

Dear Award Committee Members,

We are writing with the purpose of nominating Daniel (Danny) Kaplan of Macalester College for the USCOTS 2017 - Lifetime Achievement Award. This nomination is being put forth by Vittorio Addona (Macalester College), Nicholas Horton (Amherst College), and Joan Garfield (University of Minnesota - Emeritus). In our letter, we outline why Danny's leadership has had a profound impact on the profession and why he is deserving of this honor.

Our packet includes additional supporting testimony from colleagues around the world which speak to Danny's impact on the teaching of college-level statistics. Danny's inspirations have not only shaped what we teach our students, but also how we use the tools at our disposal to help convey our lessons. He has played an integral part in the development of software and materials to help advance curricula in statistics and related disciplines.

At Macalester, Danny led the implementation of numerous curricular innovations: a major in Applied Mathematics & Statistics (AMS), a concentration in Community & Global Health (CGH), and a minor in Data Science (DS). Danny has worked tirelessly to build a community of statistics educators, locally, nationally, and globally. In the following, we touch on each of these contributions.

### **Broad impact on statistics education**

Arguably Danny's most profound and lasting mark on statistics education has been the way that he teaches students in their first college statistics course. Danny challenged the longstanding status quo which was a course focused on basic probability, the Central Limit Theorem, and one- and two-sample procedures. That traditional introductory course rarely incorporated real data, and when it did, the datasets were overly simplistic (either due to a small sample size and/or a very small number of variables) to be taken seriously as a genuine attempt to answer a research question. Danny argued that, from their first encounter with statistics, students should be exposed to authentic, complex, data; after all, this is how statistics is used in client disciplines and outside of academia. Consequently, Danny developed the hugely popular *Introduction to Statistical Modeling* (ISM) course, and his now widely used book, *Statistical Modeling: A Fresh Approach*. In ISM, Danny introduces multivariate modeling early and often, and empowers students to grapple with issues like partitioning variation, confounding, multicollinearity, and causation.

To give a sense for its impact at Macalester, approximately 60% of all students take ISM. Nowadays, it may seem like these ideas are commonplace in introductory statistics courses, but this was most certainly not the case 10, or even 5, years ago. Danny was the pioneer, and driving force, behind this monumental shift in the way first-time students begin to learn about statistics.

At the same time, Danny knew that such a shift needed to be accompanied by the development of tools for instructors, and opportunities for professional development, in order to be sustainable. Convincing educators to teach introductory statistics differently was not sufficient. These teachers needed training, and they needed software to easily, and intuitively, implement the ideas put forth as crucial for students. Danny traversed the country giving countless seminars, short courses, and workshops to help instructors understand the core philosophies of ISM. Simultaneously, he partnered with Nicholas Horton and Randall Pruim to develop the *mosaic* R package and related resources for use in teaching mathematics, statistics,

computation, and modeling. *mosaic* has become a mainstay at many institutions around the world, with an estimated 50,000+ students having used it in their introductory statistics course. *mosaic* is merely one part of Danny's efforts from Project MOSAIC, an NSF funded fostering of a community of educators working to tie together aspects of quantitative work that students in science, engineering and mathematics need in their professional lives. Project MOSAIC has offered/produced many opportunities and resources for teachers, including: wiki pages of materials, workshops, books, and online courses.

Danny has undeniably been at the center of numerous endeavors to alter statistics education for the better, and make certain that tools are available for sustained progress into the future.

### **Programmatic innovation and curricular support**

Danny is a forward thinker who sees trends before others do. While reflecting on his remarkable accomplishments, we are reminded of this quote (which Danny himself uses) by Wayne Gretzky: "I skate to where the puck is going to be, not where it has been". Indeed, Danny has demonstrated an ability to peer into the future, and help the community move in that direction. This has enabled him to be at the forefront of so many programmatic advances. We outline a few of these here.

In large part due to Danny's initiatives, Macalester College offers a concentration in Community & Global Health (CGH); an interdisciplinary minor in public health. This represents a rare opportunity for undergraduate liberal arts students to explore these interests. Danny was a visionary who saw public health as a perfect fit for the liberal arts, bringing together students and faculty from diverse disciplines, and enabling everyone to benefit from each other's expertise. As part of this work, Danny developed what we believe is the only undergraduate Epidemiology course offered at a liberal arts college. Epidemiology is the only required course for CGH (which is by far the largest interdisciplinary program at Macalester, graduating 40 seniors annually among 450-500).

