JEREMY WOLFE: Good afternoon. I decided to go for a little amplification today because I'm feeling a little underpowered, and I think that if I do my usual unamplified version, that sometime around 3 o'clock I'll fall over and somebody will have to haul me away. And actually a lot of the experiments I'm going to talk about today suggest that you wouldn't do it.

[LAUGHTER]

You'd just leave me in a little heap there and slowly file out. And it would be-- it would-- I could try that as a demo.

[LAUGHTER]

But that would be sad. So I don't think I'll do that. But I will-- I'll amplify myself in the effort not to run out of steam here.

When last we met, I had set up the-- well, the Asch experiment-- that's the three-line thing-- the Milgram experiment, where it turned out that people would shock another apparently innocent individual to a pretty severe degree without what looked like an awful lot of provocation, and then the manufacturers-- whatever it was-- consultation-- whatever it says on the handout-- an experiment that suggested that under other circumstances people wouldn't be so willing to comply with a suggestion that is not-- that would run against what they would normally do.

And I left it there to say that we'll come back today and talk about why that must be-- why that might be the case. And the context in which I want to talk about that is the social impact theory. That's the source I put on the handout is-- the guy's got a great name-- his name is Bibb Latané. It looks like Latane, but you pronounce it Latané. And the B stands for Bibb. I don't know who names their kid Bibb, but maybe that's how you grow up to be a famous social psychologist.

So when you're studying for the final, you can remind yourself that social impact is a function of SIN. But that's just the acronym. I don't know that Latané ever particularly noticed this, but that's the acronym for his three big factors in this theory of Strength, Immediacy, and Number. And what I want to do is try to explain those in the context, particularly of the Milgram experiment. See how those speak to the question of when it is that you will give in to the social pressures from the outside.

So strength, in this case, refers to-- well, in the Milgram case, really it would be the authority of the guy giving you the instructions. Remember that all the subjects in Milgram's experiment were upset by the notion that they should be shocking somebody, and shocking them apparently severely. And Milgram had trained himself to say, "Please continue, the experiment must go on," and not more than that. He wasn't going to go get into an argument with them. He was just going to say that.

If the guy saying, "Please continue, the experiment must go on" is Stanley Milgram, white-jacketed scientist, professor from Yale, you got 63% of people going through all the way to 450 volts in that experiment. But if you made a small change in the experiment and the person running it was just some guy-- Kristen Michaud, well-intentioned research assistant in the lab, or something like that-- compliance dropped to 20%. I don't know. I'm sure, actually, if Kristen was doing it, compliance would be like 100%, and she'd smack them around and stuff like that.

But if it was not an authority figure or one-- if the person giving you the instruction was a person with less authority, compliance dropped way down. That is the sort of thing that the military knows, right? Who gives you the order makes a difference.

Immediacy refers to the vividness of the factors-- so the salience of the factors here. So I already talked about one immediacy manipulation. Remember, in the original version of the experiment, 100% of the people went all the way through to 450 volts. Milgram figured, oh, my goodness, that's because they didn't buy the story at all. And he brought the learner/victim into sight and into the range of hearing. And that change in the immediacy, increasing the vividness of the impact you are having on this other person, decreased compliance from 100% to about 2/3 of the population.

If you manipulate the vividness of the pressure on the subject, compliance can change. So if Milgram is right there saying, "Please continue, the experiment must go on," you went on. But if he said, "Look, I got to rinse a few things out. I'll be down in my office. If you got any questions about the experiment, call me."

So I have a heart attack, the experiment-- the learner is busy making all of his bad noises, the subject is getting antsy, picks up the phone, "Please continue, the experiment must go on," yeah, right, compliance dropped again to 20%. So big drop in compliance if the source of the authority was not right there to help you out.

And if you make the consequences even more vivid, you can again drop compliance in this experiment. So in one particularly vivid version of Milgram's experiment, Milgram didn't have the learner off in another booth. He had the learner right next to you making his noises.

And at a critical time in the experiment, the electrode is slipping off the guy's hand. And Milgram says, hold the electrode on him, right? And he's still doing the same thing, right? Oh, eeh, ah. I'm not going to respond anymore. I quit. Yeah. [VOCALIZING] Compliance drops, you'll be glad to know. What you may be a little distressed to know is it drops only to 30%. 30% of the people were still willing to deliver these punitive shocks all the way through to the end even when they're holding the guy's hand down on the electrode.

It's this immediacy factor that makes it psychologically easier to shoot a missile over the horizon and kill somebody than to actually look somebody in the eye and kill them. They're dead the same way in either case. You may know objectively that they're dead.

This is a real issue for the military. The military knows that it is in the unfortunate business of killing other people. And it also knows that, in a way much more profound, of course, than the Milgram experiment, that this is very upsetting to its own soldiers, to say nothing of the people who get killed.

But the people-- people don't like killing other people typically. It takes work to get somebody to kill other people. And it's psychologically less damaging if it's over the horizon than if it's face to face. Though, all you need to do is watch the latest video of some charming person slitting somebody's throat, some hostage's throat in Iraq, to realize that it is also perfectly possible to kill somebody right there.

But there is an immediacy effect, a real world immediacy effect that-- well, that's perhaps a gruesome one. And you might think this is only stuff that works in the realm of the truly horrible. That's not true either.

If I ask-- suppose I get curious this evening and I send a note around saying, what do you think of the Milgram experiment? I might get an email back. I wouldn't bet on it. Maybe a couple. I know who would be sending them, too, by this point in the term. If I ask right now, well, what do you think about the Milgram experiment? Is that a disturbing experiment? A few people will nod their heads. The Eastern Bloc might raise its hand.

[LAUGHTER]

But most of you will successfully sit on your hands and not do anything. But if I was to wander over here somewhere-- I think she's getting very nervous here. You can see the experiment really works. And if I was to ask, what do you think of the Milgram experiment? I won't actually make her respond. But I could, right?

There's no doubt that unless-- the only person capable of not responding under those circumstances would be my 15-year-old son. You perfected this within the realm of your own family. Why did you get that grade?

[LAUGHTER]

But under other circumstances, the social impact, the social pressure there is so strong by the time it's all directed at you, that you've got to respond. You can feel that social pressure. Actually, it was a great experiment-- this was a great experiment because several people thought I might be headed their way. And I caught these great fleeting looks of relief from that side of the aisle when they realized he's going that way, man. He's not going-- so that's immediacy.

