I would make that point.

Eighth Amendment – also very overblown. Unusual does not mean new. Unusual really usually just means disproportionate, so – it sounds like the Eighth Amendment would come in, because all this stuff is unusual, but if you just think of it as disproportionate, it doesn't really have such a large role. And it really does apply to prisoners – the conditions in prison. Of course you can't torture people in American prisons, in theory, but I don't think that the Eighth Amendment, as much as it would get discussed in this context really has a lot of teeth here.

Privacy. No right to privacy in the Constitution, as we all know. Protections against surveillance by government, again, based on search and seizure. So surveillance is really looked at as a kind of sort of remote search. Here's where sort of the rubber meets the road. The government's need for information in any context is always weighed against the potential threat, so almost any non-invasive screening device is likely to be deemed acceptable if the level of threat is high enough. So at root you really are talking about who is making this decision about threat. And I think everybody recalls when there was all the publicity while the NSA was listening to all our phone calls – yes, there is a very elaborate set up of law when the government can intrude on domestic – you know, people of the United States making phone calls, and they're supposed to go to a special secret court and give them evidence and get a warrant, and they apparently weren't doing that. But it really all comes down to if we just want a rule of thumb is: what is the threat and who is making the decision about how great the threat is? Because if you don't trust who's making the decision about how high the threat is, then it really doesn't matter what the law is.

So the theory of the spy court and of all courts, the whole theory behind warrants is the person who wants the warrant isn't the one who decides what the threat is – that there's some sort of neutral judge or neutral body. But if you don't have that, then that is not much of a protection. So the effect of refusing this in the criminal proceeding – what if it becomes a lie detector sort of thing? The worst effect of refusal would probably be a negative inference at trial. He wouldn't even take one of these things. You're not allowed to do that with traditional lie detectors because they're considered to be so unreliable that you would not be allowed to have that be a negative inference to trial. And it's likely that if law enforcement in the U.S. has a plausible urge and need for

information – kidnapped child; where is the child? – or if in an international situation there’s some real pressing need for information, it would be my legal sort of conclusion and opinion – and I’ll just, not going to go through this slide; I don’t know if we have a lot of time to do that – there is some law on this – is that since this is not painful – and I’m oversimplifying – since it’s not painful, I think that the threshold legally to use this in a pressing situation is going to be very low.

Again, the question before sort of who, what, where, when, and why is so important in making this legal determination that it’s impossible to generalize. You’d really have to sort of get them all together, but I think just to sort of frame the issue of where does the law – what’s the role of the law in this – the role of the law has to do with threat assessment. And it’s certainly true that the Supreme Court has often felt that not all is fair when you’re trying to find out evidence about who robbed the bank. There definitely are constraints. But when you’re trying to find out where a lost child is or where a ticking bomb is, you really don’t look to law for somehow putting a barrier to this.

And that’s kind of the oversimplification and I will send it over to the experts.

MR. CROWLEY: Thank you.

MS. BARD: That is cool. Really cool. (Laughter.)

MR. PAUL ROOT WOLPE: Like Jennifer and John, I want to talk about some concerns. There are a few things I want to say by way of introduction. First of all, Jennifer talking about using FMRI involuntarily – I just want to point out it cannot be done.

MS. BARD: Right.

MR. WOLPE: You cannot coerce someone to do FMRI because you have to lie perfectly still and you have to answer honestly. If you answer obscurely, if you think – “no, no, no” in your head while you’re saying “yes, yes, yes” with your mouth, you can – if you just shake your head a little bit, if you hum tunes to yourself, if you wiggle your toes, there are lots of ways to beat FMRI. It can’t be used involuntarily. Some of the other technologies that I’m going to show you and talk about can be used involuntarily.

And let me also say something about a couple of the – just some comments that I jotted down while John was talking. First of all, in terms of some of the brain-computer interfaces – so we showed you what Miguel Nicolelis did at Duke with the owl monkeys. There’re some other interesting examples. Schwartz and Taylor’s where they’ve implanted in monkeys – and by the way, John mentioned locked-in syndrome. It’s already been done in humans.

