

THE BROOKINGS INSTITUTION

MAXIMIZING THE RETURNS OF URBAN RETAIL AND
COMMERCIAL DEVELOPMENT USING ADVANCES IN
INFORMATION THEORY, MODELING SIMULATION
AND DECISION SUPPORT TOOLS

Tuesday, March 22, 2005

Washington, D.C.

[TRANSCRIPT PREPARED FROM A TAPE RECORDING.]

KEY NOTE ADDRESS

Dr. Paul Schoemaker, President and CEO of Decision Strategies International, Inc.

DR. SCHOEMAKER : I'm delighted to help you in a very small way in improving urban developments by looking at the subject of decision making, which is really the field that I have studied. I will not claim to know much about real estate or finance or urban development, although I worked a long time ago with the Illinois Housing Development Authority, so I had a taste of it at least. But I know it's a very worthy cause, and I do think that decision making is probably critical to improving it from a sort of systemic perspective. There are many stakeholders. It's a complex value chain, and I think the better people are able to use information, frame issues, understand where other parties are coming from, and catch themselves in the act of perhaps being biased or falling into a trap or two, I think that can only be for the better. This is what I study, mistakes, why they happen and how we might improve them.

We've studied decision making for the last four decades in academia. It really started as a distinct field at Harvard and Stanford in the 1960s, but that was a very mathematical approach. You know, a lot of bright people, mostly economists and statisticians, asked the question so what does it mean to make a rational decision under risk or uncertainty? And they worked through all the sort of the axioms and the probabilities, et cetera. And it looked very good on paper and that's my own pedigree, that's how I was trained.

But it didn't really work that well in practice, because I think the real world is more complex than can be often modeled in these quantitative, deductive studies that they conducted. So then the field of decision making got a real boost in the 1970s, when a set of psychologists started to look at so how do people really make decisions. So the way I characterize it's suppose you want to play golf. You know, you can either go to a golf coach, who teaches you everything about how you should swing the club and teach you the physics of swings and contact, and that doesn't go very far. It's probably better to have a coach who says, well, let's not talk about theory here. Why don't you just hit a hundred balls and I'll tell you then what you're doing wrong. And, as you know, if you play golf, you can make at least a hundred mistakes, but probably five account for most of the immediate improvement that can be achieved.

So this field of decision making that looked at it more descriptively by saying, so where do people drop the ball the most and why has been a much more I think productive field and was recently honored with a Nobel Prize in Economics. As you may know, in 2002, Dan Kahneman and his collaborator who had died, so they don't give it posthumously, but Amos Tversky, those two psychologists really put this area of decision making on the map. And it has found wide application in fields like negotiations, in behavioral economics, in behavioral finance, and it has in even in evolutionary biology. So this is really very foundational.

And the book, *Decision Traps*, which we wrote in 1990, was an attempt to take the findings of this field and explain this or make this accessible to managers and professionals. So there is actually a Society for Medical Decision Making. There is a judicial college in Reno, Nevada, that looks at legal decision making. So this field has had applications beyond its origin.

And in this book--and I think there's another book you're going to get, *Winning Decisions*--we conceptualized the decision making process really as consisting of four major phases, and there's nothing surprising here: defining the decision--it turns out I think most of the time people solve the wrong problem, and that's one big trap.

So the definition of a problem typically needs more attention. Then there is the whole question of information gathering. Are we asking the right questions? Do we know what we don't know, can we ever know that, and how do you estimate uncertainty.

Then there's a more diverging phase. You're opening up, you know, the assumptions. You're surfacing different perspectives. So that is psychologically a different phase of the decision making process. Then the converging phase, where you say okay so what are we going to do about all of this, which is the--excuse me coming to conclusions and the learning from experience.

The learning from experience I think is a very important part, otherwise you get in our plateau. So you may ask yourself the question having made thousands of decisions in your life, have you gotten better, and if so would you know if you've gotten better.

And we find that for many people, like my tennis game or golf game, it has plateaued. I don't get better. I do get feedback. I mean every time I play golf I get ninety strokes of feedback or whatever it is and in tennis even more feedback.

That's truly a large sample phenomenon, and yet I'm not able to translate to use that. I'm data rich but information poor because I can't quite synthesize; right? I don't have the proper conceptual model to synthesize this into self correction, which I think is what--that's maybe what sets amateurs from professionals apart. Professionals have enough of a mental model or script of what it is they do that they can also self correct, although Tiger Woods has been struggling with that self correction problem a little bit. But I think they do it better than amateurs.

Now, given the limited time, I'm only going to talk a bit about framing and intelligence gathering, because those two I think your focus on information is an interesting focus, and it's not just information out of context. It's always in the context of how we define problems, what questions we're trying to solve. So I thought that framing and intelligence gathering are two highly interconnected topics.

