

The Science Studio With Helen Fisher

ROGER BINGHAM: So my guest is Helen Fisher, research professor at the Center for Human Evolutionary Studies, department of anthropology at Rutgers University. Helen is the author of four books, beginning with *The Sex Contract: The Evolution of Human Behavior*, which came out in 1982 and explored the evolution of female sexuality, human pair bonding, and the nuclear family. In 1992, she published *Anatomy of Love: The Natural History of Mating, Marriage, and Why We Stray*, which examined divorce in 62 societies, adultery in 42 cultures, and patterns of monogamy and desertion in birds and mammals, and suggested a theory for the evolution of serial marriage. In 1999 came *The First Sex*—you're probably getting a pattern here—*The Natural Talents of Women and How They Are Changing the World*, and most recently, *Why We Love: The Nature and Chemistry of Romantic Love*, which looks at the evidence from fMRI brain scans to investigate the neural underpinnings of romantic love, which she designates a primary mating drive. The next book will be *Mate Choice: Why you fall in love with one person rather than another*, which stems from her work as chief scientific advisor to the internet relationship site Chemistry.com

I should say also that Helen is much in demand as a media commentator, and for her work in communicating anthropology, getting science out to the public, she received the American Anthropological Association's Distinguished Service Award. This, love, is very much a hot topic, if you've seen recent copies of *New Scientist*, there's a—love was the cover story of this one, this was Valentines Day, *The Atlantic* magazine, "The New Science of Love," which details some of Helen's work. I think in the words of the Robert Palmer song, you seem to be addicted to love, or at least the study of love. And as you point out, addiction is not too strong a term for this all-consuming passion of yours. Right?

HELEN FISHER: Right, absolutely.

BINGHAM: So lets get some sense of the trajectory: How did you get into this to begin with?

FISHER: Well, just, I think love can be stronger than the will to live. I mean, people sing for love, dance for love, write about love, talk about love, kill for love, live for love, and die for love. I think it can be much stronger than the sex drive. I mean, if you ask someone to go to bed with you, and they say no thanks, you don't go killing yourself. A certain number of people fall into a terrible clinical depression, stalk, commit suicide or homicide when they've been rejected in love. So, we're talking about one of the most powerful emotions on earth. So just to—that's the end of my story so far. How did I get into it? I think, well first of all I'm an

identical twin and so even as a small child, long before I knew there was anything like a nature/nurture argument/issue, I always knew there was biology to my behavior.

BINGHAM: Let me take you back to what you described to me once as a hot summer afternoon in New Canaan, Connecticut, when you were what? Somewhere between 6 and 8, somewhere around there.

FISHER: Something like that.

BINGHAM: And you have an identical twin sister, Lorna, and your mother was trying to get you to do something. Right? Answer a question?

FISHER: Mother wanted us to, we lived in a glass house, and, which also was part of my...

BINGHAM: Don't throw stones

FISHER: Well it was part of my childhood because actually I used to sneak into the woods and watch my neighbors eat dinner, because they also lived in a glass house. So, the observer was always in me, but that particular afternoon was a very particular, I still remember it very vividly. I could even, you know, paint a picture of it. There was a woman coming up our path and mother had assembled us in the foyer to talk with this woman, just to greet her. The woman came in and she did what everybody does when they see identical twins: everybody studies you, top to bottom, and, which is fine, you get a lot of attention as an identical twin. But anyway, she asked all the standard questions: Do we like the same food? Do we like the same friends? Do we like to do the same things? Do we have extrasensory perception about each other? etc. Very standard stuff, and then she turned, she leaned way over to me and said, "Do you think alike?" And I looked at this woman and I said, "Think alike? You know," I said, "How would I know how my twin sister thinks? I'm not her. I don't know." But I didn't say anything, I just was, you know, a little disdainful probably, and just weaseled out and smiled, but uh, it always stuck with me, how would I know how she thinks.

And as I've understood more about the brain I clearly see now that we do think alike, I mean Lorna's a hot air balloon pilot and a painter, and of course I write about sex and love, so we can tolerate risk. So we both have the same amount of monoamine oxidase in the system and probably the same dopamine system. Life took us very different directions, but we can both tolerate risk. We both work alone. We're both very self-motivated. She moves thousands of little brush strokes on a huge canvas, around every day. I move thousands of little words on blank sheets of paper. We both live by being creative. We probably have the same sex drive, and we're probably relatively, rather introverted. Which means we probably

have inherited the same levels of testosterone in the system, probably the same levels of estrogen, probably the same dopamine system is the same, and probably the same serotonin system. So we came out of the womb with the same genes with the same basic chemical pathways working, and then of course the environment took us very different directions. But I now understand that we do think alike.

BINGHAM: We'll get to the personality inventory a little bit later, but introverted?

FISHER: Yeah.

BINGHAM: What are you doing here?

FISHER: I, like, there's a lot of different definitions of introversion and extroversion and I seem to fit both categories. But the one I like best, most people think of an extrovert as someone who's very affable, social, sociable, good with people. I rather like the Meyers-Briggs description of an introvert. An introvert is from her perspective, somebody who gets their energy from being alone, whereas an extrovert gets their energy, renews themselves by going out and being with people. I really like people, I get along with people, but I get exhausted. I really get tired of the interaction. I'm not tired of it; it makes me tired out, whereas I rejuvenate myself by thinking, working, reading by myself. So that's probably the temperament of an artist in my twin sister's case and certainly a writer in my case.

BINGHAM: I should just say that the Meyers-Briggs thing, which we'll get to later, is a personality inventory: a series of ways to categorize people's personalities and so on. So, let's just stay at home for a minute, when you were growing up, what kind of, what was the home life like, what were your parents like?

FISHER: Well as I say, I grew up in this glass house. It was in the shape of an H. It was in a small—

BINGHAM: Oh, it was for you, Helen?

FISHER: No. Actually I am Helen the 8th, but I never did like the name. I would have far preferred to have been my twin sister's name, Lorna. But, I finally understood what Helen means. Somebody once told me, prior to a radio interview, because her name was Helen too, and I rather like the name better now. It means light, *helios*, Greek. So, I can live with that, although most people don't call me Helen.

BINGHAM: What do they call you?

FISHER: Close friends call me by my middle name, which is Elizabeth. I rather like that name. I rather like the name Lizzy, so if you want to call me Lizzy, go ahead,

but, oh, I don't know. No one's ever asked me about this, Roger, about Lizzy. But it's very close to me, it's unintimidating. Helen has such a starchy quality to it. But anyway, I grew up with a twin sister. There were lots of slogans around the house.

BINGHAM: Such as...?

FISHER: My father always used to say, "Be useful as well as ornamental," that was one, "Keep your eye on the ball," "It's not a fair world." I'm sure every family grows up with a pile of slogans that are constantly floating around. That was one of my first ones: "It's not a fair world."

BINGHAM: So you meant slogans, like, that puts me in mind of the opening, remember the John Fowles novel, *The Magus*, where he is talking about growing up and he said his father was this strict military person who used to come around and beat you, accost you with words, always these formulaic sentences. So that's what you meant by slogan right?

FISHER: Yeah. I mean that was one of the first things that I, I'll tell you about my first sexual experience, I know that's a bit odd to say...

BINGHAM: Well, I was going to save that for a little later, but go ahead.

FISHER: Only because I've written about sex and love for so many years. I'll just back up and say for a moment, that I studied prostitutes in New York for a period of time. I never wrote about it because I was, I found that an awful lot had been written about prostitution, so I didn't feel like I had anything new to contribute. But during the course of studying middle-class prostitutes—these are women who live at home and the clients come to their home. I think they make about \$200 per client, or at least when I was studying them. Anyway, I got to know a lot of these people, and I found from knowing them, that in many respects, their upbringings were more rigid and strict and fearful of sexuality than mine was. I grew up in a home where it was part of the upper class. My father was a good friend of Henry R. Luce, who was the head of *Time* magazine. He commuted to work every day. There was no problems in that house in terms of anything. But my father believed that you should have a good sexual life. That this was an important part of a marriage, and important part of a relationship, and so it was, that aura was around me.

And I just remember when I was about 4 or 5, we were all, my twin sister, myself, my mother and father had taken a vacation to Cape Cod and it was in October, nice, warm day, nobody on the beach. And my father took his big wrist watch off, and put it on my arm and he said—I couldn't read time yet—he said, "You girls go up the beach with that tennis ball," he played tennis, "and you don't come back or look back until this hand is here and this hand is here." So off we go up the beach,

and we followed instructions in that house, and came back and everything was different. My father was smoking his pipe, and my mother was kittenish. She was not a kittenish woman. There was something about, I didn't know what was going on, but there was something good about this, I said to myself, this is good for me. This is good.

I would say that it's been that, I don't have that, you know, they divide societies into sex-negative societies and sex-positive societies. And they put most of the West in what they call sex-negative societies, whereas most of Asia is what they call sex-positive societies. Because we don't, many Asian cultures don't link sex with God. Sin is not part of the program. In Western societies, in Christianity, it's very deeply woven into religious belief. Although I grew up in an entirely Christian town, I never saw my father in church. My mother became religious, I wasn't quite convinced she was really religious, but she went to church after she got older. I just didn't grow up in a household with a lot of sexual issues. It was all somehow relaxed. Love was taken for granted, I guess. It was a good household.