Doctors Kennedy and McKay at Emory took a guy named in J.R., who had a brain stem stroke so he had complete locked-in syndromes, and with the permission of

his family they implanted electrodes in his brain, and this was a man who could not communicate with the outside world at all, and he learned how to move a cursor around a screen using his brain waves. So it already actually has been tried. There have been a number of implantable technologies. Matthew Nagle, who was stabbed in the neck in a bar fight and was quadriplegic was in John Donahue's lab at Brown and they put something called BrainGate technology in his house which is – a company called Cyberkinetics creates that. And they put a pedestal plug in the top of his head, and he would come into the lab and they'd plug him in – plug him into the computer and he could move that cursor with such skill that when a wired reporter came there to interview him he played the wired reporter in a video game and beat him using only his brainwaves to control it. So there is a remarkable amount of research being done now on brain implants in human beings.

On the other hand, what you really want to do is to be able to do many of these functions transcranially and John Walpop (ph) at Albany has been working on that quite a bit and he has a hood that he puts on people. The problem is that cerebral spinal fluid is a very effective electrical dampener, so it becomes very difficult to get robust waves coming, so there's some interesting work done there.

The second thing that came – that was interesting to me, and I have mentioned this to John before, when I read *Mind Wars* was this term warfighter. We used to call them soldiers. We don't anymore. If you go on to these websites that talk about his stuff, soldiers are uniformly called warfighters. And then out of the other side of their mouth they talk about why developing these technologies is so important because they will have so many peacetime applications. So on the one hand, they've changed a soldier into a warfighter, and on the other hand they're trying to justify that by talking about the peacetime application of these technologies. I think there's an interesting psychology going on there.

And one comment about the robo-rat and many of the other of those animals: when Sanjiv Talwar at Downstate created the robo-rat, he said something that I think should go on every ethics textbook that's written from here on in. He said that he thought there might be some ethical issues involved in the fact that you've taken an organic creature and basically turned it into a robot. He said – so he got his team together, and they sat around and discussed it. And here's the quote, though I'm not quoting him exactly. He said something like: we couldn't reach ethical consensus, so we decide to just go ahead and do it. (Laughter.) Now, if that isn't something that should be in the frontispiece of every ethics textbook, I don't what should be.

I should also mention one last thing before I actually – and that is that they're also working now on prosthetic brain devices. So there's a prosthetic hippocampus that's being worked on right now. And it's basically an information technology – your hippocampus is your information processing part of the brain where you take short-term memories and turn them into long-term memories. If you have a hippocampal lesion or something like that, like in *Memento*, some of you remember that movie, or *Fifty First Dates* – whichever of those two movies you remember, it says something about you.

(Laughter.) Oh, *Fifty First Dates*, I don't know *Memento*, though. That's what happens when you have a hippocampal lesion. You can't take those short-term memories and turn them into long-term memories – other things too.

And they're trying to find a way to bypass the lesions, send those impulses into a chip have it processed, and send it back in to the hippocampus on the other side of the lesion. Right now they're just testing that on rat brain slices, so they're not very far. But in fact that's a fascinating idea, and not only will you be connected up to a computer, but in fact your actual brain function may be integrated with information technology.

One last interesting thing. Matthew Nagel – when he's hooked up, he's actually hooked up basically through tapping into his motor cortex, and when J.R., the guy with the brain stem stroke, is hooked up, they're just looking for some big wave that he can generate himself that will move this thing. But as they get more sophisticated, if they really can connect up the thinking centers of the brain and connect that to a computer, and then connect that computer to the internet, the brain then becomes an internet node. And this isn't science fiction. This isn't 100 years from now. This is something that's achievable just probably within 10, 15 years. And then we actually are going to be able, like Kevin Warwick does, to talk about integrating ourselves into our own technology, but that's not what I'm talking about today. (Laughs.)

I'm going to talk more some of the things that we've talked about. I have an interesting claim to make that John discusses in *Mind Wars*, but just using a slightly different kind of vocabulary and way of conceptualizing it. So here's my question that I'd like us to think about, and that is: is something fundamentally new happening? And I'm going to make the controversial claim that it is. And that is that until now, any information that you could – now meaning the last 10 years or so – any information you could get from human beings of any kind that was worth while you got through the peripheral nervous system. I don't care if it's language or expression or Paul Ekman – for those of you who know his work, he has this – I think, yes, John talks about a little bit in the book.

Paul Ekman has this technology whereby he claims that – he's proven it; it's not controversial – that as people speak when they lie and things micro-expressions that they can't control flit across their face, and you can train people to recognize these micro-expressions, and people who are very good at telling who's lying recognize these micro-expressions even if they don't realize they recognize these micro-expressions. But even those micro-expressions are a product of the peripheral nervous system, okay? They are a product of expression, of even galvanic skin response in polygraph – that's all peripheral nervous system.

