Talking Points: Differences in the Workplace – Causes, Costs, Contributions and Consequences September 28, 2010 IDEAS Break

Slide 1, 2, and 3:

Thanks so much for having me here today. As you see, I'm still keeping busy even since my retirement from Tech serving as a program evaluator for numerous NSF and NIH programs. I was excited when Jenna asked me to make some presentations in connection with the ADVANCE program and I'm really looking forward to sharing with you today some of the things I've learned by reading two books, "Women Don't Ask: Negotiation and the Gender Divide" which was published in 2003 and "The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies" which was published in 2009.

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There are many similarities and some differences between these two books. They have very different but closely related theses which made it logical to review them together. They are both research based and both written by economists. One of the economists, Scott Page, is a mathematical modeler and uses mathematics and logic to support his thesis while the other uses data collected through surveys and hundreds of interviews and observations to support her ideas. Neither worked alone in these endeavors – although Scott Page is listed as a single author, he gives immense credit to his colleague Lu Hong with whom he published numerous research articles and Linda Babcock worked closely with Sara Laschever.

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I'm going to start with The Difference which addresses differences among individuals without respect to gender and then tie what Page is saying to the "Women Don't Ask" thesis and data.

The two main theses that Page proports in The Difference are:

Diversity trumps ability – in problem solving given certain assumptions. (The Diversity Trumps Ability Theorem)

And

Collective ability equals individual ability plus diversity – when making predictions. (Diversity Predictive Theorem)

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To prepare for this presentation I read the book, read numerous reviews of the book, and watched several online presentations made by Scott Page. Based on all of this, I've structured this presentation around the following 4 points:

- **Why did Page start looking at diversity?**
- **What does Page mean by "cognitive diversity?"**
- **Why does diversity improve problem solving and prediction**
- **How can we leverage diversity?**

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Page didn't start out to study diversity. When he was a professor at Caltech teaching an introductory economics course to a bunch of very smart students, he realized that all the things that the economics text books used as examples wouldn't resonate with his students – washing machines, instruments, automobiles – his students were buying software, CDs, videos, music, etc. He decided

that he needed to come up with a way to gain their interest and attention so he decided to build a computer model that he could use to teach economic principles and that would show them that "the smarter you are, the more problems you can solve and the more money you can make."

To do this he developed a virtual economic landscape in which he embedded a difficult economic problem(s), then he designed a lot of "agents" and he equipped each agent with some of a subset of tools that would allow them to solve all the problems in his virtual world. These were a diverse group of problem solvers and some were "smarter" than others – that is they had more tools that were relevant to solving the problems than did others. And the tools Page provided them with were different ways of encoding the problems and different ways of searching for solutions.

To test his program (because all computer simulations have errors and bugs that have to be worked out), Page decided to set up one group of agents that were his EXPERTS – twenty of the smartest ones (the best individual performers) and one group that was RANDOM. The RANDOM group contained 20 agents some of them had the same tools as the EXPERT group and the others had a variety of tools that were in some way related to solving problems. The program was set so that one agent would go as far as it could towards solving the problems and once it got stuck, other agents could continue the process. Well, when he ran his test Page found out, that unlike what he expected, the RANDOM group outperformed the EXPERT group every time no matter how many different configurations of RANDOM groups he tried this with. All of his computer simulations showed the same pattern – the best individual problem solvers all tend to be similar therefore the EXPERT group really isn't much better than the best individual – but a collection of random but intelligent agents tends to be diverse which gives them many more options and makes them collectively better. Diversity was trumping ability! Since he

was an economist, Page needed to come up with mathematical proofs and theorems to satisfy his colleagues of his results so Page called in a colleague (Lu Hong) and set out to see if they could develop the mathematical proofs, theorem, and models to explain what was going on.

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Why did Page decide to look at the mathematics behind what he was seeing? Well, it may be because that's just what a mathematical modeling economist does…., but Page explained that the only way to build a science is to apply the math and look for mathematical truths. This helps get around the fact that metaphors are sometimes contradictory – like "Two heads are better than one." Vs "Two many cooks spoil the broth." The first implies that diversity is beneficial and the second implies that it is not. And since most knowledge is conditional – if this, then that – that knowledge can be unpacked by using logic. Logic can help identify the conditions under which diversity is beneficial. You might think of it as friction. Friction is bad when you want good gas mileage, but friction is good when you are trying to stop a car.

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Page suggests that there are two steps to this process. First we have to define how we are different and second we have to explain why these differences improve performance in two areas: problem solving and prediction.

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Page defines the types of differences he is talking about as cognitive diversity – the kinds of differences that are inside of us = perspectives – how we see things, heuristics – the tools we use to

solve problems, interpretations – how we categorize things and predictions – or our predictive models (which are based on perspectives, heuristics and interpretations) vs the types of differences that are basically on the outside of us (identity diversity) – what we look like, age, gender, ethnicity, culture. And, although Page agrees that these are often related – people who are identity diverse often have different perspectives, etc., his mathematical model applies to cognitive diversity.

