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MARGARET KOVAL: Hello, and welcome to We Roar. With coronavirus disrupting everything from classes to Commencement this spring, we're reaching out to Princetonians everywhere, to talk about living, studying and working through the crisis; to hear how we're staying connected from afar; and how so many of us are working to serve the wider world. In this episode, we hear from a groundbreaking senior with powerful skills for addressing the coronavirus pandemic.

NICHOLAS JOHNSON: My name is Nicholas Johnson. I'm a senior in the operations research and financial engineering department from Montreal, Canada, and I am the valedictorian of Princeton's great Class of 2020. Being the valedictorian of a class that's graduating into a world where we are facing the COVID-19 pandemic is very challenging. The pandemic has impacted us, impacted myself, impacted my classmates, very significantly, in unprecedented ways. Working from home to finish off our Princeton experience poses a unique set of challenges, particularly for students who don't have a supportive home environment or one that is not conducive to conducting Princeton's academic work. My heart especially goes out to all students who have lost loved ones to the pandemic.

And it's particularly difficult for seniors to come to terms with the fact that we're not able to spend the last few weeks of our Princeton experience — these weeks that we were looking forward to for several, for several months, for several years — spending time with our classmates and friends on campus, reminiscing about our favorite moments, and envisioning what our future might look like.

Nevertheless, I have been comforted to see that Princeton's strong community has persisted despite our physical separation, and that this social distancing has not turned into social isolation.

I think that graduating into the COVID-19 pandemic will be, will certainly be a very significant and defining moment in my life and in the lives of my classmates. But I think that ultimately, it will result in us being wiser and even greater prepared to address the challenges we will face in our own futures. Life can be viewed as a series of challenges, a series of tasks that individuals face and that individuals can rarely predict. And an individual's life and an individual's legacy is often defined by how they respond to those challenges, how they respond to these difficult times, whether or not they become subdued by these times or whether or not they have the courage and the confidence to fight through them. And believe that, believe that at the end of the road, there is better times waiting for us.

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I've had a very transformative experience as a student at Princeton. I discovered my academic field, for one — operations research — which is a field that I had not heard of previously before starting at Princeton. And for those of you who aren't familiar with the field of operations research, it is the study of how to make good decisions with limited information and with limited resources in uncertain environments. That's, that framework has a lot of very concrete applications that have been helping us react or respond to the COVID-19 pandemic.

I think of many of the interesting clinical data sets that have been made available between December 2019 and March or April 2020, with respect to patient outcomes, this is very, very useful data that can be used to predict many things that are of interest to us. For instance, it can be used to predict the number of cases that we might expect in any given month or in any given week. You could also use this data to then simulate how a community — or how the number of cases in a community — might respond to the implementation of various policies, for instance, various levels of social distancing enforced for various periods of time. And you could also use this data to estimate an individual's risk of contracting COVID-19, or an individual's mortality risk once they have contracted the disease, as a function of various other co-morbidities. So those are a handful of the specific use cases or the specific applications that an individual who studied operations research would be able to contribute to our society's response to the COVID-19 pandemic.

My senior thesis looked at a way to model a particular type of preventative health intervention designed to curb the prevalence of obesity in Canada. Now, obesity is a very unique health condition, because it is very heavily influenced by individuals in your social network. So for instance, if many of my close friends eat very healthily, then I'm more likely to eat very healthily. And that has the impact of reducing my likelihood of becoming obese. So preventative health interventions based on introducing mentor-mentee relationships into a community between individuals who express very healthy habits and individuals who are more at risk of becoming obese have been shown empirically to result in the individual who is at risk adopting healthier habits.

The application to COVID-19 is that our response to COVID-19 is in fact heavily dependent on behaviors that are also learned through a similar social learning process from other individuals in your social network. So concretely, social distancing is one of the best tools we currently have in our tool belt to reduce the spread of COVID-19. Unfortunately, there are varying levels of adherence to strict social distancing. One could imagine creating a public health intervention designed to increase adherence to strict social distancing that involves pairing individuals who perhaps are more skeptical of the practice of social distancing with individuals who adhere to it more strictly. And if that is the manner in which you frame such an intervention, then the work I did on my thesis would be extremely applicable to solving that problem.

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I am enrolling in a Ph.D. program in operations research at MIT beginning in the fall.

And I look forward to working towards developing more theory to unify optimization and machine learning. Longer term, I hope to contribute to building innovative analytics-based organizations. And I also hope to contribute to the development of technology policy designed to ensure that algorithmic advances occur equitably and work towards decreasing existing inequalities, rather than creating new ones or exacerbating existing ones.

Beyond discovering my academic field, I've made lifelong friends and developed lifelong friendships and relationships with mentors that have truly been absolutely, absolutely invaluable in shaping my time at Princeton and my future outlook. I've had the opportunity to learn an incredible amount through international travel experiences, to learn from immersion in other cultures. And I've had many of my views challenged. And I think that coming out of Princeton, I have grown a significant amount. And I'm very grateful for Princeton.

I feel a lot of pride in the fact that I am the first black valedictorian, because the history of black individuals, the history of African American individuals, in the United States is one that is filled with injustice and filled with countless challenges that we have had to face. I think, to — I think to my parents and my grandparents, and all of the many influential black and African American individuals I've had in my life who've encouraged me to be my best self, be my truest self, not feel obliged to conform to the expectations that the world has of me, and feel a certain confidence in carving my own path. And that guidance, those words, have truly pushed me over my time at Princeton. They motivated me when pursuing my academic courses, when pursuing my research experiences, and when making more significant decisions in my academic and professional future. I realize that this is an incredible opportunity to continue to inspire black and African American individuals who will come after me and who might hope to follow a similar path.

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