For the first time in history we're developing the ability to get information directly from the central nervous system, bypassing the peripheral nervous system. And the question that I'd like us to think about, assuming this is true, does it matter? That is, is that something fundamentally new, as I'd like to claim, or as some of the critics I've

talked to about this claim – yes, it’s true, but it doesn’t matter. That is, it is true, but it doesn’t say anything fundamentally new.

So let’s – first of all, let me try to make the claim that we are bypassing this peripheral nervous system and try to show you that with a few examples. So first of all, Elizabeth Phelps at NYU – is another thing that John mentions in his book, though some of the other ones I mentioned he would not be – she did this wonderful experiment, fascinating experiment, where she took normal white males – I don’t know how she determined they were normal, but that’s what it says in her – some people would claim that’s an oxymoron, but – (laughs.) So she took these white males and she put them in a scanner. First she gave a pen and pencil test that has a hidden racism skill in it. And then she put them in a – so they don’t know they’re taking this test, but they don’t – and they ask them lots of questions and they don’t realize that the purpose of the test is to get some level of racist ideology. Then she puts them in a scanner and she shows them normal white faces, meaning just average people that nobody knows; famous white faces, politicians and sports figures; normal black male faces; and famous black male faces.

And what she found was that the degree of amygdala activation, which is sort of a tension and fear part of the brain, correlated in white males with racism scale when they were looking at and only at normal black faces. Right? So a white male who is racist doesn’t activate when he looks at Jesse Jackson or Alan Iverson or someone he – but unknown black male faces, the higher the level of racism the more amygdala activation these people have.

Now, she refutes what I’m about to say and she should and it isn’t true, but theoretically at some point, could we reverse that? That is, could I look at amygdala activation when you’re looking at faces of another race and say this person is racist or this person has greater racist ideology. That’s not what she did. But can you reverse it and say something about racism? She says that’s a premature thing to say and it is, but there’s an example, okay? So let’s move on to another example.

Josh Greene did this wonderful work with looking at moral reasoning where he showed – and I’m not going to go into the details here, but he showed that when people make moral decisions, those moral decisions are strongly colored by emotional reactions to the moral situation. So if you take two identical moral situations and in one you sort of up the emotional valence of it, then people will make a different decision than they made. So moral decisions are not just simple rational decision, but they’re deeply emotionally activated.

Turhan Canli at Stony Brook is examining the relations between brain scans and personality, and this work is being done in two ways. First of all, in brain morphology. So it turned out that to some degree the phrenologists were right. Not that you tell on the bumps on the outside of the head, but in fact there is correlation between certain brain traits and personality.

So around your amygdala you've got something called the singular gyrus and the size of that gyrus – the size of that of that organ that wraps around the amygdala correlates with social outgoingness and social introversion. The bigger it is, the more outgoing people are. Not a direct one-to-one correlation, but a significant correlation. So in fact something – just simple brain scan at this point we can't tell much, but pretty soon we may be able to correlate your brain scan simply by the shape of different brain structures to different traits.

Hanley did something else where he showed, using amygdala again, that someone who's very outgoing, when they see smiling faces flashed up at them versus faces that have no expression, their amygdala activates more. They get more excited by seeing someone who is making some sort of gesture they perceive as being a gesture of welcome or a gesture of connection than introverted people, right? So there again, you can just flash signs up and you could say something about the person.

There's a more interesting one. This is a good example of let's say you have someone who would not cooperate with you at all. Could you tell something about them? You couldn't put them in the FMRI and say something about lying or not, because they'd have to cooperate with that. But Zafiro and Price did this interesting study where they isolated – and it's also I can't find the time to tell the details. It was a brilliantly conceived study. They isolated the part of the brain that is involved in reading. Something you know, but you don't realize that you know is that if you can read English for example, you can not look at an English word and not read it. Your brain instantaneously translates it. So you've got this part of your brain that does that, and it's very different than language. That brain does not light up when you're speaking, when you're listening – only when you're reading.

So now we have a guy in Guantanamo Bay who says – you got the wrong guy. I was visiting from somewhere else. I don't speak Arabic. I don't know Arabic. And we say, oh, you don't read Arabic? No, I don't read Arabic. So we put him in front of a screen and we start flashing multiple languages up on the screen and then – and we got him all hooked up to the brain scanner, or he's lying there in a cell and we want to know if he reads Arabic and there are five guys pick him up and strap him to chair and hold his eyes open in that clockwork orange mechanism that held – and we start flashing words and every time an Arabic word comes up, his reading center lights up. You say – sorry, you can speak Arabic, or at least if you can read Arabic, presumably you can speak it right? And so there we can get a piece of information from someone directly from their central nervous system without any cooperation on their part at all. I'm going to skip this. This is just perceptual thing.