That's also, actually, an illustration of the effect of this third factor, which is number. In the Milgram experiment, this was not manipulated. Milgram experiment is a one on one experiment. There's Milgram or his surrogate exerting pressure on you, the subject. In that manufacturers consultants study or in the Asch experiment, it is manipulated. And you find that the more people that the authority is trying to spread his impact over, the less the impact on any given individual.

Similarly, here, if I ask you-- 300 of you-- what do you think, each of you gets-- I don't know if this is actually a linear operation, but roughly 1/300 of my impact. But if I go and find her, she gets all the impact. And she has to say something. Actually, I think that we could probably work out the equations here because there's also probably a distance equation, right?

You know there are people-- you, out there in the cheap seats, know there are people who sit out in the back because the possibilities of social impact are less out there. I can do what I want out there in the cheap seats. He can't see anything anyway. Look at all those computers up there. They're all surfing the web anyway.

[LAUGHTER]

In any case-- but I don't know that anybody's ever looked at the distance effects in any sort of direct way. There's a very nice study done at Ohio State some years ago during Greek week. What the experimenters did was they hung out backstage, because at Greek week at Ohio State what you had to do was your fraternity had to get up in front of all these people, like a big stadium full of people, and do something, typically something kind of embarrassing, to show how cool you were and why everybody should join your fraternity.

And what the experimenters noticed was that the number of guys in the group varied. There could be-- you sent out your one guy or you sent out this group of 10 guys to do something. And so what they did was they simply asked people before they got on stage, how nervous are you? And the answer was-- it was monotonically related to the number of people. If it was just you, you felt much more nervous than if there were 10 guys going out there.

Now, there's no real rational basis for that. And you're not going to get hurt out there. But if you imagined that everybody in that stadium had a tomato, you can understand--

[LAUGHTER]

--the social impact version of this. How many tomatoes are going to hit you? If there's just one of you versus if there's 10 of you, it's going to diffuse, in this case, very literal impact. The experiment has-- social impact theory has one of its roots actually in a lurid and media circus murder from the '60s. In fact, a murder that I remember because it happened in New York City when I was growing up in the New Jersey suburbs, and so it got a lot of coverage.

This was the murder of a woman named Kitty Genovese who was murdered in the courtyard of her fairly large apartment block. And it wasn't a quick business. The guy stabbed her. And she crawled off into the bushes. And she didn't die. And he came back and he finished-- it was gross, just disgusting murder. And the reason-- gross disgusting murders-- I mean, there are whole New York radio stations devoted to that.

The reason this was a particularly salient one was it was clear, afterwards, that there were at least 40 or so people who had heard this and nobody had called the police, let alone intervened directly. Nobody had called. And this generated a whole lot of media browbeating and stuff about was it the case that New Yorkers were just cold, heartless individuals or what?

And rather, like the Milgram experiment, being motivated by the question of were the Nazis special in some evil sense, some of this work on social impact theory was based on the hypothesis that, no, that this didn't illustrate the cruel heartless nature of New Yorkers. What it illustrated was what happens when you're on the losing end of what boils down to a social impact experiment.

The problem was that she was diffusing her impact across this whole apartment building. And when you interviewed people, people said, over and over again, I thought somebody else would have called. I wasn't quite sure what was happening. Somebody else would have had a better look. They figured that somebody else would have taken care of it.

If the notion is that had this been taking place in the front yard of your isolated farmstead on the Great Plains or something like that, you would have done something because you would have known nobody else could have. Is there any evidence for this? Well, yes, actually, John Darley, who was one of my professors at Princeton, and Latané who worked with him, did a series of beautiful experiments on this. Obviously they didn't go around murdering people in courtyards.

But what they did was you'd come into the lab and the lab had a whole bunch of isolation booths in it because-- except if you're in a weird experiment like that Asch three line experiment, you want to have people doing the experiment alone. So a lot of labs are set up this way. And so you, the subject, would go into this little booth to do the experiment. And then something would happen. For instance, you'd hear crash and "help."

And the question was, who cares what you're doing in the booth, the only interesting question in this experiment is how fast do you come out of the booth to help? And the answer is, it depends on how many other booths you think are occupied. And of course, Darley and Latané made very sure that you knew exactly how many booths were occupied. So if it was the case that you knew that you were all alone, you were out there fast because it was-- the impact was on you. If there was going to be any help around, it was going to be you.

And if the booth was full, if you knew that there were six other people in the experiment, you were slower to come out. Because, well, you know, I'm not the biggest, strongest guy. Somebody else will help. And I didn't take that Red Cross course or whatever. The responsibility gets diffused across multiple people.

It's not just for helping. In another one of their entertaining versions, smoke comes into the lab. How fast do you get out of there? If you're alone, you're moving. If you're not alone, you're thinking, he's not moving. He must know something I don't know. And if he's not moving, it's going to be embarrassing, right, if I go, "fire, fire" and I go running around. Everybody's going to think I'm a complete doofus.

Now, the downside-- so the beautiful experiments showing beautiful social impact effects. The downside of this is this was done at Princeton, where I eventually showed up as an undergraduate to do my nice boring research on visual perception. None of my subjects ever believed that I was doing a visual perception experiment.

It didn't help that the room I had was one of these rooms with a half-silvered mirror in it, so that I could look in and they couldn't look out. I didn't care. I wasn't planning to look in. It was left over from the social psych guys. But nobody ever believed I was there to do a regular just straight up and down, I just want to know what color it looks like experiment.

[LAUGHTER]

They all figured, you're watching me, right? There's something weird is going to--

[LAUGHTER]

--happen here. Oh, along those lines-- it didn't happen to me, but a word to the wise, should you ever find yourself in an experiment that involves one of these rooms with a half-- that looks like one wall is mirrored. If you're in a psych lab, it's probably a half-silvered mirror. The implication of a half-silvered mirror is that that's not a mirror that you want to use to readjust large parts of your anatomy, because--

[LAUGHTER]

--it was a great story. The poor grad student was embarrassed for life. He was a very straight up and down square-ish kind of guy. And anyway, it was very embarrassing.

[LAUGHTER]

The grad student was the observer here. And it was embarrassing. So don't do that. You don't want to embarrass people. Oh, one last example from-- a closer to a real world example of this. The great-- I think it's another Darley and Latané-- liquor store experiment.