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Page further defines each of these components of cognitive diversity.

A perspective is a representation of possible solutions.

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So, you can represent a point on a 2 dimensional plane with either Cartesian coordinates or polar coordinates – not sure that one perspective is any "cooler" than the other. They are just different. Both indicate the same point.

Page notes, if you talk to your people in computer science or in mathematics, they will tell you how valuable multiple representations of possible solutions to problems are. That is what they do!

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Why are perspectives important? New perspectives simplify problems and come up with new approaches. Most great breakthroughs in science result from new perspectives. One example: a farmer in Wisconsin back in the 1930s brought a calf into the Agricultural Research Center in Wisconsin and explained to a

faculty member there (Carl Link) that all his cattle were dying and he didn't know why. Dr. Link pumped one of the calf's stomachs (don't know exactly which one) and found the remains of some clover and isolated a compound called coumarin which he determined had the property of thinning blood. After thinking about this for a while, he had a Eureka! moment – he had a compound that would thin the blood of mammals so what could it be used for? Rat killer!

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It took approximately 40 more years for someone in the medical profession to go – hmm – wouldn't that be useful in stopping strokes and heart attacks? And Coumadin was born – which next to penicillin has probably saved as many if not more lives than any drug developed.

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Another example – Mendeleev – a chemist in the 1860s who was convinced (for religious reasons, it turns out, because he believed that God wouldn't have designed a world without order) that there was a systematic way of arranging all the chemical elements they knew about at that time. Mendeleev kept sheets of paper each with an element and its characteristics on it scattered all over his room and was constantly rearranging them to try and figure out what the order was. Now for some reason he decided to arrange the elements by weight which was kind of crazy because at that time they didn't know about neutrons or protons or anything like that. And that would be kind of like our arranging the animal kingdom by weight – ok we'll put the alligator and the gorilla next to each other because they weight about the same!

But it worked! Arranged that way, 3 elements appeared to be missing. When scientists starting looking, they quickly found them.

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Let's look at a game you may have played before. It is called Sum to 15. Go over set up, play, and rules.

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Here is a game that Page describes playing with his friend de Marchii in 1998. First, Page took a 4 and de Marchii took a 5 (a good strategy because 5 is right in the middle). Next Page took a 6 and de Marchii took an 8 – a fatal mistake for de Marchii! Now Page takes a 2 and no matter what card de Marchii takes next – he can't come up with 15 on this turn because the only one that would work is the 2 which Page has. And Page can take either the 7 or the 9 as his next card and have 3 cards that sum up to 15 (7, 6, 2) or (9, 2, 4).

Sum to 15 is a hard game for people to play.

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Let's look at this from a different perspective. Back in the 7th grade you probably learned about something called a magic square. A magic square is where the sum of each row or each column or the diagonals always adds up to 15. If you look at how Page and de Marchii played the game from that perspective we can put a P for Page's moves and a D for de Marchii's moves and we see that what they were really playing is TicTacToe, a very simple game! It all depends on perspective.

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Page has what he calls a Savant Existence Theorem that says, "For every problem there is a perspective that makes that problem 'easy'." (As long as we remember that "easy" is a relative term!)

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According to Page, heuristics are simply the tricks and techniques we use when we go about solving problems. On one famous Seinfeld episode, George decides that everything he has ever done in his life has been wrong and so from that point on he is always going to "do the opposite" of whatever his brain tells him to. Well, doing the opposite gets him a date with a beautiful women, and eventually a job with the New York Yankees as Assistant to the Traveling Secretary. His heuristic worked! Another example of a heuristic – Steven Covey's "deal with the big things first."

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Even though Page doesn't use IQ scores as a sole indicator of a person's worth, he does make some interesting points using questions from some online IQ tests. Online IQ tests are pretty interesting but it is unclear exactly how accurate they are. Page notes that after taking a series of them he found that his IQ fell in a narrow range between 87 and 180!

IQ tests often ask you to look at a sequence of numbers and fill in the missing number. So what would be the missing number in this first sequence? 8 right? How did you get it? Well, this is the famous Fibonacci series that you get by adding the number to the one before it Example: 1 +2 =3, 3+2 = 5, 5 + 3 = 8, etc. Or you could start at the right end and subtract the number from the one to its right. Let's try another. This is one they often give you to make you feel very smart. So what's the missing number? 9, right? And the heuristic? Square. 1 squared = 1, 2 squared = 4, 3 squared = 9, and so on. According to Page, now they've got you feeling like you are pretty sharp and

knowing your IQ must be right up there. Then they give you this one. So, what's the missing number? This one's a little harder. A clue (cultural clue) that Page often gives is that it is the answer to the Universal Question from the Hitchhiker's Guide to the Galaxy. 42, right? Now how do you get the number 42? Well, it turns out that 1 + 1 don't always = 2. And that is the case here. What was the heuristic for the first example? Subtract. What was the heuristic for the second example? Square. If you know both of those two, you should be able to do this final one because the heuristic is just a combination of those two, you both subtract and square. 1806 -42 =1764 which is 42 squared. 42 – 6 = 36 which is 6 squared, 6 – 2 = 4 which is 2 squared and 2 – 1 = 1 which is 1 squared. Easy when someone shows you how to do it, isn't it?