They can – some of the stuff that has been done by a number of people, not just Camatani and Khan has to do with what you're looking at and being able to tell if you're thinking of an object you're a face or a parallel lines are vertical, horizontal vertical lines – a whole series of experiments that show that they can tell something about what type of object you're looking at and perhaps even thinking about through a brain scan without you giving them any other information. But let's move on from that.

Another part that's very, very important is a whole series of studies that have been done looking at criminality, antisocial behavior, and other of those kinds of traits and brain structure. Some of them did studies looking at things like who could suppress negative emotion more, and the prefrontal cortex has a correlation with suppression of lower levels of activation.

Violent offenders have much less activation in the orbital frontal cortex than nonviolent offenders and there are a whole series of these studies that I could cite you, but the point is now we're beginning – what about reversing nodes? What about putting someone who's suspected of a crime in a scanner and saying, you know, this person has really low LFC activation. They have the potential to be violent. That's not a leap that is that far to make from the studies that have been done so far. In fact, as you see in this quote – the consistency with which prefrontal disruption occurs across studies, each of which investigated participants with different types of violent behaviors, suggests that prefrontal dysfunction may underlie predisposition to violence. But what if you took that seriously? That's something you can easily look at in a brain scan. So now we're going to begin to track people into those who have a propensity to violence, perhaps, and those who do not.

So Freeman and Jacobson – some of you may know this study. This is a shocking study in terms of what it found, which was that if you put 10 Republicans and 10 Democrats into a scanner and you show them pictures of Republican and Democratic candidates, there's a lot of emotional positive activation when they look at their candidates and negative emotional activation when they look at the other. In fact, when viewing the opposition, you see great blood flow in the part of the brain that expresses control over emotions. So you're trying to suppress – either you're trying to suppress your negative emotion because you think it's untoward, or perhaps you're suppressing subconsciously your positive feelings towards that person. We don't know. (Laughs.) They showed them pictures of Bush, Kerry, and Ralph Nader, so make of it what you will. (Laughs.)

And now let's get into very, very quickly; I'm just going to say a few words about lie detection and show just a couple of quick things and then I'll end. But first I want to ask the question about neuroprivacy that underlies this, and that is: we all believe that our inner lives are something that we treasure and that we think of as being private, right? So the question I'm asking here is, should the skull be a privacy domain? That is, should there be a firewall between our subject of thoughts expressed in an inner way versus our outward expression, very much along the legal line Jennifer was talking about. You can look at my house and you can try to figure out what's in my house by looking at it, but you can't walk through the door, right? So you can look at my face and if you're Paul Ekman, maybe you can tell if I'm lying or not, but of course, I have to say something for you to be able to do that. But what you can't do is penetrate my skull in any way – I don't mean physically, I mean through brain imaging or brain fingerprinting – without my permission.

So historically we've only got an access to our private thoughts, right? And confession was supposed to be our externalizing in the Catholic tradition of those thoughts. Now, I want us to think about this. Think deeply about a world where anyone – the state, a judge's order, where I can have – I have two teenage daughters; only one drives now, but very soon, the other one is going to be driving in a few months, and then I come home and my car is dented and I say, "Which of you dented it?" And both of them said "Not me." And I can haul them off to CEPHOS or No Lie MRI, two of the companies that are now offering lie detection and say, "Okay, get in" and ask the guy which one of them dented my car. Is that a world you want to live in? So we want to ask the question. (Laughter.) Well, you're the one who drives, too.

Do we really want to know – are you lying in all of these contexts? The development of a successful lie detector has been the dream of governments and law enforcement since ancient times. I'm going to read you a Veda written about 900 BCE, which suggests a strategy for finding out which person is lying about having poisoned another person. "A person who gives poison may be recognized. He does not answer questions, or they are evasive answers. He speaks nonsense, rubs the great toe along the ground, and shivers. His face is discolored. He rubs the roots of the hair with his fingers and he tries by every means to leave the house." So there you go. So back 900 BCE already have some attempt to provide lie detection technologies.

The Greeks were already, by 600 years later, so it is still BCE, feeling pulses and asking people questions to see if there was quickening of the pulses. So you've got this idea – and then of course what the Christians did instead of those scientific things was the ordeal, right? You put the person in the water. If they drown, they're innocent; if they don't drown, they're guilty and you execute them. (Laughter.)

