The 2013 EV ROGERS AWARD

for achievement in the fields pioneered by scholar & teacher Everett

Honoring Stanford University Sociology Professor Mark Granovetter

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THE EVERETT M. ROGERS AWARD

The Everett M. Rogers Award honors the late Everett M. Rogers, a former associate dean at the University of Southern California's Annenberg School for Communication and Journalism and an influential communication scholar whose Diffusion of Innovation is the second-most cited book in the social sciences. Presented since 2007 on behalf of USC Annenberg by its Norman Lear Center, the award recognizes outstanding scholars and practitioners whose work has contributed path-breaking insights in areas of Rogers's legacy.

A video of the program can be watched in its entirety online at:
http://youtu.be/9l9VYXKn6sg

ABOUT MARK GRANOVETTER
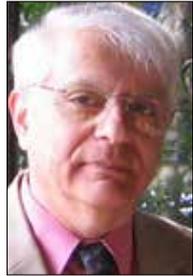
Stanford Professor of Sociology MARK GRANOVETTER PHD was the recipient of the 2013 Everett M. Rogers Award at a special colloquium and luncheon Wednesday, September 18, at the USC Annenberg School for Communication and Journalism. Dr. Granovetter presented "The Strength of Weak Ties" Revisited..

Cited over 24,000 times, Granovetter's 1973 paper "The Strength of Weak Ties" is a social science classic and a milestone in network theory. Our close friends are strongly in touch with us and each other, he wrote, but our acquaintances -- weak ties -- are crucial bridges to other densely knit clumps of close friends. The more weak ties we have, the more in touch we are with ideas, fashions, job openings and whatever else is going on in diverse and far-flung communities.

Granovetter is the Joan Butler Ford Professor in the School of Humanities and Sciences at Stanford University and the chair of Stanford's Department of Sociology, where he has taught since 1995. He received an A.B. in American and Modern European History from Princeton and a Ph.D. in Sociology from Harvard. Since 1986 he has been the editor of the Cambridge University Press series Structural Analysis in the Social Sciences; more than thirty volumes have appeared, in sociology, anthropology, political science, history and statistical methods. . His most recent book is *Geeks & Geezers.*

2013 EVERETT M. ROGERS AWARD

Martin Kaplan: Good afternoon. Thank you so much for coming, both those of you who are here from the Annenberg School and also those who have come from across campus and across town. Welcome to everybody. I am Marty Kaplan. I am the Director of the Norman Lear Center here at the Annenberg School. If you don't know what the Lear Center is, what's up with that?

We have been around since 2000. The Lear Center studies and shapes the impact of media and entertainment on society. I warmly invite you to come visit the Lear Center.org. There are seats here in the front as well. And I want to be sure to thank the people who were involved in getting us to this point. They are almost all outside working; but maybe they will see the video. Thank all of the Lear Center Staff; but in particular, Adam and Scott and Veronica. And in particular, Veronica. So even in her absence, let her hear the thunder.

Marty Kaplan: Thank you. And welcome come to the Everett Rogers Award Colloquium, which for some people might raise the question, who was Ev Rogers? And we will be hearing about him today. Just as a thumbnail to get us going, Ev Rogers was a farm kid from Carol, Iowa, who didn't think he had no interest in going to college. He ended up going to college. At age 30 he was Assistant Professor of Rural Sociology at Ohio State University and had a new book come out, called Diffusion of Innovations. And that book made him an international rock star. It is the second most cited work in Social Science.

He ended up for a period here at the Annenberg School for about 10 years. He was Associate Dean and a faculty member here. There was great affection for him. He was quite a guy, and respect for his work. When he died in 2004 the Dean of the Annenberg School, Geoffrey Cowan, we are in the Geoffrey Cowan forum, had set up a prize in his honor to celebrate his work and his memory. And it is that prize   Casey, there is room down here. And it's that prize that we are awarding today, and thrilled to have our guest here.

Mark, just want you to know that our Dean, Arnie Wilson is back east. Sorry, he can't be here, but he said he is particularly bummed, because you are one of his heroes. He didn't actually say bummed, but that's what it sounded like.

Mark Granovetter: As long as he said heroes.

Marty Kaplan: He did say exactly, that was the key. So the award was initially given out in 2005. The first winner was Arvind Singhal, who's one of the Judges of this award in the field of entertainment, education, the use of entertainment in order to spread pro social messaging, especially in the area of public health; and that particular activity is one of the signature programs of the Lear Center called Hollywood Health in Society, and in which we work with television shows in order to get the help messages in their stories to be accurate. Because we know the impact they have on audiences.

That was the area that Ev Rogers studied. One of your colleagues, Al Bandura, won the award a couple of years later. You probably know Bobbo the doll, and self efficacy. So it's been a great opportunity to bring people here, and to hear from them about their work.

The prize is for someone whose own work contributes path breaking insights in areas of Ev Rogers' legacy. So what are those areas? Well, diffusion of innovation, certainty. Communication and national development, historical and social evolution of information technology, cross cultural communication, network processes and effects, and entertainment education as I mentioned.

There is a panel of judges who met and gave out this award. There are a couple of seats down here, if you don't mind being under the screen. And that panel of judges, included Leo Brody, Manuel Castelles, Casey Kowes was here, Do Meo, Arvind Singhal, Tom Valenti, who's here; and the chair, Peter Clarke, who I am going to cede the floor to in just a second.

But first how we are going to proceed? Peter is going to introduce Mark. He is going to speak, and then ideally there will be a little time for questions before some people have to leave at one. If you do have to leave, slip out. People outside will be delighted to come in and get a seat.

The questions and answer will continue past one. So if you do have the ability to stay here; that, then, and haven't had a chance to ask your question, that's the way to do it. So please join me in welcoming the Chair of the Ev Rogers Prize Jury, my colleague here at the Annenberg School, Peter Clarke.

Peter Clarke: Thank you Marty. It's a great pleasure to see so many friends in this room and people who we hoped to make new friends with our event today. Just another word about Ev Rogers, who joined the Annenberg faculty in the mid 1980s and left in the mid 1990s, I actually had the pleasure of being Ev's colleague at two institutions, the University of Michigan, Michigan and here at USC. And everything that Marty has told you about him is true. He was not only a distinguished scholar, but a gentle and gracious and student centered person, generous with his time, and with his intellect. He is survived by Karin Sheffner Rogers, herself, who is a graduate of the Annenberg School.

We are here to recognize the newest recipient of the Ev Rogers award, Mark Granovetter, as our 2013 honoree, who knew and admired Ev. And Ev knew and admired him as well. Mark is, of course, justly famous for his Strength of Weak Ties concept, but he has done very much more than that. He is sociologist of industrial organization, and he is very interested in issues such as threshold levels and tipping points, and how the processes of industrial organization become embedded in human networks.

He holds the Joan Butler Ford Chair at Stanford University. He is a Fellow of the American Academy of Arts and Sciences. And he is also a recipient of honorary doctorates from St. Paul and Stockholm University. He leads a network study group at Stanford, whose web site I commend to you for a number of publications that have come out of that program. He is deeply interested in how networks have been important to the evolution of Silicon Valley, something that everybody acknowledges has been the case but has been vastly understudied.

And we can look forward to more research in his program in the years to come on a topic that is of vital interest to lots of people in the room, but was also of vital interest to Ev Rogers himself. He published one of his some 30 or 35 books was on the topic of silicon valley and its evolution. So it gives me great pleasure to introduce to you the 2013 Awardee of the Ev Rogers Award, Mark Granovetter.