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Page calls this the superadditivity of heuristics or 1 plus 1 doesn't always equal 2. In this case you have heuristic 1, heuristic 2 and when you put 1 and 2 together you have heuristic 3. So, 1 plus 1 = 3. Heuristics from different toolboxes can be combined in multiple ways to generate new heuristics different from any in existence previously. This is the strength of bringing cognitively diverse individuals together.

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We've looked at perspectives and heuristics. Now for interpretations. As Page puts it, interpretations are simply how we put things into categories to help us make sense of our world. Or as one of his colleagues put it, "We lump to live." We do this because there is just too much information that we have to deal with on a daily basis for us to hold each piece separately. We have only so much capacity to store and quickly retrieve information so we categorize.

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Some examples of how we lump.

Slide 25:

Let's look at interpretations a little more closely. One of the ways cultural anthropologists study the world is through what they call pile sorts. They give someone a group of cards that have the names of objects on them and ask them to sort them into piles. Then they look at the different kinds of piles and infer something about the individual based on their categories and what they put in each category. So these foods are an example. Page notes that at this stage in his life he would put these items into 3 groups – veggies, fish and meat, and canned stuff (he doesn't particularly like canned stuff).

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But back when he was growing up in the Midwest, he would have put these items into three groups labeled veggies, fish and meat, and weird stuff. The weird stuff would be things he hadn't even heard of (as he says, a sea bass would have been as alien to him as a sea chicken) and the other two groups would include both fresh and canned items.

People who put things in different categories are likely to think about things differently predict differently.

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How do we use our perceptions, heuristics, and interpretations? According to Page we use them to build predictive models. Those

predictive models are our basis for understanding how the world works and what happens or will likely happen in our world. A predictive model is an interpretation together with a prediction for each set or category created by the interpretation.

Page tells of his young son coming to him one day and saying, "Daddy, red cars go fast!" How was the boy categorizing cars – by color. And what was his predictive model – if he saw a red car, if was likely to be going fast. And it turns out that according to the American Automotive Insurance Association and police records, that he is right!

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Remember that Page doesn't see people as IQ or SAT scores. Rather he see each person as carrying around a unique toolbox full of tools (perspectives, heuristics, interpretations, and predictive models) that may or may not be helpful at solving a particular problem. And this is what he calls cognitive diversity – the differences in our innate abilities, identity, experiences, back ground, training etc. that give us different problem solving tools. These tools can and do change with time. "Intelligence" then depends on a person's tools as well as her ability to retrieve, generate, and apply these tools to solve problems.

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Page's early work with his computer models clearly showed that diversity trumped ability – i.e. diverse groups outperformed less diverse groups of experts when trying to solve specific problems. This statement is true every time provided a certain set of conditions is met. First, the problem to be solved must be difficult – for example, if you need to solve a calculus problem you can probably just as an expert who can give you the answer or if you are trying to

determine the size of a shovel that works best to shovel coal you can ask an expert or a single person can figure out the answer. Neither are difficult, complex problems. But if you are trying to solve a difficult, previously unsolved math problem you would likely want a group of diverse mathematicians. Second, all of the potential problem solvers must have some ability to solve the problem – don't set a group of 3rd graders loose to solve global warming. Third, the group must be diverse, some problems solvers in the group must have the ability to improve on the solutions of others in the group – because they have different perspectives, heuristics, and/or predictive models. Fourth, the groups must be large – both the groups from which the problem solvers are picked and the group of problem solvers itself. Two or even 4 or 5 doesn't meet the conditions.

Why does diversity trump ability when solving complex problems? What Page found was that a group of Experts have common ways of thinking and common ways of approaching problems so they all tend to head towards the same solution and they all tend to get stuck at the same point. In other words, a group of Experts is in general no better than any one of the experts. Where as a group of diverse problem solvers can build on one another's solutions and can come up with unique problem solving strategies that none have individually. (Remember are 1 + 1 = 3 example from earlier.)

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There are some pretty famous examples of distributed problem solving where diverse groups outperformed expert groups. One is the Goldcorp competition. This group owned a 59-year old gold mine in Canada, knew there was gold still in it, but didn't know where to dig to find the gold. Their CEO had attended a meeting for young company presidents and had heard a description of how the code for Linux had been developed over the web by allowing a wide group of

programmers to review the program and make additions or corrections. He decided to put all of his data about the mine out on the web and sponsor a competition with over half a million dollars in prize money for anyone who could tell them where to find the gold. All kinds of people participated in the competition. They identified 110 targets, 50% of which had never been considered by the company. And 80% of the new targets yielded substantial quantities of gold. Goldcorp rose from a has-been company of $100 million in worth to over $9 billion in worth. $100 invested in 1996 would be worth $3,000 today.