So what do we mean by the frame or framing? And it's really how you look at the problem. There are a lot of different terms that psychologists use. They talk about scripts, schemata, mental models, paradigms--and overused term--but these are the kinds of things that describe the existence of cognitive structures; that is, in my mind or in your mind, you form some kind of a representation of the problem. And there are many other representations possible, and that's what we call framing. So it has to do with how the problem is viewed. How it is structured. What options are perceived? What constraints are imposed? And the sensitivity to the fact that other perspectives are perhaps possible.

In the real world, a lot of information bombards you. You know, you're listening to a person speak. You overhear a conversation. You see an image. You listen to CNN, and what most of the time I think human beings do is they filter out information.

I think of the brain much more as a filtering mechanism than as a paying attention to mechanism. Estimates are that in the realm of vision, as I look at this room, that less than two percent of all stimuli that hit my retina are actively attended to. And that's already within a very limited window, hardware limitation, of 3,000 to 7,000 Angstrom, within which we can recognize light.

But once we have been programmed then we will force fit information that doesn't fit our mental models, our schemata, and so we distort the world. The philosopher Kant wrote about this already. He talked about how there can be no perception without preception, and he was very interested in mental precepts--mental categories, categorizations--that we have engaged in that actually lead us to distort what we see.

And most of the time, as healthy adults, we have developed a whole repertoire of frames and scripts and schemata that let us function in this society. If you were to be transplanted to a different time period or a different planet, these scripts wouldn't necessarily work. But the world even has changed on us today, so there is this question of renewal. Are we able to renew our scripts or are we at some point stuck in certain modes of thinking that are no longer productive. And let me give you an example of how these frames very subtly depend on the surface features of a problem.

So here is a very basic simple question. Imagine you have decided to see a play. You bought a ticket for a hundred dollars, and you are about to enter the theater building and discover that you've somehow lost the ticket. Though the seat was not marked, you have no receipt and the ticket cannot be recovered or replaced in any way. There's no way that you can prove that you bought this ticket.

And the question is would you purchase another ticket for \$100. And when B.A. students are presented this problem, especially if they have taken my colleague Susan Wachter's course, they should understand the same cost principle, and just ignore what happened and say sure I'll buy another ticket.

But a fair number feel that they don't want to do that. They don't want to pay \$200 to see the play. So they frame it that that loss of the ticket is part of the present decision. When we present the problem with a slight variation to a different group of MBAs, we don't get this issue. So here the problem is imagine you've decided to see a play where admission is \$100 per ticket. As you enter the theater to buy your ticket, you realize that you lost a hundred dollar bill en route to the theater. It fell out of your pocket, and now, almost all MBAs will say well, that's too bad, but I will go ahead and see the play.

So this simple problem illustrates that we draw a different boundary mentally; right? If you loose a hundred dollars in the form of cash, it goes into a different mental account then if you lose the tickets. If it's a loss of cash, it goes into the stupidity account, the bad luck account or the world does it to me again account. You know, that's a very big account. The moment this trivial transformation happens into a ticket, it goes into the entertainment account, and now we make the mistake--it's an illusion, right--we draw the boundary inappropriately--and consider it to be--that we paid \$200.

And I think we do this all the time. It's a simple example, but the phenomenon of drawing boundaries, of deciding what is part of the problem and what isn't, I think is essential to framing. And more effective decision makers have a greater capacity to zoom in and out of problems and can be flexible about how they draw the boundaries.

I think we have no choice but to draw boundaries. I think decision making is about simplification, but the question is it a useful simplification that you engage in. And Einstein had a great quote on this one--Albert Einstein. He said we should try to make it as simple as possible, he said, but not simpler. And he left it then to us to figure out where that boundary is; right?

But that's kind of what framing is about. You want to bring out the salient features of the problem and suppress the detail --it's like you see the forest and not all the trees. And I think good decision makers have this ability of zooming in and out in a much greater--to a much great extent than less effective decision makers.

Let me show you in a business context how the frame operates. What are their key assumptions about how urban development happens so what their role is in this process?

When General Motors was still at its peak, of course, they have come--they're becoming a shadow of their former self, sadly, but let's say in the 1960s, late '60s, they were probably the--you remember the phrase was what is good for General Motors is good for America. This was the most desired position probably in corporate America was to be the chairman or chairwoman of General Motors.

So these are some of the key assumptions that defines the culture, the mindset at the time in Detroit. We're in the business of making money, not cars. GM

was very much diversifying. They already owned 45 percent market share in major categories. There were antitrust issues, they didn't want to give all this money back to shareholders, so they were looking for other ways to have fun.