You go into a liquor store. You're hanging out in the liquor store. These two guys come in. They ask the guy in the liquor store, do you have any blah, blah, blah, blah, blah-- you know, weird beer-- some weird beer. The guy the liquor store guy says, I don't have it up here. I might have some in the basement. And he takes off for the basement.

As soon as he's gone, the two guys look at the case of Bud, say, ha, ha, he'll never miss this, pick up the case of Bud and leave. The guy comes up from the basement and asks, where are those guys? And the question is-- everybody's a stooge in this experiment, of course, except you-- the question is, what do you say?

The answer is, if you are all alone, 2/3 of you say, the guys, they stole the beer. But if you're with even one other person, that drops to one third, again, because of this diffusion of responsibility. You say to yourself, unconsciously, implicitly, or whatever, if he's not saying anything, why should I say something? And so you're less likely to say something.

Now, the one good side of this-- this is all depressing, right? It suggests that if we're going to hang out in large social groups, one of the downsides of this is that we're not going to look after each other terribly well. There's a useful inoculation effect here. And I've just inoculated you. The fact that you know about this-- there are experiments suggesting that the fact that you know about this, makes you more likely, the next time the occasion arrives, to discount the number of other people there.

So now it is probably the case that if I do keel over, somebody will rescue me, even though there are-- the responsibility for this has been diffused. Of course, the reason is because somebody is going to think it's a fake. And they think, I'm going to win the prize if I collect him or something.

[LAUGHTER]

But I'll try not to do the experiment at all. But in any case, there is evidence that once you know about these things, you're less vulnerable to those effects and less likely to find yourself complying with an instruction that's wrong.

Look, you know-- you probably have a good intuitive feeling-- and I hope you're right-- that all over Iraq now, if you're holding prisoners, you've now been inoculated against doing a whole round of stupid things. When the Abu Ghraib thing broke, every social psychologist in the country was on some talking head show on national public radio saying we knew about this. We can explain this. Because that's exactly the thing that's understandable in the context of these sorts of experiments. People doing things that they would never.

What's the chance that you were back home, before going off to Iraq, saying, I'm going to go to Iraq, I'm going to get me some prisoners, put them in compromising sexual positions and get photos sent back home? No, nobody thinks about doing that. But the social situation that you find yourself in, with perhaps an implicit command from somebody to loosen things up here a bit, produce the effect. The fact that this was a disaster has presumably now inoculated the system, at least in the short-term, against it happening again, at least we may hope so.

The practical questions like, what do you do about prisoner abuse, are one interesting line that grows from this work. Another question, returning perhaps to the more basic psychological side of things, is what I think I labeled on the handout as, oh, yes, the fundamental question. I decided if you could have the fundamental attribution error that I would invent for today's purposes the fundamental question.

But understand that that's my invented jargon. And I won't put a question on the exam saying, what's the fundamental question? The question here is, who is this-- I keep talking about you-- you can be pushed around by these laws of social impact and stuff like that. Who is this you or I that can be so readily manipulated?

There's a lot of folk psychology about it. We understand that there's something-- well, look, we understand, for instance, it is possible to control a car in such a way that the car kills somebody. It is also possible to train a dog in such a way that the dog kills somebody. And history tells us it is possible to train human beings in such a way that they kill-- that a human being kills another human being.

There's something fundamentally different-- folk psychology understands that there's something fundamentally different about the responsibility involved here on the part of the car, the dog, and the human. And that seems to have to do with this sense of self, the sense of you as a self-aware, psychologically continuous over time kind of entity.

Is there anything useful that we can say about that sense of you as a psychological self? Well, let's back into this a little bit. If you look at me, you know who I am, right? Pretty much. Those of you who don't, it's getting a little late in the term. But you recognize me. That's fine. Could I be a cunningly disguised actor who's impersonating Wolfe today? Yeah, that's possible. It'd be mildly interesting. OK, fine.

Switch. All right, let's suppose this is your mother or somebody else who you feel strongly about. You look at that person and the recognition has two pieces to it, more than presumably looking at just some person you know. And there's a fairly strong affective component. And let's take the best case scenario here. You see your mother. You recognize that's my mother and I love my mother. OK, good.

Now let's suppose that something goes wrong with the affect piece of that. That little hunk that-- some hunk of brain that's doing that for you, something goes wrong with that little hunk of brain. And you look at your mother and you say, I recognize my mother and I hate that. Or I don't feel anything would be another possibility. That's going to be-- that doesn't make sense.

How could that-- this is, again, happening not-- you're not sitting there with a little checklist saying, does this make sense? You're toting up your current experience and asking, implicitly, does this make sense? And the answer is no. How could that be? Well, one possibility-- it sounds a little odd, but one possibility is that's not really my mother. It looks like my mother. But actually she's been cunningly replaced by a fake.

How could that-- why would that be? Well, if it was my real mother, I'd know my-- I love my mother. I don't love this, therefore it's a fake. Now, that sounds weird, but it's a real neurological condition. It's called Capgras syndrome. I put a definition of it I think on the handout.

It's a very-- I always think of it as crabgrass syndrome, but Capgras is correct and it's the name of somebody. The disorder seems to be an effort to reconcile an unreconcilable pair of thoughts. And it sometimes travels with schizophrenia as a diagnosis. It may be the result of a brain injury. Typically, when there's a brain injury involved, it looks like it's frontal lobe in some fashion.

But it's relevant to the current discussion because you can have the same phenomenon for yourself. You look in the mirror. You say, that's not me. And you have a denial that you are you. It points out that even something as self-evident as-- oh, I know, is that a Dr. Seuss book? I am I. Where is that from? I can almost hear it. You haven't been reading your kid lit recently enough.

AUDIENCE: Sam I am.

JEREMY WOLFE: No. Sam I am, but I don't think Sam has Capgras issues.

[LAUGHTER]

No, I am I, and I can't remember what comes next. Oh, well, doesn't matter. In any case, one might ask whether there is some little piece of neural tissue that is you in this sense. That if we were to go in and take out this one little bit of tissue, that what we would discover is that you weren't you anymore. That you'd be-- you'd still have a memory. You'd still have this. You'd still have that. But you just wouldn't have this sense of being you.