BINGHAM: And from that day forward, you encouraged your father to smoke his pipe as often as possible?

FISHER: All I knew is that when their door was shut you never knocked, never.

BINGHAM: We'll get onto this, but at some point I want to talk about the whole field of evolutionary biology as well. You probably remember one of those classic stories in all the textbooks that we saw at conferences we were at together and so on, the story about the Coolidge effect. Remember that story? So I'll just tell the audience. There's an old story in the sexual literature about President Coolidge and the First Lady going to a new government farm, and they were given separate tours. Mrs. Coolidge passes the chicken coops and sees a rooster vigorously copulating. "How many times a day," she says to the guide, "does the rooster...?" and the guide says well, "Dozens, dozens of times." "Please tell that to President Coolidge" says Mrs. Coolidge. So a little later on in the day, President Coolidge comes around and he's told about the rooster's prowess. And he says, "Always with the same hen?" And the guide says, "Oh no, no, a different one every time." "Please tell that to Mrs. Coolidge." There is this, there is a lot of theory, by the way, this is actually, you'll find this part in a lot of evolutionary biology textbooks looking at mate strategies and so on. I just wanted to get some context for you. So, looking at the neighbors, move on to doing anthropology at the American—no, you find someone at the American Museum of Natural History who gives you an assignment, right?

FISHER: I got a double major in anthropology at New York University, down in the village, which I just loved. I just loved being in a place where there were lots of different kinds of people. I am truly interested in why we're all alike. And all of my books have been on why the Russians and the Japanese and the Australian

Aborigines and the Americans are all alike—I'm very interested in human nature. So when I got out of my lily-white little town in New Canaan, Connecticut, which was a lovely place to grow up, and into a big city school, I was captivated with it. I took so many anthropology courses that I ended up with a double major in anthropology and psychology. But it was anthropology that really was answering the questions for me when I got into understanding chimpanzee behavior and some of the connections between human behavior and chimp behavior, etc. Well anyway, in anthropology, a professor, Dr. Ruth Fried, whose husband worked at the Museum of Natural History, and I don't know how it happened, but she came up to me and she said "Stan is looking for somebody to go to the Navajo reservation to study a matrilineal society, one that traces their descent from the mother rather than the father." So, I said that would be a thrill, of course. So I did spend a month up at the Museum of Natural History reading about American Indians. Then he sent me to the Navajo reservation. I was so thrilled. I thought to myself, "This is the beginning of really being an anthropologist."

BINGHAM: And what happened? What was it like?

FISHER: Well, it wasn't the beginning right in the beginning. I bought a Chevrolet. I didn't know how to drive stick shift, so I remember going through one town just in second gear. It was just awful, I was afraid I was going to run over someone. I drove down there from Colorado, bought this car, and got to the Navajo reservation, and I'd never seen an Indian, never been west of New Jersey, and it was March. It was really cold. It was over 7000-feet high on the reservation. I stopped pretty much just shaking, stopped at a trading post. They told me where Mabel Meyers lived. So I went in, and I saw this hut and I stopped my Chevy and I rammed like an American does on the door. They wait an hour and a half sitting in their car, you know, I didn't know any of the local rules. So anyway, I went in and—this story is about culture shock, about really becoming an anthropologist—and in this tiny little one room were 7 Indians, 2 goats, a potbelly stove, 2 big brass beds, a kitchen table, and these kerosene lamps. So everything was in this sort of yellow haze.

So anyway, I made it through the day, trying to ingratiate myself and all. I put my sleeping bag down on the floor that night and I could hear all this breathing. I said to myself, "You've made it. You're going to be an anthropologist." The following morning I woke up and tried to busy myself and everyone was busying themselves and I didn't know a word of Navajo. It's a very complicated language. They've got something like 76 sounds; English has about 36 sounds. It's very difficult to understand Navajo. It's also a tone language. You say something by a different tone and it means something different. So the moment came, and everyone started to file out the door. The last one stopped, and looked at me, and he did speak some English. He smiled at me, and I smiled at him, and he paused and then he walked out the door. And so he shut the door and I could hear next door—I could smell

the coffee, and I could hear the clinking of spoons on plates and I—So anyway, about 2 hours later they came back, and I made it through the day, and the following morning came and that moment came again, and they all file out, and he looks back at me, and he smiles and I smile back at him, and he shuts the door, and I hear the clinking of the plates and smell the coffee.

So anyway, the third day happened and once again, the same exact thing. He goes out the door and he pauses and he smiles. But this time, something snapped in my head and I said, why don't you ever ask me to come along? And he shouted at me, "Why don't you ever just come along?" And it suddenly occurred to me, I don't know what I'm doing. Every single one of the things that I have learned as a human being could be totally wrong. I went that moment through a porthole into a different world in which I, for the first time really in my life, sat down and listened, and tried to put this one together. And I don't think you ever forget that experience, that your view of reality is not necessarily someone else's. On the other hand, we do have human nature. So it's a big mix of environment and biology.

BINGHAM: Alright, so you said at that point, the theme that runs through all of this, is to study human nature and to try and figure out how and why it evolved. Let's start with something there, which is, you obviously saw human individual differences there. You saw cultural differences. The notion that there is a human nature is one thing. What about the notion that there are all these enormous individual differences as well? How do you reconcile the two things? Because as you've been doing work more recently on fMRI, looking at brain scans, trying to find patterns, you probably have noticed also that that's a great instrument for showing individual differences in the brain as well.

FISHER: Well, it's interesting, you know. I've put 32 people who are madly in love into this functional MRI brain scanner. Seventeen who were madly in love and their love was accepted and 15 who were madly in love and their love was—they had just been dumped. They had many things in common. The 17 who were happily in love all showed activity in certain brain pathways. So in that respect, that's part of human nature. They also showed tremendous individuality in parts of the cortex, the thinking parts of the brain. I think we're beginning to understand that question, the juxtaposition. I don't even want to call it the juxtaposition. I think we are 100 percent biology *and* 100 percent culture. The brain is very flexible and we have a fear system, but in New York I'm afraid of being hit by a cab. In the grasslands of Africa they were afraid of being eaten by a lion. But they probably felt fear the way we feel fear. In the same way with romantic love, I think that 4,000 years ago in Sumeria, 50,000 years ago in France, 100,000 years ago in parts of Africa, the feeling of romantic love was the same. Who you fell in love with, how you expressed your love, what you did with that love, was very dependent on your upbringing, your environment, but the actual feeling of romantic love, that's biology. And I think we have inherited many of those.

BINGHAM: Okay, so you said romantic love, you described three different basic neural systems in your world. One is sex drive, the second thing is what you call romantic love, and the third is a more of a long-term attachment, which I suppose you would call companionate love. Are they really three different systems? How do you justify that? Could you explain that?

FISHER: You know, I remember the moment I came up with that. I was walking through Greenwich Village in the middle of the afternoon and I said to myself, could it be that romantic love is different from the sex drive? I mean, it's a different feeling, I mean, when you are, the sex drive is a craving for sexual gratification. Romantic love is a craving for someone to call you on the phone, for emotional union, and could there be this third system, that sense of attachment, that sense of calm, you can feel with a long-term partner. I began to see love as these three basic brain systems, and I now know that there have been 5 different brain studies of the sex drive, and they're beginning to map the basic highways associated, and the brain regions associated with the sex drive. I and my colleagues have mapped some of the brain regions of romantic love, and they're different. And indeed, once I describe what romantic love is to somebody, they can very easily see that it's a very different feeling.

BINGHAM: Could you go on with that a little?

FISHER: Yeah, what romantic love is, well in order to figure out what romantic love was, I read the last 40 years of psychological literature, and culled from that the very the basic characteristics of romantic love, and it pretty much goes like this: The first thing that happens when you fall in love is the person takes on what I call "special meaning," as a man once said to me. The world had a new center, and the center was Maryanne. George Bernard Shaw once said, "Love consists of overestimating the differences between one woman and another." And that's pretty much what happens. Then you focus your attention on them. You can list what you don't like about them, but you sweep that aside and just focus on them. Their book bag is different from every other book bag in the gym. Their car in the parking lot is different from everybody else's car in the parking lot. Their wine glass at the dinner party is different from everybody else's. You just focus on it, which is high dopamine in the brain. Intense energy, you can walk all night, talk until dawn, elation when things are going well, mood swings into despair when things are going poorly, real dependence on the relationship, physical and psychological dependence. As one man said to me, anything she liked, I liked. It's a simple madness.

I think the most important characteristic is you cannot stop thinking about the person. You obsessively think about them. You go to bed thinking about them, you wake up in the morning thinking about them, and that's I think low levels of

serotonin. Also, the heart pounding, the sweaty palm syndrome, that's probably high norepinephrine in the brain, and many other characteristics. Certainly, it's very hard to control. It comes from primitive parts of the brain. It evolved long before our modern human brain did, and last but not least, I don't think it's permanent. I think you can sustain romantic love for a period of time, but not that very early intense feeling of romantic love. That evolved for a very particular reason too. I think the sex drive evolved to get you out there looking for a whole range of sex partners. I think romantic love evolved to get you to focus your energy on just one at a time and begin that mating process and attachment evolved to enable you to tolerate this person, at least long enough to raise a child as a team. I think that these brain systems are big mix-and-match systems; you can swing easily from one to the other, even lie in bed and feel deep attachment to one person and feel madly in love with someone else. It's a very fickle situation, love.