Success comes from rapid adaptation, not from automotive excellence. I came as a student from the Netherlands around that time actually, and it struck me how much styling changes there year to year in the United States. In Europe, the cars don't change that much. There's Mercedes. It doesn't change on the outside. It actually does change a lot under the hood, because of the engineering focus.

And in the U.S., this was the right assumption. This goes back to Alfred Sloan. The market was very much the planned obsolescence. These cars are supposed to fall apart after five years, so, you know, why worry about quality, you know, et cetera. So this fit. This was a successful set of assumptions.

A car is primarily a status symbol. People want to upgrade. Again, this is Alfred Sloan. The U.S. car market is isolated from the rest of the world. Fuel will remain cheap and abundant. The government is an enemy and so are unions. Whenever you are big and have a lot of money, a lot of people want to get a piece of that money. And there were more assumptions.

But I hope you can see that this was not just a random set of assumptions. There are some mutuality reinforcement in these assumptions, and this starts to filter how General Motors sees the world, what signals get through. And in hindsight, of course, we know that the car industry really restructured in a very fundamental way, which was not seen by GM or Ford or American Motors was still at that time a separate company and Chrysler.

And some of the signals that were filtered out, which were clear in hindsight were obviously the energy crisis in the Middle East that was brewing which led in 1973 to the first major oil shock; the export of Japanese cars; the weak signal in hindsight was Honda getting a foothold in the motorcycle industry. Honda was selling the Honda Cub 50 cc cycle very successfully in California, but both Harley Davidson and GM said well, that's not really that relevant to us. We do big bikes, you know, not 50 cc cycles.

Environmental issues. In 1963, some of you may remember Rachel Carson, who wrote a classic book called *Silent Spring*, and I mentioned these because these are the kinds of weak signals that ideally when we do scenario planning or we try to layout, you know, possible futures for organizations, these are the kind of things that need to be amplified.

So normally the frame filters out what doesn't fit and the challenge I think of leadership and strategy is to do the opposite--magnify the weak signals that don't fit the frame, and you can only do that if you have an alternative frame where they do fit so

that you can--don't see them as isolated pieces, but you see them as part of a tapestry, as part of a more complete picture.

So boundaries and maybe and tomorrow as you continue further to discuss the role of information is I think one important feature of the frame. Be more sensitive to how people draw the boundaries around problems. What is--do you solve a narrow problem? Do you solve a big problem, et cetera?

Another point that I think is central to understanding frames is the notion of a reference point, and again allow me a simple cover story to illustrate the power of this element of a frame. So here's the question. Suppose you're the head of a large manufacturing division that's part of a Fortune 500 company. Due to economic changes et cetera, this division's factories are threatened with a partial and possibly a complete shutdown. All you have to remember from this slide is that there are currently 600 workers employed in the factory.

And imagine that these are your choices. You accept these choices that this is, in fact, you're only choice. If you do alternative A, then exactly 200 jobs will be saved. That's one alternative. Or alternative B, you will take a risk. You know, there's a one-third chance that 600 jobs will be saved or there's a two-thirds chance that zero jobs will be saved, which is statistically if you multiply that out also 200 jobs saved. Just a show of hands.

I know you need to know more about the union and the legal issues and whether you have good director insurance and what have you, but how many of you would probably pick A in this case if you thought about it deeply it came down to that--thank you--that question. How many would probably pick B? All right. You are an atypical group compared to what we--which is perhaps good news; right?

But we normally find that the majority of a large audience, managerial audience, would pick A in this case. Less interested in what the breakdown is between A and B than the fact that we can reverse the aggregate references by flipping the problem around and looking at it from the loss side.

So you can also frame--this is a reframing of the problem. You can reframe alternative A as entailing a loss of 400 jobs; right? If you have 600 jobs are being threatened, then saving 200 jobs is logically equivalent to losing 400 jobs. Likewise, you can recast the gamble from the loss side, in which case you have a one-third chance that no jobs would be lost and a two-thirds chance that 600 jobs would be lost.

When you present this to a large audience, the majority of people will chose B. So we have a very peculiar phenomenon here that a change in wording--is the glass half full, half empty; right--brings about a reversal in what the majority preference is.

When people are presented options on the gain side or they see it from a gain perspective, they tend to be risk averse, not always, but that's the modal response. When it is presented from the loss side, most people, but again, it depends a little bit on the probability, so it's a little bit more complicated than I'm making it out to be here.

But the tendency is to be risk seeking on the loss side. Contrary to the existence of thriving insurance markets and this causes to economists, like Susan, perhaps some paradoxes about how do we explain on the one hand, people's risk taking propensity for losses.