The short answer to that is there doesn't seem to be any specific lesion that does that. That used to be the end of this part of the lecture. However, particularly with the advent of fMRI, it's becoming increasingly clear that aspects of this sense of the self do have homes in the brain that can be localized to some extent, damaged in various odd neurological disorders and give us some idea about how it is that this sense of self is assembled.

So what I've done is I've actually modified a list from a recent article in *Trends in Cognitive Science* to come up with six aspects of the self to give you some notion about how you could take this problem apart. The first of these-- I must have just listed them on the handout, right? The first of these is representation.

We're all-- nobody, when asked about themselves-- you know, what kind of person are you-- nobody says, oh, I am just a collection of reflexes responding to the current situation in the environment. Everybody has a list of-- I'm an honest, loving individual. You may have some theory-- trait or situational theory about how you came to be honest and loving and all that.

But you've got a set of traits that you believe to be fundamental to you, at least at the present time. And that's your representation of yourself. That's your theory. That's your theory of you. You also, as part of that theory, have the notion that-- you have this notion of agency, that you are responsive, and, in fact, you are the cause of at least a reasonable number of your actions. You feel that you own those actions.

That's part of what makes the Milgram experiment disturbing, right? It's not disturbing that a machine can produce 450 volt shocks of some shnook. It's disturbing that you can, because you figured that you own that action, and that if you did it, that says something about you. That's this question of agency.

Now, not only do own actions, you own your body. That's the aspect of ownership that I'm talking about in number three there. You own your body. Look, you also own your laptop. But you own your body in ways that are more profound than the way that you own your laptop. There's something fundamentally different about that.

You're able to use this information that you've got about what kind of you you are. You're able to use that to perform new calculations if you like, like do I like-- I don't know-- I need a new fruit-- durian. Do I like durian? Well, it's a fruit. I like fruits. It's supposed to smell like fermented garlic. I don't know if it sounds-- but I could ask myself questions about myself based on my knowledge of myself. That's this evaluation aspect.

Monitoring is a sub-- well, I don't know if I consider it to be a subset of that. Monitoring is this-- is keeping track of what you are doing and asking yourself how it's going. All right, so here I am, I'm self monitoring here and saying, am I really going to fall over today? No, I don't think so. I'm feeling pretty good just at the moment. That's monitoring. You're asking yourself, am I still awake? If you're answering yes, the answer is probably yes. If you answer no, that's a little weird.

[LAUGHTER]

Or it's lucid dreaming or something. That's nice too. And finally, there's this sense of integration where the whole thing is tied together into a single self. There's been plenty of evidence that we've been accumulating during the course of the term that you are in some sense a committee, that you've got lots of semi-autonomous bits and pieces doing their thing and giving rise to you.

But an important sense of you is that it doesn't feel that way to you. You don't think of yourself as a committee, or a collective, or what's that thing on-- is it *Star Wars*-- where the colonial organism-- is that the Borg? The Borg, right? You don't think you're the Borg. You've got this sense that you are a unitary thing.

Now, each of these bits, while it is not the case that we can go in and somehow pull out the thing that is you-- at least nobody's figured out what piece of brain that might be-- each of these aspects of you is subject to attack and to some degree at this point of localization in the brain.

So a clear example would be the question of ownership. I think I actually talked about some of this earlier when we were talking about perception. If you get a lesion in your right parietal lobe, you will typically show symptoms of what's known as contralateral neglect. Contralateral, meaning on the other side.

And you can-- what I think I talked about when I was talking about perception is the fact that you will ignore the left side of visual space. And I think at that point, I also mentioned that people ignore the left side of their body or can. You can have all sorts of varieties of neglect. But it can include ignoring the left side of your body to the point of denying-- I mean, you can see it, but you might deny that it's you. That's neglect.

Interestingly, if you lesion the left parietal lobe, you do not typically get neglect of the right side of the body, at least not in right-handed individuals. The best understanding I've ever come up with for that is that it may be that in right-handed individuals, the right side of the body is represented more robustly or redundantly than the left side of the body.

And so a typical lesion, that leaves you alive at least, doesn't take out the entire sense that you own that side of the body, whereas a lesion of the less dominant right hemisphere, left side of the body, takes out this sense-- it leaves you with this sense that you don't own the left side of your body at all.

Now, the flip side of this is our phantom limb phenomena. So suppose you lose the limb rather than the piece of brain that represents the limb. So if you lose a limb, very typically patients-- well, the hunk of brain is still there. And the brain is a kind of a noisy place. What's going to happen if you've got activity that goes above some threshold in the chunk of brain that used to represent this arm?

The answer is you're going to think you've still got an arm. And you may know at some nice cognitive or depressing cognitive level that you don't have that arm anymore, but it's going to feel like it's there. And it's going to be-- it can be really annoying because phantom limbs do things like they get stuck in a position. Why is that annoying? Well, that's annoying because somebody with a phantom limb stuck like this walking out the door does things like this--

[LAUGHTER]

--which is exactly what you would do, of course, if your arm was like in a sling out there, because you don't want to bash into the door. But you feel a bit of a fool if you're doing that with a limb that you know perfectly well isn't there. But it's a very-- and what do you do if you've got an itch in your phantom limb, or actually pain in phantom limbs is an even more serious problem. Perfectly possible to have pain in your phantom limb. It's not particularly easy-- it's not particularly easy to treat that.

Now, it turns out that the brain does not-- the brain, like nature, abhors a vacuum. And if you lose a limb, the chunks of the brain surrounding the arm representation start to say, there's open territory here, we could take that. And over time, the brain reorganizes. And you get very curious reports about the limb changing. So the limb may shrivel up.

And there are reports where the guy comes back to the doctor and says, how are you doing? I'm doing much better. Now instead of the stupid limb out here, I just have fingers hanging off my shoulder, which is kind of weird. But since they're invisible, it's not that weird.

[LAUGHTER]

As it's being taken over-- what seems to happen is that neighboring stuff takes over. What's near to the arm and the hand in the sensory homunculus, for example, are things like the face. And I put a reference to Ramachandran's entertaining, as I said, book on the handout. Blakeslee is a science writer. Ramachandran, or Rama as he is usually called, is a-- well, I think of him as a vision researcher, though mostly these days he's gone off more into the neurological work.

