

Acting and Mirror Neurons

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The Philoctetes Center

Levy: Francis Levy
Nersessian: Edward Nersessian
Brown: Blair Brown
Gallese: Vittorio Gallese
Grifasi: Joe Grifasi
Landy: Robert Landy
Ludwig: Adam Ludwig
Vasiliades: Tom Vasiliades

Levy: I'm Francis Levy, co-director of the Philoctetes Center, and I wanted to welcome everybody to Acting and Mirror Neurons. I'm very pleased and honored to introduce Adam Ludwig, who is a member of our staff, and somebody whom, in addition to everything else I'm going to say about him, I'm tremendously fond of and enjoy jousting with about all the topics that we deal with here in the Philoctetes Center. Adam Ludwig is an actor and member of the Philoctetes staff. He edits the Philoctetes website and the newsletter *Dialogue*. He has performed at regional theaters throughout the country, including Berkley Rep, the Old Globe, the Pittsburgh Public, and ACT. He has appeared on television and in film, and most recently played the lead in the off-Broadway comedy *Jewtopia*. He holds an MFA from the American Conservatory Theater. Adam will introduce the other panelists and moderate tonight's discussion.

Ludwig: Thanks. Before I introduce the panelists, I just wanted to point out one thing about the website. You can go on the website now and under each of the roundtables that we've held, you can go to the calendar or you can go to the event archive and click on a roundtable and sign up to be part of a discussion board where you can post comments. One of the reasons I'm bringing that up is that we had a couple of comments posted regarding this roundtable that were very interesting, and I actually want to read a quote from one of the comments. One of the themes that's in the quote, and also one of the themes from *Eye of the Beholder*, which was the event that took place on Monday, which was kind of the companion piece to this event because it was about mirror neurons and the visual arts, is this theme of connection and connectivity. The Philoctetes center is interested in finding the connection between the humanities and arts and the sciences, and specifically neuroscience. In doing so it ends up connecting people from all of those various fields in these discussions. It's also interesting that this discovery of mirror neurons, which seems to be a way that human beings have of connecting with each other wirelessly or pre-consciously, is coming about in an age where our technology has become wireless and we have wireless telecommunication.

The quote that this woman in San Diego posted is from Forrest Whittaker, who, as you all probably know, won the Oscar for Best Actor. And this is from the speech he gave when he won. He said, "When I first started acting it was because of my desire to connect to everyone, to that thing inside each of us, that light that I believe exists in all of us. Because acting for me is about

believing in that connection, and it's a connection so deep that we feel it. And through our combined belief we can create a new reality."

So, following on the idea of this interconnectivity, I'd like to introduce the panelists, starting with Vittorio Gallese, who is Professor of Human Physiology at the University of Parma, where he teaches cardiovascular physiology and neurophysiology in the School of Medicine. He also teaches neuroscience in the graduate program in Philosophy of Mind at the University of Bologna. His main research interest lies in the relationship between action perception and cognition and he has published several papers about mirror neurons. He's part of the team that actually made this discovery of mirror neurons. Then we have Tom Vasiliades, who is an internationally recognized teacher of the Alexander Technique. He is the Founder and Director of the Alexander Technique Center for Performance and Development. He is Assistant Professor and Chair of the Movement Department at the New School for Drama. He's on the faculties of the NYU Tisch School of the Arts and The Juilliard School, and he's also an actor on stage, film and television. He works as an Alexander Technique and movement coach on and off-Broadway. Joe Grifasi is an actor and director on Broadway. He's appeared in numerous plays, including *Dinner at Eight*, *The Mystery of Edwin Drood*, *Accidental Death of an Anarchist*. He's also appeared in regional theaters: the Goodman Theater, Trinity Rep, Yale Rep, Williamstown Theater Festival; and in over 70 films, including *The Deer Hunter*, *Batman Forever*, *Matewan*, *Splash*, *Natural Born Killers*, and *Ironweed*. He most recently was on the ESPN miniseries *The Bronx is Burning*, playing the role of Yogi Berra. He's a graduate of the MFA program at Yale. Blair Brown, who has edited her bio here, so I'm going to have to parse it out—

Brown: I wanted to be in *The Heidi Chronicles*, but I wasn't. Then I thought, maybe I just won't correct that.

Grifasi: Wait a minute; if she lied I want to add something.

Brown: I didn't lie. I corrected.

Ludwig: She has appeared, if I'm not mistaken, on Broadway—she won a Tony Award in 2000 for her work in the play *Copenhagen*. She appeared in *The Comedy of Errors* at the New York Shakespeare Festival, and in Richard Foreman's production of *The Three Penny Opera*. She also appeared on Broadway in *The Secret Rapture* and *Cabaret*. She's appeared in many films, including *The Paper Chase*, *Altered States*, *Stealing Home*, *Continental Divide*, *The Astronaut's Wife*, *Dogville*, *The Sentinal* and a film that we recently screened at the Center called *The Treatment*. And she's been in a lot of television shows, most notably the Emmy Award winning series *The Days and Nights of Molly Dodd*, in which she played the title role. Robert Landy is the Founder and Director of the Drama Therapy Program at New York University. He's the Editor-in-Chief Emeritus of *The Arts in Psychotherapy* publication, and the author of numerous books on the subject of drama therapy.

On Monday, with *The Eye of the Beholder*, Vittorio gave a pretty thorough explanation of how mirror neurons were discovered and what they mean, or what we think they mean, and he's going to do more of that explanation, and then connect it to acting and the human impulse to imitate.

Gallese: We discovered—well, good evening to everybody, first of all. We discovered mirror neurons in the macaque monkey brain, and they provide a neuro-physiological mechanism, which we believe explains, at just a personal level, effects that had been already demonstrated by psychologists at the behavioral personal level—the intimate relationship between action and perception.

The bad guys of this story are classic cognitive psychologists, who entertained the idea for many years the idea that action and perception and cognition constitute three separate domains. These appear not to be the case. So when we perceive the external world, and in particular when we perceive particular objects, the object we are interested in tonight are the human beings, carrying out actions, displaying emotions, experiencing sensations. We do not simply record this sensory stimuli with our sensory apparatus then submit this perceptual record of what's going on in the world outside us to our cognitive interpretation. We certainly are capable of doing it. We are doing it many times. But mirror neurons provide direct evidence that there is a much more direct link between our own brain body system and the brain body system of other individuals. In other words, when I see someone acting, performing a movement, or a goal directed motor act, not only the visual part of my brain starts to be activated, but also part of my motor brain, so the part of the brain I normally employ in order to program, control and execute similar actions, similar movements, and in other domains, experience similar sensation or similar emotion.

We originally discovered mirror neurons in the domain of action—neurons that fire when the monkey grasps a piece of fruit and when she sees another individual, be it a monkey or a human being, carrying out a similar action. But then we discovered not only that the human brain behaves in a similar way, so the motor strip is activated not only when we act but also when we see other individuals acting, but the same mirroring mechanism applies to other domains of social cognition, emotions and sensations. So we believe we are at the beginning of an investigation of which we just started to uncover only a tiny little part. What's most important probably for the discussion tonight is the intimate relationship between this mirroring mechanism and imitation, mimetic skills. So we know from developmental psychology that we are mimetic creatures. As soon as we are born, when we see an adult, which most of the time, at least for lucky children, is their mother, performing movements with the mouth, the neonate tends automatically to reproduce these very same motor acts, like opening the mouth, sticking out the tongue and so on. This instantiation of imitation appears very early. It lasts for a few months, then disappears. And then the form of imitation that we know, one of the basic ingredients of our capacity to learn things, develops later on, and continues for the entire life span. And according to many scholars, this is one of the most distinctive features of our species.

So there is a sort of paradox here of something that we cannot explain. There is continuity between the monkey and humans in that apparently they both have mirror neurons, although human beings are not just smarter monkeys. We are something completely different. And a big challenge for neuroscientific research in the coming years will be to try to focus on this peculiar difference, which makes us unique on our planet. Or, a short cut can be to read Dostoyevsky. You don't have to do experiments.

Ludwig: I wanted to then transition here to the actors, because one of the things that I get out of what Vittorio is saying is that when you watch someone perform an action, and also when you watch someone experience an emotion, you have a motor response that is the same as their motor experience of doing the action or feeling the emotion. It's as if you are performing the action or as if you are feeling the emotion, and those two words are important for me as an actor. I've heard them so many times in acting school, that an actor enters an imaginary world, an imaginary circumstance, and behaves *as if* they were real. And so it seems intimately connected with the process of acting, and I just wanted to hear, maybe first from Joe and then from Blair.