BINGHAM: Right, and I guess my point was that in some sense is this just a useful handle to be able to talk about what might be stages of the same process. I am sometimes a little bit leery about "parcelating" things. That could be just one large system operating.

FISHER: I see what you're saying. I can go there, absolutely. It's a matter of how you—you know the problem with romantic love is that people have always regarded it as part of the supernatural. They don't regard depression as part of the supernatural, or anger or fear or surprise. But when it comes to romantic love, they want to believe that it's part of the supernatural. So until recently, it wasn't even studied. As a matter of fact, in the 1970s they wouldn't even allow it to be studied. People laughed at somebody who studied romantic love.

BINGHAM: Well, because, I mean, wasn't it thought to be sort of a cultural construct, you know, things that troubadours did in the 13th century?

FISHER: When people ask me, what is the one thing I'd like people to remember, it's that, exactly what you said, that romantic love did not, was not invented by the troubadours in 11th century France, that the Iraqis love, that the Australian Aborigines love, that people up the Amazon River love. I think other animals love. I think that this brain system evolved from what I call "animal attraction," that all animals need that focused attention, that obsessive thinking, that dogged following to start the mating process with particular individuals and that this brain system evolved in human beings.

BINGHAM: Okay now, you talk about the drives, and a standard evolutionary biology, as you would know, the reason I mention the Coolidge effect, is that there's such a huge disparity, they would argue, between male and female strategies, and that's largely an investment story. As our old friend Don Simons would say, all the male requires is about 20 seconds of his time, a teaspoon worth

of sperm, that's it. Some people can sometimes get me on 20 seconds, but it's a very small investment. Whereas the woman is at least stuck with 9 months, minimally; it's a huge investment. If you look at those in terms of economic investment, in the wild, there's obviously hugely different strategies.

FISHER: I don't know. Men spend their lives trying to court women. You ask a young man whether it's actually 20 seconds of depositing some sperm or whether he hasn't pumped up at the gym, whether he isn't trying to get an A in economics, whether he isn't trying to get himself a nice big car, whether he isn't trying to be the head of the basketball team. I mean, men spend their lives—devote their lives. This is one of the reasons that I think men will kill themselves to get ahead at work, because men at the top tend to get the ladies.

BINGHAM: I'm not saying I subscribe to that. I'm saying that is a standard evolutionary biological theory. And on top of that, so, that is based on the notion that much of what we do now is based on the strategies that were successful when we were hunter-gatherers in the Stone Age, and that we've still contained within ourselves, to some extent, those passions. You know from things that I've written, my personal predilection is that we in fact construct ourselves as we go along, and we each have individual databases, which is why we are very different people. So we're constructing our personalities as we go along, and that it's easy to override any of those alleged primal urges. I mean, what would you say to that?

FISHER: Well, first of all, I loved your book and it was very useful to me. I took some of the data out of it and I gave a good deal of thought of it. I often feel that these very big arguments that there's elements of both or elements of the all. For example, as an identical twin, I think that my twin sister and I both inherited a particular dopamine system in the brain that enables us to tolerate risk. Then our cultural environment as children and as adult has given us to very different directions. So I think there's always, I do think there's something called *homo sapiens* and as *homo sapiens* we have inherited a group of tendencies, of variables. I mean, we like sweets; the human animal likes sweets. Carnivores don't like sweets. I suppose you could get a lion to eat a chocolate bar but they go for meat because they're carnivores, and there are some things in the brain and in the whole system that drives them to seek certain kinds of food, whereas we tend to seek sweets because for millions of years our ancestors lived in the trees and they needed to eat sweet fruit in order to get the nutrition to survive. And so I do think that we've inherited some basic tendencies. I don't think that we're a blank sheet of paper on which environment inscribes personality. On the other hand, I think that environment.... we even know how the environment turns genes on and off; they've finally explained why identical twins can have different major diseases: because they're environments will actually turn genes on and off. We're beginning to understand what happens at the synapse, what happens in the nucleus of the

cell, and where environment and heredity meet, but I do feel that we do have a heredity.

BINGHAM: So you would say that, let's take an example of that. You, at one point, had to reverse some ideas that you had. You had the idea that we had, essentially a seven-year itch.

FISHER: Yeah, that's what all the data said, yeah.

BINGHAM: Do you want to tell that story?

FISHER: Well I, well this was my second book, *Anatomy of Love*, and I had this theory... First of all, my first book I had written about why the human female lost her period of estrus or period of heat and why we evolved pair bonding. I mean 97 percent of animals do not bother to pair up to rear their young and people do. How come? So I had—as a matter of fact, a lot of times on television people would ask me, why are we adulterous? And I don't say it, but I generally feel like saying, you know that's not really the question. The question is why we bother to pair up at all. That's the hallmark of the human animal, that we pair up and rear our babies as a team. So anyway, having solved that one, for myself anyway, I came into thinking, why after so much effort to form a pair bond, to build a house, to have these babies... Why do we break up? Why is it so difficult to form a life-long pair bond? So I looked at divorce data in 58 societies through the demographic... 62 societies, through the demographic yearbooks of the United Nations and I found worldwide patterns of divorce. And I had hoped, you know, you always hear about the 7-year itch, and I had looked at American data and the median is seven years. In other words, a 50 percent of Americans divorce within the first seven years and 50 percent afterwards. The facts are a rather meaningless piece of data, but never mind.

We have this cultural concept of the seven-year itch, and I said, seven years would be the period of time that a million years ago a man and a woman could raise 2 babies through infancy, which is about 4 years; human infancy is about 4 years. And then after those 2 babies, those babies could join a multi-age playgroup and be raised by other members of the band. And they could break up, form new pair bonds with other people, and create more variety in their genetic lineage. That would make biological sense, that we evolved this drive to pair up and stay together, at least long enough to raise 2 young through infancy and that would reproduce you and me. Not to be. I kept on looking at this data over and over and I never found a seven. In Russia, in South Africa, in Venezuela, in all of these cultures, I found a 4-year peak. People tend to divorce during around the 4th year of marriage, not the 7th in cultures around the world. Well, that was upsetting and I didn't know what to do about it.

Anyway, I went with the data and finally I was standing at a wine and cheese reception at a New York University gathering and somebody said something from across the table and it suddenly occurred to me; maybe we evolved the drive to stay, form a pair bond and stay together only long enough to rear one child through infancy, and then to have a tendency to break up and form a pair bond with somebody else and thereby have another child and create more genetic variety in our lineage. Leaving the human animal with a tremendous drive to seek sex, fall in love, form a pair bond, raise at least one child together as a team, break up, a tendency to break up, form a new pair bond with somebody else and create more genetic variety in our lineage. And then I looked at other birds and mammals and you see that same pattern. A good example are robins, birds, all of the songbirds. They form a pair bond in the spring, they raise one clutch or two or three, but when the last of the babies are flying away, they break up and form a flock for the winter, and then form a new pair bond the next spring. It's surreal, pair bonding, you see it over and over among pair bonding species, and I think that's the basis of some of the problems we have in life-long pair bonding. I think we can do it. Over 50 percent of Americans do form a pair bond for life, but every culture in the world where divorce is possible and economically feasible, the divorce rates are relatively high, and remarriage rates.

BINGHAM: I had a speculation about the 4-year thing as well. In most of the literature, this thing we call theory of mind, in other words, your capacity to put yourself in somebody else's shoes, see things from other people's perspective. A lot of the studies show that children aren't actually able to do that until about 4 years old. Until then, they think that everybody thinks exactly what they're thinking. You know, there's this study called the Sally-Ann study, or the one with the little smarties, and you have a child. You have, say, a stuffy bear there, and with the child and the bear, you show the child where you're going to hide the crayons, and you hide the crayons and you do it in the absence of the bear and in the presence of the bear and the child has to figure out where the bear will say the crayons are, or something like that, that's essentially the Sally-Ann test. Below the age of 4, the child usually gets this wrong because they assume it'll be where they saw it in the first place.

FISHER: You know what, I read that in your book; did you put that in one of your books? I, because I just, it's coming back to me, but I hadn't put it together that it was at age 4. So many things happen at age 4.

BINGHAM: So at that point the child has got some sort of its own sense of how to navigate more effectively through social space. The other thing that happens is that in larger families that age tends to drop. So that if there's more interaction and more having to navigate through social space and interactions, they become more proficient at doing it at an earlier age as well. That's some way in which the 4-year thing would possibly...

FISHER: ...continue to work. I often want to ask people, you know, people who are divorcing, let's say they've been married 15 years or so. I often ask them, how old was your youngest child when you divorced, because I think that marriages go through cycles, and I think we'll end up finding the brain circuitry of that. Do you know—you've probably read this stuff about the monogamy gene. They've actually found a gene in a prairie vole, like a little field mouse, and this particular gene codes for vasopressin receptors in the ventral pallidum, a certain part of the brain, and when they take this gene out of the prairie vole that forms pair bonds naturally, and put this gene into a meadow vole that does not form pair bonds, it will begin to form pair bonds too. So we're getting to understand how the physiology of something as complex as pair bonding behavior could have evolved, and I think we're going to get to the point of understanding what happens at those receptor sites when people become interested in more restless in a long term relationship.