If I asked most of you would you rather--if you had to chose--lose \$100 for sure or take a, you know, one in hundred chance of losing \$10,000, most of you would probably say I'll take my chances, so people have a strong loss aversion.

They prefer not to commit to a sure loss, and yet we gladly, you know, pay an insurance premium to protect against that loss, but that' maybe because we frame it or the insurance industry has taught us to frame it as buying protection. They have sort of created the illusion that there is a gain.

What you're really doing is just substituting a probabilistic, you know, loss for a sure loss of a different magnitude. But that's not how you want to sell insurance.

Now, the framing challenge can kind of be illustrated very simply using this visual analogy. Most problems are incomplete; right? Reality itself is an ambiguous figure. The future is certainly an ambiguous incomplete figure. That is, many people see it very differently. And the art of framing is to put meaning on an incomplete figure by highlighting certain features of the problem and suppressing others.

So if I take this example, which is an incomplete figure, then some people see a human face; right? Some people see a mouse. Some people see maybe yet something else, depending on what they had to drink. But the point I want to make is that it is very simple for me to manipulate what you see by making very few changes in the figure. So in this case, I changed less then two percent of the original drawing to bring out very clearly the mouse, and I then made some other changes. I brushed up a little bit. And I bring out a human face, and if you want to see how I did it, the top is what we start with--just notice how few changes are needed to totally change the gestalt, what psychologists call the gestalt--the totality, the total meaning of the picture.

And this is kind of what I think happens in framing. Once we lock into one view of a problem, we have implicitly brought to the fore certain aspects of the problem and suppressed other problems, but without really being aware of that. I mean, there is some awareness of the fact that others look at it maybe very differently, just the question that's currently being debated, you know, in the media about the right to die question or Iraq.

I mean take any of these sort of current topics and it's just striking I think how vastly differently people look at it. And it's not that they have different data I think, because we all share--sort of feed from the trough--we have all the same public data--it's that we just see the collage somewhat differently.

We combine the pieces somewhat differently, and then we snap into a certain configuration, and then we have a hard time--and that's why frames are so nefarious--we have a hard time I think then undoing that, because we become stuck in a sense.

So frames I think are terribly important because they set up the entire structure, like if you build a house if you don't get the foundation right or the blueprint isn't right and that's really what the frame is, then all of the other activities that happen in problem solving the questions we ask, et cetera, get constrained by that. It nests all these other things.

So key questions to ask in framing. We'll talk more about that policy level, but the question we would ask in any sort of case would be so are we solving the right problem? Is this really the crux of the issue or are we kind of shadowing with it or dealing with more tangential issues. What are our own implicit assumptions? Again, our own prior assumptions. How do others look at it? What are the links of this issue to other issues? How do we measure success? What are the yardsticks and the reference points we use. What are the constraints we are imposing, and are those, in fact, valid constraints or self-imposed constraints?

It's striking that once you start to look for more options, how there usually more options. So when I'm in a meeting and people say well, we have three things we can do here, immediately an alarm bell goes off and I say well, there got to be 10 other things, you know, but the fact that we don't see them doesn't mean they're not there; right? So let's look for them kind of mentality.

And who should get involved in the decision is part of the framing as well, and that ties to questions of legitimation--how do you justify the decision to various stakeholders, et cetera. So that's kind of on the framing side some points.

Let me now address, if I may, four traps that are well documented on the information gathering side, but all information gathering happens usually within a frame; otherwise, you're drifting. You need some focus. And the traps that I think are interesting to contemplate are these: the fact that most people are overconfident; that is, they don't know what they don't know, and we'll demonstrate that briefly. The so-called availability bias--the tendency to anchor and not realize how the anchor exerts an influence on the final estimate; and lastly, the tendency to look for confirming rather than disconfirming evidence.

And let me just go through them fairly quickly because I think you'd recognize them immediately I think as well know biases.

So overconfidence, you know, what's the--the colloquial definition is two guys at a bar; one saying what do you mean your guess is as good as mine? You know, mine is a helluva lot better, and the problem is that both believe that. And there's not shortage of examples where famous people were absolutely sure and absolutely wrong, and this is really what overconfidence is in the extreme.

So when you say you're a hundred percent sure, you can never be wrong. If you say you're 90 percent sure, well, you can be 10 percent of the time wrong. And when you do calibration studies, it's remarkable that if you simply plot people's stated degree of belief in a proposition and the percentage of time they're accurate that this is not a linear--it's not a 45 degree line. So when people say they're 90 percent sure, they will be wrong much more than 10 percent of the time.