Grifasi: Could you ask that again? I don't think we have time. It's a long question. Okay. Can I just say what I wanted to say?

Ludwig: Go for it.

Brown: You're an actor, of course.

Ludwig: Feel free to improvise.

Grifasi: Well, it's funny because I've been thinking about this. I saw this thing, this documentary two years ago, this piece on Nova, which was fascinating to me, because they said, "and it's particularly active in the brains of actors," and I went, "Ah!" I might have something, you know? I mean not a disease—or maybe a disease—that's good, as opposed to feeling lousy all the time. So it was kind of exciting to know you had something. Then I started to think, well, maybe not, maybe science is wrong. But then I started thinking about, as they got more into it, how it involves the medium we work in and how the medium we work in requires this sort of talent, if you will. And a lot of things started to come to mind, and just talking specifically about theater, I wrote some things down today. I mean I was thinking of some simple gestures that to me are like—mirror neurons communicate in such a way that the person watching can complete a gesture for someone. Do you know what I'm saying? Even if someone looks malevolently at someone, what's the next act that follows that? And I think in theater we use that a lot. It's actually from how actors work back into the form that we work in.

I was reading an article by you today. I just read the abstract, because I couldn't understand the rest of it. In fact, the abstract was too abstract. And it made me wonder, why do they call the part that's supposed to be the easiest to understand the abstract? Why don't they call it the meat and potatoes and the rest of it the abstract?

Gallese: Well, it saves you time, because you get scared at the beginning.

Grifasi: It does. The whole thing scared me. But I have to say the title didn't scare me. The title was *Grasping the Intentions of Others with One's Own Mirror Neurons*. Okay, grasping the intentions of others with one's own mirror neurons. And the word grasping caught my attention—the verb. And I wrote this down. I'm going to read from this a little bit, just because it was coming out of my fingers. The idea of thought and gesture completed by the audience is used in the theater a lot. Theater is a time constrained form, unlike a novel. It must take place in a matter of hours. So for that reason, to tell the story that we want to tell, we infer, we suggest,

and we do it physically, and I think we've incorporated it into our mode of storytelling in theater. In Greek theater they used to use the word *obscana*, which came to become obscene, something you wouldn't do in front of people—you know, if someone was murdered or something. But they would always lead you to the idea that something like that was going to happen off the stage. And in order to stay with the story and stay within the timeframe and the sequence, you bought it. I think it took advantage of a certain leaning towards the understanding. So the person gesturing or suggesting gesture uses the audience's ability to continue that story, the story based on the actor's calculation of the audience's needs to see that gesture completed or feel completed. The less that is needed by the actor or by the story as it's presented in the play, the more reassured I feel we are as actors to the level of communication we have with that actor, because now we're going down to less, less, less, less, and we're able to still put the story together. We all know the expression in the theater, "less is more." Well this is another way of thinking of it. Just neurologically, I think less is more. It's when you are with a group of people who can finish each other's sentences, or you start to tell a joke and you look at them and you're laughing. Bob and Ray, the old comics, used to have a routine where they said they no longer told jokes, they would just say numbers of the jokes. They'd say 47, and they'd go, yes, yes, or something like that.

So the point is it's intense communication built up with a minimum of gesture. An example would be if a person was talked about who was offstage, and then suddenly the person was onstage. The story gave the sense and the person had to give the sense that they were going to kill someone after they left the stage. That's your job to indicate any of those things. You never need to show that the murder took place. You never need to demonstrate how the murder took place. It's all transmitted. And I think audiences really do love it when you're going, "I think that person went off to murder that person." As opposed to, "Well, he went off to murder that person, we know that. There was rage in his eyes and a knife over his head." Because it makes you feel smarter. But it also makes you feel like you're in much stronger communication with the minimal amount of language, and I think that speaks to our society.

The other thing has to do maybe with narcissism, but it's a strange form of narcissism to want to be able to complete gestures or create gestures that the audience will look at and need to look at, and need to look at to understand the story. Not to look at it to understand you, because as actors we want to mask ourselves. We don't want to be understood. We want supposedly the story of our society, of our group, whatever, to be told. The example I would give is, and I know Blair and I have worked with people who are very, very needy and very greedy in rehearsals—totally narcissistic, not very considerate of others, in fact, vilely inconsiderate of others, and yet will go into the play and give a performance of someone who is as loveable, as likeable, as understanding, and as self-effacing as could possibly be.

Brown: And it's infuriating.

Grifasi: Infuriating. My question to the good doctor is, do people like that imitate and create someone less narcissistic because they understand that that person is more compatible in society than they are in their form? I don't know. They're so determined and so skillful to represent someone—there's something in their will that makes them drop all of that other stuff, and you don't know why. But they do.

Landy: They're actors.

Brown: Yes, and they—

Grifasi: They're actors but what is it? The submerging of themselves to the role I think might have something to do with the connection that I think, from what I've read, these neurons have to do with—stabilizing society and having something to do with its—

Ludwig: Well they think that it's an adaptation, a survival adaptation that's very ancient, and that allows people to connect.

Gallese: Yes, although I think there is a risk if we make the jump from the fact that mirror neurons provide evidence of connection between people. There are many different kinds of connections. There are many different ways to be connected with others. So I would never dare to say that because we have mirror neurons, we are good and we are altruistic, because the other side—I mean the same mechanism explains, or perhaps one could hypothesize, it might provide something that explains the other side of the coin, which is our mimetic desire, as Girard would say, and our mimetic competition. So we desire an object ourselves, not in as much because the object has intrinsic qualities, but because of this mirroring mechanism, we recognize that the same object is desired by someone else. So there is a mimetic competition, which provides an image of mankind that is exactly the opposite of the altruistic person.

Brown: But it's the basis of advertising, in fact, to make us all desire—

Gallese: Right. This antagonistic behavior might partly stem from the fact that we directly grasp to what extent something is the target of the action of someone else, because we have this direct link.

Grifasi: I should amend what I said, though. I used the wrong words. A person of this kind of nature or bent doesn't necessarily become likeable, but what they do is they complete the role of the character in that story that the audience wants to see in such a way that is so efficient. It could be a murderer in the story, that's all I'm saying. But I'm saying they do it in such an economical and un-neurotic way that it seems opposed to their own intentions, otherwise, offstage or whatever.

Ludwig: One of the ideas that came up in the roundtable on Monday: someone asked a really interesting question about psychoanalysis and how a psychoanalyst who is mirroring the emotions of his patient can bear all of that suffering. I actually wanted to ask Blair about this question, because, obviously, you've played many emotionally challenging roles where it's almost like you have to put yourself into that emotional reenactment. How does that play out in acting and how do you withstand that?

Brown: Well I mean I think actually in that way acting is a highly sane profession, because you actually exorcise a lot of demons. I know at a time when I was going through some very, very difficult stuff with a health issue in my family, and I had to go and, actually I was doing

Copenhagen at the time. And I would drive and spend a lot of time in the hospital and come back and go and do the play. A friend said, “Well, how can you do it?” And I said, actually I’m very lucky that my occupation makes all the things that happen to me, all the emotional things, all the intellectual things, the ones that are most difficult to deal with—I can make them useful. I transform them and turn them into something else.

So in that way, I don’t—there was something when you spoke originally about the very fact that these mirror neurons tell us that there is some kind of social, connective need that we have. I must say I found talking and thinking about this whole subject very cheering indeed, because working in the theater you tend to think you might as well be making horseshoes. We’re on our way. We’re dinosaurs lumbering about. But people come to the theater to be together, to connect. So then it took me to the place where we started to think about how actors are trained, whether you do a Delsarte Method, which now to us makes no sense whatsoever, but actually was revolutionary at the time. It was a way of codifying behavior, absolutely, for an emotional effect. And you read diaries, reviews at the time—it was completely spellbinding. You see little bits of it in very early film. There are some early films where you can see what it is, and it seems absurd. Absurd. So you think, “Aha!” So then you get to Michael Chekhov, who’s talking about a psychological gesture, which will communicate an inner feeling to something communal that we will feel together in the unconscious, so now we’re talking about the unconscious. But now when I look at young actors, there’s this whole difference now in modern acting. We have access to those old techniques, but there is now another—we have other images that we’re mirroring now. And that to me was something I wanted to come to understand and to get very different points of view on what that is. Because it’s changing the art form by the way in which we are mirroring.