Mark Granovetter: Thank you for those gracious introductions. I hope I can live up to all that talk. I first met Everett Rogers in 1976; and there were a lot of things to appreciate about Ev Rogers, but the thing that I particularly appreciated was he was one of the first really big fans of my paper, *The Strength Of Weak Ties*. He told everyone about it. And he would introduce me to people and they would say, oh you are that Mark Granovetter. I don't know how many others there were.

And I think at this point in time, much more than at that time, social networks and networking, and social media are really hot topics. People had just started to think about them in the 1970s, when all this first originated. So what I want to try to do today is to explain where all of the social network ideas came from, and talk about what they mean in the 21st Century. And along the way, I want to talk about how I came to write this paper *The Strength of*

Weak Ties, and how the argument of that 1973 paper applies at the present time.

So let me go back to the 1930s. Probably the first coherent argument about social networks was made by a psychotherapist named Jacob Moreno in the 1930s. And Moreno was quite a strange character. He wrote a book with the ominous title Who Shall Survive, which was about social networks. And the book had a lot of strange things in it. For example, he talked about social networks, and he talked about for example, he talked about social networks and talked about how we should rearrange cities according to who likes whom. And we are probably lucky that no one paid attention to that part of the book, because it wouldn't have worked out so well.

But from Moreno's work came the representation of networks and network diagrams in terms of points and lines, the familiar network pictures that we all look at now and the idea that you could measure social networks by asking people whom they liked or spend time with, what came to be called sociometric tests. They probably became to be called sociometric tests because these were mostly inflicted on children in school, because that was audience where you could get the kids out of class, because they had to do what the teachers and administrators told them to. And anyway it was probably more fun than doing what they told them to in class anyway, where you would write down who your first, who your three best friends were, the people that you admired or spent time with, whatever. And then they would take that data and they would construct pictures of networks from that.

So these ideas about social networks and entered sociology and anthropology from the 1940s to the 1960s. And along with them came the first mathematical techniques for measuring social networks, which I won't go into any detail about today, but it can be very intricate and detailed and complex if you look into any of the research material on social networks, you will see some of it can be pretty daunting.

In the 1940s, came the first simple ideas, for example, that if you would represent who knew whom, or who liked whom with a matrix of ones and zeros if you scored that matrix, would you get another matrix of all of the two step connections of who likes someone who likes someone else. And it went on from there and got more and more complex.

Meanwhile in pure mathematics, a field was developing called the theory of graphs. One two of the most prominent people who worked on the theory of graphs were Hungarian mathematicians named Paul Erdos and Alfred Renyi. They developed what is called the theory of random graphs in a series of beautiful and path breaking papers. So a random graph   a graph is just a mathematician's name for a network, where a network is a picture where there are points and lines, points being units like people and the lines being connections or ties. So a random graph is one in which the nodes, the people in a social network, throw out ties at random to other nodes, which is to say the chance of linking to any other node is the same for every other node that you might think about linking to. And it turns out that when a network is formed randomly like that, it has very high cone activity. It's very easy to get in a very small number of steps from any other node to any other node when the ties are thrown out randomly. You have extremely short paths.

Of course Erdos and Renyi, even though they were pure mathematicians, they knew something about the real world. And they knew that real social networks were not random. It was just a model. Because real people hardly choose their friends randomly.

Instead you meet friends through other friends. So you are more likely to be people whom your friends already know. Or you meet friends through talking part in similar activities. And because of that, because of the way that people really make social ties, we expect people to form clusters or cliques, which is what happens in real life.

And when you have clusters or cliques, then it's harder than in a random graph to reach people in other cliques through a short path. Because you get stuck in a clique when you are trying to make that connection. But no one up to the 1960s had a clear idea how to think systematically about this problem. And in the 1960s, the social psychologist, Stanley Milgram came along. And he got interested in this. And he started talking about something he called the small world problem.

So what is the small world problem? He took the term small world from the obligatory cocktail party response that you make when you meet someone you haven't met before, and you get to talking as you do at a cocktail party about where you came from and what you have done in your life. And finally you figure out there is someone that you both know, even though you never met each before.

And when you make that connection, there is something that you have to say, and everyone says, small world. And so this is what Milgram took as the title of his problem, the small world problem. And, of course, let me say that in a world of random networks, if people really made their friends randomly, then finding you had a common contact with a stranger, would not be a surprise. Everybody would. Because the number of ties, the number of links to reach someone would be very small.

But that's not how it is in the real world. And so people are surprised to find that you have a common contact with a stranger. And indeed saying the phrase small world, is a signal that we are surprised. So Milgram wanted to know. He wondered for strangers who let's say did not share an acquaintance, because there are, after all, some people that you meet at cocktail parties that you don't find a common acquaintance with, he wondered for strangers that did not share an acquaintance, how many personal links it would take to connect them.

So for example, if we take two people, X and Y that we chose randomly, then how many people does it take to connect them? So if it turns out X knows A, who knows B who knows C, who knows D, who knows Y, and that's the shortest connection between them, that's a chain length of four. And we had four people between X and Y. And so Milgram wondered for any if you chose any two people in the United States, just randomly, throwing darts at a map or whatever method you might have, how long a chain would be needed on the average to connect them. And once he knew the answer from his experiments, which I will tell you about in a moment, he used to tease I would even say taunt, because he was that kind of a guy, he used to tease academic audiences by asking them to guess the answer. And then he would be pleased when I think when their answers would be wildly inaccurate. And people would say oh, probably hundreds of connections to connect randomly chosen people. But, in fact, his small world experiments, the chain letter technique that he made famous, turns out the answer was only 6 or 7, a fact that a fact that is passed into common knowledge by now, with the phrase six degrees of separation, which comes from in part a game involving the Actor Kevin Bacon, whose been in more movies than anyone has ever seen. And also from the 1993 Will Smith movie of that same title, which I highly recommend for those of you who have never seen it.

What he did was he got a bunch of people. He was at Harvard at the time, got a bunch of people in the Harvard area to agree be targets. And Milgram was from Brooklyn and the most remote places he could think of in the whole world were Kansas and Nebraska. So he chose randomly people in Kansas and Nebraska and sent them a package identifying a target person, and asking them to move the package along if they knew them personally, which was highly unlikely.

They could send the package directly to that person. If they didn't they should send it to someone more likely than them to know. And then that person got the same instruction. And so,

the ultimate question was, how long would the chains be, when they actually got back, when the packages actually got back to the target people.

Well, I was a graduate student at that time so I knew Milgram's RAs. I knew Milgram a little bit, too. And I kept track of all this, and I took possession of some of his instruments, too. And so up here is a picture of the original instrument that Milgram sent around to people, communications project. Here is the target person, a stockbroker from Sharon, Massachusetts. And it went first to this person, Albert Gross would have been in Kansas or Nebraska, I don't remember which one. And here are the instructions. You send off a postcard each time you send it back, you send it along to someone else. And eventually it might reach the target person Dana Windsor is the person if you can see this, if I can make it here the laser's pointer behave. Here it is. And you can see, this is a short one, there were three people in between.

And this whole so this is a photocopy of the original instrument. This is 1966. This looks so hoky. You couldn't ever do anything that looked like this. Look at these lightening bolts up here, communications project. And then don't know if you can read this. It says, we need your help in an unusual scientific experiment being carried out at Harvard University and so on. And all of these instructions. And then at the end it says here, if you can read this, every person who participates in the project and send on, sends back a postcard is entitled to receive a certificate of appreciation.