So let's think about this really quickly. Dan Langleben, who did these fMRI studies and he did them with cards where people looked at cards and then said whether the cards were of the suit that he claimed – I'm not going to go into details here except to say that you do see a unique activation when you subtract the – what you do when you do these studies is you take a brain when it's not lying and you take a brain when it's lying and you subtract the image of the lying from the not lying and what's left over is the part that is unique to lying. And first they did it with groups and then they did it with individuals and they found that they could in fact tell when people are lying.

These were all done on undergraduates looking at cards, and Scott Faro at Temple did it all on undergraduates who were supposed to in a room and take one thing or another or – and he also had this gun situation where someone shot someone else they shot and they tried to – so all of these have been done on undergraduates under fake circumstances, but they had no real incentive to lie except \$20 in one study if they lied successfully, but they gave them all the \$20 anyway. How these technologies are going to work with people who are deeply invested – terrorists, people who are pathological liars, criminal minds, people who are con artists and can lie with facility and especially – what?

MR. : Politicians.

MR. WOLPE: Politicians, who are very skilled at it. Right. We really just don't know.

And then finally, I want to say something about brain fingerprinting. Brain fingerprinting is Larry Farwell's technology and I want to say something about this because it is an example of a technology you could use coercively for lie detection. So brain fingerprinting is very simple: an EEG technology where the P300 (unintelligible) potential is a recognition potential; that is, when you – we all know this feeling if you think about it deeply. If I showed you faces that you didn't know and all of the sudden I showed a face of someone you knew, a friend of yours up here, you would immediately go – I know that person. Well, that feeling of recognition is the P300 wave and it happens 300 milliseconds after viewing. Before you have a conscious knowledge that you know that person it spikes. So first your brain goes, I know that person, I'd better tell the conscious mind. And they say, hey, conscious mind, we know him. You go, "I know him," but before it's conscious, so you can't suppress it.

So what Farwell says basically is, if this person said I was never in that room. I never saw that person, and you could show them a series of people they know and people they don't know you establish a baseline, and then you have what's called the murmur, and I'm not going to go into this except to say you have people you know or things you recognize, things you don't recognize, and then you show them the target, and if the target looks more like things you recognize, Farwell says you recognize this person even though you say you've never met him and vice versa.

And what you find – the problem with all this is that this is proprietary technology and Farwell has never let anyone else actually study this. In the one study where it was published, it didn't turn out too well, but those are his findings, okay? One hundred percent, 100 percent, 100 percent, 100 percent, 100 percent – you don't get this kind of correlation when you're studying anything in science, right? So people are very, very skeptical of these kinds of studies.

I should also point out very quickly that there are other technologies that can be used for this that may be able to be used remotely and in other ways, too. Here you got on your left a thermographic technology, and this involves the fact that you're talking about blood flow to the frontal cortex, so in fact when people lie, they get more blood flow up front. If you remember that slide I showed you of where blood flow goes when people lie. And with a very sensitive thermographic camera you can tell that there's a slight bit more heat emanating from the orbits of the eyes when someone lies than when they don't lie under simple conditions. Could that then be used to do remote or covert lie detection? We don't know.

And then on the right there it's functional near infrared where they actually – they now put it on the head and you get functional infrared beam being beamed a couple of millimeters into your frontal cortex, then sensors picking up the reflection and there, too,

they can detect that. Now, whether they can detect it from far away – whether you'll be sitting in the airport one day with a beam of near infrared in your forehead, we don't know yet. So these are all the technologies that are potentially violating this idea of the skull as a privacy domain.

So very quickly without saying much about them, there are privacy issues here. Do we have a right to cognitive privacy? Who has a right to these kinds of technologies? Can we do covert use? Who decides if it's proper? How do we think of this in clinical care? Dan Langleben, who was one of the pioneers in this, actually started to do this not to produce a lie detector for forensic reasons, but to produce a lie detector because he would have psychotic patients who come to him and say, "The CIA is beaming things into my brain." And then when they are on medication and they come back to normal, they say, "You know what? I didn't even really believe that then." But if you ask them then, they absolutely insist they believe that.

So he was trying to figure out what does that mean to say I didn't really believe it then, when at the time you said you believed it, and he was trying to find a way to – find a lying place in the brain to see what it meant to say these outrageous things when you were psychotic. And that's how he started. So it was actually a forensic – actually a clinical reason. And there are a lot of clinical issues here, and as John talks about in his book, there are also enhancement and selfhood issues. So I think that there are a remarkable set of important ideas here that we need to think about and that policies have to be developed in a very robust way.