Grifasi: I wonder if people need to elaborate on who Delsarte was and what Delsarte did. Do you know who Delsarte was? He wrote a book in the early 1800s, which had hundreds of drawings in it, which described for actors all the different poses that expressed different things.

Brown: Yes—mercy, fear—which look absurd to us, but were at the time extraordinary.

Grifasi: At the time, to use all of those gestures in the large theaters to show—they would even add fear. They would say “fear, yet obsequious.” And it’d be like once removed or something. But it was all gesture. It was all done through gesture and pose.

Brown: But when you read about it now, you realize that what it was filled with at the time was great feeling and thought. And by the time it came further along it was bastardized, so that it was just hollow gestures. So Stanislavski comes along and we come into a movement that’s very naturalistic, trying to say, “Let’s pretend—we’re going to act what we see right here in this room,” which of course wasn’t really what was happening. It was still an art form. But it was that sense of mirroring in that way.

Ludwig: There’s a bit of disconnect between the two forms of mirroring and the transition between mirroring and action—a physical gesture, which in my thinking is really useful in sports training. You watch an excellent tennis player, and for a couple of hours you go out and you hit balls in a different way because you’re imitating. With acting, it’s a little bit different, because

you can do this kind of outside-in thing, where you imitate the form, but—like you said with the Delsarte stuff—over years that form becomes hollow because the intention isn't learned as well.

Brown: Yes. I was thinking it's like a kiss is just a kiss, a smile is just a smile. Well, not actually. I mean a smile may have to do with my pleasure that I want to demonstrate to you. A smile may be the excitement of seeing you that is really about you. A smile may be a way of keeping you at a distance, of creating a pleasant way of keeping the world at bay. A smile can be extremely threatening. It's still a smile. And a baby will maybe just take that and just pop you a smile.

I have a son who's 25 years old, and when he was little, the thing that was coming into fashion was children learning to read with flashcards. When they were babies people were flicking cards at these little blobs lying there so that they could read at three. And I remember thinking, this doesn't seem right, but I want to be a good parent. Then I read some article that said, well, actually what they were finding is that children were burning out, that kids that learned to do this were really burning out. And I thought, oh, this is odd. When I was a child, I was in the hospital for about six months, so I had to learn to read when I was four. And I burnt out in the fourth grade. And what it was—you could go, boom, there's sunset, there's the word sunset, and you see these squiggles, and the child will mimetically says sunset because the mother says sunset and they go, "Sunset." But until they've experienced sunsets, where it's very beautiful, as the colors turn lots of ways, or it's terrifying because dark is coming, that seemed to me where this qualitative thing was happening in regards to mirror neurons as well. It's like there's an area that's hard to name in this way.

Ludwig: I wonder if Tom, you have something to say about trying to connect emotional intention and content with physical gesture? Because my understanding is the Alexander technique helps to release emotional content that's blocked because the physical gesture is constrained.

Vasiliades: Yes. In reading about mirror neurons the thing that I found interesting was less about what the subject was experiencing, but the relationality. I think that's what's interesting in thinking about it in terms of actors—that there's this relationship between the actor and the audience going on all the time. If you're able, let's say from an Alexander vantage point, to undo excessive and unnecessary tensions, that allows the gesture and the movement to—I don't want to say be pure, because that's not exactly right—but it gets expressed in a way in which the person you're either playing the scene with or the audience that's observing can respond to that in a way relationally that they're impacted in a greater way or in a deeper way. Sometimes you might talk about it in terms of the performance being looked at as, that actor seems more alive or less dead or more connected or more invested in what's going on by having—again, from an Alexander vantage point—an improved use, a more open, more free body to give expression to that. So I think of it in that way, in terms of what I find interesting about it. I've read some of the abstract as well, and what I found interesting is this thing of imitation and development, in terms of how we develop even as young people—that we're imitating our siblings, we're imitating our parents, and we even learn how to speak that way through language. And it made me think of some psychological work of a Soviet psychologist named Lev Vygotsky.

Gallese: Yes—the region of proximal development.

Vasiliades: Yes. Right—zone of proximal development. He was relating a lot to the inner activity and what he would call the outer activity. He was using modernist terms, but in a way he was almost like a pre-postmodernist, as I read him, in being able to say that there is this relationship going on between the internal life and what's happening in the world and society. And it's in that relationship that growth and development happens. And so I found that interesting. As you were saying, someone does a movement and you're feeling it, you're sensing it physically, and what goes on with that? I found that really fascinating.

Ludwig: Robert, did you want to add something about how all this connects to treating people through drama therapy?

Landy: You know, it's interesting, because when you raise your questions, people sort of go off in their own ways. They're not mirroring you.

Brown: It's true, isn't it?

Landy: The first mirror moment for me was when somebody's cell phone went off, and everybody else started turning off their cell phones. I wonder how much emotion was involved in doing that, or shame. It's often about shame in the theater. Usually in the theater somebody gets up and makes an announcement. Please turn off your cell phones and pagers, and everybody does it, so there's no shame. But if someone forgets, it's a big deal. And then other people all of sudden realize, oh my God, I didn't turn off my cell phone. So I'm trying to deal with what's here. In thinking about this, I want to broaden the discussion a little bit to think about theater in a broader way, or the dramatic experience in a broader way, as a series of mirrors. I don't want to get off the topic of mirror neurons, and I'd like to come back, find a way to center in that. But in many ways, as I see it, the essential dramatic experience, the essential relationship, as you were talking about, Tom, is not about the actor and the audience, but it's about the actor and the role. The essential one—I mean it broadens out. I don't only mean that in thinking about what happens on a stage, but also in every day life. That relationship becomes a really key one that's probably played out more neurologically, or as neurologically as the relationship between one literal human being and another, in the theater or not in the theater. And then there's a relationship in the theater between an actor and another actor, and when a play works well there are very, very positive relationships between and among actors, whether they're narcissistic or not. But there's something going on that's a shared experience, and when that happens, like on a sports team—I heard something on sports radio today about how all the Mets players are very positively connected to each other in the locker room, and that's why they're the winningest team in baseball. But I think it also happens in the theater. And then there is the relationship between the actor and the audience. And I forgot—there's also a relationship between an actor and a director, who sort of holds the vision of the whole together and helps each actor work toward that sense of the whole.

So I see these as many, many mirrors going on all the time in theater. In my work, which is not too different from Tom's and the Alexander technique, the goal isn't necessarily entertainment or enlightenment. The goal is some form of therapy, some sort of therapeutic change. And the

therapeutic change occurs because the medium is drama, or working in a role. The therapeutic experience changes in part because of the relationship between the client and the therapist, but in part also in the experience between the actor and the role. The role is not a real thing. The role is a virtual thing. So I'm just wondering, Vittorio, maybe you can respond to this—I wanted to ask you—what about that relationship between an actor and a role? Can you talk neuroscientifically, or in terms of a mirror neuron relationship between a subject and an inanimate object or a virtual object?

Gallese: Yes. Well if we deal with physical objects, not a human person—

Landy: Well, a role is an abstraction. It's an abstract.

Gallese: Yes, well, we're not at that level. I mean what we know is that there is a part of your brain which is active when you do something, when you see someone else doing something, or when you are imagining either yourself or someone else doing something. The overlap is not perfect. So, in other words, not all the same regions in your brain which are activated when you imagine yourself doing something are also activated when you imagine the same thing being done by someone else. For example, Jean Decety, who is a psychologist at the University of Chicago now, investigated specifically this dividing line in imitation when you're asked to imitate someone as he would do the thing or as you would do it. Or what happens when you imitate someone else or you are being imitated? The overlap is not complete. In a sense, one could think that your relationship with the character you're supposed to play is intrinsically relational. So you try to enter into, metaphorically, or even literally, the body of someone else—in the body, in the gesturing, in the mind. So, more than a mirroring mechanism, it's an imagery mechanism, which partly impinges upon the same neurocircuits which are involved in action observation.

Brown: That makes sense to me just in terms of acting as a memory of things that have happened to you, things that you are imagining, and then you send them back in a form that mirrors something, and that's what's actually happening. You send it back into a form that makes something happen to the people that observe you doing it.