I think you have to do it a little differently now. And so, the fact that these   when they   when they reached their target people that the average number of steps in between is only six or seven, that was very interesting to me. And I kind of filed that away, along with some other things that I was thinking about. And these results were closely related to another set of studies that I heard about in lectures by my mentor, a guy named Harrison White, who's one of the pioneers in network analysis in the United States and sociology, and in 1966 Harrison White was teaching

an introductory course for freshman in Harvard's Department of the Social Relations, which at that time in the Department of Sociology, he was about the worse possible choice for that course, because no freshman could ever understand anything what he was staying, And I was one of the TAs. So I got to hear all of the lectures. And in fact, even though the freshmen were completely mystified by the lectures, there was a devoted graduate student following. We all loved it. And we were very interested in it.

And one of the studies that White talked about, was the study carried out by a guy name Anatol Rapoport and his colleagues, who in 1960, asked all 859 students in the junior high school in Ann Arbor, Michigan, and obviously they were at the University of Michigan at the time to fill out a card, a series of cards which stated my best friend in the school is. And then you had to fill out a name. And then my second best friend in the school is another name, and my third best friend and so on up to my 8th best friend in the school is so and so. And each of the 859 students filled out the 8 cards. And this was lot of network data. And all of the kids in the junior high school. And Rapoport knew quite well network weren't really random. And he was trying to figure out in what ways they deviated from randomness. And he suspected that there was more what he called overlap bias among close friends, your first best friend, second best friend and so on than there would be among a more distant friend.

In other words, the closer friends were, the more likely they were to choose the same other people as friends. So you and your first best friend, second best friend, would tend to be choosing the same best friends much more likely than your seventh and eighth best friends. And to show this, what he did was he took   so he had all of this data, and he had to organize it somehow. And he took random samples of 9 students. And he did the following thing. He took the samples, and for these 9 students, he put their names on a list. And then he would take the names of the first and second best friends that they named and add them to the list. You had 9 plus 18 is 27.

So you might not have 27, because some of the 9 might name the same first and second best friends as one another. So it would be 27 or less 18 plus 9 is 27, 1 removed. And then he would take the people at the second removed, the 18 people or less named at the second removed and look to see who their first and second best friends were. And you have this branching out like a tree. And he kept doing that until finally at some removed, no new names were being added to the list.

And they did the same procedure for third and fourth best friends, for fifth and sixth best friends, and seventh and eighth best friends. And what they expected was that the first and second best friends would be a lot more likely to name students who were already on the list. They would name the same people as their friends named than the seventh and eighth best friends would. And therefore, you would eventually have a much shorter list for the first and second best friends than you would for the seventh and eighth best friends. You would reach a lot more people through the seventh and eight best friends than you would through the first and second best friends.

And all of this data is in the articles by Rapoport and his collaborator, Horvath. But it's kind of hard to sort through that. So one of the other TAs for Harrison White's course compiled a graph which summarized the Rapoport and Horvath data. And here is what the graphs show, that if you look at the first and second choices, that's the bottom line here. Then this is how many people you eventually reach. This goes out 12 removed. And we stopped it after 12 removed, because the numbers aren't changing very much after that point. And you would say it's [ascentodes] at that point.

And what you see is that the total number reached through first and second best friends is only about 175 out of the 851. The number reached through third and   I guess I have got, it says sixth and seventh up there, but it should be seventh and eighth,

and that number is about 375. So you reach a lot more people through seventh and eighth best friends than you do if you went through first and second than if you did the third and fourth, fifth and sixth, they would fall in between.

So the original guess was right, that you reach a lot more people through your seventh and eighth best friends, your much weaker ties; and that was very strong and impressive result. It turns out also that if you do a random network, where ties were thrown out randomly, which Rapoport had to simulate because there was no real random networks here, you say reach this many people.

And then if you do a planned network where everyone has to choose somebody already been chosen, then you reach almost everybody, which is this graph up here. So very strong and impressive result, which is more or less the one Rapoport expected. But he didn't do much with it. He used it mainly to argue some rather technical points called network parameters, which if anyone is interested I can refer you to the original set of articles. And I was guessing that the formulas were more interesting than that and in my mind it had something to do with the small world result.

So when I got around to doing the dissertation research which was on how people use social networks to find jobs, which is summarized in my book called Getting A Job, which is still in print. You can buy it on Amazon, a shameless plug. And if you go to the web site they will say like they always do, only three left in stock. And you know, if you believe that, I have a bridge I can sell you.

And so when I got around to the dissertation research on how people found jobs through social networks, I was interested in information flow. And I still had the results in mind for the Milgram experiments and from the Rapoport experiments. And when my respondents surprised me with some of their answers, I started putting two and two together.

I was interested in information flow. That was a big topic, certainly

when you are talking about people finding jobs is information flow. And I thought that how many of a person's friends knew each other, what proportion of the ties among your friends are actually there, possible ties of your friends are actually there, something called egocentric network density in that literature, I thought that would be, perhaps, an important influence on information flow.

And so in my pilot study, I made a chart, a little picture with each respondent at the center. And then I had boxes around and lines to the boxes. And I asked each person to name the people, the five people they spent the most time with. And I put their initials in those boxes. And what I intended, and I asked them which of the people knew each other, so I had a measure of network density study for all of the people they spend their time with.

And what I was trying to do, was I was thinking when they told me whether are or not they found a job through personal contact, which is a question that I asked them, I would look at this network picture and I would see whether the people   whether network density was different for people who found jobs through contacts of that for people who did not find jobs through contacts. And the problem was and the reason that you won't find these charts in my book at all is that none of the people helped my respondents find the jobs ever showed up in the charts at all. They were not there, absolutely not there, because they were almost never close friends. These were the people they   spent the time with, the close friends. They never were the ones who helped people find the jobs.

And that was kind of surprising to me at first. And in fact, sometimes I would say, how did you find your job? So, so, and so told me. Oh, a friend told you? And over and over again people corrected me and said oh, no, no, no; just an acquaintance, just an acquaintance. Well, one of the things about doing research where you actually talk to people is that you need to listen. You actually need to listen and try to understand what they are telling you instead of just sliding past it or correcting them as if you know

something about themselves that they don't know.

And so I listened and I thought about this. And the puzzle was why would people be finding jobs mainly through weak ties than through strong ties? And I thought about it, and I thought about the Milgram results and the Rapoport results, and I realized that what was going on here was that because your strong ties know the same people that you know, you know, this is the overlap bias, that they might be great sources of social and emotional support. We need our close friends. I am not telling to you get rid of all of your close friends and stick to acquaintances. We need them. But they may not be great sources of information because they are talking to the same people you are talking to. They are hearing the same thing you are hearing. It's what we call redundancy. Whereas your weak ties, people that you don't know so well, they move in circles that are different from your own. And they are much more likely to link you to ideas and information that are distant from you, that you didn't already know so. They are really an important sense your windows on the world.

Now, I could mention also   so this is now, all of the things coming together in my head and making me think about this. And let me mention that is bit parenthetical, because it didn't make it into the article, but I did remember from my college chemistry course, that one of the most important cohesive forces both within and especially between molecules was something called hydrogen bonds. Any of you who have taken a chemistry course will know what it is.