BINGHAM: So let's talk about this. Some of this work was done by Larry Young at Emory University, some by Tom Insel, who is now running some of the national institutes. And fundamentally, the story is, well the story was that prairie voles form pair bonds, they're enduring, for life and so on and so forth, whereas the mountain or montaigne or meadow voles are not monogamous. They don't do by parental care, and so on and so forth, and the difference is basically in the neurobiology. That to form this long-term pair bonding you need these nice little things called, these nice little neurotransmitters like oxytocin and arginine vasopressin. Paul Zank at Claremont has done some work which shows that you can, if you somehow... I was going to say put oxytocin in the drinking water or even spray it, that people who were doing these experiments where there's two people working together, trust experiments, are more trusting if exposed to oxytocin. So its effect is kind of like forming a bond of some kind. So don't you think that people are a little bit spooked by this idea that a lot of this stuff, which is the subject of poetry, can be explained by molecules?

FISHER: I don't know why they're spooked, frankly, because I think maybe they don't have quite enough information and so. You know people will ask me, you know so much about romantic love; has it spoiled it for you? And I say, well first of all, I understand my friends a lot better when they're suffering and when they're feeling elated, so I feel a much bigger connection to people. I can even be walking along and look in a baby carriage and feel compassion for that child and what it's going to go through in terms of its love life. But in terms of myself, you know, you can know every single ingredient in a piece of chocolate cake and still sit down and eat that chocolate cake and feel that rush of joy. And in the same way, you can know that there are molecules for trust but you can reach your hand out to somebody and hold them and feel trust. And we're never going to kill that feeling in the brain that goes along with these chemicals. And if you think carefully about

it, there's got to be chemistry to all of our feelings. I mean, everything, this table is chemistry. Our hands our chemistry, you know, lunch is chemistry, these thoughts we're having is chemistry. I mean the animal is operating; the mechanisms are operating while you're feeling these things. For me it only adds to the understanding. I don't know; I like to know how things work.

BINGHAM: The reason I said lunch is chemistry is I did a program many years ago called *The Addicted Brain* and actually went to some lengths to make the point that when you're talking about addiction, you're not just talking about alcohol and cocaine and so on. The same circuitry is involved and people can get addicted to love, that you can be sort of transported by music and so on. There's also a program called *The Sexual Brain*, and people said, are you going to do the rock 'n' roll brain along with sex and drugs? *The Sexual Brain* looked at male-female differences and that was very interesting because there was a lot of evidence in those days about differences in the corpus collosum, which is the bundle of fibers that connect the right and left hemispheres, and the story was that at certain places on the corpus collosum there seemed to be more smaller connections between left and right hemisphere in female brains and kind of a thicker cable between the male right and left hemispheres. Which suggested that transmission of information from left to right hemispheres was quicker and more effective in a male and there was more information being transported.

FISHER: I think it's the reverse.

BINGHAM: No, I don't think so.

FISHER: I think it's the splenium, in the back of it, and I think the female has more connections. Yeah, more highways, more axons to be factual. You know, I mean the female brain has more long-term connections and the male brain has more short connections. The male brain is more compartmentalized. The female brain is more...

BINGHAM: We're saying the same thing. So the information between the two hemispheres in the male was faster but had less content in that sense. Less complexity of the information, that's the way I remember it anyway.

FISHER: They're different animals. I don't know why people want to think we're exactly alike. For millions of years they did different things for a living, and those different things have made some differences in the male and female brain.

BINGHAM: I was trying to get to *The First Sex* in which you argued, in fact, that there's something in the way in which females are comported in their chemistry, in their biochemistry and so on which would make ideal leaders, and so on and so forth. Do you want to expound on that?

FISHER: Well, what started me on that book, and I'm surprised I wrote that book, to be honest, because it was a little off my track of sex and love. It was on gender differences and it was on differences as opposed to similarities. But I became captivated with it because I knew there was more and more data piling out that there are some real gender differences. And I thought to myself, well, if there are these real gender differences and we've got this society now in which people are piling into the job market, in cultures around the world. The demographic yearbooks of the United Nations have nice data on 130 societies, almost everywhere women are moving into the job market. Now in some Muslim cultures, they're getting an education, they're not getting into the job market yet, but they're going to, I hope. And what's the world going to be like one hundred years from now? We've got not only the male brain in the job market, but the female brain too.

So the book really goes through, very methodically, all of the real gender differences and how they evolved and the impact I think that these will make. And I mean the bottom line is I think we're moving towards a collaborative society in which the skills of both men and women are going to be understood and valued and employed. But you know, I see men and women like 2 feet; we need each other to get ahead. For millions of years these brains evolved to work together, and in fact, what I find most exciting is that we're back on that track again, of really working together. You know, for millions of years, women commuted to work to do their gathering of vegetables; they came home with 60-80 percent of the evening meal. The double income family was the rule, women were economically powerful, they were sexually powerful and socially powerful, and were moving. You know, we've got these ten-thousand years of the farming society where women lost a great deal of their economic power, and also their sexual and social power, and now they're moving back into the job market after ten thousand years and we are seeing a return of the kind of woman we saw a million years ago—expressing her sexuality, being more and more powerful in the job market, making all kinds of contributions.

We haven't talked about the actual gender differences, but the overview is that it's a... Women have a lot to add. Think of it, we've got a communications bonanza. I mean, we're about to have 500 channels on television. Who's going to do all that talking? I mean, girls, little girls speak sooner with more grammatical accuracy, with more words per utterance by age 12. They're better at reading, writing, verbal comprehension. It's associated with estrogen; we know the brain circuitry of it. The woman's ability to find the right word rapidly, basic articulation, goes up in the middle of the menstrual cycle when estrogen levels peak; even at menstruation she's better than the average man. I mean, you can go, there are so many gender differences, and if you look carefully at them, you can see the huge contribution that women are beginning to make and will continue to make.

BINGHAM: So, the differences I was talking about in terms of connectivity there, was that the male brain was, in theory, designed for a very fast rapid response, whereas you can get more contemplation in a sense from a female. But that's really all speculative isn't it?

FISHER: It is and it isn't, you know. All these people are doing MRI research, and I'm with some of those people some of the time, and they'll have studied something that has nothing to do with gender differences. And I'll get them to the side and say, tell me: did you find any differences between men and women? And they'll say, yeah, Helen, as a matter of fact, we did. We weren't looking for that, we didn't write it up, but I think the more we look at the brain, and that's truly exciting: We're going to see more and more gender differences. Nature would have been pretty shoddy if she had selected for men and women to be exactly alike, because they did such different things for a living for so many millions of years.

BINGHAM: Yeah I think we've got to a phase now with the fMRI stuff and the things that you're doing. Its coming up on 50 years since a researcher whose name you'll know, Harry Harlow, did those classic studies with attachment in rhesus monkeys. Where he had monkeys, as you know, some with their mothers, other little infants that were placed with cloth mothers, and so on, and some were just placed with a piece of steel and so on, to see what the differences were. And there was a CBS program called *The Measure of Love* in 1959, and all this sort of stuff. So, and Harry used to say that if monkeys have taught us anything it's that you've got to learn how to love before you can learn how to live. And at the same time, Harlow was working, there was this man John Bolby, who wrote these classic texts on attachment with Mary Ainsworth, and they classified the behavior of infants into secure or avoidant or resistant depending on how they felt when the mother left the room and so on, and it seems to me that these attachment strategies, styles, are in fact there if you look at love. I mean, if you start asking questionnaires of how do you feel if you're left alone by, and how do you feel... So people have found that the same attachment styles that were there in infants, the same kinds of styles are still there in adults during romantic attachments as well. I don't know if you've looked at that or thought about that.

FISHER: We actually did an experiment about it and we haven't published our data yet, but when we collected this data on the 15 people who were madly in love, when they were happily in love. We had all this data sitting there and we decided to look at it a little bit differently. We had given these people a lot of questionnaires, and so from going back to those questionnaires, we took some of those questions that we felt that a person who was sort of the clingy attached would answer one way and the person who was sort of avoidant attached would answer another way, and people who were just sort of comfortable attached or had

a very non-neurotic sort of stable attachment system... Anyway we looked at the brains of just those individuals separately and we did find some brain differences. So we're beginning to believe that your infant care system—which by the way, everybody has always known, but we're beginning to prove it—can have some permanent effects on the brain and on behavior and on attachment style.

You know, I think that we can also learn, though. You know, people have called me America's last optimist, and I think you can, in the right environment, get people who were very avoidant to continue to change the brain. I do think that you live and you learn and that you can change the brain and behavior. Just like the Coolidge effect; I wanted to go back to that for a minute. You know, tell Mrs. Coolidge that it was always with a different chick, right? In order to sustain a long-term relationship, the one thing that we now can actually say that you should do is do novel things together. Novelty drives up dopamine in the brain and maybe can sustain that threshold of romantic love. I guess this is just my way of saying that the more we know about the brain, rather of being scared of this data, that trust is associated with oxytocin and dopamine is associated with romantic love—we begin to use the data to change our own styles of loving so that we find the right thing. To behave in certain ways so that other people will respond to us differently, to change what we do in a relationship, to strengthen it. I think it's all very positive knowing about the brain.