Grifasi: Yes, and if you imagine yourself doing a role, then you imagine someone else doing it, and it's a different part of the brain. That's the envy part.

Landy: Or the empathy part.

Brown: The dark side here.

Grifasi: The green part of the brain.

Ludwig: Blair, you mentioned Michael Chekhov, and I think that's really important, because he has a really specific approach to getting into a character, and it relates to what Vittorio was saying, because you actually create an other that you can relate to and imitate in your head. Can you say a little bit about the technique?

Brown: Yes, a little, because I had worked with a lot of English directors who took much more that approach, which was, just in broad terms, Americans work inside-out and the Brits work outside-in. I've worked both ways. Yes, I had done some of those exercises. You do a lot of very physical work with Michael Chekhov, flying and all kinds of things. Well, you could actually speak much more eloquently than I can, but you come up with and then move to a series of gestures that in fact are larger than what you're playing, and it kind of comes into a place where it's actually naturalistic, and then you can abandon it all. And the wish is that it will continue to communicate itself to people watching.

Ludwig: When I read about it, one of the very first steps was to kind of close your eyes and imagine the character walking in—you create the character in your mind and you begin to imitate it through gesture.

Brown: Well that's like that amazing piece I read somewhere about how people could tell if you showed a series of just dots of light, 11 dots, you could see a person, and you could tell, with these 11 dots, what a person is doing. And then you could even have these 11 dots be the person who's observing it, and they know it's them. So even without actually ever seeing yourself walk from behind, you know it's you.

Vasiliades: You asked a question before we were here about how much research you do, and then how much do you throw out? I think, again, it's about how many of those dots you retain, but you still have a presence that's recognized, so that both things come through. So that the emblematic and the personal are both appreciated and understood.

Gallese: Those experiments are a nice example of how when we are looking at someone moving, even in a very, very impoverished way—because you don't have any shape to rely on, you just see this tiny little luminous dots that move on a black screen—you are nevertheless not only capable of recognizing what's going on, what kind of action, if the subject is throwing a stone or climbing a staircase or descending, but you can tell if it's you or your grandmother. It's unbelievable. So it cannot stem from your own visual system. It's something that you have internalized. It's experience based. Every perception is always a personally filtered enterprise in which your acting body plays a major role. This is something that slowly is surfacing in many places, and hopefully will make it to the handbook of neuroscience. But people are very slow to—because it's much more self-evident. You see with your eyes, so why should you imply a role of the way you move in perceiving the external world? I mean it's out of you, so it has to be external. It's not. So we internalize, as we were discussing Monday in the case of objects, that glass—it's a glass not only because it has that particular shape, but also because it is the target of a possible motor act I might wish to entertain with that object. So, you see, vision is always relational, and this type of relation involves the motor system—the way you act. That's crucial.

Grifasi: That's interesting, because you're always seeing things possibly as how you extend to them and how they are invisibly strong to you. You know what I mean?

Brown: It's like completing the gesture.

Grifasi: Sometimes I get so riddled with this kind of perception of everything, of people, that it almost leaves no room for anything else, and everything comes into that kind of—you know what I mean? You sit around understanding everybody's situation. You sit like them, you complete them, and then after a while it becomes almost manic. In fact, I was thinking one of the things that interesting about playing a role is oftentimes, as we are in rehearsal, we're working to grab all these different feelings and physicalizations of things and people, and when you get in the role, it sometimes is very simple, and you're suddenly satisfied. A person who lives their life maybe with these neurons firing left and right is suddenly very quiet and content, and I almost think, personally, psychologically, there's a relief to be away from it, because you've limited the things that you have to relate to neurologically. You've made a target for yourself in this condensed period of time that is simple and straight. It's almost like living like a different person for a while. That's what's kind of interesting.

Vasiliades: What I was thinking of as you were talking, Vittorio, is, as I understand it, from the little reading I've done on neurophysiology, using the current models of a body schema, you're able to have a map, and you're able to tell where your hand is and where you're moving and how that's going. And it seems like that would be similar in what you're saying with the mirror neurons, of being able to see someone move, or even to imagine what the character would be doing, and then with that to be able to create physically and activistically a character in this sense. Or to copy what someone else is doing if you're trying to imitate them.

Gallese: Yes.

Vasiliades: So have you done any work with that at all, in neurophysiology?

Gallese: You mean in the monkey?

Vasiliades: Yes.

Gallese: Well what we have done is we wanted to know exactly to what extent the firing of a mirror neuron depends on the fact that this firing, this activation, embodies simply a visual description, an iconic description of an action, or rather the intrinsic pre-linguistic sense of that action. So to answer this question experimentally, we came up with the idea to show to the monkey an occluded version of the action. Suppose you're looking at this action, and there's a response when the monkey sees the hand grasping the glass. Then we show the monkey just beginning the action, and we introduce an opaque screen, so the action occurs as previously, but this time the interaction between the hand and the glass is not visible any more. Nevertheless, half of the mirror neurons we recorded with this paradigm continued to respond, even when the object was hidden. So we wrote in the paper that out of sight is not out of mind in this particular case, because these neuron are filling the gap. And this shows that they are the correlate, not just of the visual description of the action, because here there's no visual description of the action. The action is implied. It's measured. It's anticipated. So these neurons fill the gap.

I think you were really right when you established this link between the actor starting something that is completed and the connectivity between the audience and the actor varies linearly with the capacity to have this filling in going on. This, I think, is the quintessential epitome of what being

human is all about. I think that acting is, in a sense, one of the best exemplifications of what is uniquely human, which is this capacity—and it's crucial what you both said before, and what I read many times in interviews with actors, that in order to be natural you have to be unnatural. And this is exactly the way philosophical anthropology pins down the nature of humans. It's exactly that. That's one of the main characteristics of mankind—the unnatural naturalness of human beings. And the actor probably is the pinnacle of this.

Grifasi: Just as a side thing, before it goes away—

Gallese: Pinnacle—can you say pinnacle? The top.

Grifasi: Yes. The discussion you just had about occluding, does that ever come into the discussion of phantom limbs?

Gallese: Yes, yes, we discussed that on Monday. It's most likely very much related to that. But another recent finding is was in an experiment done by a group of psychologists in Padua. They showed an action—so there is a subject grasping a ball—and this leads to the activation of the motor and perceptual parietal cortex, so the mirror neuron system is activated. Surprisingly, the same network is activated when the subject is simply gazing at the object. So, again, we see an example of the capacity of the system to be ahead of the action, to anticipate. And this probably is very old, phenogenetically.

Levy: In this kind of situation, are there any anomalies? Do you ever have macaque monkeys who do not display the imitative ability? I mean just like humans who have no—

Gallese: No, we don't have this kind of model in the monkey. But what's striking is that, for example, autistic children are not capable of anticipating a hug. So they totally lack, or lack to a vast degree, the capacity to be ahead. In our hypothesis, this is one of the main reasons why they are disconnected. If there is this link, as you suggested, between the capacity to anticipate, filling gaps with a capacity of being connected, it is no surprise that the lack of anticipatory power of the sensory motor system of these children might lead to impairment in their capacity to be socially connected, although we are at the beginning of this investigation. We have new avenues to investigate with Asperger's Syndrome and Autism, which is very different from the idea that it is a purely cognitive deficit. But it's just the beginning of that discussion.

Landy: Yes, because you can look at it the other way. That is, that the inability to enter into a social relationship precedes the inability to anticipate what an action will be as it's played out.

Gallese: Right. It seems to me the other way around.

Landy: Yes. You know, it's really interesting, too, because the issue I'm thinking of is attunement. I think you speak a little bit—

Gallese: Yes.

Landy: Don't you have a—

Gallese: Intentional attunement.

Landy: Intentional attunement. Because it seems there's a lot of research in the clinical area of psychology that if there's not a good match between a therapist and a patient, no matter what the technique is or what the approach is, the work won't necessarily be successful. And I think that's true also about acting. If there's not some kind of attunement between the actor and the audience, or even an actor and another actor, the intention of the playwright will fall flat. Or the intention of the scene will fall flat, and that that social connectivity is really the key factor, that attunement.

Moreno, who is the inventor of psychodrama, has a term for the connection between people. He calls it "tele," and it seems to be the basis of all sorts of therapeutic work through drama. From the extent to which the relationship or the attunement or the tele is affective, is optimized, one can predict the outcome of the work, whereas the opposite—

Grifasi: I wonder if it would be an interesting experiment to perform a piece to an audience with all the lights out, as we usually do, and then with all the lights on. Because I know you have to draw a different relationship. I've done it, and I don't know what it is, but I think you have to suddenly feel differently towards them. I think you maybe do the play as well or better than you did the last time if it's the opposite thing.