They are much weaker than other kinds of bonds, like covalent bonds or ionic bonds. And because of that, they are able to hold together much larger chemical structures than the others, than the stronger ties are. All of these thoughts came together, but I left out the chemistry part, because I didn't want to sound like I was crazy, a little megalomaniacal, whatever. So I left that part out. But now that I won a prize, I am allowed to say it. And so all of the thoughts came together in a paper that I drafted

before finishing my dissertation. And I called the paper Alienation Reconsidered. And the subtitle was the Strength of Weak Ties. And I called it, Alienation Reconsidered, because there was already a large literature out there arguing that the prevalence of weak ties, weak social attachments in modern society was a bad thing. It led to alienation.

And I wanted to show that, in fact, weeks ties had a kind of strength that was very important that strong ties didn't have, which could lead to important outcomes like finding out about a good job. That's not anything to be sneezed at. Unfortunately the American Sociological Review, which was the journal I choose to bestow this paper upon, referred it to alienation theorists, who just despised it. You know, the first line of the first journal review that I ever got in my academic career read, "Among the innumerable reasons why this paper should not be published, I list the following six."

This was little discouraging, and the paper was, of course, rejected. Well, so this sent me into a little bit of a funk. So when I finally got back to the paper a year or two later, I wisely dropped the alienation part of the title and retitled it simply the Strength of Weak Ties. And it was published in 1973 by the American Journal of Sociology. And it apparently answered a lot of questions people had been asking, because it immediately started drawing an amazing number of citations, which according to Google Scholar is now in excess of 25,000 which I find quite amazing.

I don't know why people don't have anything better to do than sit at home and cite my paper. I think they should probably get out more. But I can't control people's behavior. Among the questions that the paper answered, I think, is how it could be that Milgram's 6 degrees of separation was not a much larger number, that many people's intuition suggested. And I think what it showed is that although there are many distinct social circles separating randomly chosen individuals in the United States, but people figured out, without ever having a course in network analysis, that they could reach across social circles by using their weak ties.

And if you think about what networks look like, and if I could make this, you know, a down arrow, I got it, and if you have a network that looks I am not sure how to make this go part way, but anyway this will have to do it. Here is a kind of a make believe network, and you can see there are cliques in the network, and cliques are connected by probably weak ties. Part of the argument of the Strength of Weak Ties, there are cliques but the cliques can be connected with, if they are connected, by relatively weak ties. And people figure that out. They figured out that they shouldn't if they are in Nebraska, and they are trying to reach this stockbroker in Sharon, Massachusetts, they shouldn't send it to their cousin. They should send it to someone who's a much weaker tie, their minister and probably someone who gets around other circles. And people figured that out. And the article showed that weak ties reduce the path link that it takes to connect randomly chosen people in a dramatic way.

In the 1990s, a whole new wave of formal work began on the small world problem, beginning which is now the well known work of Duncan Watts and Steven Strogatz. And when they did, that more light was shed on the issues. So Watts and Strogatz in 1998 in the famous paper that appeared in the Journal Nature showed that there were really two parameters of interest in the study of social networks. And one was how clustered clique networks were so a kind of an index of clustering. And the other was what was the smallest path that would connect any two randomly chosen nodes? So a measure of path link. And what they showed, was the following. And so let me show you a table here. So here is the puzzle.

And the puzzle is that if you had random networks, random networks and networks where there is not much clustering, people choosing their friends randomly and the average pathway is low, because it's easy to get from anybody to anybody else, because you don't have cliques blocking that process. If you have a network that has got a lot of cliques, which is what this upper

left hand cell is; then there is a lot of clustering and the average path link of ties, it's hard to get out of cliques to reach people randomly.

So the puzzle is that in the real world, what you have is what Milgram found, which is what he called small world networks. Which is, there is still a lot of clustering. And obviously we know there is a lot of the clustering in the world. So the clustering coefficient is high and the yet the average, path link is low. It's six or seven. So how come that is what the real world looks like?

And I think the Strength of Weak Ties paper pretty much answers that question. And what Watts and Strogatz showed was that if you took networks that were, highly clustered, very totally cliqued, and then you just rewired, as they said, a very small proportion of ties. So let's go back to here. If you had this picture here okay, where is my little red dot here? You have this picture here, they would take ties within these cliques and they would randomly rewire them so they went to other cliques. And they found if they did that in a very large network, and they did this with a simulation. These weren't real network data, that it was remarkable. Of course when the network was highly cliqued and the pathway was very high, it was very hard to get from any random point to any other point. If you did a little bit of this rewiring, then the cluster, the path's coefficient went down so dramatically, once you finished rewiring 8 or 10 percent of the ties, the path link coefficient was the same as it would be in a random network. It went down so dramatically. And this is what the real world looks like. It's the weak ties that are making these connections between cliques. And that's why the real world network looks like a small world network.

One other important point about the ideas that I want to make. Let's go back to the small world comment you make at cocktail parties when you learn you share an acquaintance with somebody you just met. Well, this phrase shows that you are surprised at your own social network. And that surprise reflects ignorance of your network. And that ignorance is an absolutely fundamental

social fact. Very important fundamental fact. Because suppose you know 500 people. But it's not so unusual for people to know 500 people. You would have to take a while, to write them down. But it's not too unusual.

In order for you to know which of the 500 people know which of the other 500 people, well, the number of possible ties among 500 nodes is 500 times 499 over 2, as you can convince yourself pretty easily if you make a picture. That is approximately 125,000. That's a lot of information, a lot of bits of information, people would say, to keep in your head. And nobody keeps that in your head. So that's already just for your own friends to know. And if each of the 500 already knows 500 more, then you have a potentially a quarter of a million people just two removed from you. And the number of possible ties among those people turns out to be more than 31 billion. You are not going to keep that in your head no matter how prolific a networker you are. Nobody has that kind of information in their head. Now, of course, in practice, it's not 31 billion, because some of the people choose the same people as others do. But that just introduces another kind of complexity.

So the details of real social networks are so complicated and there are so many details, details that no one can keep that in their head. So everybody It's not surprising that people say small world, because people can't know that much about the social networks. There are fundamental cognitive limitations. And those limitations of human cognition and time, I mean imagine how long it would take you to find out all of the stuff, even if you had a place in the brain to keep it, not to mention the fact you have a life to live, the obligations of everyday life, keep our network knowledge small and non random.

And for that reason, the six degrees of separation found by Milgram and subsequent researchers, the number might be too high, because no one knows the shortest path. These people sending out these cards are guessing. They don't actually know the shortest path. So the boundaries that they found are really

an upwards bound, on what is really going on. Well, so until the 1990s, these limitations on our knowledge of our own networks, which are so fundamental, they were inseparable. You couldn't do anything about them.

But then enormous computing power arrived right on our desktops in the 1990s, an amazing revolution, and Scholars and Mayfield made new technical advances on some of the old network questions. One of the new tools, for this understanding was something called network visualization software. This is important because in any network, if you try to draw the network, there is such a tangle of points and lines that you can't   If you can draw it by hand, this is probably too hard to do by hand, you still can't see what is going on, because so many lines cross that you can't keep track of it. And that's why for many years studies in social networks were limited to collections of 50 people or less. And even then the network diagrams were incredibly complicated to look at.

But now we have numerous network visualization packages, you see Inet, Piac, many others which sort out the structure of even very large networks, and make pictures where you can see what is going on. And so now networks with millions of nodes are routinely studied. And this is something that now goes under the heading of computational social science. It's a fancy word for saying we can study very big data sets now, and especially social networks.

So you see articles in science about networks with millions and millions of nodes, like cell phone networks, like studies of whole countries, and every cell phone   every time someone makes a cell phone call to someone else, the researchers have got that data. And they are analyzing it, which is remarkable. We could never have done that before.