But what he did was he was testing phantom limb patients. And he was touching them on their face and asked them, what do you feel? And the patient-- he's got interesting video, actually, of the patient saying, well, you know, look, of course, I can feel you touching my face, but the interesting thing is it also feels like you're touching my phantom thumb.

You move over a little bit and now it feels like you're touching this phantom finger and so on. And you could actually map out the hand and arm across the surface of this guy's face. He loved it, by the way. Why did he think this was good? Yeah.

AUDIENCE: He could itch it.

JEREMY WOLFE: Yeah. He knew where to scratch if it itched and it worked. You get an itch on your phantom arm, he's now learned that he can scratch there and get a degree of relief. This is actually-- so the sense of ownership of the body is clearly, at least partially, it can be localized in the brain to the things like these parietal structures.

The degree to which the brain is plastic, even in adulthood, is a growing story where you find that the chunks of-- oh, there was an fMRI study showing, for instance, that if you look at violinists, the representation of the fingering hand in the brain is larger than the representation of the bowing hand. The fingering hand is learning a whole lot of stuff that the bowing hand doesn't need to and it ends up using more brain, apparently.

All right, let's go back to this notion of the self as a bundle of personality attributes and of your understanding of the implications of that knowledge. So these are the ideas of representation and evaluation from that earlier list. Does this have a home?

Maybe is a reasonable answer. There is evidence from neuropathology that suggests disorders that specifically attack that sense of that aspect of the self. The disorder I'm thinking of is known as Pick's disease, which I probably labeled-- yes, I labeled on the handout as a frontotemporal dementia.

The way to think about-- oh, it says that on the handout also. The way to think about it is like an Alzheimer's of the personality. It's an Alzheimer's-like disorder. It's a terrible diagnosis, by the way, because it typically is a very progressive-- quite rapidly progressive dementia that leads you witless fairly quickly and dead fairly shortly thereafter. Very bad news.

But it is of psychological interest because while the initial manifestations of Alzheimer's are often the forgetfulness, the manifestations-- what gets your family to bring you to the doctor if you've got Pick's is a change in personality. So I'd like to tell you a couple of anecdotes here.

Here's a patient-- 54-year-old woman, describes a charming dynamic real estate agent who goes from wearing expensive designer apparel to choosing cheap clothing and gaudy beads and asking strangers how much their clothes cost. Once a lover of French cuisine, she adopted a love of fast food, particularly Taco Bell. Now, look, if you like Taco Bell, that doesn't mean you're going to die of dementia next week.

[LAUGHTER]

The point is that what people notice, what your family typically notices is an unexplained change in that list of attributes that makes you you. Or a patient-- 63-year-old woman described as a well-dressed-- I don't know why they're all well-dressed-- well-dressed, lifelong political conservative who became an animal rights activist who hated conservatives, dressed in T-shirts and baggy pants, and liked to say Republicans should be taken off the Earth.

[LAUGHTER]

So again, you can imagine somebody whose political opinions evolve. But you could also imagine that if your rock-ribbed Republican grandma was suddenly doing a kind of a late hippie thing and people might worry. And the lesions here seem to be, typically at this stage, in the right frontal lobe is when you get these people into a scanner.

Other parts-- there's-- [COUGHS] that was a mistake.

[LAUGHTER]

You shouldn't try lecturing while you're drinking.

[LAUGHTER]

But no, you don't have to rescue me.

[LAUGHTER]

I think I'll be able to rescue myself. Oh, anyway, so the loci that seem to be particularly important-- but if I'd been eating, you should come up and Heimlich me and stuff like that. I don't think the Heimlich maneuver works well for water. Anyway, the particular chunks of brain that seem-- that at least one recent study suggests are important here are chunks of the frontal lobe lying on the midline.

So your brain's like this. If you open it up, that's the medial surface of the cerebral hemispheres. And there's evidence that locations in there are what's important, that what may be very important for putting together this sense of the self.

Now, I think I did-- oh, yes, I put on the handout the notion that orbital medial prefrontal cortex might be a possible home for representation. I put that there just because it's got to be so much fun to go off and be able to talk about the OMPFC, and to distinguish it from the DMPFC. I promise not to ask exactly that. Is representation localized in the OMPFC or the DMPFC?

This is for the subset of you who are dying to go off to med school and stuff like that and want practice using jargon that nobody else will understand. Don't get me wrong, this is useful stuff. If you're interested in the topic, the reference on the handout to-- did I put the reference on the handout? Yes, this comes from this Northoff and Bermpohl article way up at the top of page 2. By all means, go check it out.

I just realized when I was thinking about lecturing about this that I knew that a whole bunch of people are going to go get deeply obsessive about worrying about whether they've got the OM versus the DM straight. And I don't want people to spend a lot of time worrying about that. What I want you to come away with is the notion that there are a set of localizable bits of, particularly, frontal structures in the brain that might be-- where you can make a case for each little bit being responsible for a little bit of this overall sense of the self.

And so you can-- well, one of the ones actually that where the little chunk of brain-- again, I probably won't ask the question-- but where the little chunk of brain is quite clearly doing something specific for you is the anterior cingulate. Again, in the midline of the brain, the medial surface of the cerebral hemisphere wrapped around the corpus callosum, that big bundle of fibers that connects the two halves of the brain.

The cool thing about that is that it really looks like it's serving a monitoring role. What it does is it's the thing that's sitting there checking, am I making a mistake here? So if you're in our lab, I can feel my anterior cingulate light up. Because if you're in the lab and you're doing a whole bunch of, say, visual search experiments, and you hit the no key just as you see the target, that, oh dear phenomenon where you can just feel yourself saying a word you shouldn't say, that's your anterior cingulate error monitoring.

How do we know that? Because if you do these experiments in a scanner, when people make errors, that lights up. It's really quite lovely. Oh, it's also-- in the practical advice side of the course, it turns out, at least from a couple of things that I read, that the anterior cingulate is particularly vulnerable to alcohol.

What's that mean? Well, it means have a few drinks and the chunk of your brain that's saying, is this a mistake, takes a vacation, right? So have a few drinks, go down to Kenmore Square to celebrate the Red Sox. Look, there's a car. Could we flip that over?

[LAUGHTER]

Yeah, we could do that. Would that be a mistake? I don't know. The guy's asleep. Don't wake him up. Or go and drink a few things and should I sleep with that person? Well, I don't know. We'll ask in the morning.