Landy: Lights Out is a radio play, though, isn't it? Would there still be voices?

Grifasi: The lights out in the audience. Well, going back to what you said, the connection between the audience—who are they connecting to? Well, you posit who the audience is when the lights are out. You can put the 12 most interested people out there or the 12 most difficult people out there if you want to. When the lights are off you can't—your mirror neurons are showing you the people. You see them going like this, or whatever they're doing, or like that, or like that. So now you have to face that, which is a different audience than you have to face when you face the blackness of the audience as you imagine and remember audiences in your mind. I just wonder if that would be—

Ludwig: One of the things we haven't touched on yet is that mirror neurons don't necessarily fire or not fire. They're activated to different degrees. A ballet dancer who's trained, who's watching another ballet dancer, will have more activity in his mirror neurons than if it's a Capoeira dancer or a non-dancer watching it. What's interesting, relating to both of your work, is that with the Alexander technique and the various body work that you do in actor training, it's like someone can be more or less attuned as an audience member, like a ballet dancer is going to have mirror neurons that in a way are more trained. As an actor your body can be freer, so that you can be a better instrument for activating other people's mirror neurons and connecting in that way. I think emotionally also there can be a flow that makes you better, and I think we all know it when we see it with a great performance. That flow is there. It's there physically, it's integrated with the emotional and the emotion is going directly to you. There's no blockage or interference.

Grifasi: Yes, the really good performances are the ones that don't seem clichéd or stylized, and yet the audience almost feels like, I knew that route was going to be taken before it ever got taken, because that's the route that the story had to take, and somehow you did that.

But I just have to say something. I wrote this down today. You talk about ballet, and one of the things I was thinking about was anticipation. You know the old joke about putting a chameleon on a piece of plaid? It would kill itself! It would try to turn all the different colors. It'd secrete so much it would die. And I was thinking, I remember years ago I saw Nureyev dance, later in his life, and Nureyev was famous for his leaps. And one of the things that always marveled people—and I think why they thought he was so magical—was when he leapt there was always a split second longer coming down to the ground than normal people would come down. So you sense that. Up and down. It was up and—what's he doing up there? And it sort of almost threw something off within you, so you'd go, "Hey, that's not supposed to happen." And physically when people do things that—like when we first saw Michael Jackson do the moonwalk, it was, "Huh?" None of us were prepared for that.

Brown: Because you're almost breaking what you were anticipating.

Grifasi: Yes. You're breaking the anticipation.

Brown: Lars von Trier, the Danish filmmaker, made a series called *The Kingdom*, and when I was looking at it, for the first few minutes I thought, this is actually the worst thing I've ever seen. They can't even get the continuity right. One person is about to do this and they cut back and the water is over here, and it was all—I thought, well this is pathetic. And within ten minutes I was completely transfixed. It was like I was shoved into the action, because he kept breaking the anticipation of what we were expecting, of how the gesture would be fulfilled. He kept knocking it over and knocking it over and knocking it over, and it was extraordinary.

Gallese: Well a magician, in a sense, systematically violates expectation. That's why it's so fun to look at a magician.

Brown: That's right.

Gallese: Because you don't expect to see the rabbit, but it's a rabbit.

Landy: Yes, but that's the exciting thing about acting. It's not just that wild breaking of the expectation—it's a balance. It's like the actor is poised on the edge of the stage, and the audience sitting in the first row feels that, my God, the actor could leap and could harm me. But then there's another part of the brain, I think, in the audience that modulates that to know, there is this stage, there is this safe space, there is this distance, and because of the distance I can engage. I can engage in this relationship safely with the anticipatory fear that it could happen, but it won't happen, which makes it more exciting to me, and more manageable. And that's why drama therapy is an effective form of therapy, because people can retell terribly painful and traumatic stories or reenact traumatic episodes without the sense that they will be overwhelmed by reliving this terrible—

Brown: Yes. There's energy in that transformation. That's what I'm saying about our occupation just on a daily basis. It's the same way, to a mild degree, of doing exactly that, but still going to something that people will see as mirrored, even though the source of it is not what they think it is.

Landy: So there's something about the world that's transformed, but there's something else about the world that is constant and safe, so that in that dual reality, that mirror reality in a certain way, someone can then have a very profound experience, whether it's a healing experience or a performing experience, or engaging with a performing experience, witnessing it.

Grifasi: You were talking before about directors, and both Blair and I have done some directing, and I was thinking about this today. We always fear the director that gives you too much gesture, and yet we always fear the director that doesn't give you enough. I know as an actor directing, and maybe you've had the same thing, that I could jump up literally and give a line reading on every single word that ever happened. But you're kind of slapping yourself down, and then you see something that's nice and better and you go, good. But when you get into sort of the hyper-empathetic mode, it feels like a wonderful tool, but it also can feel like a sort of power trip, because it can be overused as a tool. Tyrone Guthrie said when you give line readings to actors you've failed and they've failed. How do you do it without that? It's lines like that that make you sort of go, how many ways can I gesture—and I've been pretty shocked and amazed in a few of my better moments as a director when I've said, "Put your hands in your pocket, think of a word," and somehow you transmit it with a word. I think I'm just saying what would be interesting about this, but I know something's happening, maybe with my ears or my eyes or something. Even the slightest thing I think is being read, because then I've seen on a few occasions an actor go off into a whole mode that was kind of there but I didn't demonstrate it, and how does that get transmitted? How subtle is this communication? It's kind of almost frightening the trunk of information that's being transmitted and you don't know with what. With crumbs.

Ludwig: Relationship, I think.

Grifasi: Yes.

Ludwig: It's the relationship. If there's a powerful relationship and the mirror neurons are firing the same way, something is getting through.

Grifasi: Guthrie also says that the actor's greatest need that has to be satisfied by you is to satisfy you, because of that role-playing, that transference the director assumes. So that even though they eschew it and pretend it's not important, you're the one that will empower their whole thing. But then you've got to do it, you've got to suggest it, you've got to offer it, and then you've got to get the hell out. I always say a director is like chlorophyll. You're used up, you get out of the plant and nobody needs to see you anymore. As opposed to the ones who stand in the back and give you 100 notes after every show and you want to kill them.

Brown: Does this mirror neuron response work with sound as well? Is it always visual?

Gallese: Yes. We just completed a study where we asked two professional actors to perform to basic emotions—sorrow and joy—without uttering words. They were laughing or crying. Then we showed to our participants—and we were recording their facial muscles while they were looking and listening—silent versions, so they just saw the expression of the emotion. One female and one male actor were involved. They both saw and heard, or they just heard the sound. And then in a fourth condition, the cut was so that they saw the person laughing while they were listening to the sound of crying and the other way around—so incongruent cuts. And the results are pretty interesting. If you see someone laughing, you have a strong activation of your zygomaticus muscle, which is the muscle, which is active when you laugh. If you see someone crying, you have an activation of the corrugator supercilii, which is this muscle here. But the same results were obtained with sound.

Brown: Just sound?

Gallese: So if you listen to the sound of someone sobbing, you activate this muscle, and when you listen to the sound of someone laughing, you activate this and you enable this, because this muscle is a double pattern of modulation, where the zygomaticus is only activated. When you have the incongruent, you follow what you see.

Brown: You follow what you see.

Gallese: Yes, you follow what you see. You don't follow what you hear.

Brown: Interesting.

Gallese: And indeed we are planning to employ this task to study psychotic patients to see to which extent they depart from the average results we have obtained. Another line of research we want to pursue is to see to what extent the readout of the muscle correlates with the personality profile.

Brown: Interesting, yes.

Gallese: So inward people, outward people. Because at first we see that people on average—the statistic is there. The effect is significant, but there is huge inter-individual variability. People react in very different ways; their muscles react in very different ways. So we want to try in a double-blind fashion to see if there are correlations. Oh, you're that kind of person, so not surprisingly you show this pattern, or the other way around. So that's something that's in progress.

Brown: Interesting

Ludwig: Was there a reason you used actors for that experiment, rather than non-actors?

Gallese: Well, we wanted it to be as natural as possible, so the best way is—

Brown: So you had to find someone who could unnaturally do that.