Now if what you have an academic goal, rather than   rather than individual goal, rather than an academic goal, I should say,

then the development that exploded from the 1990s, on was something called social software, or social media, which all of you know about, all of you who are under 30 anyway. One piece of this was services that helped you find the right person to contact like Linked In. Probably all of you know what it is. If you don't, then you are not linked in obviously. They could   Services could do this, because they kept track of who knew whom for millions of individuals in ways that no human could do, using these new software routines. And that was valuable precisely because it broke through the network ignorance barriers that had previously been so fundamental because they are based on human cognitive ability. But machines can do some things that we can't do, obviously.

I did a search on the term social software in Google in 2006. And in 2006 there were 20 million entries. I did that search again a week ago, and I found 937 million entries. I didn't look at all of them, but that's how many there are now. And I think it's safe to say that this sector is growing explosively.

Probably the most famous kind of social software is social software that helps people keep track of those they know the slightly but have been out of the contact with, their weak ties. And the first of these was some of you will remember something called Friendster, in 2002, now probably long gone. Facebook debuted in 2004, and now has more than a billion users around the world, including more than 40 percent of the US population and considering how much of the US population is under two years old, that's more really quite impressive, because they are not   maybe, I don't think they have pages yet. But who knows?

In June 2011, Facebook became the most visited web page in the world, and probably still is with more than one trillion page viewers. We are getting numbers here that are quite amazing. Twitter emerged in 2006, now has more than 500 million users, and by some recent counts more than 58 million tweets per day. I am not sure what people are doing with their time when it seems

like all they are doing is Tweeting and Facebooking and Liking.

So this explosive growth, I think, can be explained in some fundamental way by the limitations of the unaided human mind in grasping and using social networks, and the apparently limitless desire of people to maintain and use their weak ties to link themselves to a larger world. But the question of what the impact of social media is on the world is one that has seen surprising little great research. There is a great dissertation opportunity for lots of you here, in part because it is such a rapidly moving target.

For example, in my own research interest, I think there is no clear answer to the question of whether social media have created important changes in the use of social networks to change from one job to another. If someone wants to talk about it in the Q and A, I would be happy to tell you what I think about it. But one very interesting debate I want to review here in closing is whether social media played a major role as sometimes claimed in 21st century revolutions, and what we can expect in the future. So some writers and scholars who study information flow and social media argue that the advent of the internet and the rise of these media are a huge impetus to political freedom and a huge threat to despotic regimes around the world.

They have argued, for example, that the unrest in Iran following the hotly disputed election of Mok Muda Adinashad in 2009 and successful revolutions, such as the 2011 one in Egypt   well, successful for a time, anyway were heavily driven by communication on such media as Facebook and Twitter. Some people have gone so far as to call Egypt the Facebook Revolution.

Others have hotly disputed this. I came across this debate when I read two articles by talented journalists, each of which used my paper, the Strength of Weak Ties, to take to my surprise completely opposite positions on whether this really was the case. So, in his   in a New Yorker article in 2010 Malcom Gladwell, a great writer, wrote an article called Small Change. You can tell from

the title that he was in debunking mode. And the subtitle was why the revolution won't be tweeted. And he notes that the US Civil Rights Revolution of the 1960s was a situation where activism was highly risky for participants. And as shown by the murder of three of them during the Mississippi Freedom Summer of 1964, and the thousands of arrests in the violence that attended the earlier sit ins in the South. And then he cites research by others, including my Stanford Colleague, Doug McAdam, showing that those who stuck with the freedom summer movement, despite the huge risks, were those who previously had had strong ties to other participants.

And so his point is the high risk situations you need strong ties to pull you in. Weak ties won't do it. Weak ties won't pull you into a dangerous situation. Then he says look, Facebook and Twitter, what are they good for? They are good at diffusing information, and they are good because they foster weak ties, but that's not how revolutions are built. They are built on strong ties. And so he also argues that dangerous social movements require discipline and hierarchy, and weak ties don't lead to those. They lead to networks that work well in the low risk settings.

So Gladwell is saying no. That's not important for these social revolutions. His argument was challenged almost immediately by another talented journalist and writer named Jonah Lehrer, in an article in Wired, entitled Weak Ties, Twitter and Revolution. And so Lehrer also cited my Strength of Weak Ties article, but he cited a different part of the article from the part that Gladwell cited. And he cited the part where I talked about a Boston neighborhood that is no longer there. It was called the west end. If any of you know Boston, it's where the Charles River Park Development is along Sterner Drive. Used to be a sign that would say "you would be home now." This is a neighborhood where people really loved living there. Everyone had lots of close friends. But then when there was a threat of Urban Renewal which eventually demolished the neighborhood they were not able to   they were not able to mobilize to meet that threat.

So how can it be that people who loved the neighborhood so much couldn't mobilize to meet that threat? Well, my argument in my paper was well, the reason was there weren't enough weak ties. And the argument goes like this. If you look at this picture on the bottom here. Let's imagine that's what the west end neighborhood looked like. It was made up of the fact that there are all of these cliques, is consistent with the idea everyone has good friends in the neighborhood, and everyone was very happy. Look how happy the people are being in these cliques. You can at least imagine it.

And here is the problem. The problem is that if the weak ties, if the cliques aren't connected to one another, then an organization that is going to fight or might get started in one of these cliques, maybe get started in this clique here there we go but then it gets real strong here and doesn't go anywhere.

And if is going to start in another clique, it has got to start all over again. And you got to have it started over again in every clique it's not going to happen, because if there are no connections, if there aren't any weak ties, which are how cliques get connected, then the mobilization is not going to spread. And so, furthermore, in this neighborhood, as in many settings, people are very weary of people who want to be leaders of a movement. They are afraid they might be out for themselves. If they are collecting money supposedly to fight urban renewal, and maybe they will use it to go to Tahiti on vacation. How do they know? But I know these people. And one reason that you trust a leader is if you know them directly. But if you don't know them, then if you know someone who knows them who can vouch for them, then you might trust them. And if you don't know them, maybe if you know someone who knows them, maybe if you knows someone, who knows someone, who knows them, so the shorter the path link between potential followers and leaders, then the more likely you are to trust leaders and the more like organizations are to get started. But if there aren't enough weak ties, then those path links are

long, because you can't break out between cliques. And then the mobilization is not going to happen. And I argue that that might well have been what took place.

So Gladwell and Lehrer came to different conclusions, and they are looking at two different stages of social movements. Gladwell is looking at visible demonstrations, like the one in Tahrir Square in Egypt where people come together and make their case in a loud and public way. Obviously it's an important stage. But Lehrer is talking about an earlier stage, and at least equally important where the movement is just taking shape and people are forming an organization and potential leaders trying to gain the trust of potential followers. And that's very critical. Without weak ties, he argues, as I did from Boston without using my Boston argument, they might never succeed in establishing a following. Furthermore, Gladwell's idea that media only facilitated weak ties is just simple, because the media are highly adaptable and we see them morphing into new spheres unexpectedly.

For example, a fellow named Romesh Shernivassen who's an information scholar, UCLA, teaches information studies, sees political unrest in Kyrgyzstan I never say that quite right and found that a small league of dissidents, 10 or 20 in all, who would have been killed if they had all been present in the same physical place, were able to keep together by using social media like Facebook and Twitter in ways that they never would have been able to otherwise. And it was very significant in a country that is hardly wired at all. But they had enough capacity there that they were able to hold together and get something started. So that stage is even prior to the one where leaders try to gather followers. They are trying to survive and get organized. So social revolutions are complicated, multi stage affairs where what works in one stage may not work in another.

