Hello, and thank you for joining us today. I'm Anne Hultgren, Executive Director of the Arnold and Mabel Beckman Foundation, and I'm excited today to share an overview of an article we recently published where we examined the impact that blinding a step in our review process had on reducing institutional prestige bias.

To start with: A background on the foundation and our programs, as well as how we implemented the blinding process and then talk about the analysis methodology we used, as well as our results and conclusions.

So, just a quick background about our foundation. Pictured here are Arnold and Mabel Beckman, our founders. They were married in 1925, when Arnold Beckman was a PhD Candidate at Caltech. He later completed his PhD in chemistry and stayed on as an assistant professor at Caltech. In 1934, he invented and patented the first electronic pH meter and began selling these to chemists and manufacturers across the United States. In fact, sales were so good that in 1936 he made the decision to leave Caltech and started National Technical Laboratories, which was later renamed Beckman Instruments. Over many years, the company produced many types of instruments for chemistry and medical labs in and in 1965, Arnold Beckman retired as the CEO and President of the company, although he did stay on the company board. With the success of the company and the wealth that it had afforded them, in 1977, Arnold and Mabel made the decision to form the Arnold and Mabel Beckman Foundation in order to give back to the scientific enterprise.

In forming the foundation, Dr. Beckman left us guidance on how he wanted his funding to support science and the vision he had for the impact that his foundation could make. One of the things that he said was, quote, “I want to support young scientists. Those that do not have yet have the clout to receive major research grants.” So, at the foundation we’re always looking at our programs to make sure that we’re meeting this vision and adhering to this guidance that we’re supporting the young scientists, and especially reaching out to those who haven't yet broken through who are still working on that first major project. Second thing, he said was, quote, “There’s no satisfactory substitute for excellence.” And this really pushes us here at the foundation even every day, to make sure that we’re looking at our own internal processes and looking for areas of continuous improvement.

So, one of the core programs that we run here at the foundation, and the one that was the subject of the study I’m going to discuss is the Beckman Young Investigator program. This program started in the early 1990s and is intended to support young faculty in chemistry and life sciences. And in particular, we look at those who are working on the invention of new methods, instruments, and materials that will open up new avenues of research. And this is really following in those pioneering footsteps of Dr. Arnold Beckman himself.

To be eligible for award, you need to be in the first 4 years of a tenure track position at a U.S. institution, and the award itself is a 4-year award for a total $600,000 grant for your research project. So, if we look at our eligibility, you know we are looking at junior faculty. So, we’ve kind of checked the box with the vision of supporting young scientists. But there was a second part to that statement, which was, we also want to support those who don’t yet have the clout to get major research grants. And so, we’re looking at our own
process and saying: Are we making sure that we are adhering to that vision that Dr. Beckman laid out for us?

And one thing that we were concerned about is that sometimes we saw that we were always submitting awards to similar organizations and similar institutions, and we thought that perhaps in our own process, blinding the application step and the application review might help us more align with that vision that Dr. Beckman laid out for us. So, the application process for our Beckman Young Investigator program starts with an open call to the scientific community for letters of intent. These letters are reasonably short technical proposals where we ask the applicant to spell out the technical challenge, their proposed approach, as well as the risks and innovation that might happen along the way.

Those letters of intent are sent out for peer review and the outcome of the first peer review step is to select 100 or so letters of intent where we're going to then ask for a full application from those applicants. Those full applications are a longer technical proposal, and then also include more information, such as letters of recommendation, institutional support, and those sorts of documentation. Those full applications are then sent out again for peer review. We then select some candidates for interview stage and to narrow that down, then to the final award recommendations.

So, since the program started in the nineties, up until 2020, the entire process was unblinded, meaning we sent the technical information as well as the identity of the applicant to the reviewers for discussion. But with the 2021 application cycle, we decided that that first peer review step would become a blinded review. And so, the technical information was sent to, the technical proposal was sent to the reviewers, but not the information about the applicant themselves. And so, in the study that I'm going to describe, we looked at the 4 years with our old process before we made this change from 2017 to 2020 and compared that to 4 years after we made this process change with our blinded review.

I just want to outline a few things that we did and didn't do as context for the discussion. So, what we did do is we asked the applicants to blind their own letters of intent. We provided some instructions on our website and in the application system, and what we meant by blinding. We asked them to make sure that in that technical proposal there's no indication of who they are, what institution they're at, who their mentors were, or what institutions they receive their training from. And so, when we, when we send these blinded letters of intent out to our reviewers, we also asked them to please focus on the technical innovation and risk within those proposals. And we modified our reviewer criteria and the questionnaire that we send with other letters of intent to reflect this change, to be really focused on the technical merit of the proposal. And then we were looking to see, is there a change in who is advanced to that full application stage, and especially, how? What institutions they're affiliated with? Are we seeing a shift in how applicants are perceived in the review process between blinded and unblinded?

What we didn't do was start in 2020 with the idea that we were going to publish a study and I mentioned that because, you know, there are certain things you might have done if your intent was to put together a study and publish something. You might have established some control groups, or things like that. We didn't have this intention. And so, we didn't actually do that. We just made this change, and everything you'll see is just part of the normal operations of the foundation. We also didn't modify any of the materials that were submitted to us. What was submitted by the applicant is what went out for review. And similarly, you know, we didn't create blind or unblind versions, and look at the same proposals head to head, and we didn't use any kind of a quota system. So, we didn't artificially tell certain institutions they could, you know, only send in a few applications, or we didn't look at the outcome of the review process and change any results based on institutional affiliation. However, as we had made this change in our
process, we at the foundation, we’re noticing that there was some significant differences in how the review discussions were held.