BINGHAM: Let's just look at some of the work that you did with, and we should mention, Art Aaron and Lucy Brown at Stoneybrook. Incidentally, isn't Art Aaron the husband of Elaine Aaron, who has written a lot of these books on how to be sensitive people, which is sort of another whole area. But there's, you have a line here, and I'm quoting from the paper, "Early stage intense romantic love is associated with reward and goal-representation regions and is better characterized as a motivation of goal-oriented state that leads to very specific emotions such as euphoria or anxiety." It's a motivation state; romantic love is a motivation state produced by a constellation of neural systems that include the cortex and an area called the ventral tegmental area, the VTA, which produces dopamine, and the caudate. So we now have, you're appearing inside the black box where these people who subjectively report that they're deeply in love or wildly madly passionately in love and so on, and different areas of the brain are apparently more active in different categories, stages of love. Is this roughly the story?

FISHER: That when you look at a photograph of your sweetheart, and that's what we did. I would interview these people and make sure that they were madly in love because these machines are expensive and it's time-consuming. And this was the first experiment of this kind, so I had to convince myself that these people were madly in love. And my first question was always, how long have you been in love? And my second question was what percentage of the day and night do you think about your sweetheart? And my last question, which I always had a hard time

coughing up, but I did, was would you die for him or her? And they would say yes. And those were the ones that I would put in the machine. And I went in this machine myself 3 times. At first I thought it would be unethical not to do it. It was totally transparent; I would tell them exactly what was going to happen in the machine because I was afraid that if they were to become angry or fearful I would be measuring a different response.

So anyway, they would look at a photograph of their sweetheart and they would also look at a neutral photograph that they had brought in. So they would look at the positive one for 30 seconds and then they would look at the neutral one for 30 seconds, and between the positive and then neutral, we had them do a distraction task, because the problem with romantic love is you can't stop thinking about your sweetheart. So we had to cleanse the brain of that emotion before looking at the neutral and we would cast a large number on the screen, like 8421 and they would have to look at that number and starting with that number in their mind, they would have to count backwards in increments of 7. So this way, we were able to capture the brain, madly in love, doing an attention game which is counting backwards, and looking at a neutral photograph, and then when you take all the scans of the neutral and the positive, cancel out what they've got in common, you're left with the brain in love.

And you started talking about Art Aaron, and very definitely I've done this with Art Aaron, SUNY Stonybrook, and Lucy Brown, neuroscientists at Albert Einstein college of Medicine. And Art's theory was romantic love is not an emotion, that it was a motivation system. Both Lucy and I, I'll say for myself, I thought it was an emotion or a range of emotions going from exhilaration to despair, and Art said, no, it was a motivation system, so that was part of our hypothesis. My hypothesis was that we would find that dopamine pathways involved; Art's hypothesis that it would be a motivation system. Well, actually they're the same thing. But anyway, we found activity in these brain regions associated with motivation. The ventral tegmental area and the caudate nucleus, which you write about in your book, are brain regions associated with focus, with elation, with addiction, with motivation, with goal-oriented behavior, and that's what happens when you're in love. You feel a lot of things, you think a lot of things, but basically you want somebody; it's part of the wanting system. And so when we discovered that, I then went one step farther and I said, okay, if this is a strong motivation system, I'm going to call it a drive, because I like to bring that word, drive, back into the vocabulary. Because to me its very meaningful, if you're going to talk about the sex drive, then I'd also like people to understand that there's a drive to fall in love. I would have called my book *The Drive To Love*, but I was overruled.

BINGHAM: I'm just thinking now about the categories that you've given here. Let's go back to the Pew survey, which says that 31% of adults—I'm shifting now to how you can utilize this information to help people navigate through these really

emotionally extraordinarily charged states that they find themselves in and how to better navigate through all of these sorts of things. And how to deal with a love affair that's just finished and so on. You have to as you know from what we've both written, you have to completely somehow change your state, and there's only certain ways you can change your state. Before I get to that, just one quick caveat here. Some people are critical of the fMRI studies, not just in terms of love, but in terms of fMRI studies in general, because plainly you can't be doing single cell studies at the same time; you're getting these rather large effects and they're being used by experimental psychologists, and some people, some neuroscientists think that it's turning into kind of a neo-phrenology, the different brain areas, each one for kind of a different emotion, and so on and so forth, and we have to be a bit careful about how precisely you can describe these results. Is that something that you're very cautious about as well?

FISHER: I believe that in collecting information, you can always throw it out. It's better than sitting there doing nothing at all. People used to say, why do these surveys, everybody's making it up? We've now found that, actually, we gave a lot of questionnaires to our people who were madly in love before we put them in the machine, and indeed, those people who scored higher on the questionnaires for romantic love also showed more activity in certain brain regions. I think we're one of the first studies to show that there can be a correlation, that a questionnaire can show something about the brain. I don't know, I'm not in the poo-poo world; I just think we shouldn't overemphasize the value of these things, but MRI has only been around for 10 years, and nobody's ever looked at the brain before, and people would say, they haven't said this about our study but I would guess that this group of people would say, what could you learn about the brain, it's just mechanics. We learned a lot about love because we had thought it was an emotion. Now we understand it's a drive. That makes it much clearer why it is that people will kill for love, will die for love, why people will stalk, why they fall into a clinical depression. I mean, if something is an addictive substance, it helps to explain the behavior by knowing the biology.

BINGHAM: What I'd like to do now is go through the Internet site that you're talking about and actually come up with a couple of the questions that you use on a questionnaire, and just see if we can get some response from the people here. Then we'll take a break and come back with some more questions. Let me just explain first of all that there's a Pew survey being done recently that shows that 31% of American adults, that's 63 million people, know someone who has used an Internet dating site. Twenty-eight percent of those, that's 53 million people, know someone who's had a date as a consequence. That's a lot of people; it's unprecedented. So instead of being in the stone-age savannah with just hunter gatherers, you've got 53 million people out there that you can actually access through Internet relationship sites. You've become a scientific advisor to chemistry.com. Incidentally, how did someone get that URL?

FISHER: They bought it.

BINGHAM: That's a very rare...

FISHER: This is a Barry Diller company; it's Match.com. They came to me a year-and-a-half ago, and asked me if I would be interested in setting up a whole new dating and relationship site, one for people who were seriously interested in getting married or having a really serious long-term relationship. I didn't know what their—we all tried to come up with titles for this site, and finally an email was circulated among their staff. I'm chief scientific advisor but I designed their questionnaire, asking us to please not come up with any more. Sure enough, the title was chemistry.com. Yes, so they bought that.

BINGHAM: A standard psychology questionnaire, assessment scale has got things like introvert, extrovert, sensing, intuitive, thinking, feeling, judging, perceiving, all those sorts of things. The Helen Fisher version is builder, explorer, director, negotiator. Could you explain that, and then we'll figure out which of our audience members are builders, which are explorers, which are directors, and which are negotiators.

FISHER: I'll start out by saying I'm an explorer first and a negotiator second. It all started when the CEO and the main people at match.com asked me to design this new site, and at the time I said, I'm not a personality psychologist, are you sure you've got the right person? And he looked at me and said, yes, he felt he did. So it was right before Christmas, a year-and-a-half ago, and I had to come up with whether I was going to do this or not, and so I was washing the dishes in the kitchen, and I said, you have to come to wits with this, and I went to my empty dining room table and I pulled out a blank sheet of paper, and I said okay, Helen Fisher, what do you know? What can you actually say that you know? And I said, well you studied dopamine in the brain. I wrote dopamine at the top of the sheet of paper, and said, what do you know about dopamine? Oh, well, you know some of the genetics and neurotransmitters, certainly associated with the dopamine system, and you can say that people with a certain activity in this dopamine system tend to be risk-taking, novelty seeking, optimistic, irreverent, flexible, curious, and creative. You know those things; you can prove it. So I said, well if you're going to work in the real world, you should give the kind of person who's high in dopamine a name. So I said, okay, explorer.

So then I said, what else do you know? So I took another sheet of paper and said, well you know something about the serotonin system. And I know that people with certain activity in the serotonin system tend to be calm, social, popular, religious or spiritual, quite conventional, eager to follow rules, scheduling, conscientious, dutiful, loyal, and building. They like to build. They're good at managing things.

They are good at building home and family. So I decided I would call that person the builder. And then, because I had written a book on gender differences in the brain, I knew quite a bit about estrogen and testosterone. So I called the high estrogen person the negotiator. This person tends to be very imaginative, flexible, creative, intuitive, altruistic, sympathetic, very verbal, good at people skills, good at reading posture/gesture/tone of voice, and so I called this person the negotiator. And last but not least, is the high testosterone person. I guess a lot of people would call it the Type A personality. There have been a lot of studies of testosterone, because they want to get to the bottom of autism, and other problems. The high testosterone person tends to be decisive, direct, assertive, a lot of people would say aggressive but I'd like to say assertive, ambitious, inventive, original, and so I decided I didn't have a great name for this person, but very rational, very logical, willing to do the right thing even if it hurts others, and I would call that person the director.