Thank you. (Applause.)

MR. CROWLEY: We probably need another hour to sift through this stuff. But let me ask one question and then we'll open it up quickly to the audience for – and each of you, it seems to me, touched on a different element here. And the simple question is for each of you in the area of neuroethics, neurolegality, neuroprivacy, how do we – where do we go from here in terms of what you were saying about there are clearly – there's not a – there are dual-use aspects. How do you get to a situation where you have proper scientific oversight of what's being done so we don't – like today, we're not chasing atoms for peace as we today, because we gave some secrets to Iran 50 years ago. You said we don't have a body of law that addresses this; how do we get to a better place?

And then, in what way do we engage in a public debate so that we draw some red lines on this area at the start of the development, not wait till it develops, because, as you said, the default position is if we can't decide whether this is a good thing or a bad thing, let's do it. So where do we go from here? John.

MR. MORENO: At the end of *Mind Wars* I actually tried to develop this question, and at the risk of sounding like an academic who believes in the eternal life of the committee, nonetheless there is a useful function in the federal system for bringing experts together from different disciplines to talk about something new, and there are

numerous advisory committees, as we all know, in DOD and DHS and DHHS and so forth. I think it's time to create an advisory committee on neurodefense or neurosecurity.

What's going on in neuroscience is now I think – and you've heard this as well from Paul Materno, so that we do need to think about what the conditions ought to be on the use of these devices and even before, perhaps, the use of any of these devices, drugs or technologies or inventions, the testing on human subjects of these inventions. So I showed you the new Naval directive. Another portion of that directive dated November 6th refers to authorization for doing classified human experiments. Now, the last time I was part of a presidential advisory committee on this question about a dozen years ago, we were told that there were no classified human experiments going on. That's in the mid '90s. And I have no reason to believe that there are such things going on now, but one could certainly believe in the current environment that such experiments will be deemed necessary at some time.

They all have to go through informed consent processes and IRB review, but I raise the question: how can you do a classified human experiment ethically if it has to pass through an IRB – a research ethics committee – and a minority of the committee, perhaps even only one member of the committee, believes that the majority is wrong and that the experiment ought not to be permitted to go forward. In the typical university environment, in the industry environment, I can go to the boss, I can go to the newspapers if I think something is wrong, but if I'm on a classified IRB and I'm at the center I could go to Guantanamo if I do those things. So I think there's an underlying question here among many, but when we start thinking about the application that these technologies in the military context or defense context – how do we do the work and is it even possible ethically to do a classified experiment?

MR. CROWLEY: But in just one quick follow-up. Is there currently an agency within government – is it the National Science Foundation, the National Academies? Is there any place where this can be in theory –

MR. MORENO: There is an Office for Human Research Protections, as many of you know, that's responsible for ensuring that IRBs do their work. But OHRP does not have the ability to go into a classified environment. There would have to be some new directive to enable them to do that. But, nonetheless, there is a rule that transparency requires that there is an IRB and informed consent, but whether OHRP has the ability to go in and question – to audit the process of the human experiment that is classified would require more authority than the OHRP has ordinarily.

MR. CROWLEY: Jen?

MS. BARD: I think that what Paul is saying – it's really easier to talk about, well, when you really zone in on something, and I think what Paul is saying is – just the heart of it is, what's different about what's inside here? There is a very well developed body of law regarding defendant – you know, can you get a blood test? Can you – okay. Well, you can get a blood test. Can you get fingerprints? Yes. Can you – and you sort of go

down the line. Can you get DNA? Yes. And there is a point – there is a recent case where a court said you couldn't cut somebody open to get bags of narcotics out of their stomach – that that was overly intrusive for the risk involved. And the concept is shock the conscience. So I just think that this is – really the issue is, does it shock the conscience to go in here, when we really have gone down that road pretty far that it doesn't shock the conscious to take blood, to take DNA, to take a lot of kind of samples that really are much more invasive, so invasion and pain aren't going to be the issue. The issue is: is there really something about what's inside the skull that's different?

MR. CROWLEY: But just to follow up there. If you look at the analogy of the current legal debate on the Geneva Conventions for example, you had the White House lawyers aided and abetted by the Justice lawyers who were pushing a philosophy of law on behalf of their client, the president, to justify things. And then ironically you had the lawyers within the Defense Department looking at Geneva within the framework of protections for our own soldiers. They were the ones who were posting the significant objections, so as you develop a legal understanding and framework for this, does that start on the Hill? Can they accommodate this? Is that within the ABA? Is it within existing judicial structures within the government? Where do you go to really develop this?