Netflix sponsored a similar type competition in which they offered a million dollar prize to any individual or team who could improve the ability to predict which films individuals would prefer (their ratings of films) by 10% over Netflix's program called Cinemath. Netflix released coded customer data and teams developed algorithms which they used the data to test. The teams results could be compared to the actual results obtained. It took several years but finally two teams who were the top two competitors combined to improve prediction capabilities by 10.6%.

A third company InnoCentive was developed originally because in the pharmaceutical industry often times teams working on a complex problem would get stuck and not have the resources to move forward. This company releases the problem to the general public via the web and offers financial incentives to whoever submits a solution to a problem. An example that Page gives in a presentation he makes is that one company wanted to know how to get an element into a tube without making a huge mess. An electric guitarist solved this one and made himself $25,000 for sending in a 20 second e-mail. He said "Put one charge on the compound and an opposite charge on the tube." Worked like a charm. And probably the team that was asking the question actually had that information – they just didn't retrieve it because it wasn't in their predictive models.

One of the things that has come out of this work is that it is critical how you frame the problem that you need solved. In general, what they have found is that the more general the problem, the more likely it is to get solved. In other words, if the problem is framed as a "spectral analysis problem" lots of people won't even look at it and those that do will already be thinking of it in a specific way. This often eliminates creative solutions.

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Let's look at prediction and how diversity impacts it. Page retells an example from James Surowiecki's The Wisdom of Crowds about the 1906 West of England Fat Stock Show and Poultry Exhibition. A group of people were asked to guess the weight of a steer. The average guess from a group of contestants was within a pound of the weight of the steer. They guessed 1197 vs 1198 which was the actual weight. The crowd's guess was better than any individual guess and better than the average guess of a group of steer weight estimating experts.

Page insists that it is not that hard to guess the weight of a steer to within 50-60 pounds (keep in mind he grew up in the Midwest with lots of cows), after all they are just larger humans with somewhat more interestingly colored skin. But to get within one pound is pretty amazing.

Another example of a smart crowd is The Iowa Electronic Market, which allows anyone in the country to add their prediction, is an amazingly accurate predictor of elections.

The question is why are crowds such good predictors.

Page puts forth what he calls his Diversity Prediction Theorem which states

The collective error of the crowd is equal to the average individual error – the predictive diversity.

In this equation the average individual error is equivalent to ability and the predictive diversity (sometimes called variance) is equal to the collective diversity.

Slice 31:

The important point to be made from this theorem is that individual ability and collective diversity contribute EQUALLY to the group's collective predictive ability. That doesn't mean 500 X's ability and just a sprinkling of diversity, it means they are equally important in developing a group that makes accurate predictions.

Another way of saying this is to say that being different is just as important as being smart!

And Page notes that this theorem has been proved by computer scientists, statisticians, and economists. And that all three got tenure! So it must be true.

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Let's look at a really simple example of the math behind this theorem. This examples just uses two "individuals" NOAA and WEDC. The first two rows of the table show the low temperature predictions made by NOAA and WEDC for three cities for a given day. The third row gives the averages of the predictions for each city and the final row gives the actual temperatures on those days. As you can see, the actual temperatures were pretty far off from the predicted temperatures. But you've got to remember that this is weather prediction, NOT science!

Be that as it may, the math still works. Page used an accuracy measure called squared errors to look at these numbers. Page says he explains why you have to square these numbers to his students by saying, "You can't have someone shoot one arrow into a target a foot above the center and a second arrow into a target a foot below the center and claim BULLSEYE." By squaring the numbers, you keep the negative errors and positive errors from canceling each other out.

Let's look at NOAA's average individual squared error. To get this you take NOAA's prediction, subtract the actual temperature and square the result, then sum that for each of the three cities. When you do this you get a total squared error of 105. Do the same thing for the WEDC and you get a total squared error value of 117. Now do the same thing for the crowd – subtract the actual temperature from the crowd's temperature prediction and sum for each of the three cities and you get a total squared error value of 77. Much less than either of the individual's predictions which indicates that the crowd was more accurate than either of the individuals in the crowd.

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Let's review are theorem and the values we have so far.

The collective error = the average individual error (individual ability) – the predictive diversity (collective diversity or variance)

Average individual error = 111
Collective error = 77

From those two numbers we could determine that (if our theorem is correct) the collective diversity (or the diversity of predictions) would have to equal 34.

Let's try and see if we get that.

To get the predictive diversity we need to take NOAA's prediction subtract from it the crowd's prediction, square the result, and sum those values for the three cities. When we do that we get values of 3 squared (9) plus 4 squared (16) plus 3 squared (9) or a total of 34. The same happens when we do the math for the WEDC predictions. Thus the predictive diversity is 34 and are equation is correct.

77 = 111 – 34.

Page has tested this theorem with all kinds of data. In the book, he shows how it works when you look at NFL draft data. He has the data for the 2005 NFL draft in his book and shows the math for the rankings of the first twelve players selected and the predictions made by 6 experts in the field. Page notes that the Diversity Predition Theorem is exactly the same as the Pythagorean Theorem. It is ALWAYS true. And as always, the NFL draft data fits the theorem. Page notes that after he gives a presentation describing the theorem and the math behind it, later someone who has attended will come up and say, "I went back to my institution and tried some of our data and (in amazement) it worked just the same." Page says, "I get out my right triangle and go – see this side of 3 and this side of 2 and the hypotenuse of 13!