Gallese: Actually, yes.

Grifasi: Let's get them to play monkeys. Why use monkeys? Let's get them to play them.

Brown: Right, let's suit up, come on.

Ludwig: Those monkeys were actors also.

Gallese: There is always the objection that this is not the natural expression of the emotion. It is an acted emotion. So there are colleagues of mine that I don't know how they manage to get the approval of the ethical committee—most importantly having people saying, yes, we're ready to do this experiment. They inflicted real pain to these people; they inserted a needle into the hands of—

Brown: Ai, ai, ai!

Gallese: Exactly.

Grifali: Her neurons just went off.

Brown: That wasn't acting, okay, that was real.

Gallese: That was mirror neurons—they actually are playing with the relationship between the viewer and the person in pain, so they want to see if there is a modulatory effect of whether the person whose pain you're witnessing is your partner or is a stranger. And they will do a brain imaging experiment soon to monitor differences. Another interesting experiment, which was completed by colleagues of mine in Rome, deals with attachment relationships. They sampled a group of mothers who were still breast feeding, and they showed them different expressions of their own child—neutral, happy, and distressed—and they compared the way their brain reacted to those images with similar images displayed of an unknown child. What is interesting is that the mirror mechanism is more active when you see your own child, with respect to when you see a child that you don't know, although there is still an empathetic relationship. But, interestingly, when you see your own child, you do not only activate the circuit of empathy, but you activate also part of your motor system. And they interpret this to mean that you are ready to provide help.

Brown: Yes.

Gallese: Which is totally lacking when you see a stranger. You empathize, but you are not ready to intervene.

Grifasi: Can you quantify degrees of concern? If it's not your child, but someone you know, and then a stranger?

Gallese: Well I'm afraid that the technique is not so—I mean, maybe in ten years.

Grifasi: Well, get working on that there.

Vasiliades: It's interesting what you were saying earlier about doing it with sound and then doing it with the visual, and the different permutations, because I was thinking in terms of how these mechanisms allow actors to influence an audience emotionally. I was thinking the relationship of the voice and the physical movement is one. Are you saying that the physical movement tends to influence or impact the mirror neurons more so than sound?

Gallese: No. When there is a conflict, you stick to your vision and not to the sound. Something we didn't expect—the two modalities do not add. So it's not that you have more activation in your facial muscles when you see and listen simultaneously. It's almost the same that you have when you silently see or you just listen without seeing.

May I ask a question to both of you? I mean, do you say a line differently if it's on the radio or if you are playing in a movie or in the theater?

Brown: Depends on the size of the theater, for a start, because if you've got a big house everything you do is larger with your body.

Gallese: Yes, but I mean, both if you are in a theater or in a movie, you know that people will look at you, while—

Grifasi: Oh, I see what you're saying.

Gallese: But if you are playing in a radio drama, where you are sure nobody will see—

Brown: I think it's the same. It seems you start always from the same place.

Gallese: So it doesn't affect the way you relate to the part?

Brown: No.

Grifasi: You would know this as well—the sound you make, even though you're speaking through a microphone, if you do the same physical thing, if you're conveying that I've just woken up and I'm speaking to someone in the morning on the phone and it's sounds that convey muscles stretching for the first time, I think that transmits. You may accent that more in a radio play, because those sounds I think would tell a person that someone's neck is stretching or their arm is going like this. And I think you use whatever you can to create the picture a little more vividly.

Vasiliades: It would seem that the process would be similar, but you might make some different choices depending on, again, the size of the house, if the camera is right here, if there's no camera, and so on.

Brown: The place you start is the same.

Grifasi: It's that occluded movement as opposed to visualized movement.

Brown: Yes, yes, exactly.

Ludwig: This came up on Monday, because we were talking about the fact that when we're on the phone we don't stop gesticulating.

Brown: Right, yes.

Gallese: That's the nature of behavior. Here we are dealing with something that is totally unnatural in order to be natural.

Grifasi: Well, yes, but you see, we're choosing to emphasize, because of the script and the story, what we want to emphasize. So I think that's where you would put the most—

Gallese: Something that's also very interesting that I don't think anybody has investigated from a scientific point of view: It concerns the problem of dubbing a movie. Here in America you don't dub. You have subtitles. In Europe, in Italy, in Germany, in France—not in Holland—we dub. So in a sense you have something not exactly equivalent to our experiment, but you will never get the perfect synchronization between the sound and the—

Grifasi: Yes.

Gallese: And, indeed, we have very good actors who are excellent in dubbing movies, but what they complain about is that there's not enough room to get physical when they are acting while watching. On the other hand, when you see an undubbed movie, you have to read. So you don't pay attention.

Grifasi: No, you miss a lot.

Gallese: So, how differently are these mirroring mechanisms modulated by the poor synchronization or the dubbing? I don't know that anyone has looked into that.

Grifasi: Yes, and we're lucky, because the only dubbing we do is exactly our lines, our own voices, so we get to breathe and—

Brown: I had the experience once of having to dub something where I was having a sort of breakdown, and there was some noise in the back and they wanted me to do all of that and to clean it up. And I actually just couldn't get to the same place, and I'm pretty good at dubbing. So we left it messy, because there was a rawness to it, and it was just off in a way that was just too hard to recreate.

Grifasi: Yes, you can—if too much thinking about it gets in the middle—

Brown: And you have these little blips going, “blip, blip, blip,” and you speak—

Grifasi: I had a weird experience—it was the first film I ever did, and I sang in the film, and instead of looping the sound later, they wanted to keep all of the background noise just as it was, so the director came to me that night. It was the last shot of the day, and he said, do you think you could go back and sing that song?

Brown: The way you sang it the first time?

Grifasi: Well, you're just going literally to the soundtrack. I said I could try. And he said we're going to do it first thing tomorrow. And a very interesting thing happened. It was because I had done no work between the two times, and I just kind of turned my mind off, and I said I'm not going to worry about this. Because when I sang this song I had a few frumpers in there, where I'd go, dee-da-da, da-da-dee, like that, and I had a couple of mistakes. So what I did was I didn't try to think anything about I'm going to hit this mark. I just let it go, as if I'd just gotten out of bed. And it came out, the second take—it was identical to the thing. I could never do it again if we did a third take, but it came out with all the mistakes and the aspirations where they were. And that was it. And yet you'll go into a dubbing room and see your own voice, you'll have all this control, and you won't get it right for ten times sometimes. So it was weird, because it was a matter of just letting the muscle memory, I suppose, take over or something.

Landy: Well, I heard this story a friend of mine told me of growing up as a child in Israel in the late '40s, early '50s. They used to go to the movies, and they would have foreign films and often it was very haphazard. The text, which was always subtitled, would not necessarily match the film. So you'd be seeing a comedy, but the text would be of a tragedy. So I said to him, what was the experience like for you as the audience? And he said it was fantastic. He said it was like being in this surreal universe, and it was so much fun, because everybody—at first people were very confused—and then everybody started laughing and having a great time. And they were completely consonant with the experience of being in the theater with everybody else enjoying this experience, especially from the point of view of being a young boy, even though it made absolutely no sense. There was no cognitive—

Grifasi: They agreed on their own form of entertainment.

Brown: That's right.

Grifasi: They decided—

Brown: Collectively to have fun with it, yes.

Landy: I mean there was no connect between the cognitive piece and the visual, gestural piece.

Grifasi: The sound and visual thing is interesting, because there was a famous scene in a movie by Charlie Chaplin years ago, and some of you probably saw it—*Monsieur Verdoux* it was called. And in the scene, Chaplin is brought a telegram and it says, “Your wife has died,” basically. And he stands there and he looks at it, and he goes over to a window, which is here, you know. This won't work for half the audience. But he goes over to a window and from behind

all you see is his shoulders start to shake. Do you know this? His shoulders start to shake, and he's like this. And finally he turns around and he's got a martini shaker in his hands. And he pours himself a drink. And so everybody was completely taken to the other place. But it's a case where had there been sound, you'd have heard ice, and it would have ruined the whole thing. It was just silent.

Brown: That's so great.

Ludwig: I don't know if this is a true story or a legend—but back in the days of Stanislavski and the Moscow Art Theater, these guys were so adept at their technique that there's a scene where he turns from the audience and does this shaking and the whole audience is just overcome with emotion and weeps. But he became so adept at it that some nights he would laugh, and he would be shaking with laughter and the audience would still have the same reaction.