[LAUGHTER]

Well, I guess the answer was, no, I shouldn't have. But anyway, so next time you are inclined to imbibe something stronger than Poland Spring water, just think of your little anterior cingulate that's bathing in alcohol.

And then you can go drive down the highway and say, would it be a mistake to pass this semi on a wet road tonight? Well, I don't know. Let's find out. So you want to keep that piece of your brain and you want to keep it more or less functional.

The conscious you, this notion of integration seems to have something to do with the notion-- well, what's it mean that it's all one thing? In some way, this is all tied into the fact that you feel like a single self-reflective conscious entity. One interesting question-- well, one interesting question is, are you conscious?

AUDIENCE: Yes.

JEREMY WOLFE: Well, sure, now that I asked you. Were you conscious before I asked you? I don't know. Maybe. This is what's known in the philosophical literature as the refrigerator light problem. Is the refrigerator light on when the refrigerator is closed?

AUDIENCE: No.

JEREMY WOLFE: Well, you know that the answer is really no.

[LAUGHTER]

And look, even most philosophers know that. But that's because you have a deeper understanding of refrigerators.

[LAUGHTER]

But if you're just faced with this thing and the question is, is the light on when the door is closed, how would you know? You open the door. The light's on. It's always on. Every time I open it up, the light is on. It's cool. It's possible that consciousness-- people seriously entertain the possibility that consciousness is like that. It feels continuous because every time you ask yourself, in any fashion, about whether or not you're conscious, not counting the guys who are out cold-- and, well, they can't ask themselves anyway-- you feel conscious, right?

But the closest you can get to a feeling that there might be an issue here is-- there's a phenomenon known to long-haul drivers where you're driving down the interstate, you get from point A to point B and you have no recollection of having done that. The good thing is if you're not doing that while you're asleep. Asleep is a different problem. It's a very serious problem.

But car accident-- the greatest number of car accidents per mile is not in downtown Boston, where you would think it ought to be, but it's way out West, because 600 miles, the road doesn't even turn. The problem is the 601st mile, it makes a 10-degree slant off to one side and your semi doesn't. And you go straight into the sagebrush or something like that because you've gone to sleep.

But the less dire version of this is you can get into a kind of state driving down the interstate where you really seem to lose a chunk of time. And if you ask yourself, was I conscious during that time, I must have been awake because I didn't crash the car. But I got-- there's nothing there.

Whether or not you were conscious or not, I can't speak to because of this refrigerator light problem. If we asked you while you were in the midst of the state, are you conscious, you'd say, of course, I'm conscious, that's a stupid question. So if you're interested, one of the projects-- one of the more interesting neuroscience projects out there is to decide which bits of brain are important for consciousness.

Christof Koch at Cal Tech has done a lot of work on this, wrote an interesting new book, which I would have put on the handout if I could have quickly found the reference. But if you go to my website, you can find my one-page review of the book, which tells you what the book's about without you actually having to read it. But it would also give you the reference for the book.

But Christof refers to the neural correlate of consciousness. The question is, which bits of brain do you need to be conscious? And then you can go on from there to ask, what that consciousness might actually be for? It's very clear that we can do an awful lot of stuff without being conscious. This is an important wrinkle on this issue of agency.

There's an interesting body of research that suggests that when you feel like you are making a decision-- which one of these things do you want-- the brain-- we can pick up electrophysiological indications that you have made the decision before you, the owner of the brain, know that you've made the decision, suggesting that the-- one can wrap oneself in philosophical knots trying to ask yourself what that means about the agency of your acts. Are you, the conscious you, committing those acts or are you merely reporting on them afterwards? But there is this interesting data that suggests that you have made the decision before you know that you've made the decision.

In any case, what we can't find is clear evidence of a single little piece of neural tissue that is you. No single lesion seems to leave everything else intact but take you out. So what I want to do now is to switch from neuropathology to psychopathology. But I will do that after you take a brief stretch here. And then we'll talk about that a bit.

[CHATTER]

AUDIENCE: I had a question about the syndrome that you talked about where you can't recognize who you are.

JEREMY WOLFE: Yeah, yeah.

AUDIENCE: Is it visual? So you can't-- if you look in the mirror--

JEREMY WOLFE: Oh, no, no, no, no, you know perfectly well looking in the mirror that that looks exactly like me. The weird thing is it just isn't me. So if I had a photograph of you, you would know that was you and you would also know that it wasn't you. I mean, it's not you. You're this person right here. If I had a photograph of your mother, you would know that this was a representation of your mother, but wasn't necessarily your mother per se.

The weird thing about Capgras is if I had your mother here, you would have the same sense of it being it looks like mother, but it just isn't. It's one of those things where it'd be cool if you could have this reversibly just to know what it felt like. It's very hard to wrap your brain around what that particular delusion must feel like.

But there are visual disorders where you don't recognize spaces. That's prosopagnosia. I think I talked about it earlier. I look at you, I say two eyes, nose, mouth, it's a face. Whose is it? I don't know. But this is in some sense the opposite, the complement of that. I know exactly who it is. I just don't believe it.

AUDIENCE: So if I had that disorder and I looked at--

JEREMY WOLFE: So it would be your hand. That's interesting. I'm not sure I've ever read anything about whether people deny their own-- in neglect you would deny it was your own hand. But in neglect, typically the hand would be paralyzed and you wouldn't be doing anything with it because of the nature of the stroke.

I don't know. I thought you were going to ask whether people-- whether I could look at that water bottle and deny it was my water bottle. And it doesn't seem to extend to objects. It seems to be a very person-specific kind of delusion, that it's about people and about people with whom you have strong affective relations.

And it's a very sad kind of thing because you read these anecdotes about how would you feel, because typically somebody is in tough shape for one reason or another when they've got this disorder. So you're visiting your kid in the hospital and he's busy declaring you're an evil agent who's disguised as daddy. It must be heartbreaking.

And I remember reading one account where daddy, in an effort to cure the kid, comes back and declares I did it, I killed him. And I think the story was that it provided some temporary relief and then it didn't stick. But very weird stuff. Very small, it's rare stuff. Small literature.

OK, let me-- oh, I just realized-- I suppose it didn't matter, but I just realized that if I'm going to mic myself, having discussions during the break could be a little risky. I got to make sure that I'm just talking about the details of Capgras syndrome, which we were, as opposed to having a discussion about I hate my TA. Oh, yeah, do you? What's the name of your TA?