So I have these 4 types. So I was off to the symphony that night with a friend, and walked by Barnes & Noble and I said, I've got to go buy some books on personality. So I bought about 9 books and over the course of the next two days, I came to realize that Plato, Aristotle, Carl Jung, Meyers and Briggs, and whole lot of other people had defined four basic personality types, and indeed those 4 basic types corresponded perfectly to my 4 biological types. I was able to piggyback on their data, because if you know that someone is this, is also calm, social, and popular, somewhat religious and conventional, you can also say that they're not only scheduling but they're judgmental and this, that, and the next thing. So piling all of what I knew about biology, and the last 2000 years of what psychologists and philosophers know about psychology, I created a test with a lot of questions to try to figure out whether you are—you get a pie chart. We're all a combination of all these things, but we do have a personality, and in fact, my pie chart comes out that I am predominantly an explorer, and secondarily, but actually a great deal of a negotiator. So I am an explorer-negotiator.

So the theory behind this dating site, and the hypothesis behind it, is that during reproductive years, you tend to gravitate, fall in love, with a somewhat different but complementary genetic type, because for millions of years it was adaptive to fall in love with somebody who had different genes so that you could create more variety in your children and also come to the job of parenting with different parenting skills. So the reason I am so interested in this chemistry.com site is they now have 850,000 people on the site, and I get to find out who falls in love with whom and see which biological types fall in love with which. It will be the first huge international study of the biological aspect of why you fall in love with one person rather than another.

BINGHAM: Some of the questions are in fact quite clever and draw on a lot of other scientific literature, and I see that in some of the questions you show people

drawings of hands and you have to figure out which your hand looks most like, whether your index is slightly larger than the ring finger.

FISHER: Look at your right hand and see the—do it yourselves—and see how long the fourth finger, the ring finger is as opposed to the second finger, the pointing finger.

BINGHAM: In the literature, this is known as 2D and this is known as 4D. So the index finger is the 2nd and the ring finger is 4th. There's a ratio of 2D to 4D, and there's actually quite a sizeable scientific literature on this. It was started by, one of the original people was Marc Breedlove up at Berkeley. And there are correlations between the ratios of these sizes and the amount of, these links are a result of the amount of testosterone flowing in the fetus.

FISHER: As fetal testosterone is washing over the brain, it is building aspects of the male brain, actually probably compartmentalizing it more, and it is also making your 4th finger somewhat longer than your 2nd, because there are testosterone receptors in your 4th finger. I have not read the explanation for that, but my theory is that is good for throwing, and the high testosterone male evolved these testosterone receptors in the 4th digit in order to better hold a spear or a rock. But anyway, the reason I ask that question, is because I want to know how much of a director you are.

BINGHAM: So in women the ring and index finger tend to be about the same length, roughly the same length. In men they vary and the index finger is usually the shorter of the two digits

FISHER: Now that's all only fetal testosterone, because apparently about 2/3 of men... I think that were going to find that a third of men have it the same length. Don't forget were all a combination of all of it. And a man who may have, not show this fetal testosterone effect, may be... testosterone washes over the brain many times in life, but in early teenage, there's a real flood of testosterone. In fact, I've got the female pattern. In fact, my pointing finger is a little bit longer than my ring finger, so that's a very female pattern in the womb, but I must have had a lot of testosterone in early teenage because the jaw is that of a high testosterone, and also parts of my figure are that of a more testosterone. I'm totally heterosexual animal, but, just to make it clear, not that it makes any difference, but you asked about my childhood. So the long and short of it, I see your hands, it is longer, it is longer, you're very verbal, and you're a writer, so there's a lot of estrogen in there's too. So you're probably, there's some director, what do you think you are?

BINGHAM: I have no idea, but let's shift off that. Let me move to another question, which is, how often do you vividly imagine extreme life situations such as being stranded on a desert island or winning the lottery? Let me tell you what the options

are first, and then I'll ask you to raise your hand. The options are almost never, sometimes, most of the time, all the time. So how often do you vividly imagine extreme life situations such as being stranded on a desert island or winning the lottery? Just imagine it: Almost never? [looks at audience] That's about 5 or 6...

FISHER: You know, I actually changed that question, because this is an evolving website, but how often do you imagine walking down the street and then really being hit by a bus, and being totally run over and going to the hospital, losing both legs...

BINGHAM: That's extreme death situations

FISHER: In other words, something that's very vivid to you. How often do you go that route?

BINGHAM: Almost never? Same group. How about sometimes? Most of the time? Oh my god. All the time?

FISHER: Well, there are two of us here. I do it all the time, and I'm very high estrogen.

BINGHAM: So what's the answer?

FISHER: Well, women are as a group on average more imaginative than men, and I think that it is, and in fact, when you ask the CEOs of major business corporations, they once asked CEOs of Fortune 500 companies, what was the most important thing that women have brought to the business world, they all say they're more varied, less conventional point of view. Women do tend to be more imaginative, and I think it's probably because the parts of the brain are better connected; they more rapidly put together whole scenarios. There's a good deal of psychological data that women tend to be more imaginative. So the question is about imagination.

BINGHAM: And obviously, you're not just using one question or two questions. I assume there's a huge battery, that they all cross correlate to figure something out. Because otherwise it begins to sound a little bit like a parlor game.

FISHER: You know what, I had something like 300 questions in there, and of course they kept on taking my questions out because they needed to be short enough and so that people won't get discouraged in the middle of it, and we actually know who proceeds to finish the questionnaire and who doesn't. Certain personality types, the builder type, are most likely to finish the questionnaire, then the negotiator and the director, and the explorer, you would guess, would be least likely to finish a questionnaire of any variety. They would find it more tedious.

BINGHAM: I thought they had high motivation...?

FISHER: They're high motivation, and very focused.

BINGHAM: Short attention span?

FISHER: No, I think that all of these have a good attention span; we're talking about temperament, the temperament part of personality. For example, you can be an explorer and want to go across Montana on your motorcycle. Or you can be an explorer and want to read all of Shakespeare in your home at night. In other words, we're talking about temperament, as opposed to other aspects of personality. This is actually quite complicated, but I'm fascinated with it. I've finally become interested in why we're all different.

BINGHAM: You have some faces as well. People can try to assess faces. Again, some of this literature I find interesting and solid, and some of it I find a little bit iffy. There is some literature out there, for example, where you show females men's faces. And depending on their state of estrus, or depending upon—some women apparently are very good at tracking, just by looking at faces, men's testosterone levels,

FISHER: Right, isn't that amazing?

BINGHAM: And also their interest in infants.

FISHER: Isn't that incredible? That's the newest stuff. Isn't that fascinating? They don't know why, it's just that those men...

BINGHAM: Although it's a suggestion that it's in some way, some evolved mechanism that's coming into play. That's a very difficult thing to substantiate, I would have thought.

FISHER: On the other hand, you can walk into a room, and temperament does change, if a person is calm one day, they might be quite frenetic the next day, but overall I think people are coming to see that we do have personalities and that over time you do have some stable elements in your personality, but you know, from a Darwinian perspective, it certainly would be adaptive to signal people with who you are, and also to pick up the signals of those around you, so that you can weed between them and find what you're looking for. I just can't believe that natural selection would have been so shoddy as to not produce in the human animal all sorts of signaling devices to signal your assets and all kinds of mechanisms for perception so you could walk into a room and scan that room, and talk to the

people in that room and feel some instant attraction to some and not to others and that there isn't some biology at work here.

Now we know that women can with smell, establish a man's immune system, and women tend to be attracted to men who have a different immune system from their own. And it is that piece of data that first made me think, well, if women—and they do it by smell—can establish aspects of a man's immune system, nonverbally, and unconsciously, perhaps they can also establish—and men also—a person's dopamine system, estrogen system, testosterone system, and be naturally guided by behavioral signals, by architecture of the face, by smell, by many mechanisms toward better mating choices. We know, psychologists are in a mess, they don't know much about why we fall in love with one person rather than another. They know that you tend to gravitate toward people who have the same socio-cultural background, the same ethnic group, same general intelligence, same level of good looks, same religious values, and that's about it. But we all know you can walk into a room, and all of those people have the same background, the same basic religious values, the same general level of good looks, the same general level of intelligence, and you talk to them all, and 20 of them are perfectly nice people. You like them very much, but there's no spark. And number 21, you're "attracted" to. Why is that? I think biology plays a role.

BINGHAM: Which part of biology?

FISHER: That's what I'm trying to figure out. It's my guess that the builder type with the certain aspects of the serotonin system, is going to advertise that system by being religious, by being calm, by being conscientious in conversational style, by the way they court. Whereas I think the explorer is going to have this expansive high-energy type of demeanor, which is actually advertising their biology.

BINGHAM: So this is very interesting, instead of the traditional what's your sign, it's going to be what's your neuromodulator?

FISHER: I've even fantasized about reading in the *New York Times* in the personal section...

BINGHAM: High Serotonin male seeks...

FISHER: A high 5-HT MAO, low T high E, you know the whole biological gamut.