Landy: Well I've got a mirror neuron story. As you were telling that story, I had the same thought of the same exact scene, except I transposed it a little bit. It was a Charlie Chaplin. That story was in my mind before you told the story.

Grifasi: Wow.

Landy: Except my memory of it was that he gets a letter from the doctor saying that he's an alcoholic. If you have one more drink you're going to drop dead in a moment. And he turns his back, and he's weeping, the audience sees him weeping. And then he turns around and he's doing the martini shaker thing.

Grifasi: You're probably right.

Landy: That was my memory. But this is a connection—I had that same story in my head five minutes before you told it.

Grifasi: Holy cow!

Gallese: That's more than mirror neurons.

Ludwig: I think we're going to take some questions from the audience.

Audience: You guys talked a lot about the role of the motor cortex and the imitation of what people do and how that relates to acting. But what I was wondering about is the way in which so much has been recorded in the actor's mind, which the actor has to use to get into character, I would think. So there's the whole question of how much we have stored, and how much it's being accessed during the time that you're watching somebody else's action. I mean it's extraordinarily difficult to research, but it may really have a lot to do with the capacity to act.

Gallese: I would say that there is a longitudinal dimension to mirroring, which we need to explore, of course. But there are many suggestions that the system keeps track of your own previous experience. So different experiences lead to different mirroring in the very same

situation. There is an idiosyncratic part of the story. I mean you have what you have. You have some sort of predisposition, which may limit the degree of plasticity, or may enable a higher degree of plasticity. Luckily enough, we are all different. Even monozygotic twins, they can be terribly different, even when they live within the same environment, so to speak. So there is a longitudinal dimension, which keeps track of all these different stages you go through in your life, depending on the people you met or the way. You establish relationships with them, what you got in return, because the mirroring is never a perfect mirroring. Nobody is capable of reproducing. If I tell you do exactly as I did, I'm 100% sure, but actually it has been shown that the most perfect imitation has always something idiosyncratic within it. I mean you put your own style, even when the task is specifically to exactly reproduce what I just did before.

So, as we said on Monday, it's not a Skinner box. It's not all or nothing. It's not a stimulus or response relationship. There's a lot of plasticity here at play. And therefore I would say that the mirroring is never perfect. So in a sense, the metaphor of the mirror, which I think brought a lot of attention, is not exactly capturing fully what's going on in this kind of mechanism.

Levy: I had a question for the actors. Chekhov, who we all remember from drama school, is the one playwright who is often talked about as being appropriated by the viewer of the play—people say, “That’s me!” When you’re playing a role, a Chekhov role, what is the aspiration? What is the thing you try to configure in a situation where there is this ultimate empathetic reaction? It’s the reverse of Brecht. There’s the ultimate form of empathy created between the actor and the audience that so much sees themselves in Chekhovian characters. What do you propose to yourself in trying to take on a major Chekhov role?

Grifasi: I’ve got to do a Chekhov play. I’ve really got to do a Chekhov play.

Brown: I don’t feel it’s any different. I really don’t feel it’s any different. I mean, I’ve had so many people over my lifetime say, “That’s me!” about all kinds of characters, and you kind of go, really? God, I’m so sorry. I think it’s very interesting how people identify with things. I have a friend who’s a writer. This is like the flip of that. He’s a novelist, and when he was younger he said it was very difficult writing because he was so concerned about people—many characters were based on parts of people that he knew, and actually no one ever recognized himself.

Audience: It’s the *Verfremdungseffekt*. You have the opposite.

Brown: That’s right.

Audience: So here in Chekhov you have this other side.

Brown: You know, I’m not so sure that’s true. I mean I think he wanted you to laugh a lot.

Grifasi: I think it’s pretty satisfying when you play a very stylized or out-of-period character, that people say, oh my God, I know that feeling. And there’s nothing identifiably on the surface to do with them. It just shows that the onion may have been peeled off and there’s a deeper dilemma, which is a kernel of a dilemma that they understand. And that’s good. All the externals

make your job harder, and that's good. That means a higher degree of connection, I believe, because you're dressed to look like something you never would—

Brown: And that actually we've done a better job, because you do feel, I'm like that Shakespearean queen. That's the best, when someone says that.

Nersessian: How does the system handle surprise?

Gallese: Yes, that's a very interesting point we know very little about—violation of expectation, surprise, ambiguity. As I said we are just at the beginning. We don't know.

Audience: I'm a drama therapy student. I'm one of Robert's students. I'm really excited to be here, because I'm actually writing my thesis on vicarious traumatization of mental health workers, and I'm looking at the concept of mirror neurons. I'm wondering, is there ever a case, or has this even been looked at, where someone's mirror neurons are overactive to the point where it's causing some sort of burn out?

Gallese: No. I'm not aware of any study that—

Grifasi: You could talk to my wife.

Gallese: The only thing that might be connected with your question is a synesthetic patient that was brain scanned by colleagues at University College in London, who did an experiment to study tactile empathy—something we haven't dealt with today. We showed in 2004 that when your body is touched, there are parts of your brain that map the touch feeling. It's because of this map thing that even if you are blindfolded you can tell when they touch your nose or your toe. The surprising finding is that part of the same tactile related network in your cortex is active also when you see the same body part of someone else being touched. So you see with your skin, in a sense. Not just with the eyes. So this synesthetic patient literally feels on her body when she experiences the tactile sensation of someone else. We know how it feels to be slapped on your face or how does it feels to be caressed. But we don't actually feel it in our body when we see a tactile sensation experienced by someone else. This kind of patient actually feels on their body, and in that patient they saw a hyper-activation of the circuit. But that's the only thing I can relate to your question.

Audience: I think you're probably far more relaxed than maybe the other night, because you allowed yourself something.

Gallese: Actually, I was surprised to see that it's a quarter past 9:00. I thought it was much earlier.

Audience: I felt you qualified—you started to use the word empathy on Monday, and then you pulled back, you qualified. And I noticed tonight in the written thing, that word was used several times and you really got ecstatic and allowed yourself to use the word. I think that there is something there about the distinction between what's going on in the neurons and what's going on in the more complex reality that we experience that caused you to not want to have empathy

directly associated with mirror neuron experience. I would like it if you spoke to that from your point of view as to what that distinction, like brain/mind, would be.

Gallese: I have a very ambivalent relation with the word empathy, because in a sense I think it captures beautifully what this mechanism is all about. On the other hand, there are colleagues of mine—to speak about one, Colwyn Trevarthen, who is a developmental psychologist—who studied a lot of synchronization of rhythm as a leading aspect of the cognitive development of the child. To him, timing is one of the most important steps through which a healthy child has to go in order to develop a fully competent, effective and emotional life, which is very interesting for drama therapy, art therapy, dance therapy, music therapy. So he doesn't like to hear the word empathy. He uses the word sympathy. But the word sympathy is not as we tend to interpret it now, but the way it was used by Scottish enlightenment people, like Hume and Adam Smith. When they speak of what we now call empathy, they used the word sympathy. Now we tend to keep this dimension separate. There is a nominalistic issue here. I mean people interpret the word empathy in many different ways. If you talk to a cognitivist, empathy is completely cognitive. It's nothing to do with the body. It's the problem that in order to empathize, you have to first understand. In their hands, understanding means explaining. So it's hermeneutic—it's language mediated, it's a predicative. It is disembodied. It is computational. It is representational. So it depends where you speak.

Landy: But an actor makes it simple. From a dramatic point of view, the problem of empathy is solved. The philosophical problem is solved. It's very simple. It's thinking as if, or acting as if—putting yourself in the position of the other.

Gallese: Okay.

Landy: The self is in relationship to the other by taking on the other's role. It's very simple. And it sort of cuts through—maybe explaining it neurologically, neuroscientifically, you have to deal with the philosophical issue or the linguistic issue, but it's very simple. From a dramatic point of view it's a very, very simple problem. Would you agree?

Brown: In that case where I think it becomes more complicated is what the actor wants the audience to feel, because I actually want them to feel empathy and sympathy. Because in my mind, the way I think of it in those terms, empathy is that they feel as I feel. They have the same feeling. Sympathy to me always implies a little bit of distance, of being able to look and feel pity for that character, which is different than feeling, which for me is about engaging their brains as well as just having the experience of whatever that character is. But they also stand back and observe that person. They have both things happen.