[LAUGHTER]

That wouldn't work. Or I love my TA and in-- well, never mind.

[LAUGHTER]

Well, let's get on to psychopathology and my own and others'. The first thing to do is to say something about the distinction between a neuropathology and a psychopathology, which might seem a little weird in a course that began by asserting the mind is what the brain does. I mean, in what sense can you talk about neuropathology on one side and a psychopathology on the other?

I decided today-- and I'll see if I still think tomorrow that it's a useful distinction-- to think of it like a hardware bugs versus software bugs. Same computer not working in some interesting fashion or other. But you can have a problem because some piece of the equipment is broken. And you can have a problem because the program running over that equipment is not working properly.

Now, I realize, as I'm saying that, there is one problem with that analogy, which is that if I have a hardware bug, I'm going to be inclined to fix the hardware, and if I have a software bug, I'm going to be inclined to fix the software. That distinction is by no means as clear in psychopathology versus neuropathology.

So you can have a brain lesion where the treatment is essentially behavioral because you want to do some retraining of the brain that you've got left, and you can have a psychopathology, a problem, if you'd like, with the way that the software is running, where the intervention is to give somebody a drug that's doing its work essentially on the hardware. So the metaphor is not perfect, but it gets at something.

Psychopathologies are-- it's worth thinking of as problems with the way that the program is using the brain. Are there psychopathologies that specifically attack the self? The answer is, yes, those are what's known in the trade as dissociative disorders. Much beloved of various and sundry literary outlets.

So the cleanest one, if you like, is psychogenic amnesia or depersonalization, occasionally resorted to by soap opera writers who have backed themselves into a corner. That's the get a knock on the head and I don't know who I am, I don't know where I am. And that allows you to do a certain amount of plot twiddling as needed.

It does happen in the real-- oh, let me say a word about-- now that we're talking about psychopathology, I need to say something about psychiatric hypochondria, which is psychogenic amnesia-- very rare. It's not going to happen to you. It's not even going to happen to you after I tell you we don't really know what the cause is. But the best we know about it is that it's a response to severe stress.

The problem is you say that and people say, oh, I'm under more stress than I've ever been in my life. I'm going to wake up tomorrow, I'm not going to know who I am. Not going to happen. Very rare stuff. But this is a close kin-- this is the intro psych kin to med student hypochondria, which is a very real known phenomenon.

Med students are always coming down with spectacularly rare diseases, at least in their own minds. You hear about some new set of symptoms of some weird tropical disorder and you can-- is that a tapeworm right about there? And they worry about these things a lot. And in the same way that they probably don't have that tapeworm, because you just don't pick them up at Harvard Med mostly--

[LAUGHTER]

--you shouldn't worry about whether tomorrow you're going to wake up without knowing who you are, even though you may be under a certain degree of stress. That said-- so let me tell you one case. A woman wakes up in-- a woman's found, actually, in bad state, under the bushes in Florida somewhere back in 1980. Doesn't know who she is. Can't remember anything about her past.

And eventually is in an effort to figure out who she is. They call her Jane Doe, of course. And then take her on morning TV and ask, basically, does anybody know who I am? And immediately got a string of phone calls that suggested that they knew exactly who she was. She had apparently left Ohio a few years earlier and moved to Florida and then disappeared. Her parents hadn't heard from her for several years.

And unclear what happened in this particular case. Atypically, she did not recover her memory. Typically, these global amnesias are transient. In her case, at least at the time of the report I was reading, she had not recovered her memory. That's the most global, if you like, of these dissociative disorders.

Fugue states, from the Latin word to fly, are related. Again, it's presumed to be a response to severe stress. There's a very nice case described by William James in his great principles of psychology, the best intro text ever written in 1890. So we can't still use it.

But he talks about the Reverend Ansel Bourne, who took some money out of the bank in Providence, Rhode Island and vanished. He reappeared-- well, he woke up one morning in, I think, Norristown, Pennsylvania, and discovered that for the past two months he had been running a store in the name of AJ Brown. He had no recollection of the preceding two months.

Hypnosis turns out to be a useful and somewhat mysterious tool in such cases. And James, who was very interested in hypnosis, found that under hypnosis he could call up either Brown or Bourne. They didn't seem to know each other. But what seems to have happened was that the characteristic of a fugue state is that you disappear to another location and pick up another identity.

Now, one of the interesting things about this-- and it's actually a theme that will recur through a lot of discussions of psychopathology-- is that a fugue state is, in a sense, an abnormal version of something that we all understand as a normal story. In fact, most of us, in our family histories somewhere, have somebody back in Germany, or Poland, or China, or Russia, or Korea, or somewhere, who was under a lot of stress in the old country, picked up and developed a whole new identity in the US.

The major difference, of course, is that grandpa remembered the old country. Grandpa hadn't suddenly just gone poof, and, hey, now I'm running a store in Brooklyn. Nothing like that. But the notion that a response to an intolerable situation here might be to move here is the American story. The pathological aspect is if you don't remember what had happened before.

Now, by the time you've got a couple of different characters, particularly who can be called in and out of awareness under hypnosis, you are very close to everybody's favorite dissociative disorder, long known as multiple personality disorder, now more officially known as dissociative identity disorder. But I will continue to refer to it as multiple personality disorder, because if I say multiple personality disorder, I know what I mean immediately. If I say dissociative identity disorder, I have to think about it. But they're essentially the same thing.

This is the situation in which two or more personalities appear to occupy the same individual. Popular supermarket psych books. The great movie of my youth was a movie called *Three Faces of Eve.* Has anybody ever seen it? Oh, good, it must still be playing in reruns on some old-- scared the wits out of me when I was little. I can't remember anything about it except that-- I mean, she didn't have really three faces, but she did have three personalities.

Let me tell you instead about Billy Milligan, a convicted rapist, not a nice person, but one who attempted to get off his conviction by claiming lack of responsibility due to a multiple personality disorder. Depending on which of the multiple accounts you read of this, he had anywhere between 10 and 24 personalities, including Arthur, a master personality who knew all the others rattling around inside him. Arthur is reputed to know Arabic and to be self-taught in physics and chemistry.