Even golf players were tested. In an environment that's very stable with a lot of feedback, they would ask golf players so how often will you make this putt, they just put some, you know, balls out. And you know, they might say well, I'll make it eight out of 10 times, and then they just measured it, and they're overconfident. And maybe you need to be overconfident to be good golf player. On the other hand, if you're too overconfident, you pull the wrong club out of your bag and you go for that green with a two wood when you should really lay up.

So there is an interesting question: does it pay to be a realist or does society select for optimism? I think you have to distinguish here the time when you make a decision, I think you want to be a realist. The time you implement a decision you probably want to be an optimist to get other people on board, to be a coach, to be a cheerleader so you want, you know, the coach has to make the team believe they can win. But when the strategy is formulated for the team, one hopes the coach is realistic and not believe his own pep talk too much.

So no shortage of cases like that here. How would you like to be this guy in 1962. You're offered the Beatles contract, the biggest contract of the century, and you say, well, we don't like that sound. Groups of guitars is on the way out. It's a Decca Recording executive, and they go across the street, across Abbey Road, and the rest, as they say, is history.

I took this from a book called the Experts Speak. It's a compilation. It's an institute actually of journalists who are compiling documented cases of well-known people, experts, being absolutely sure and absolutely wrong. And they have about 10,000 entries in all walks of life, you know, from music to science to economics, and here are just some samples.

Lord Kelvin didn't think that airplanes would ever fly. He was, of course, the most celebrated physicist at the turn of the century, the previous century.

Ken Olson, in 1977, a famous quote: "There is no reason for anyone to have a computer in their home." This led to then DEC being sold to Compaq and Compaq being sold to HP. And not a pretty story, in other words.

Business Week, a very savvy magazine, didn't think in 1968 that the Japanese would carve out a significant slice of the U.S. market. Now, this is before the energy crises of '73 and '79, et cetera. And even colleagues at Harvard--if you notice we didn't put Wharton up here--but the Harvard Economic Society wrote a newsletter about, you know, the economic conditions and in 1929 before Black Tuesday, before it really all started to fall apart, they said well, a severe depression like that of 1920-21 is outside the range of probability.

So this is a serious issue, and if we had more time, I would do a longer quiz. But let me just illustrate the phenomenon. The way we measure whether people are overconfident or not or whether they're well calibrated is we give them a trivia question to which they don't know the answer, and we ask them not so much for the best guess but for a range. And we want to see if they can put ranges down so that the answer is most of the time in the range. To be precise, we ask for a 90 percent confidence ranges.

So let's do an example. If I ask you how long is the Nile River, which is a very long river, the longest actually in the world, you might get a best estimate. But we're really interested in your ability to bound and express how uncertain you are about that estimate and one way to do that is to put a low number down and a high number down so that you're willing to take a 90 percent bet that the answer is in the range. So if you're right, you know, you get one dollar. But if you're wrong, if the answer is outside your range, you would pay me \$9. That would be the fair bet.

And just to take one of these that you think you know something about just for fun here, you may try the year in which John Steinbeck won a Nobel Prize. So put down a low and a high year down so that you're 90 percent confident that the answer will be in the range. A more difficult question on the Asian elephant, a female Asian elephant--how long is she pregnant on average in days? Many of you in finance so the for--may appeal--what do you think the Dow Jones Industrial Average, which is what--around 10,000 now--what do you think it was in mid-1985.

And lastly, Martin Luther King. How old do you think he was when he was assassinated? So pick one or two of these question or all five if you like. Mental a mental note of a range. And just let's see if the answer is in the range or isn't. And most of the time, we find that people miss it far more than 10 percent of the time. If you put a 90 percent range down, right, then in a large audience 90 percent of the time the answer should be in the range and 10 percent of the time it's allowed to be outside of the range. So we find that people miss half the time the range.

Ready for the answers? Okay. So the Nile is 4,187 miles. Yeah. It's very long. John Steinbeck got it in 1962. That elephant 645 days of pregnancy. The

Dow was at 1337. And Martin Luther King was assassinated at age 39, quite young. And if we give more of these questions randomly taken from an almanac, we find that people miss 50 percent of the time when they think they are 90 percent sure what the range is.

That's, of course, a real problem in the quality of information. If we don't know what we don't know, we're not going to ask the right questions. We're not going to, you know, put the right, you know, qualifiers around our estimates et cetera.

Another problem in intelligence gathering information is that we may be not sensitive enough to where the information is coming from. So let me again use a simple demonstration. If you had to guess which kills more people--forgive the morbidity of the subject--but question A, do you think more people die annually in the United States from stroke as a cause of death or all forms of accidents? And you may just want a show of hands. How many people think stroke is the bigger killer in the U.S.? Thank you. How many think all accidents that would be the rest. So strokes have it by a thin margin. Question B, do you think lung cancer is a bigger killer or motor vehicle accidents, which we be busses, trucks, and cars. How many of you think that lung cancer is a bigger killer. All right. That's kind of 50-50 then.