Landy: Or maybe one is feeling sorry for the character and the other one is feeling sorry for yourself. I mean, in other words, experience the character as the character, as opposed to experiencing the character as you. Sympathy seems to me to be experiencing the character—

Brown: No, I don't see myself in that equation for them. I want them to feel empathy with the character I'm playing and then sympathy for this person's plight in looking at the whole context,

the social context, the family, whatever is there. That to me, as an audience member, is what I like to get in the theater.

Audience: I'd like to ask the actors if—when you started you wanted to get your own voice—but if you started with trying to see the voice of someone that you admired, and then by understanding that voice and then consciously being able to come to your voice in a more developed form. Because I think that a lot of actors probably imitated, in some sense, some of the greatest actors—Brando, or whoever. Did you find your own voice right away? How did that develop?

Brown: Well, I went to Michel Saint-Denis's school, where we were taught to find our own voice, always. That was the whole process. But it takes years and years for you to find your own voice, because you are so easily influenced by other things.

Grifasi: And not just by other actors, but you get filtered through all these different techniques.

Brown: And yourself, just growing up.

Grifasi: I never liked my voice. No, really, when I was a kid, I used to imitate every voice that I ever heard, and that was the only way. It seemed a safe way to get people's attention, to use another voice. To this day I don't like it.

Brown: But we do, so that's okay.

Grifasi: Now when you say found your voice, you don't mean physical voice. You mean your voice as—

Audience: Yes, your voice as an actor.

Grifasi: Yes, yes.

Audience: How you talk and how you move your body, everything.

Grifasi: Oh. Well the instrument, as they say, yes.

Brown: Yes.

Audience: I just wanted to comment that I found your comment about beginning a gesture and then having the audience finish it a very intriguing idea. I'm a psychoanalyst and I think we do that to a certain degree with patients, where we try to come to the place where they are in order to sort of enlarge and nuance the ideas that the patient is trying to talk about. But there's one example that came to my mind, which is from a wonderful film, *Rosemary's Baby*. I was thinking about the scene—it's about a man who has to sort of make a pact with the devil, and basically his wife gives birth to the devil's child in order for him to—

Grifasi: It's about an actor.

Audience: Having success in his career. Yes, it's about an actor. But the scene that's so wonderful is that scene that's being filmed through a doorway, and you see the John Cassavettes character—he's gone, the telephone's rung and he's gone to the phone, and you just see his back. His head's behind, and you can't see the phone and you don't care what he's talking about. And I don't remember exactly who said this—it might have been Polanski himself—someone said that his goal was to get the entire audience to peer around the door as though they would be able to see it, they would be able to overhear what was—

Brown: You know, it was William Fraker, who was the cameraman, and he said he fought with Polanski on it because he kept centering it up.

Audience: Right.

Brown: And Polanski said no, and then he said, "Oh, this is idiotic," and he was at the first screening and standing in the back and the whole audience went like this.

Audience: I've always remembered that, and it struck me that that really is a lovely example of the director doing what you said and getting the audience to complete the action.

Grifasi: Because he controls the whole—

Audience: I think as far as Chekhov goes, as I recall it was because a large part of his work was the drama of inaction. We saw a lot of people reacting to things. I think maybe in terms of being an actor and maybe actually filling in some of that stuff, since all the action takes place off stage, all the big dramatic stuff, whereas someone like Brecht is very in your face. I think that might have something to do with it.

As far as the mirroring, there's a developmental issue that I came across, and this is not my field but I'm interested in it. It has to do with the fact that people who are antisocial and who act out—supposedly more than three-quarters of the people on death row were shown to have somehow been inhibited during a critical period. We know that in neurophysiology, there are periods that you have to have things wired together to fire together in the future. It's very heavy in the classic notion. But there's this John Bradshaw part of development where the first 18 to 24 months of the child's life, if it doesn't get that eye contact, there's a part of the brain, the right prefrontal cortex, which doesn't really form properly. So it can't relate well to other people after that. And I guess, again, because you're dealing with more sophisticated behaviors in humans, you really haven't seen this kind of stuff in primate behavior, because a primate who is unable to relate well with others probably wouldn't survive too well. It'd be very interesting to go through these developmental issues, how the capacity for that kind of mirroring is affected by environment.

Gallese: We started gaze-following behavior in monkeys, from a developmental point of view. It's the only study of development we were able to do with monkeys, and actually what you see is that in the early stages of development, they start following the head turn but they can't follow the eyes. They learn to follow the eyes, even when decoupled by the head turn, at a later age, and the speculation is that the system is ready to learn that, but it has to be exposed to a similar

behavior in the social community where this young monkey lives. Otherwise it probably wouldn't emerge.

Audience: Professor, I just want to ask you, have you done any studies, like your studies with the object, where you would have a reaction to a live person and then, say, reacting to television, a guy on television?

Gallese: Yes. And the live action is more powerful than the filmed action.

Audience: There's a difference of reaction in terms of—

Gallese: The intensity of the response, both at the single neuron level with monkeys, or with brain imaging or magnetic encephalography or TMS. In healthy human volunteers, it's much stronger when you see the action developing, executed by a living, present agent, with respect to when you see the filmed version of it. I mean they both work, but the live presence of a person is much more powerful.

Brown: That's interesting.

Audience: So what's that say about this idea that people watch too much television? Does that play a part in their—

Gallese: Well, I read incredible things—I don't remember where I read it. It was not a blog, because the blog is already a domain where everything can happen. But I don't care. I think it was in the news, someone proposing—oh, we live in a violent society because kids play violent video games with the Playstation. I think it's too trivial. First of all, I don't believe we live in a society that is particularly violent with respect to what was happening in the past. Actually, I would tend to say the opposite. We live in a much more peaceful society than people used to live in four or five centuries ago. That's the first point. There's a lot of trivialization of this scientific finding, and so I don't follow that track. I mean we can study that. It would be interesting to investigate it properly. But I think it's too early to jump to the conclusion that kids are violent or are bullying other kids because they play Nintendo. I don't believe that.

Audience: Just a quick interjection here. There's a real significant difference between the experience of violence—I mean, I remember I was traumatized when I saw the movie *Freaks*. I couldn't watch it. But the difference is that people's immediate experience of it in life is much less than it used to be.

Gallese: Yes.

Audience: But their exposure to it, without the actual experience, is much higher. So that's the issue, I guess—

Gallese: That's a very well known psychological effect under the name of habituation. That can be dangerous in the media—not just if people watch a violent movie or play a violent video game, they go out and start shooting people in a cult. I don't think that's the point. The point is

rather the reverse. I mean this constant exposure to violence, in a sense it's contextualized, framed in a peculiar way. "Oh, what's going on in Iraq?" "Well, today it's a good day, 30 deaths." "Oh, good." So constantly you are exposed to that. The emotional impact of that violence becomes more and more and more reduced. So certainly media has a big impact.

Audience: Just a question. What happens to the mirror neuron system when someone is sleeping and dreaming?

Gallese: I don't know.

Audience: You don't know. Do you know, would there be any way of seeing, when one's dreaming about one's self, when one sees oneself in a dream as opposed to—

Gallese: I'm not aware of any studying relating mirror neurons to dreams. There are studies done in rats, showing that in the right hippocampus, which is the deepest part of the temporal lobe, there are cells that have been called place cells. These cells are cells that map the environment from an allocentric perspective. So the rat is exploring the environment, and there are cells that fire only when the rat is occupying a specific place within this arena or box or whatever. If the rat explores systematically one spot of the arena more than others, there are cells that fire more frequently than others fire, because the cells that fire relate to that specific place. When the rat is sleeping and dreaming, their more active cells are those that map the places that have been actively explored by the rat. So, in a sense, the rat is reliving the experience of exploring those specific locations he's more acquainted with. That's the only relationship I can say.

Ludwig: I just want to wrap everything around back to theater very briefly, because I think we're out of time. The enjoyment of seeing Baryshnikov, or Michael Jordan, or Liev Schreiber doing *Talk Radio*—there's something magical about this moment of disbelief. We're actually going to be doing a roundtable about magic. But there's something very stimulating about that moment, even the moment of wanting to peer around the door. It's therapeutic to participate in that, and it has something to do with the possibility that mirror neurons are a survival tool, so we need to pay attention to them because it's how we evolve. That's why we like to see Michael Jordan, because he's doing something amazing that is the next step, and we want to identify with it. Or Baryshnikov or John Cassavettes.