BINGHAM: We had a conversation yesterday with Pat and Paul Churchland, who are neurophilosophers at the University of California, San Diego, but they also know a great deal of neuroscience, after the program had ended, we were talking about the difficulty in using language to accurately express some of the new developments in neuroscience. Paul said, "Well, Pat has no problem with this. She

came home the other day, and she said, 'I've got really low serotonin, I'm just out of glutamate, I need a glass of wine to pump of this and that.' " They were literally talking in terms of an acute understanding, or the beginning of an understanding of what was in balance and what was out of balance in their biochemistry. I think that would be a good thing to have.

FISHER: Some people will be interested in it. And some people will go along merrily without it, but I recently read that green tea drives up dopamine in the brain. I don't know, but that's what I read, and I wouldn't be surprised if all these people with—I actually did read a book with all these different diets and certain personality types are going to gravitate toward certain kinds of foods, and must be wary of other kinds of foods because of their personality type, but also their chemical type, and it's all connected, Roger, we both know that.

BINGHAM: Does this mean that the poets got a lot of the stuff wrong? I'm thinking...

FISHER: I think the poets got it right.

BINGHAM: "Let me not to the marriage of true minds admit impediments, love is not love which alters when it alteration finds."

FISHER: Shakespeare was in a state of attachment when he wrote that poem. I like to look at poetry and see which state of being someone was in when they wrote that piece of poetry. Let me give you an example, and songs too, songs are good too, in fact I've had friends send me cowboy music, country western music with a third of the songs being about sex drive, a third being about romantic love, and they try to find people who sing about attachment, but people don't create songs about attachment. Well, you're asleep at night when you're feeling attached. You're up all night being creative when you're high on dopamine and you're madly in love with someone that hasn't called. That's when you're creative. But anyway, let me give you 4 lines of a poem that come out of 9th century China, which is a perfect example of a guy names Won Chen, he happened to be the poet, who was madly in love. This is a perfect example of someone who is high on dopamine, so high on dopamine that they have focused on a tiny little part of life with this woman. It's only 4 lines; it's called "The Bamboo Sleeping Mat." It goes like this:

*I cannot bear to put away
the bamboo sleeping mat.
The night I brought you home,
I watched you roll it out.*

So he got himself focused on that bamboo sleeping mat. He cannot put it away even, because it's so a part of this woman who he's madly in love with. That's high dopamine in the brain, and I think that poets have gotten it right. If I had more poetry here, you know, poetry from all over the world expresses these chemical experiences that we all go through.

BINGHAM: So, have you, are you married? Have you ever been married?

FISHER: I was married when I was 23, and I divorced again when I was 23, so I wasn't married in the state for very long. In those days, 23 was very young, and for some reason we divorced in order to improve the relationship. That doesn't make sense. We actually went out for about 4 years. Which I only figured out a lot later, after writing a book about the 4-year itch, it was several years later that I said, oy, you're part of the problem. I've had 3 very long and very meaningful relationships with men; I just didn't marry any of them. The next one I will marry. I finally figured it out.

BINGHAM: Do you have any sense of whether you would have liked to have children?

FISHER: I know I didn't. My twin sister had a child. I'm her aunt, so I have passed on my DNA, but that's not the point. And she's had children, so I'm in the loop, but I didn't feel somehow that I could do both realistically. I just didn't see how I could do both. I've had a wonderful time helping raise my various boyfriends' children. There's something perfectly wonderful about not being somebody's mother. My boyfriend at the time was always worried about their grades in school. I was much more worried about suicide, drug abuse, alcohol abuse, driving too fast, things their father couldn't talk to them about, but Helen could. I think that's actually helped me as a professor too. I don't talk down to students. I know they're people. Maybe I treat them as real adults because I didn't have children and I don't see people as children.

BINGHAM: Do they treat you as what we would call in England, an Agony Aunt, in other words one of the ladies that writes the columns that doles out advice. Do they come to you for advice?

FISHER: Everybody comes to me for advice. I get it from Iran, most recently this week, a soldier in Iraq. India quite often, people from all over the world, people email me and ask me. And of course, I feel as if I have to respond because I know something I could be helpful at, and I don't make it... I try to be helpful. People are in agony everywhere, you know, nobody gets out of love alive, Roger. Nobody. We all get hurt at one point or another and it's nice to have some information to be of use.

BINGHAM: I noticed this line you have about when you've been in that situation, you can somehow trick your brain into recovering more quickly from the pain of rejection. "Someone is camping in your brain, you must throw the scoundrel out." Now how do you do that?

FISHER: Boy, wouldn't we all like to know. But I think that one of the greatest 20th century movements was the 12-step programs: Alcoholics Anonymous, Drug Anonymous, all this stuff, and so I think that um... We are talking about an addiction that can kill you. And if nothing else, it's going to waste years of your life if you don't try to get over it. And of course, men and women, I mean, 3 out of 4 people who kill themselves when a relationship is over is a man, not a woman. Men also actually fall in love faster than women do, but we all suffer. And to try to understand this addiction and to use some of the principles of the addiction movement is something that I think would be useful. So one of the things I say is, don't try to be friends for at least a couple years. Say to the person, you know, you've dumped me and I understand and try to be nice about it, although you feel the abandonment rage, and say, you know I'll get back to you in a couple years when I can be friends with you. Anyway, throw out the cards and letters, or stash them in the garage. Don't see the person. Don't talk to the person. Don't try to make friends with the person. Get rid of your drug of choice. Get some exercise; it drives up dopamine in the brain. Sunlight can change mood. Be around happy people. You know, when you look at somebody who's smiling, you immediately smile also, and the muscles change the nerves, the nerves can change the brain chemistry. This is why you feel better when you're around a happy person. And so go around, stick with friends who are old friends, so that you can feel some of that attachment. Go do novel things to drive up the dopamine, and of course, as Shakespeare said, if you can find a new love then that will drive out the old love, but it's awful hard to do.

BINGHAM: So if you hadn't gone into anthropology, hadn't been a scientist, what would you have liked to have done?

FISHER: Oh Roger, nobody's ever asked me that. Well, I would have liked to have been a ballerina; I like to dance. I'm glad now I didn't do that because I do like to read so much; I love ideas. I thought for a while I would have made a good actress. I loved the theater, but you know, I cannot remember lines. I can write 'em, I can deliver 'em, but I cannot remember lines. I would have been dreadful as an actress. So I think I'm one of those people. I think I was always an anthropologist. I think I was an anthropologist as a small child sitting on that stone wall, watching my neighbors eat dinner. Trying to figure out how much of my behavior was biological and how much was learned. I think I'm one of those lucky human beings where, you know, Robert Frost said your vocation and your avocation are like two eyes that make one in sight and I think that part of my life was very fortunate.

BINGHAM: Is there any discovery you wish you had made?

FISHER: Oh my. Oh goodness, I will lie in bed tonight and I will come up with something that will be just right, or maybe not, but... a discovery I would have like to have made... well I'd still like to make this one about personality. I'd like to be able to... and I've designed some chemical experiments. I'm going to give this questionnaire to 250 people and also take blood, saliva, and urine. I'd like to do brain scans on them, but that's too expensive. And be able to prove that certain personality types do have certain biological profiles. And then I hope to prove that we are drawn to certain kinds of people rather than others.

BINGHAM: So you'll discover the magnet of love then, right?

FISHER: Another part of the magnet.

BINGHAM: One last thing. Who would you have, if you could sit down and have a one-on-one conversation with anybody in history, who would you have liked to have had a conversation with?

FISHER: I would have liked to have a conversation with a million-year-old girl. I would have liked to have sat around that campfire with a girl a million years ago. I would have liked to have traveled with hunter-gatherers a million years ago for a week. I think there's so much we could learn about the continuity between past and present that could tell us a great deal about human nature.

BINGHAM: Alright, Helen Fisher, thank you very much.

FISHER: Thank you.

BINGHAM: Now if you'll just stay there for a moment, we can ask if anyone has any questions. So does anybody have any questions for Helen Fisher?

AUDIENCE MEMBER: If love is a drug, why are people having more trouble finding love and resorting to online dating rather than conventional meeting people on the streets or somewhere?

FISHER: I think there's many reasons why people are, I wouldn't say resorting to online dating, but using online dating. We're marrying later, so the boy you fell in love with in high school, you're probably not going to marry. The boy you fell in love with in college is probably somebody you're not going to marry. And so we get into the job market and follow our careers until our mid- to late-twenties, and by then most of our friends we know already and we've sort of already tried out or looked over that particular group of people, and we don't want to involve ourselves

with somebody at work because we don't want to jeopardize our business life. And we're sick of the bar scene because we've done that already, and so we want to look at other alternatives.

Match-making is very old in humanity. I mean for millions of years people were saying, I know in that hunting-gathering band there's a young man that you might want to meet the next time we're all at the same watering hole, et cetera, et cetera. So you know... In India they've been advertising for centuries. And this is modern technology's way of doing something very old. As a matter of fact, I think it's actually more suitable to the human mind than walking into a bar. When you walk into a bar, you don't know who those boys are. You don't know what their intentions are. You don't know anything about their background. They might be interested in being with you for one night and then moving on to Chicago where they have a job, etc. You know, we're used to this artificial environment where we know nobody and by signaling devices, you know, trying to get to talk to people. But in many ways, all of these online dating services are a forward motion using the newest technology to introduce you to people, and in chemistry.com and in some of these other sites too, you get to know the person before you meet them; you get to know some things about their background. You don't know that in a bar. Though I just think it is just the 21st century's mechanism for doing the same old thing.