MS. BARD: The problem there is it's so definitional. When you're talking about what can you do by way of torture, you've got three categories of people: real POWs, real civilians, and this middle category of noncombatants that no one before the current events – no legal military legal thinker could have conceived that you would describe the people that we are now calling as noncombatants as noncombatants. It's just out of nowhere did they come up – there always was this category of noncombatants, but no one ever thought it meant this.

So I think what I'm saying is to each – and depending on where you categorize somebody, it's a different standard. Some people you can humiliate, some people shocking of the conscience. There's a continuum. So I guess the answer to that question is first you have to categorize people, but I think at bottom you do have to come up with an answer of – forget about whom you're hurting or – you know, forget those old categories: what does it mean to be inside somebody's head? And I think that still would be fundamental.

MR. CROWLEY: So then how do we get to the privacy issue?

MR. WOLPE: I'll just say this about that. I'm not talking legally here. I'm a sociologist by training, so I think about things in terms of social impact. I don't think the people are going to allow it. It's one thing to say we want to bring a lie detector down to Guantanamo Bay. It's one thing to say – this person – we all watch CSI and things – this person knows where the baby so buried and the baby has got two hours and if we use a lie detector we can save the baby. Okay. But when you actually articulate the other side to the public in a kind of robust way and you explain that for the first time in human

history we're going to be able to go into your mind, take out subjective thoughts that you thought were private, people get very upset, and so it's not just a legal question.

It also it's going to be a very robust public conversation about this, once the technology is ready for primetime, and I think, overwhelmingly, either it will be allowed under extremely narrowly defined situations – the public will insist on that – or the public will say this is a line that we're not willing to cross. And then you still end up doing it in Guantanamo Bay, but whether they're going to do it sort of routinely and end up with an MRI machine in every courtroom, I doubt. So I just don't think that people are going to allow this.

MR. CROWLEY: And we apologize, because this has been such a rich presentation that we don't have a lot of time for questions, but, Paige, why don't we start here?

Q: I work in –

MR. CROWLEY: Identify yourself please.

Q: Jay Schulkin – a number of places for Georgetown. I work on the neuroscience of fear in part. By the way, the amygdala is mostly associated with recognizing unfamiliar objects in which fear is the dominant thing, which explains the Phelps kind of effects. But suppose it's the case that here I am, I figured out a piece of the brain and the gene that results in fear and I believe in the war – not this particular war we're in, one that I actually believe in. And then I come across something that's fundamental. We all get funded from sources and we extend it to new places. It wasn't actually written into what I got funded for, but I discovered something. But now I've hit something. And I know if it gets used by somebody else it's going to work against what I really believe in, all right? So now – and actually, I think that's not that far away. What does one do?

MR. WOLPE: You're asking a fundamental question about the use of scientific knowledge and I've actually recently written about that in a sort of a book way, but I had an experience – I'm a bioethicist at Penn and I had – I'm in the psychiatry department. A group of psychiatrists came up to me and they said, we don't know what to do. This was early on in brain imaging studies, and it turned out they were wrong, but that's not really relevant. They said, we think – they had mapped some differences in brain function between men and women, which is that very well known that we think about spatial issues differently. And they said, we think in our preliminary data that we might have found racial differences; that is, that certain racial groups manipulate data in their mind differently than other groups. We're trying to decide whether to pursue this. What do you think? Right?

And then you have to ask yourself the question – there's one perspective that says scientific knowledge is always good. Knowledge is pure, and knowledge is always good. And there's another side that says how scientific knowledge is going to be used is the

moral responsibility of the scientists. It's not that just throw it out into the world and say it's their responsibility. You say this is something I generated: it's my product, I have some responsibility.

And I said to them, if you believe that this data is going to be misused by your society, then you have a moral responsibility to think that – I'm not going to tell you whether to do this or not, but you need to think very strongly about whether you want to generate that (or that?) could be so misused by society, and they decided not to pursue it. And so I think that that's the fundamental question. The scientist can no longer disavow responsibility for the products of their science. They have an ethical responsibility for those products.