Slide 34:

So, what are the take home messages.

When growing organizations, businesses, universities, and teams, maximize the available tools – you need people with ability but different perspectives, heuristics, predictive models, etc.

Make sure you recognize which problems will best be solved by a diverse teams vs just one or two individuals. Don't constrain possible solutions by the way you format your problems. Be sure to identify the true problem and then state it in a way that doesn't limit people's thinking.

When necessary restructure organizations to enhance the work of diverse teams. You know the kinds of issues that arise at a university – which unit will get credit if individuals work across units. How do different types of activities "count" towards tenure especially if they are out of your field? Who gets credit, extra funding, etc? How do salaries get paid if someone is working on a project outside their department? Etc. And rethink resources – there are numerous ways to capture the diversity that is outside of an organization, when you start thinking outside the box.

One of the points that Page makes is that diverse teams can be the best of the best of problem solving teams or they can be the worst of the worst. Overall, data have shown that, on average, diverse and homogeneous teams do equally well. But the teams that are the very best at solving problems are always diverse. Why don't some diverse teams function well? Lack of trust, fear of differences, different agendas, inability to communicate. For a diverse team or unit to work well, it is critical to take the time to develop common goals, build trust, develop communication skills, etc. Otherwise the value of diversity is lost.

Slide 36:

Ok, away from mathematical models and on to an issue that is directly tied to gender. Negotiation and/or the failure to negotiate.

Slide 37:

Actually the title of this book should probably be "Women Don't Ask for THEMSELVES" because the authors are very quick to point out that women are actually excellent advocates when it comes to asking for things for others, but when it comes to negotiating or asking for things for themselves, NOT SO MUCH.

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I found the book title itself to be very intriguing. "Women Don't Ask." That's a pretty strong statement and it immediately brought three questions to my mind:

1) **How do the authors know this?**
2) **Why don't women ask? (And also "What is it that they don't ask for?)**
3) **What does "not asking" cost?**

So, these are the three questions I'm going to try to answer with this part of the presentation.

Slide 39: This book was written by two women:

Linda Babcock who is currently a Full Professor of Economics at Carnegie Mellon University (only 6% of all Full Professors of Economics are female even though 25% of the PhDs in economics are earned by females) and Sara Laschever, who is an author who

has written many articles on women in the workplace for magazines such as the New Yorker.

Linda first got interested in the topic because of several things that she personally observed. When she was serving as the Director of the PhD program for Hinds College at Carnegie Mellon University, a group of female teaching assistants came to her and were very angry. They wanted to know why most of the male teaching assistants in the college were teaching their own courses while the female teaching assistants were all serving as assistants to other professors. Linda didn't know but she told them that she would find out. She went to the administrator who made the teaching assignments (who happened to be her husband and was very candid about answering her question) and asked. He told her that he would give a course to anyone who came with a good idea, a clear outline of what they wanted to teach and why it was needed and a reasonable budget. He said the men asked, the women didn't ask.

About this same time, a female graduate student came and asked her why she (Linda) had allowed two men to march in the spring graduation even though they wouldn't actually defend their dissertations until August. The female grad student said "I would have liked to march in the spring too, but I didn't know you could." Linda said she had to tell her, "Well, the men asked if they could march and I could make that happen so I did."

A different female graduate student came and complained that Linda had provided funds to a male graduate student to attend a major public policy conference but hadn't provided the same funding to her. Linda again had to say, "Well, he asked and you didn't. I see my job as helping make possible opportunities for students and I could do this so I did."

Linda started seeing a pattern and thought back to her own experience when she was an Associate Professor. Two men who were probably equally, but not better qualified than she was were promoted to full professor. So Linda said she sat in her office thinking, "Soon the Dean will come down and say "Linda, you are doing such a good job, we are going to promote you to Full Professor." But months passed and the Dean didn't appear. Linda had a good relationship with the Dean so she went to him and asked why she hadn't been promoted when the two men were. It turned out that the two men had both gotten offers from other institutions and had gone to the Dean and said they were going to leave if they weren't promoted. Once Linda brought to the Dean's attention that she was as deserving as the two guys, the process for getting her promoted was begun.

After reflecting on what was going on, Linda, who is a researcher in the field of negotiation, started looking into what was known about gender issues related to negotiation. She found that all the studies that had been done to date looked at differences in how men and women negotiated and NOT who was negotiating nor what motivated someone to negotiate.

So, Linda called in Sara to help her collect data that would enable them to understand these issues. Sara went across the country and interviewed hundreds of people, both men and women, from the extremely successful to people with everyday jobs. Linda stayed at the university and collected data through surveys, observing people in her lab playing games to see who used negotiation strategies to better their chances, and got the administration of Hinds College to include a single extra question on the exit interview that was given to all graduating students: "Did you negotiate your job offer?"