BINGHAM: So it's sort of a home shopping network except the goods are future mates, etc. Any other questions?

AUDIENCE MEMBER: I wanted to ask you about the website, chemistry.com. Have you noticed any patterns between the explorers matching more with the, what is it, the directors or the builders matching more with the other ones?

FISHER: We just got our first group of data back last Friday and I'm going to meet with the statisticians on Monday, so if you email me in some period of time, I will be able to tell you what we've found. I will tell you this, and it's helenfisher@helenfisher.com. But if I don't get back to you right away it's because I'm insanely busy, but I certainly will. And make sure you tell me where it is that we've met. But, we've had our first marriage, and in fact I was invited to the wedding; the wedding is next weekend. And the wedding was a young man called Jay who was wiped out by Hurricane Katrina. He lived in New Orleans, he lost everything and he came to New Jersey to stay with relatives. He got on this chemistry.com site apparently. He met a girl named Stacy who lives in Brooklyn and they fell in love. They talked on the phone for a week before they met and then they have not been apart a day since. And sure enough, she's a second grade school teacher. And so during her spring break, he took her down to the Bahamas and on the third night of being in the Bahamas, he leapt up with the resort band and asked her to marry him. And after all the other people in the room died down

from their cheering, she said yes, and sure enough, he had planned it for the next day. He had even planned her hair and makeup; can you imagine? And they got married. But they're going to get married again the 17th of June. And that's a long way of saying that he is a negotiator and she is a director. And that does fit in my hypothesis but I have a sample of one. So, stay tuned.

AUDIENCE MEMBER: I was actually wondering about, you said hormone levels of testosterone and estrogen can actually help determine your personality. I was wondering about people who get sex changes and they take, say estrogen, to do that. Does that start affecting their personality then, in those ways?

FISHER: I'm really interested in these people; it's a wonderful question. And because I do a lot of public speaking, people in the audience do come up to me and on two occasions somebody who has had one of these sex change operations plus the hormones along with it, have come up to me and told me their story. One was, it looked like a small man, but it was a woman who had changed into a man and the other was a very large woman, was a man who had changed into a woman. And they both said different things but I found both of them fascinating. The one who had now changed into a man said to me, he said, "You know, my thinking is more focused. I focus more on the here and now. I see more in black and white. I tend to miss the nuances of social situations that I felt that I used to be privy to." And I asked him, "Do you miss that?" And he said "Well, yes I do, I do miss that, and I do see the change in me. On the other hand, I'm glad I am who I am." And the reverse person said that also. This woman said, "I feel more compassionate now, I feel more sensitive to other people's feelings." It's biology to behavior. It's biology to everything!

AUDIENCE MEMBER: Hi. There's a popular internet theory, it's kind of loosely called the Ladder Theory, I don't know if you've heard of it, but basically when women meet a man, they have 2 ladders and one of them is a friendship ladder and the other is a relationship, like sexual, ladder, whereas men only have one. And I was wondering if you had any thoughts about that or if you think there's any merit to that theory, you know, where men, every woman they meet they kind of rank her sexually, whereas women kind of separate the two.

FISHER: I think I do have a Darwinian theory about that and I, probably Roger would have a theory too, and he probably would agree. But women make up their minds, you know, in these speed-dating situations. They make up their minds much more rapidly than men do, whereas men keep their possibilities open. And I think this Ladder Experience is basically another aspect of the same, largely gender difference. And I think that both are adaptive Darwinian strategies. You know we only have so much metabolic time and energy and courtship is extremely expensive. It's expensive biologically. You know, you go out on ten dates with somebody and then you discover that they don't like you, you've expended a lot of

time and energy, even money, you've probably bought a new dress or something. So the long and short of it is, it's adaptive for women. Women have more to lose. They may have a child, spend 9 months with that child in that womb, the pain, expense, and danger of delivery, the raising of that child predominantly for many, many years, and so I think it's an adaptive response for women, as rapidly as they can, to distinguish the haves from the have-nots, the will from the will-nots. And from a Darwinian perspective, it's probably adaptive for a man to know, even though she's not the girl of my dreams, but she'll do for tonight, and from a biological perspective, they're not doing this consciously, if I can pass on my seed, it would be an adaptive advantage. So I think that there's some biological payoff to both strategies, and it doesn't surprise me that you find that gender difference.

BINGHAM: I think we also have to remember, if I can just say this, that a lot of these, a lot of the literature is now showing that we have to be very careful about the generalizations and that new research is showing up new variations that weren't evident before. So even the allegedly monogamous voles, there's some research that they sneak off on the side occasionally. So... you had a question over here.

AUDIENCE MEMBER: You talked about this addiction to love and I'm curious about what people look like when they get over their addiction to love and how that changes their romantic life.

FISHER: I don't know the answer. I think different people are going to respond very differently. What I do know from the literature is that some people are more clingy and respond very poorly when they've been rejected. Other people are avoidant anyway. Some people are much better looking so that have a whole lot of other opportunities that enable them to forget about it more easily. Some people are better at denying the truth. A huge number of personality traits are going to operate to... In all parts of love, I think the builder is going to court differently than the explorer. I think that the director will respond differently to rejection than the negotiator. I think we not only have male-female differences, but we have individual child differences, and I think we've got genetic profile differences, a host of different ways that people respond to rejection.

BINGHAM: Any other questions? You guys over here?

AUDIENCE MEMBER: I was hoping you could talk a little bit about friendship since it's a form of love that doesn't really abide by the 4-year rule since there's not child-rearing involved. I don't know exactly what my question is, I was just wondering if you could talk about love and friendship.

FISHER: I think friendship is a fascinating issue. I think we're going to find more brain systems associated with different varieties of love. You know, these three different brain systems: lust, romantic love, and attachment, I think the brain is a big mix and match system and for example, you can, they've now looked at a mother's brain, what's going on in a mother's brain when she looks at her infant. And as it turns out, certain brain regions associated with romantic love become active and certain brain regions associated with attachment become active. And you can see a mother behaving in some ways, like a person who is romantically in love with her baby. She can't stop thinking about the child. She thinks it's the most beautiful child, even if it has 3 heads, she doesn't notice. She's got a great deal of energy to stay up all night, yet she feels a defensive attachment to that child also. I think that in the same way, friendship is going to be a big mix and match of different brain systems. For example, some girls will almost fall in love with each other for a while. They have no interest in having sex with each other but they fall in love: they obsessively think about each other, they've got to talk all the time, they've got to be together, they'll be jealous if one is with another girl friend. So those are some aspects of romantic love. And then I also think there's a defensive attachment. And so I think that friendship, love of god, love of family, love of community, love of your work, love of some ideal concept, love of some social cause, is all going to hijack or use different parts of these different brain systems to create the texture and variety of different kinds of love.

AUDIENCE MEMBER: I wonder if you can briefly comment what do we know about romantic love in other species and when did the circuits that are involved in this arise from the evolutionary point of view?

FISHER: Thank you for asking. In my most recent book, *Why We Love*, my favorite chapter was the one on love among animals. I can't remember the title of the chapter right now. But I think that this brain system for romantic love, human romantic love, evolved from what I call animal attraction. And there's not an animal on this planet who will copulate with just anybody. They all have favorites. It's called "mate choice," and in fact a female elephant who comes into estrus, she will avoid a lot of males until she sees one that she becomes particularly attracted to, and then she makes a beeline for him and she stays with him for about five days, and they pet and walk side by side, appear obsessed with each other, have an incredible amount of energy, they hardly eat or sleep. They show many of the characteristics of romantic love. So I think that, and we've studied this attraction system in, there's some evidence in sheep and there's some evidence in prairie voles. And when a female prairie vole finds a male, who she finds attractive, the levels of dopamine, exactly the same chemical associated with romantic love in people, increases by fifty percent in a brain region called the nucleus accumbens, which is an indication that it's exactly the same system.

And I honestly think that animals fall in love. I think that it will vary, I mean for example, I would guess that a prairie vole or a rat might feel deep attraction for 30 seconds, an elephant probably for about 5 days, a female fox probably about 20 days, and that it evolved for the same reason: to enable males and females to weed between their possible mating, sexual opportunities and focus their mating energy on just one, thereby conserving mating time and energy and getting on with the job of reproduction. I even think that love at first sight comes out of nature. In the beginning of the breeding season, a squirrel, let's take a squirrel, she's got to get on with finding another squirrel; she can't discuss his college plans, she's got to get on with the job of reproduction. So when she sees one with a nice bushy tail and crisp whiskers and a nice healthy gait, you can see the attraction. They behave attracted. And I think that instant attraction is something that human kind inherited. You see it in poetry from around the world. People will talk about an instant attraction that they have for another person. And in one study of a hundred men and women, ten percent of them felt love at first sight. I've never felt it, but I think any one of us can walk into a room and talk to one person and feel the beginnings of attraction for that person. It might not last more than a few minutes, but I think love at first sight comes out of nature. And in fact, you know, maybe if there were two things I would love the world to realize, one would be that everybody in the world does love, it wasn't invented by the troubadours, and the second is that other animals love too.

BINGHAM: Okay, thank you very much. Again, Helen Fisher.