And lastly, emphysema versus homicide. How many think emphysema is a bigger killer of those two? Thanks.

Okay. So you are much better than typical audiences, which is good. Here are the answers. Stroke kills 209,000 people; accidents 112,000. So stroke is double as prevalent. Lung cancer kills slightly more than motor vehicle accidents. Emphysema more than homicide.

People in a broad survey guessed the wrong way by an order of magnitude. And the reason is that they base their judgments really on what they hear and read, not what's really happening. So in the last column, we list how frequently these causes of death are mentioned in newspapers--two newspapers poor graduates had encountered for a whole year. You know, the Boston Globe and the Oregonian. And you can that perceptions correlate much more with reports of reality than with reality. And we call this the availability bias--the tendency to judge frequencies of events on the ease with which information is available to support, you know, a particular proposition without being aware of the slant or the bias in the information. And I would submit to you that almost all information we receive is unrepresentative in some way, even scientific information. Not all papers, you know, there is a selection bias about what papers get submitted to journals. And that's already then a bias right there.

And these are very difficult biases to correct for. Sometimes the bias is deliberate, like people political campaigns advertising. Sometimes it is inadvertent. It's simply a consequence of how information is coded, collected. The newspapers are not in a conspiracy to try to distort your perceptions. It's simply they report what they think you find interesting.

The way you think about it how does the availability bias influence thinking about urban development. Are the statistics, the reports that you get are they truly a good slice of reality or are they themselves very biased? And as one travels--I was just in Asia two weeks ago --as I read the newspapers there, you have a very different perspective on what's happening in Taiwan or Hong Kong or Tibet or North Korea. So anybody who's traveled outside the United States knows that the perspectives and the interpretations are very much a function of how the information machinery works. And I view myself as living in an information cocoon, and I try very hard to pierce that cocoon, but it's very difficult to do because it's like the fish in water. They cannot escape the water.

But it's an important caveat that we need to put with data and information. So immediately when I see data, I ask two questions. Number one, what's missing? What am I not seeing? And secondly, where's the slant? And I'm not impugning anybody here. I'm just recognizing that this is a serious trap.

Last bias, and then we'll bring this to a close. On the intelligence gathering is the one that Pari mentioned in her position paper, which is a really intriguing bias called anchoring.

Suppose I asked you to estimate my height or my age or my weight--don't--but suppose I asked you to do that, how would you do that? You would probably start with your own height, weight, or age, because that's a easily available number. You know what that is, and then you say, well, Paul seems heavier or lighter or older or younger, and then you make an adjustment away from that number--that starting point--and that's all good and well, except that you will probably not move far enough away from your starting point.

So the initial estimate, around which adjustments get made, becomes like an anchor, like with a ship, and holds the judgment too close to that anchor. So tall people when they estimate my height will overestimate my height because they started with a high number go down, but not enough. Short people will underestimate my height. They start with a lower number than what is really the case. They don't go up enough. Of course, if they meet and average, they do a good job. That's why the wisdom of the crowds, right, the ability to sort of average out numbers is very important. But anchoring is a really pernicious bias, because think about it. Almost all estimates and judgments you make somewhere rely on an anchoring process; right? I mean, whether it's the budgeting process. That's why zero-based budgeting, you know, doing it from scratch now and then is very important.

And I don't think we can eliminate anchors. I think the key is to use multiple anchors. That is if you were to estimate any phenomenon, you need to try to triangulate it and look at it from at least three--in fact, Leonardo da Vinci said this in his writings, he says you never understand a phenomenon unless you look at it from at least

three perspectives, and he practiced this in his drawings and his art, and I think this generalizes also to business.

And the phenomenon of anchoring is so, as I said, so subtle that even if the anchor is random, it has an influence on people's judgment so let me show a last demonstration here.

This was done when I was at the University of Chicago. I asked my MBA students to write down the last three digits of their telephone number in order to start with a random number. That's obviously a random number. And then I asked them to imagine that that was a historical date after Christ, in the first millennium. Suppose that my last three digits are 356. Then I was asked the question do I think that Attila the Hun was defeated in Europe. He was defeated in the first millennium. Was he defeated before or after 356 A.D.? And I would circle before or after. And then the second question the students were asked was okay so when do you think Attila the Hun was defeated, so then they were asked for a point estimate.

In this graph, we plot people's telephone numbers horizontally against their estimates of when Attila the Hun was defeated. Students with low telephone numbers, between zero and 200, guessed lower than students with intermediate telephone numbers or high telephone numbers.