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All the data they collected was consistent. They found that:

- **Men initiate negotiations 4X's more often than women**
- **That only 7% of women graduating from Hinds College at Carnegie Mellon reported that they negotiated their first job offer while 58% of the men did. (And this was even after all students were counseled that negotiation of the job offer was expected, that people would offer them less than they could pay, and that they SHOULD negotiate the job offer.) It is also interesting to note that younger women (such as these new graduates) reported on surveys that they felt they were as assertive as men when it came to asking for things for themselves and that the negotiation issue was an issue only for "older women" – those forty or above. The data from the Hinds College survey doesn't support their belief.**

When asked to give words and metaphors that they felt described the negotiation process, men chose words like "fun," "winning a ball game," "a wrestling match"

While women chose words like "scary," "intimidating," and equated negotiation with "going to the dentist"

They also asked both men and women to tell when they had last been involved in the negotiation process and to describe the negotiation itself. On average, women reported that it had been about 18 months before when they had been involved in a negotiation and the types of negotiations they reported were – buying a car or agreeing on the buying or selling price of a house- activities in which negotiations are typically expected.

Men, on the other hand, reported that their last negotiation had been within the past week and had involved more everyday

activities- asking a colleague to support a pet project of theirs in return for the negotiator's support of a project of the colleague's, getting a neighbor to help with a backyard project in return for a case of beer, or negotiating with a spouse to determine who would pick up a child from soccer practice.

It is clear that men saw negotiation as an everyday tool to be used to make their lives easier and to help them get things that they wanted, indeed, men saw it as a fun, perhaps even entertaining activity, or as a chance to prove their superiority. Women had an entirely different outlook – they saw negotiation as something to be dreaded, something to be used in their own lives only under very structured circumstances.

Along these lines it turns out that 70% of the people who buy Saturn cars are female and that females so hate to negotiate for a car, that a man in New York is running an entire business in which he handles all the price negotiations for his clients. And all of his clients are female! The process doesn't save his clients any money, but it does keep them from having to negotiate.

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Sara's interview data confirmed Linda's survey data. As you can see from these quotes: women report being very uncomfortable when they have to negotiate on their own behalf. When women do negotiate for themselves they back down at the first sign of resistance, or they back down because they don't want to hurt their relationship with the person they are negotiating with.

Slide 42:

So, why don't women want to ask for things for themselves, even when they know it is expected or they know they deserve them? Turns out there are three things:

- **How children are socialized**
- **The types of behaviors we accept from adult women**
- **Women's knowledge of what opportunities are available, what is out there to be negotiated, what others who do the same work they are doing, are asking, etc. that occurs because women in many cases are excluded from professional and personal networks that men are involved in.**

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Note: Remember that what authors are reporting about how children are treated etc. are general patterns and they don't apply to every child all of the time or even some of the time. However, in general, the research shows pretty consistently that boys and girls are treated differently from day 1.

Parents and nurses perceive boy and girl newborns very differently. Boys are perceived as "more coordinated, more alert, more active, less in need of comforting"- even when no real differences exist. Nurses have been observed to pick up babies in pink caps much more often than they do babies in blue caps even if the caps have deliberately been placed across gender lines. One physician reported that he could walk down the hall and tell by the voices coming out of a room if the newborn was a boy or a girl. Linda said that she didn't really believe him until she started thinking about how people talked to her two boys. Boys: Come on, Tiger. Go get em. You can do it. Slap me a high five. Girls: What a sweetie. Don't you look pretty. Can you give me a kiss? Look how good/nice she is being. Look what a good little helper you are!

And the way we talk to children signals how we expect them to be. Girls: sweet, nice, and loving. Boys- a little man, a tough guy, in charge of the situation, a risk taker.

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By the time they get to 1st grade, children have internalized expected behaviors. In the classroom, little boys will raise their hands and wave them around excitedly even when they don't know the answer because it gets them what they want – the teacher's attention. While little girls, even when they know the answer, will sit quietly and wait to be recognized.

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In general, toys given to little boys and little girls also differ. Girls' toys tend to be dolls, doll houses, kitchen sets, ironing boards, things that have a focus on caring for others and providing services for others. Rarely, if ever, are these types of toys given to boys.

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On the other hand, boys' toys focus on setting and accomplishing goals, being a winner, self-expression, figuring something out and making it happen, successfully building something, completing a project, and having an impact on others.

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It is not only how we talk to children, and what we give them to play with that makes a difference. The types of chores boys and girls are typically assigned also differ. Boys may take out the trash, wash the car, mow the yard, rake the leaves. All chores that they can do outside of the house, often without direct supervision, and that they

frequently get paid for either by their family or by others in the neighborhood for whom they do work. Girls, on the other hand, are more often assigned household chores like helping with the cooking or cleaning, or watching a younger sibling. These type chores are ones that are usually done with supervision and they are much less likely to be paid for them.

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As a result, boys learn "Work for money." And girls learn "Work for love." And which do you think pays more cold hard cash?