Regan was aggressive, fluent in Serbo-Croatian, spoke with a thick accent and was reported to be the initiator of the sexual assaults. Adelana is a shy, introverted lesbian with a spontaneous nystagmus, reported to be the actual rapist. Now, there's a whole collection of weird stuff there. One point is that there's no guarantee that all the personalities are the same gender.

A perhaps more salient point here is this spontaneous nystagmus thing. And nystagmus is a beating movement of the eyes. It's hard to fake. And part of-- there's an argument about whether multiple personality disorder is for real. And even if it is for real, there's always an argument in a court case for whether or not somebody is just trying to get off the hook by faking it. The spontaneous nystagmus is important because it's hard to fake. If you sit there and try to vibrate your eyes continuously, it's not easy.

So there's Alan. He's a con man. Tommy knows electronics and plays the sax. Samuel is an Orthodox Jew and a woodcarver, and so on and so on and so on. So it's very odd business.

On the face of it, it's a fragmentation of the self. If you think of the self as a kingdom, this is like a bunch of the provinces have rebelled and they have complicated diplomatic relationships with each other. Who knows who? Who's talking to who? Who likes who? Very complicated construct here.

Oh, one important way to distinguish a psychopathology, which this, if it's for real, it clearly is, from a neuropathology is nobody would expect to put this guy in a scanner and call up-- I don't know-- Regan, the Serbo-Croatian rapist, and find, there he is, that piece of brain. And now the other guy is over here and this guy is over here.

Ah-ah. Look, they're all making use of the same brain. They're all forming memories, for instance, and using, presumably, the same hippocampus to do it. This is a case of very odd software running over the hardware. So it's a troubling pathology. Yep, there's a question?

AUDIENCE: What's the deal with the eye beating and why is that hard to fake?

JEREMY WOLFE: Why is it hard to fake? Well, just sit yourself in front-- well, you can't look at your own eyes moving in the mirror, so you can't try it that way. Pick a friend, look at a friend, try to keep your eyes beating rhythmically for five minutes by an act of will. Make sure you have Aspirin handy. It's just very hard to do. And it's very hard-- and even I can do all sorts of really weird things with my eyes, actually. But that's not a nystagmus. That's some weird spastic movement.

But even if you could produce a movement, a competent-- any competent ophthalmologist can look at a nystagmus, or you can record it, and know whether this is a plausible neurological sign or something weird that the guy's doing. It's just supposed to be very-- who knows? Maybe he's a genius at this thing. But it would be a hard thing to fake. I don't think there's much more to be said about it than that.

But this issue of whether it's fake or not, one of the other arguments in favor of the notion that there is a real disorder is imagine you've got 24 personalities or imagine you've got-- your parents tell you-- how many parents, when you were little, made up some long-running story that they told you? No? Oh, good. The rest of that-- you was deprived. They were just reading out of the books.

Anyway, I used to have a nice long-running story about bunnies. Very complicated stuff. The problem is once there were like 24 bunnies or whatever-- I don't remember how many there were-- the kids would keep calling me on errors. No, no, no, he lives over there. And so it's very difficult to keep all this stuff straight.

If you have a story with 24 characters in it that you're making up as a fake in your own head, you've got to keep that lie-- well, you don't have to do stories. Think of a good lie. How many times, when you were a kid, did you get stuck because the lie fell apart because you told it wrong? You changed the story. If it's the truth, it's easy enough because you just go back and refer to the truth and it's just kind of there. But the lie you have to remember the details of.

And there's an argument that the same thing is going on here. If you really had 24 different personalities, it'd be just very difficult to keep them straight unless you were just reporting on so here's Chuck, the personality. Who do you know? I know boom, boom, and boom. If you're faking it, you, the owner of this whole story, have to think, Chuck, Chuck, oh, god, how many-- who did Chuck remember? I don't remember who Chuck knows and so on.

Now, a more troubling fact, perhaps, is that multiple personality disorder was practically not on the radar screen 20 years ago. When I first started talking about multiple personality disorder, I could read the whole literature on this-- handful of cases from a handful of-- a handful of patients from a handful of therapists. In 20 years, it skyrocketed. It became flavor of the month. Everybody had a multiple personality disorder for a while. That's faded off a bit since then. But that's odd. Why should that be?

One theory is that it's a well-intentioned delusion cooked up between the therapist and a patient. Patient's got some real problem. The therapist believes in multiple personality disorder. And through the use of hypnosis, which is a common tool for therapists who treat multiple personality disorder, you come to the conclusion-- you and the therapist come to the conclusion that you have more than one character rattling around in there, and that it wasn't real before you came into the therapist's office.

The counterargument to that is that what brings people in often as not is that they're missing chunks of their lives. You come to the therapist's office and you say, look, I have no idea what I did Tuesday afternoon, but there's a new dress in my closet, and there's a charge on my Visa card. And this is disturbing, right? If things were happening to you, you just didn't remember, it might eventually get you into therapy. The case-- yeah?

AUDIENCE: Well, didn't multiple personality disorder popularity skyrocket after that movie came out and everyone saw it?

JEREMY WOLFE: Oh, yes, well, there's-- to anticipate what I will actually end up getting to next Tuesday, since there's no class on Thursday, there is a sense in which you get to choose how to go insane. The culture around you enables certain forms of-- certain patterns of mental disorder and not others. And sure, there's a lot of this copycat cracking up, if you like.

Let me say one last thing about this issue of what gets people into therapy. It's one thing to find a dress in your closet. The thing that drives you to the therapist really quickly is you wake up in the morning, there's a guy in bed with you. It's pretty clear that he's been there for a while. And the suggestion is that you've been doing stuff of some sort. And you don't know who he is.

There's a lovely-- well, lovely-- scary anecdote by one patient where-- a case where bad girl/good girl personalities. The good girl didn't know the bad girl personality, but the bad girl knew the good girl. And the bad girl, in therapy, said, oh, this is great. She's such a prig.

So I'd take over and we'd go out to a bar and pick up a guy. I'd bring him home and we'd do stuff. And then I'd just withdraw back into her and watch the next morning. It was great, man. She'd wake up and she'd freak every time.

Well, you got to imagine the guy's point of view, too, right? Guy comes home with somebody. The next morning she's ranting and raving that she's never seen him before and kicking him out the door. It must be very strange for all concerned. But it is certainly the thing that would land you wanting to talk to somebody in the mental health field. All right, we'll pick up next week.