Now, these people were asked were you able to ignore the anchor, and the point is this is an unconscious bias. In a real estate it was studied then with realtors asking to assess the value of a home and the experiment was set up that in one condition the realtors were told that the owners hoped to sell the house for \$300,000, but then the instruction said but you know owners, they don't have a realistic sense of value. They're dreaming. Why don't you ignore that \$300,000. Do your own independent assessments. Look at comparable properties, recent sales--the normal routine, and come up with your own independent professional assessment as to what this home is worth or will sell for.

And then another group was given the same situation, except the anchor was changed. They were told that the owners hoped to get \$350,000 for the home. So the implanted anchor was \$350,000. They were then asked to ignore that anchor. Do their own analysis and the studies simply compared what the two groups of randomly assigned realtors came up with, and they were apart by about \$30,000. So they were-- then they were asked were you able to ignore the anchor price the owners thought? And they said, of course. What do you think we are? We are professionals. You know. But the point is they can't. They can't.

And so as you think about urban development, if you think about where does the information come from that informs our judgments? What are the reference points we use to judge what's feasible? And to what extent does anchoring play a role in our estimation procedures, I'd think that would be perhaps a good way to tie the decision making topic to the world of development.

So here are the typical questions we ask in the intelligence gathering phase. What don't we know that we should and can. Just do an audit of that. Where might we be overconfident or anchored? Is there a slant in the information? What are some of the truly unknowables and should we then play with these unknowable in a scenario planning sense or is it sufficient to simply put some estimates, some brackets, around these unknowable?

Last slide, more conceptual. My view of decision making is that we are moving from a world of certainty and risk to a world of uncertainty, ambiguity, and chaos. This is a consequence I think of deregulation, of globalization, of geopolitical turmoil, et cetera. So whereas in the past, perhaps many problems could be approached as though they were decisions under risk, increasingly I think the problems have to do more with uncertainty and ambiguity.

Very briefly. Risk is typically defined as okay, you know the outcomes and the probabilities, like roulette or life insurance. You know, you can kind of have an actuarial base credit scoring would be maybe risk.

Uncertainty is the case where we know the outcome space. We know the possible, the things that might happen, but we don't agree on the probabilities.

Ambiguity is a case where we don't agree--where experts would not agree on the outcome space, let alone the probabilities then. So the case of Iraq or what's going to happen to North Korea would be much more uncertainty and ambiguity. And chaos and ignorance is usually the area where you don't even know what the problem is.

But, now, the irony is, of course, that if you think of sort of an efficient market model that on the left side the opportunities are typically arbitrated out precisely because they can't be assessed very well. So if you're in established markets with good, you know, functioning, you know, regulations, et cetera, it is harder to I think create economic rent, surplus economic return than if you venture more into the worlds of uncertainty, which could be technological uncertainty, going into genomics or, you know, nanotechnology. It could be, you know, political or geographic uncertainty, with companies now going into China, India, et cetera.

And it is, of course, the ability to get out of the mainstream where the largest opportunities unarbitrated still exist. But that requires--and that's the point I want to make--probably a different toolkit. So, Susan, I don't know how you teach the MBAs, but a little bit at the curriculum and how I was taught and what I still teach. We teach a lot of the still the traditional toolkit, which essentially assumes you have a well-defined problem. The issue is one of computational complexity. It's to some extent also value complexity, but mostly computational complexity, and through a good deductive analysis, we can figure out what the right answer is.

So tools like net present value analysis, forecasting techniques and much of this can become very sophisticated, as you know, it could be three stage exponential

smoothing models what have you--decision trees, which is again a way to formalize uncertainty,--Bayesian updating, expect utilities theory. Some of these techniques got Nobel Prizes. Sharp for the net present value analysis and Markowitz for portfolio optimization.

And, as I look at and I deal more with strategies--so most of our clients deal not with operational routinized problems but really more with the direction of the firm, what's going to happen to my industry, et cetera, within a global context, increasingly we think the toolkit has to be much more about helping the client learn rather than optimize or solve a problem.

So the farther you go to the right, it's less a question of problem solving. It's more a question of asking the right questions, challenging your assumptions, and learning faster than the competition. And those tools that are good at learning, the tools that are good for uncertainty and ambiguity tend to be of a different flavor. They tend to be softer. They're not analytically as rigorous, and they have a more epistemic flavor to them. They ask questions about our own knowledge base. What don't we know? So influence diagrams is an attempt to model how a complex system behaves, recognizing from dynamic systems theory that complex systems have counterintuitive manifestations, so trying to sort of appreciate how that works.