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In general, women come to the workplace with much less experience at using negotiation as a tool to get things for themselves and with a much lower comfort level that the work they do is worth being paid for. They also often don't have a good idea of what the fair monetary value is for the work they do.

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THEN, women get to the workplace and find out that others (both men and women) do not like women that are aggressive about going after what they want for themselves. They see that these women are often "punished" by having their work undervalued, by being ignored in meetings, by being excluded from important projects or committees, because others see them as "pushy," "not a team player," "overbearing."

Slide 51:

And some even less flattering terms!

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And, because many activities have traditionally been divided along gender lines, women often find that they are excluded from many of the support networks that men in similar jobs have available. One female physician reported that for many years she was not even aware that the men in her field at the medical school had regular tennis round robins in which she was not invited to play (even though she had been the college tennis champ at her university and could have probably easily beaten any of the men in the group). Not only did this keep her from getting informal advice and guidance from her male peers, it kept her from knowing what things were coming up, who she should ask, what she should ask for, when would be the best time to do the asking, and what her colleagues were asking for. And who, should opportunities arise, do you think her male colleagues are going to think of and offer an opportunity to – someone with whom they feel comfortable because of common interests and multiple informal interactions or someone with whom they have had little or no contact?

Slide 53:

Now that we know that many women really do hate negotiating things for themselves, and we have an idea of why they don't like negotiating, let's look at what it costs when women don't ask. In their book, Linda and Sara ask the question, "Who wouldn't trade 5 minutes of discomfort at the first of her career for three quarters of a million dollars or more at the end of her career?

Slide 54:

Go over numbers.

This is what is called "accumulated disadvantage" because the disadvantage isn't very large at the beginning, but gets larger and larger as time goes by.

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This situation may more closely align with your situations. Go over numbers.

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These data are from 2001 (and not from the book) but they clearly show the differences between male and female salaries within the same educational level. The gray bar represents salaries of males at 100%, women who hold professional degrees (doctors, lawyers, dentists) earn only about 60% of what men with the same degrees earn while for all other educational levels, women earn between 72 and 76% of what men do. That means that for every dollar a man earns, a woman doing the same work earns approximately $0.75.

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The wage gap between men and women has decreased since 1980, but has not changed much since the 1990's. Women still earn only about 75% of what men do when in the same jobs. Put another way, often females work 12 months for what a male doing a similar job works only 9 months.

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But it is not only money that is an issue. All of the things on this list are things that men get more often than do women, simply because men negotiate for them on a regular basis.

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Unfortunately, for women, many of us tend to think that we will be recognized for our good work. In an ideal world, in which all managers/bosses/supervisors were great at their job and made sure to cultivate their best talent, this might well happen. But in the real world, many supervisors are reactive rather than being proactive (perhaps because they are overworked themselves) and they deal with issues only when they are brought up to them. An example from the book is of a woman who was an electrical engineer at a large company, she had been a member and leader of a team that had developed some cutting edge software related to optics in robots and was well respected within her company for her excellent work because what she had developed had brought the company lots of recognition and lots of money. Well, her boss was transferred and a new man from outside the company came in as her supervisor. He didn't know about the work she had done previously, and consequently did not assign her to top projects, did not have her go to some important meetings, and in general was just overlooking her. She says she believes that because she was pregnant with her third child at the time, that the new boss just saw her as a fat cow who couldn't possibly be of any particular value to the company. And the female electrical engineer was uncomfortable with going to him and saying, "Hey, this was my work and I want to be assigned to this new project." Because she didn't want to be confrontational or push herself forward. Consequently, within 6 months of her new boss arriving, she had found a new job at another company and left. And her company had lost a very valuable employee.

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Here are some statistics that show that even though women make up 50% or more of the workforce, women occupy the top jobs at much

lower levels than would be expected if men and women were moving forward equally.

The same statistics apply in academia – even though 46% of the people receiving PhD degrees are female, a much lower percentage achieves the rank of a full professor or become college presidents. And remember from earlier that only 6% of Full Professors of economics are female even though 26% of the PhDs awarded in Economics are to females.

One possibility of what might cause this to occur: Remember when we looked at what happen when one person negotiates a slightly higher salary than does another? Each year the person who started at the slightly lower salary gets farther behind and after 10 years they are earning only about 69% of what their colleague is earning and after 25 years they are only earning 62% of what their colleague is earning. Suppose about the 10 year mark, the two individuals apply for the same job. Both individuals have similar resumes, similar recommendations, and do equally well in their interviews. Then the employer looks at their pay history and sees that one has consistently been paid at a lower level than the other. The employer is likely to wonder why and perhaps to assume, although wrongly, that the person who was paid more is actually better qualified. It is important to remember that:

LOW PAY COMMUNICATES SOMETHING INACCURATE ABOUT YOUR VALUE AND YOUR WORTH.

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What we are seeing is that business and academia are not making full use of the potential of their female employees.