And a really critical lesson if you look at the latest research on this subject is that at the end of the day there is more going on in any complicated society than networks of leaders and followers that

determine whether a social revolution will succeed or be crushed. And one piece of this is highlighted by Shernivassen, who's also studying Egypt. He notes that social media in most countries are used by only a very small fraction of the population, young relatively affluent Egypt under 5 percent use Facebook, and 1 percent use Twitter, at least in 2011. It's probably increased by now. Actually all of this hype about how important social media are lead people to use it more. And there is a kind of self fulfilling prophecy about it. And Shernivassen notes social media are situated within an ecology of other technologies and they transmit images and information to the traditional media like CNN and Al Jazeera and these are not disconnected. And that makes a huge difference.

So the old media and the new media are linked together and expands both of the influences in ways that are more than just additives. Very interesting. Finally Shernivassen as well as others such as a guy by the name of Evgeny Morozov, who has a book called Net Delusion, the Dark Side of Internet Freedom, points out that that social media and the internet are not only available to freedom fighters, but also to repressive regimes that have the resources to hire technical firms and consultants to help them root out dissent through these tools. So in Libya, the Gaddafi regime had quite a sophisticated operation of this kind. They lavished large sums on western mostly American consultants, to help them manipulate social media.

Morozov called those who fail to see this, he calls them cyberutopians. And he argues that governments are much smarter than we think in general. Mubarak's regime was very slow about this. That's one reason why they are not around anymore. But this is not the case in Iran, and was not the case in Libya under Gaddafi. So the reality is more complicated than we would like. Most realities are. And to study the impact of social media and weak ties on social revolutions, or other important outcomes, we need to keep in mind that while social networks may be critical and fascinating pieces of the story, as indeed they are, they exist in a cultural, historical, and political institutional setting. And

outcomes can never be understood if you don't take that into account.

That's a very good lesson for those of us interested in social networks. The way networks interact with these elements is a long and important story. And that's   this is certainly the next place to go for us to really understand what the impact of social networks and social media are. Unfortunately my time is up. So it's not a story that will fit into these comments today. So thank you.

Audience Member: I am interested in your response. One of the things using the political and the latest examples, and I will illustrate this with a recollection from the Republican Convention in the Philadelphia in the year 2000. It was called R2K, in contemporary lingo which a lot of activists, were present and protesting. And that was just the period when some of the new technologies were available. And the activists, and I was somewhat involved, at least peripherally, of this were totally enamored of these cell phones. And I forget the one that they were calling at the time. It was a particular model, it was very popular, and completely oblivious to the fact that this was a very permeable network, and that the conversations that they were having in organizing protests were very easily eavesdropped on by the people who weren't supposed to know about it. And I think one of the unspoken factors in exactly in what you were saying is that a lot of these networks by virtue of their openness mean that anybody can join them. And you have the weakest of ties.

Mark Granovetter: Like the NSA for example.

Audience Member: Yes, as we now know. And the weakest of ties, means really that you are unlikely to have somebody say, wait a second. Who are you? And who do you talk to? And where do you come in? Whereas the ones that are stronger, the groups based on face to face knowledge, could resist that. And if someone showed up, for example, from the R2K, someone showed up in the manner of a protest which would block a street,

offered to help by driving people there in his van, they all got into the van, and he drove them to a police station where they were all arrested, because that tie was so weak that nobody was there to question this volunteer.

Mark Granovetter: So I think one thing that is very interesting, I wonder if when that started happening, whether that changed people's understanding of what was going on.

Audience Member: It took a while.

Mark Granovetter: But you think it did eventually?

Audience Member: My experience was later, groups as they become more aware, but still seduced by the attractiveness and the toys they realize. And I think as you say the NSA thing, the awareness of the permeability of these networks reached a new level.

Mark Granovetter: I think it's a contextual question. I think for example if you are in China, for example, you are a lot more aware of because of the hand of the authorities is a lot less gentle and a lot more obvious. So I think the people in Philadelphia thought they lived in a country that it didn't happen.

Audience Member: They have this magic tool.

Mark Granovetter: That, too right.

Audience Member: And you are not aware it's coming.

Mark Granovetter: Absolutely.

Audience Member: I have been following a social network for many years since it was begun. And I have a sense it's only been around for about eight years in this community.

Mark Granovetter: What community have you been operating yours?

Audience Member: Account serving. And I have a sense, that it's reached it's point of saturation. And I know when a lot of network emerged there was lot of hype about them. And I mean, something like this network is not really new. It was an old network off line in World War 2 called, Siravas, but anyhow this, I had   I have a sense sometimes that, you know, there is kind of this, well at the beginning, there is a kind of a great interest. And I am not saying that the networks aren't going to forever change the way the people relate to each other, but to the extent that there can be a lot of hype about it in the beginning, the interest or involvement in it, I am interested if you see signs it may be leveling off or evening sinking a bit. And people starting think I want to reconnect to each other on a more, you know, level of face to face.

Mark Granovetter: Yes, right. I think a lot of people are interested in that question. Obviously there has to be some leveling off. After you have over a billion people on Facebook, you are obviously reaching some saturation point and has to be some decline. The question of whether all of these online links reduce the number off line links is a very interesting question. And I think that some people can get completely lost in the online stuff. But there are some who argue that people who connect a lot on line, then have many more people they can connect with off line. So it's a very complicated question. And you have a variety of different types of people doing this activity for a variety of different reasons. People keep predicting the imminent demise of these networks, but the trouble is it's a moving target. And they keep developing and improving, and the fact that this is a for profit sector, and certainly up where I am people are spending a lot of waking hours figuring out what the weak points are in these social media, and how they can be patched up and fixed so you can bring more people in because there is a huge revenue stream available from that.

And every time someone succeeds in that, it kind of pushes the

envelope back again. And just when people think it will die down, someone develops some new way of doing it, or some new wrinkle on it, or something to do with the now that we have GPS, and people can find out where their friends are any given moment, even if they are in a strange city, they can find their friends who happen to be a block away which they never have been able to do before. So there is always a new angle.

And as long as there is profit to be made there, it's hard to predict where it will stop, because if I could tell you where it will stop, that means that I would know every possible future development. And in which case I would be so rich I probably wouldn't be standing here now. And I would be on some south sea island enjoying my big villa. So I   it's a very important question. And I think it's one that is not so easy to answer. So I am not sure how satisfactory it is, but that's kind of where I am. Tom, you had a question:

Audience Member: Yes, I now have to confess to misinterpreting the west end of Boston argument, because you just presented it here that the lack of weak ties between cliques within the neighborhood is what led to its failure to mobilize. Where I interpreted it as the lack of weak ties to external agencies, city counsel, or other activist groups outside of the neighborhood that lead to the failure.

Mark Granovetter: I think both things are true. But the latter is not something that I emphasize. And it was very convenient that I wrote this paper after the west end had been torn down. So no one could go back and find out whether this was true. And now, I did talk to Herb Ganns who wrote the book The Urban Villager, which was the ethnography of the West End, a brilliant book. And he said that my account seem quite plausible to him having lived in the neighborhood for several years. But he also didn't have the data. And I actually drew on his book and argued that the picture that he constructs is one in which people were very ingrown, everything was family and friends, close friends and people constantly with the same people. And to me that is

consistent with the very fragmented. He never thought about the fragmentation because he was with his informants. He was doing an ethnography. He knew the people he knew. And they introduced him to whom?   To the people they didn't know? No, they introduced him to the people he did know. And he himself was stuck in one of the cliques. And it seemed plausible. Unfortunately we can't go back and find out. It's unfortunate if my argument is true. It's fortunate if it's not true.