MR. MORENO: Of course, there are these boundary cases where we can't know. Say the probability of something really bad happening is low, but the magnitude if something bad happened is huge. So one example that happened in genetics is the project to map the large chunks of DNA that get passed from one generation to the next depending on what historical, continental, racial group you're part of. So that in fact may have very profound implications for the way that we begin to see – as you well know, we begin to see differences in inheritance patterns. These different groups are almost certainly going to have different responses to different kinds of phenomena and stimuli. So these boundary cases are really, really hard and this is going on already.

MS. BARD: I'd like to make a comment on that which is that the old – just because we can, should we? And I think it's very hard in research. How do you know where it's going, whatever, but I think it's a much easier question when you have something and a lot of people talk about stem cells this way. We know how to do that. Should we? So it's really both not just in research, but also in the application.

MR. CROWLEY: We have time for just one more question, because Paul has got to get a train back, but we'll question here and the rest of panel will stay around and answer some questions informally once we're done. Go ahead.

Q: Thank you. Two sides of the coin on national defense. The one side of the national defense side: if we're contemplating a situation where enemies are hostile to the United States, how far should we be going in the area of psychotropic and behavioral modification – targeted neurosis kinds of research? The other side of the coin is how far should we go in terms of our own national defense, anticipating the weapons utility of this technology?

MR. MORENO: So how far we should go is part of the large social question that we need to address. Thank you for articulating it so well. And it seems to me that's what we now need to start considering. I think in *Mind Wars*, and I probably speak for the rest of us, I'm not a pacifist when it comes to these questions. I think we need to be prepared. There are a lot of bad people out there.

We also need to worry about the rebound effects to the way we construct our own society, so I – unfortunately (unintelligible) in *Mind Wars* I talked about these cases, some of which Paul refers to, some that I've talked about as well, and I felt that I ought to give the reader the sort of the maraschino cherry that's going to make all this worthwhile, but I think at this point we're really stuck with the process problem, and that's what I think we need to do. We need to work it out in terms of diverse and transparent processes in which we start talking about these problems, because the cases are unfortunately going to be so different. The technologies are different, some of the devices I think are clearly out of bounds. Some of the stuff – if you asked me if I thought that we ought to have access to opioids, aerosolized opioids to manage a hostage situation, I'd say yes, under the right circumstances with the right protections. So it's unfortunately a very complicated area. It's just too hard to give a four-syllable answer to those questions.

Q: But do you agree there's a final word that the debate should be elevated in public?

MR. MORENO: And there's – in public and I think there are signs that our colleagues in the neurosciences are now beginning to feel that they need to engage in these questions.

MR. CROWLEY: Jennifer, Paul, last comments?

MS. BARD: Well, I think that you're talking about in war – even in war, the big topic now is blinding – laser blinding. And we're talking about right out on the battlefield – a real war, everything. What's off limits? Can you blind people with lasers? So this is such a complicated question involving where are you when you're saying this. Because if the worst scenario – they're coming at you – we still talk about law of war and what's appropriate.

MR. WOLPE: For centuries, human beings have had discussions about just war theory – about what is an appropriate war, an inappropriate war, and what are appropriate and inappropriate tactics. And there's always been – I was actually amazed – I once heard – I was at Gettysburg and this guy was talking – a historian from one of the central Pennsylvania universities was talking about Gettysburg and the battle there, and he was showing these cannons, and there are these cannonballs and then he said they didn't really fly that far and that fast. He said in fact in most cases you could see a cannonball coming and you could step to the side, but you didn't because it was considered unmanly to step away from the cannonball. If that cannonball was coming at you, your job was to take it and that was part of the discipline of being a troop. And it was like – (laughter) – you're kidding me.

But in fact, in some sense that was part of the ethic of war at the time, and you see that over and over again: people who engaged in war in a way that reflected something about their sense of value, about their sense of propriety, perhaps a sense of manhood that we no longer would subscribe to, but in any case it was supposed to reflect something

about the society that waged the war. And I think we need to ask ourselves the question of does the kind of war that we wage today say something about our society that is unflattering. So take those brainwaves like a man. (Laughter.)

MR. CROWLEY: Before we adjourn, thanks to Paige Fitzgerald, Sam Berger for their help in preparing this event – a very rich discussion. Sorry we didn't get to more questions.

Q: (Off mike.)

MR. MORENO: We'll provide them. We can do that if you –

MR. CROWLEY: We will transcribe this and put it up on the web at americanprogress.org, so you can go back and see it – because there are a lot of phrases in here, even as an English major I've got to go back and say, what was that? (Laughs.) But please thank them for a wonderful panel discussion. Thank you very much.

(Applause.)

(END)