Scenario planning is really a collective surfacing of our ignorance but putting it into coherent stories. Real options analysis is more quantitative but is really an attempt to price the value of new information on a flexibility so it fits more to the right. There are hedging and derivatives, which is more in finance, are now reaching a level of sophistication where risk management I think can be used to deal with an ambiguity better than it used to in the past, et cetera.

But to create learning organizations as opposed to--and that was the premise of this book, *Profiting from Uncertainty*. It sounds like and the subtitle was indeed strategies to succeed no matter what happens, and it may seem, you know, almost too good to be true--snake oil. On the other hand, if you really know what you know and you don't what you don't know, and you know what you don't know, then you can lay your bets in such a way that you have flexibility built in for those strategies that are very scenario dependent, and you have very strong commitments to those strategies that are very robust across the scenarios and figuring out what's the balance of commitment versus flexibility in strategy is I think the essence of winning no matter what happens.

Lastly, I want to conclude with a short video clip. And then I think we'll open it up for some questions.

So as we get more into an uncertain world, the ability to have clear full vision becomes more important. And let me illustrate that, if I may, with a very simple short clip.

When I roll the clip, you will see these two--there are two basketball teams here. One white shirts--three students with a white shirt, and three students with a black shirt. As the clip starts then, each team will move the basketball just amongst itself. So the white team will move a ball and then at the same time, which is what's confusing, the black team is going to move the basketball.

Your challenge, if you want to play, your task is to count how often the white team--I hope you can see this--let me enlarge it a little bit more--how often the white team passes the ball amongst itself. That's the only task. And, by the way, women tend to do this better than men, so a special challenge here for the men. Everybody clear about the tasks? I'm going to roll it. Very short clip. Just count if you don't mind how many times the white team passes the ball. So here we go.

[Video showed.]

DR. SCHOEMAKER: How many think it's 11 or less? Any takers for that? Twelve times? Anybody for that? Thank you. Thirteen? A few people. Fourteen? That's the majority. Fifteen? Okay. More than 15; anybody more than 15? The correct answer is indeed--the wisdom of the crowd said 14.

Second question: Did anybody notice anything else going on?

AUDIENCE MEMBER: That gorilla thing.

DR. SCHOEMAKER: You saw a gorilla. Anybody else see a gorilla? No? Let's take a look again. Actually, there is a gorilla walking through this scene, so here we go. Don't count. Just watch if you don't mind.

[Video repeated.]

Now, there are very few people who see the gorilla and get the count right. Did you get the count right? Wow. That's really remarkable. Excellent. Well done. Yes. That deserves a hand of carrots. But this illustrates I think and again a very interesting principle that the price of focus is that you lose peripheral vision. So as you focus on a task, in life, you know, not just counting balls, but doing your job, et cetera, the--without realizing it we all have limited mental capacity, so our CPU time is going to be all devoted to counting and we don't see anymore what's really going on in the world, and this can happen in one's personal life. You may have a relative who becomes depressed. People become suicidal. You read these stories where a teenager gets pregnant and the parents don't notice 'til the eighth month or so. So the point is this is a real phenomenon. This is not just a trick. I think there are gorillas walking through our lives--in our backyards, and we simply don't notice them because we're too busy; right?

And that's why I think as move more to the uncertainty side of the spectrum, to hunt for the gorillas becomes much more important. And that's really about framing. It's the wide angle view. It's developing your capacity for peripheral vision. And this can be taught.

To conclude with an actual example, Bill Bradley, before he became a Senator, was, of course, a great basketball player. And he had enormous peripheral vision; that is, he could see players to the right and the left and pass to them in a way that astonished a lot of people. And he was actually tested for this, and he has peripheral vision--his eyes--the position of his eyes are such that he can see beyond one 180 degrees. So if you draw a half circle, he can actually see almost behind him.

Now, in his biography, he wrote that he practiced this ability when as a kid he would, you know, go to school, walk to school, he would walk down the street would look straight ahead and then try to spot what was in the window of the store on to the right or to the left; and then he would look, et cetera.

And just as great athletes have to develop both an ability to focus on the ball but also have a broad sense of the playing field and can learn that--how to do that, I think organizations have to also balance focal vision with peripheral vision. And I'm writing a book with George Day, a colleague at Wharton, on that topic--Peripheral Vision: How Not to Get Blindsided and See Opportunities Faster. And it's all about the organizational side of developing that. It has to do with leadership. It has to do with knowledge management. It has to do with the culture and rewards for people to bring in information from the edges.

And I think if you as a community of urban developers were to improve your own peripheral vision within the role you play within the value system, the value chain, and be more sensitive how framing restricts us from seeing good options, and be perhaps more sensitive to the fact that we often torture the information 'til it confesses, so to speak; that there's a lot of biases in how information is used, then maybe all of that will lead to a more effective ecosystem to support urban development.