Audience Member: I wonder if you could say a few words about who are the people who create these weak ties? And in a similar idea in Bert's work, where he talks about structural holds, people who bridge the structural holds and gain informational advantages and they get promoted more rapidly in their work and they gain an advantage for having the weak ties. So there has always been this confounding variable that is it possible it's more entrepreneurial people who create the network structures for themselves and really it's their entrepreneurialship and not their network.

But I am wondering, especially in what you have seen, in looking for a job, are there particular people who are the ones who create these weak ties? And do we relate that to certain traits of individuals and are they gaining advantages from that?

Mark Granovetter: The question is why do people have more weak ties than others? Is it because they are more entrepreneurial? If they are more entrepreneurial, is that what is really explaining it rather than the network structure? And this is a very important question. And I think that there is   if you read Ronald Burt's work, he emphasizes the strategic advantage of having weak ties. And so his vision of all this is one in which people can construct these ties for their own advantage. And it is what a rational actor would do. And there is a whole   for a long time economists didn't think about social networks, even though in their private lives they knew they were important. But in their lives as economists, they couldn't figure out how they could model it,

so they didn't pay any attention. It's kind of how it goes, if you can't model it, you don't pay attention to it.

For 50 years they knew how important uncertainty and ignorance was, but they couldn't model it, so they just cast it aside, and said everyone knows everything. And make sure everyone knows everything. And now, there is a whole group of economists who do very sophisticated models of social networks. My colleague, Matt Jackson at Stanford does a lot of this.

He has very interesting introductory textbook, called Social and Economic Networks. And I think some of that is very good work. It's become a very lively subfield within economics. For me the trouble with that work is it is all sophisticated as it is, all premises on the idea that people create the networks as investments, and they have some control over what networks they are able to create.

Now the problem is sometimes this is true, but a lot of times your networks are not under your control to create. And you end up with the ties that you have for reasons that have nothing to do with your own agency. So that's the question. And there is a lot of reasons why this happens. So for example, in the Strength of Weak ties article, I will   maybe I don't talk about this in the article, but I contract the west ends of Boston and the north end of Boston. The north end of Boston lobby very successful against urban renewal, and it is still now a thriving neighborhood. And you think mostly of the Italian part of the neighborhood, although there are other ethics groups that are there. Another neighborhood that was successful against lobbying against urban renewal was Charles Town, which has a naval yard.

And so the question is, why did Charles Town's north end lobby, successfully, and the west end couldn't? It turns out that in Charles Town, in the north end, most people work in the neighborhood. And in the west end, most people worked outside of the neighborhood. And now, why is that interesting? The reason it is interesting is that in the west end, in the neighborhood Ganz

talked about, people were in these cliques which were defined by their very immediate surroundings, and family and close friends. And then when they went to work, they met people from other neighborhoods. They didn't meet other people in the west end. That wasn't a way to break out of cliques within the neighborhood.

In the north end, especially in Charles Town, where there is a naval yard in Boston, for those of you who know Boston, almost everybody, the men, it was the men, really, that were at issue, they worked in the neighborhood. That meant at work they met a lot of people who weren't in the immediate cliques, were in the cliques, and those weak ties bridged the cliques, and so my argument is that because of this happenstance that the   okay, I can try that. Is it live though? Yes, but I don't   does this sound any different than before? You think they can hear this downstairs through here? Okay. I am game for it.

And it depends on how big the string is. And so the argument is that people working in the same place are likely to bridge cliques of family and close friends. And so you get the weak ties between cliques in Charles Town on the north end in the way that you didn't have in the west end. Now, the fact that they happened to be working in the same neighborhood and that it creates the weak ties that has nothing to do with the strategic vision of how to create ties. It is a happenstance of the labor market ecology and how it intersects with social structure. And I think there are a lot of things like that where people's ties result in getting a job, I argued, that one of the reasons that some people have all lot of weak ties and others don't is some people stayed in their jobs for a long time. Maybe because they are so happy. And if you are an in a place where everybody is happy, the other people stay in the job a long time. That's great. That's wonderful. Except if you don't have to change your jobs, you don't know people in other please.

People who change their jobs every few years, they know people in each place. And those people scatter, also. And after four or five job changes you have weak ties all over the place, but you, you

weren't changing job in orders to create those. You are changing jobs for other reasons, but now you have all these weak ties. What I would say is people may try to structure the social network for strategic reasons. And you might be able to do some of that if you take a networking seminar, which is not hard to find. If you have $500 you can take a networking seminar for whatever they charge now. And they tell you, oh, you have got to meet three new people every day. Okay? And pretty soon, everyone is running away when they see you coming, because they know you try to meet them, because it's so artificial.

I think there is something to be said for being aware of the strategic implications of making network ties. But I think our ability to create our own networks is limited. And there are other factors that come in here that have a huge impact on who is in our networks, that we don't have direct control over. And that makes it hard for me to think that that's the main thing that is going on.

Audience Member: My apologies. Just as a preface, I am a first year Ph D student so pardon me if it has   if the question has any sort of ignorance about the field. But I was curious about this weird binary, of strong and weak ties and how we could add some nuance to that. Specifically I am coming from New York City and my experience with Occupy, which with it being New York City and the people who were involved in Occupy being what it was was writhe with weak ties. It was everybody knew everybody, because especially because there were some university people involved, but because the ties were through the university, weak though they were, and similar as they were to other weak ties, nobody took it seriously. And so I could never get any of my colleagues to come out to Occupy, whereas the people I knew through like work were more willing to come out, even though these were still what we would probably consider in this model weak ties. And I am asking about what gray area exist there and how they are important.

Mark Granovetter: So you are saying all weak ties are not created equal? Cool.

Audience Member: Obviously, that's not the case, but I wanted to hear you elaborate on it.

Mark Granovetter: Sure. The article is very simplistic in that it talks about two kinds of ties. And obviously there are a lot more things you can say about ties than that. I avoided being sophisticated about it, because I thought that the more sophisticated I was going to be and I avoided if you read the article, you see I avoided doing any explicit mathematical modeling. And I thought that it was better to get the main idea across than to get lost in the details, even though the details might be very important.

And so there are a lot of different dimensions of ties, weak and strong, obviously a continuum. And the reason I used weak and strong is because I think that's how people think about it. I think people think about a distinction between acquaintances and really good friends. And if you ask people which people are your close friends, and which people are acquaintances, people don't look at you and say I don't know what you are talking about. People know what you are talking about, and they can tell you who is who. And so it's a kind of a binary that people have in their heads, and because of that, it has some significance. That doesn't mean that there is all to say about it.

Now, as you say, there are university ties, work ties, ties that are distinguished by the setting you made them in. And that can make a big difference. And there are a lots of different dimensions of ties that matter a lot. And I didn't try to do that in the paper. But I think there is some literature that tries to talk about some questions like that. There probably need to be more. So I agree with you that the weak strong thing is a really very simplified account. And we need a lot more sophistication about the quality of ties, the texture of ties, the nature of ties, the lengths of the time, the amount of energy that goes into them. And with all it's one of the problems that I have with so called computational science with the emphasis on how wonderful it is that we can

analyze data sets with hundreds and millions of nodes, that is great, but we also have to think about the texture of the ties and the meaning of the ties and what is going on in a theoretical way. Being able to analyze large data sets is not a substitute for ideas. It's a way to use ideas, but we have to keep coming up with new ones. And certainly how ties work and what the qualities are of ties that matter is something that hasn't gotten enough attention. And so the kind of thing you are talking about is very important.