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And at home, it turns out that even when both the husband and the wife hold equally high paying and demanding jobs, the women still do 2/3 of all the household work. And both the men and the women who responded in surveys felt that that was the way it should be. Now what does this mean overall

1) **Women have less free time than men**
2) **Women are becoming more stressed then men, which can lead to all kinds of health difficulties.**

In an experiment where they looked at levels of stress hormones in working men and women at various times during the day, they found that at 5 pm, the level of stress hormones in men's blood decreased while the level of stress hormones in women's blood increased. They hypothesize that this is because women are starting their second shift, and not only do they have to do anything that is required by their job during the evening, but they are also in charge of running the household and providing the majority of the child care.

An article in 2007 in the New York Times, titled "He's Happier, She's Less So" reported that compared to the 1970s women were reporting being less happy and men more happy. Time-use data showed that men now spent less time on things that they didn't really want to do and more time on relaxing while women, while not spending that much more time on things they didn't want to do, just had so much more to do than before (including keeping a home and maybe a garden, caring for children, having a career/job, and caring for aging parents), that they couldn't get it all done and had to let many things go undone which led to greater discontent. And maybe it is because women have greater ambitions now then they did back then, when they were likely only comparing themselves to other women and not both to other women and other men.

The same trend was seen between teenage girls and boys. Girls now feel they have to do everything as well or better than boys and still be "effortlessly hot."

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It turns that even when women do ask, they tend to ask for much less than their male counterparts are asking for, between 15 -30% less. One thing that I found very interesting is that even though women are responsible for starting more than half of the new businesses, they only get 22% of the start-up funds that are available. One venture capitalist told Linda and Sara that men came to them with pie in the sky requests for huge amounts of money that they had to cut way back before it was a realistic request, but the women who came, had such tight careful budgets that it was clear that if they had even one unexpected set back, they would not have sufficient funds.

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Men tend to think "the world is my oyster!" while women are thinking "you can't get blood from a turnip." Several studies were done in which both men and women were given descriptions of jobs and asked how much they thought the salary for such a job would be and women consistently estimated less than men estimated by approximately 30%. Studies have shown that men tend to estimate their worth based on what they see as their own potential while women tend to estimate their worth based on their accomplishments. These are two very different frameworks for estimating value!

They found the same thing when women and men were asked to estimate what a company would have available to support a specific project and once again women estimated much less than men.

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Why do women often get less than men when they negotiate? As we've just seen, women think fewer resources are available so

- **Women generally set lower goals.**
  - **They are unsure of what they are worth.**
  - **They are afraid that asking for too much might threaten a relationship.**
  - **They fear that the people around them will react badly.**
  - **They are less optimistic than men about what might be available.**
  - **They are less comfortable than men with risk taking.**
  - **They are less confident in their ability to negotiate.**

Slide 66:

When women do negotiate, they approach it from a very different perspective than do men in general. For women, negotiation is a collaborative process in which everyone should come away with something. They see negotiation and a situation in which compromises are reached for the best of the organization as well as they individual. It is important to women that relationships be maintained and that at the end of the negotiation everyone comes away a winner. Personal experience: guys playing horseshoes vs women playing washers. Guys were giving each other a hard time and reveling in their own successes and talking trash to their competitors. "You couldn't hit the side of a barn with that horseshoe." "Knock his horseshoe out of there!" "Get him!" Women playing washers were cheering each other on and saying things like "Nice try." "You almost got it." "I wish I could do it that well." "Just a little farther and it would have been perfect." "Yeah! You got it." It was an amazing difference to the guys.

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So, when women don't negotiate, it holds them back in numerous ways and consequently they are often not involved in the top teams, projects, etc. and their employer loses out on the unique contributions they could make. How can we as individual faculty members, mentors to Tech students, and/or administrators go about addressing this issue:

- **Raise awareness of all students, faculty, and administers to issues surrounding gender and negotiation, it causes, costs, and consequences for individuals and for organizations for which they work**
- **Provide all students with training in how, why, and when to negotiate (and junior faculty as needed)**
- **Design assignments/projects that provide students with opportunities to practice negotiation skills**
- **Support programs that support the above**
- **Make sure that administrators are aware of gender differences related to negotiation and that they are proactive in providing equal opportunities to all junior faculty; design organizational policies that provide equal opportunities to all junior faculty**

Why is this important? A university is known by its graduates and it is important to prepare all graduates to be as successful as possible when they enter the workforce. Negotiation skills are just another in the set of skills that all graduates need to achieve their maximum.

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So, how are these two books connected? It seems pretty obvious.

Page has shown that cognitive diversity "trumps ability" when solving complex problems (given certain assumptions) and that the

accuracy of predictions is EQUALLY (and EQUALLY is the most important word) dependent on individual ability and group diversity.

One way to increase the cognitive diversity of any group is to include highly educated and able women who come with very different perspectives, heuristics, interpretations, and predictive models. In order to do this, it appears from Babcock's and Laschever's work, that it is critical to be proactive in supporting women already in the workforce and preparing students with negotiation skills so that they are successful and are prepared to work effectively as a member of cognitively diverse teams.