We get a lot of proposals at the foundation, and we set up a lot of reviews. And so, hearing some of the changes, and how the reviewers were discussing the proposals was becoming fairly obvious to us. So, I have a few anecdotal summary statements here, but things that you might have heard before we blinded applications. You might have heard something like: “Well, there are a lot of mistakes in the chemical formulas. But the applicant trained with my favorite scientist and I’m sure they know better. So, I’m sure these are just typos. I’m going to give them the benefit of the doubt and support this proposal.” However, after it’s blind and we don’t know the name of this mentor, the types of comments you would hear would be: “Well, there’s a lot of mistakes in these chemical formulas. I can’t support moving this proposal forward.” Similarly, before blinding, you might have heard something like: “Well, this is a really unique idea, but I don’t know if the applicant who’s at, you know, pick an institution that does not rise to the top of the list of institutions, will have the resources or the mentoring network needed to accomplish the work. I don’t think I can support advancing this proposal.” But after blinding you would hear: “Well, this is a really unique idea. I’m very interested to read more, and I support advancing this proposal.”

So, as we were hearing the real shift in the proposal review meetings, we stopped and said, hey, could we quantify this change? Is this something that we could actually put together and share with the community to show, you know, how we found that the blinding affected our review process? So, the first step in this was to actually define institutional prestige. And what do we mean by that? Unfortunately, there isn’t a, you know, list out there where everyone agrees this is the top set of institutions. And particularly, you know, we’re looking for chemistry- and life sciences-focused institutions. So, what we ended up doing was collecting many lists together, and also looking at different time points in case the universities had shifted within, relative to each other, within these rankings. And so, the lists that we pulled are here. We also looked at our own historical funding with the thought that perhaps reviewers who are coming and helping the Beckman Foundation had some expectation of, well, Beckman Foundation funding often goes to these particular institutions, maybe this is what the Beckman Foundation is expecting. And so, we also wanted to make sure that we weren’t sort of internally biasing our own reviewers.

So, we looked at all of these lists, and then came up with what we called a consensus ranking where we looked and said, any institution that was on at least 5 of these lists, so on a majority of the lists, we then did an average ranking against where they were on each of the lists. And it turns out there were 96 institutions that appear on at least 5 of these other top 100 ranking lists. We then divided that consensus list into 4 - categories, and then also in other categories. So, we looked at the top 10 schools on that list, the 11 to 25, 26 to 50, and 51 to 96 as categories. And shown here just for reference is those institutions that ended up in our top 1 consensus rank category.

We also looked against the letters of intent that we receive against these categories and what we found was that over all 8 years of our study that we had about equal applications received from each of these categories, even though there are not the same number of institutions within the categories. So, we do receive a disproportionate number of applications per institution in that top one to 10 category especially as you consider, like the other category, has about 300 institutions within it. However, by binning the institutions in this way, we did fairly evenly divide the letters of intent that we receive each year.

And then we looked at what we call the relative advantage metric and so, for each category, and each year, we calculated the number of full application invites that we sent out within a category divided by the number of letters of intent that had been received in that category and then that was normalized by the
percent of full application invites we sent overall. And so, with this relative advantage metric, if a category has a relative advantage that’s greater than one that means that any letter of intent received in that category has a greater than average chance of being asked to submit a full application. And conversely, if your relative advantage is less than one, a letter of intent received in that category has less than average chance of being asked to move into a full application.

But you know, if our reviewers didn’t have any institutional perceived bias when they’re, you know, working on our system, we would expect that the relative advantage would be the same between blinded and unblinded reviews. However, when we looked at our data, we did not find that that was the case. In fact, we found a fairly significant difference in relative advantage by category between blinded and unblinded. So, shown here in the solid bars is the average of the 4 years, the relative advantage of the top one to 10 schools, the top 11 to 25 schools. And then, as you can see, there’s pretty much a linear decline in the relative advantage as you move from the top 10 schools down to what schools ended up in the other category. However, when we started blinding, you can see that the top 10 schools and the 11 to 25 are almost the same. And so, there’s a slight relative advantage for those schools that are in the top 25.

However, what we found, especially with the other category, is that the relative advantage in this category is approaching average which is great. It means that a letter of intent received from a school that is not in this top based top 100 list is still getting through at about the same rate as other applications. And just to overlay here the actual data points, you can see not only the average, but the spread of the data points each year, and particularly in the top and bottom categories where the averages are distinct, as well as the distribution of the data points between blinded and unblinded.

So, just to wrap up with some conclusions. We did find that the relative advantage was reduced but not eliminated. And we can really attribute that to multiple things. So, there might be a real advantage of being at a top institution to have more research supports, more mentorship in your grant writing. Perhaps you have a lower teaching load as a new faculty member, etc. However, since we did reduce that relative advantage, that means that there are more spaces that open up in our full application, since we limit those to 100 per year, so that those that are in those other categories have a chance to be seen at that next stage. And so, we feel that we are more closely adhering to the vision of Dr. Beckman, where he says, please, you know, support the young scientists, and especially those who don’t yet have that clout. So, we feel that having made this change really helps bring us closer in line with what his original wishes were.

And then there were some additional benefits that we heard from reviewers about the blinded applications. Specifically, they’re shorter because they’re not reading CVs, and they are not considering who the candidate themselves is, and so the shorter makes it easier, less workload on our reviewers and our review meetings are shorter. And I don’t mean a little bit shorter. I mean a lot shorter. We really just focus on talking about the science and we’re not talking about journal impact factors, publication rates, and you know, the mentorship plan, and choices that applicants have made in their career journey.

And so, with that, I really would like to thank you for your attention. And if you have more questions, or would like more information, the QR code to the full article is shown here. Thank you.