Audience Member: First of all, I have to say thank you for mentioning the hydrogen bond analogy, because it's absolutely relevant to something that I am writing. So thank you. I was just wondering if I am lying to my students, because what I tell them is that these strategically made weak ties often don't work, not only because people don't want to hear from them, but their interest really isn't sincere, and that.

Mark Granovetter: That's right.

Audience Member: But what they should do is to be curious about everything. And I find that people who are curious about everything, and you know, maybe I am talking about a lot of people in this room, certainly me, tend to have lots and lots of weak ties but become very useful, but just because you are interested.

Mark Granovetter: Right, I think it's a very interesting problem in. Peter Blau, the great sociologist, wrote a one book in 1964 called Exchange in Power and Social Life. And one of the things that he says at some point in the book, he is talking about, how social approval from other people is rewarding. And he says at some point that social approval from other people is a reward for you unless you think it was meant to be a reward for you. And then it's not. So it's this question of sincerity. If you think that the reason that people are acting as if they like you is because they are trying to get something from you, then that's a turnoff. And that's why this idea that you can keep making more and more weak ties strategically, we are all on the lookout for people who

are just trying to use us, and who are just trying to make new ties for their own purposes. And don't have any particular feeling for us. And I think that you are absolutely right. And I think that a lot of curiosity and a lot of interest in what other people are doing will lead you in some cases that you have an affinity to and will form a tie and if you don't, then what is the point anyway? I think that makes a lot of sense.

Audience Member: Thank you.

Audience Member: Hi. I wanted to ask a question, sort of following your talk where you start about the very localized processes and weak ties and strong ties and the nuances of these diads, and then end it really talking about the huge network that we have observed, multiple types of ties, how relevant settings are, and where you think moving towards statistical modeling that encompasses all of these factors that are really complex models across multiple settings with multiple variables, is really the most useful way to go to understand these emergent properties or it's really looking at the details of these parts of these systems?

Mark Granovetter: Well, I think the statistical models of large systems are very interesting. And it's interesting one of the things about network studies in the last 10 or 20 years is it's no longer the preserve of social scientists. Now the computer science people, the physicists, and others have really gotten into it because they see a lot of very interesting analogies. There are a lot of situations in network physics, for example, where network processes going on. And there is an old problem in computer science called the problem of cellular automata. And this kind of modeling is very interesting.

If you look at some of the work on very large networks by physicists by J. P. Onella, for example, is published in science, some very interesting models of statistical and otherwise. Some of them are deterministic. I think it's very useful to do that. But I think that those models don't go anywhere unless there are some social

ideas behind them. So I think that the problem is how you can get the people who are really proficient at statistical modeling and physical models, about izing models and other kinds of models in physics, how you can get them to either understand the social science part of it or get them teamed up with social scientists who can understand what they are doing in such a way that those models are put in the context of actual ideas about social structure that makes sense. Because I think the models themselves don't tell you enough. They just are descriptive. So I think it can be very useful, but only if it's done in a way that links to some real ideas

Audience Member: I would like to go back to the Milgram experiment. Here I am talking to somebody who actually knew people who were carrying on experiment s. The way that I remember from the paper and from similar studies that were done, only about 20 percent of the paths or something were successfully found or not paths of the respondents actually

Mark Granovetter: Were completed?

Audience Member: Were completed that's correct.

Mark Granoveter: It might be less than 20 percent.

Audience Member: So what happened? Did people just ignore the task or it got stuck in a really long chain? What happened to the failed cases?

Mark Granovetter: Well, what happened in the failed cases someone didn't send the post card on anymore.

Audience Member: Didn't connect? It failed after 10 steps? No way to recover those partially completed?

Mark Granovetter: You know, Harrison White, at that time looked at all of that data, and modeled a   he said if, in fact, people are dropping out randomly, then what is the impact of

that on the chain length? And in fact, the final number of six or seven is adjusted, is corrected for the dropouts in such a way that it reflects the facts that some people dropped out randomly. And the ones completed were shorter than 6 or 7. But so many that weren't completed that they had to try to figure out what it looked like had it been completed.

I think that subsequent experiments have sustained the fact that people are dropping out for random reasons. You know, if it were the case that people were dropping out of these chains, because they would be lengths 100 or something, then, that would be a problem for the idea that the typical chain is short. But there is a lot of evidence, Duncan Watts and others have done very large scale experiments using email on small world, and there is a lot of evidence that the dropouts really are more or less random. And even though you have to take that into account, and it's certainly a serious issue, I think people have addressed this in a way that gives us some confidence that the short chains actually are fairly and you know the thing about a chain of six or seven is we think it's short because people used to say 100, 200 but it's not short at all. If you think about how confident would you about something if you heard of a friend of a friend of a friend of a friend. That's really quite long. And in the sense it takes you over hundreds of thousands of maybe millions of people, and not really getting much confidence of the sort that you get from someone that you knew personally or a friend of a friend even. The idea that this is short is a little bit misleading.

Unidentfied Woman: Yes, visible, even shorter. On Facebook, the chains are even shorter, 4.3.

Mark Granovetter: Right, yes, but the people on Facebook are not a random simple of the world population. They tend to be literate. They tend to be affluent. They tend to   it's penetrating more. And we will see if. And the people of Facebook, they have a whole group of social scientists there doing constant research on it. And some of it is quite good.

Audience Member: Do you think the connections, the kind of connections have more value when they are serendipitous, when I you end it with something like it's a small world versus something more explicit when you see it laid out on something like Linked In, because I don't know how comfortable or opportunistic you can be when you can see it when you are 6 connections away from someone you say, hey, here is how I know you. And it seems it has a little bit more value when it's that cocktail party setting.

Mark Granovetter: Right, you are talking about someone that doesn't really know you, but came across you somehow or?

Audience Member: You have that weak connection, it exists.

Mark Granovetter: A friend. So that's pretty weak. And I think that I mean   I suppose each case is different, but someone you actually know from a real social context is probably a more valuable contact. We don't really know. It's an interesting question. Have services like Linked In changed the way people find jobs?   And I don't think there is any good research on it. I am skeptical. It obviously changed some things about it, and I think most people are not eager to find jobs that way because if they are in a job that they are secure in, they don't want to be known as someone who is sniffing around looking for other jobs. And that's what happens when you go on line. You start contacting people on Linked In, you don't know, hardly at all, or friends and pretty soon everyone including your employer knows that you are out there looking for something. And I think this is a little bit tricky.

So my guess is it hasn't changed things that much. And people still in the end use and even so called executive search services use their there is supposedly a substitute for networks, but the reason some are successful is because they have networks. And so they are still using networks, even though they kind of institutionalized it.

And I think that's what I would call the real weak ties are probably more powerful than the ones contrived like the ones you are talking about. But I am not seeing good research on this. And part of the reason it's part to get research if you go over to Linked In, and for me, it's just go over because it's and nearby and say I would like your data, they say sure you would. And you know, you can get it if you don't mind that they put a   they put you a thing on your leg and chain you to a desk and you have to use it there. And students have a lot of trouble getting that data. They are very jealous of it, as they should be for privacy reasons. But that's why the in house team are most significance but they haven't answered the questions satisfactorily yet.

Marty Kaplan: Please join me. Thank you for joining us.