With only three statisticians, and a tremendous service load, it is impossible to sustain a major solely in statistics at Macalester. Recognizing the burgeoning interest among students, however, Danny introduced a major in Applied Mathematics & Statistics (AMS). In less than a decade, AMS has become one of Macalester's largest majors, graduating 35-40 students per year. What is apparent is Danny's originality in the face of constrained resources. Combining applied mathematics and statistics allows students to: explore different areas without penalty, receive a desired credential, and customize their major experience. Danny's support of the AMS curriculum was also significant: he is responsible for the development of two innovative offerings: *Computational Linear Algebra* (a course in numerical analysis) and *Statistical Computing & Machine Learning*. AMS at Macalester College could not persist without these offerings, and would not exist at all without Danny Kaplan.

Finally, Danny has been a leader in the Data Science revolution at the undergraduate level. Macalester was one of the first liberal arts colleges to offer a minor in Data Science (DS), and it is quickly becoming one of the largest minors at the College. Danny's support of data science is evidenced in part by his creation of a *Data and Computing Fundamentals* (DCF) course. DCF allows students with limited background the opportunity to gain experience wrangling, analyzing, and interpreting "big data". As with ISM, Danny did not stop at developing a course, but partnered with Benjamin Baumer and Nicholas Horton to disseminate the work via a textbook,

*Modern Data Science with R* (CRC Press) and R package, *mdsr*, so that others can benefit from it.

### **Building a community of statistics educators**

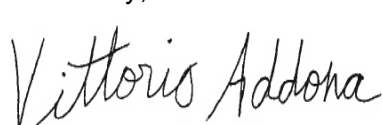
Danny has made numerous long-lasting contributions to statistics education, but he has not done so in isolation. He understands the value of establishing connections between instructors, sharing resources and expertise, and communicating experiences for others to learn from. Danny has been, for so many, the thread that binds us together.

One example of his community building efforts is *StatChat*, a monthly get-together of statistics educators from the Twin Cities and beyond, which Danny coordinated for several years. *StatChat* brought together teachers from liberal arts colleges, research universities, community colleges, and high schools to discuss statistics education research, and pedagogical strategies, but also to socialize. A friendly atmosphere was established, and this enabled individuals to network, an important component for many who were “isolated” statisticians at their own institutions. Recently, Danny has been hosting the Twin Cities R User group in order to achieve similar goals.

Another example of Danny’s outreach efforts is his recent grant, *Professional Development Emphasizing Data-Centered Resources and Pedagogies for Instructors of Undergraduate Introductory Statistics* (statPREP). This successor to Project MOSAIC was funded in conjunction with the Mathematical Association of America (MAA), the American Statistical Association (ASA), and the American Mathematical Association of Two Year Colleges (AMATYC). Recognizing that most statistics education in the U.S. is provided by mathematics faculty with little background in statistics, statPREP aims to help teachers develop data, computing, and statistical skills. statPREP will offer professional development for faculty who teach introductory statistics, it will establish regional communities to support these instructors, and it will provide a national support network comprised of statistics education experts.

We hope that we have adequately conveyed our enthusiasm for a few of Danny’s innumerable contributions to statistics education. In 2008, Danny was deservedly awarded Macalester’s annual *Excellence in Teaching* award. This academic year will be Danny’s last in the classroom, and we feel that receiving the USCOTS 2017 Lifetime Achievement Award would be a fitting end to an illustrious teaching career.

Sincerely,



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## Supporting Testimonials

I first met Danny in July 2011 at a workshop on inquiry-based statistics education at Wesleyan University. At the time, I was about to start what would be my final year of graduate school. Although I was in a math program, and my dissertation research was in theoretical computer science, I had been teaching statistics and working as a statistical analyst (for the New York Mets), and expected to teach statistics once I graduated (thus, my interest in attending the workshop). I had been using R for several years, but it was not my primary tool. Even though I worked with data extensively, most of them were in a database and had to be displayed on the web. Thus, I did far more programming in SQL and PHP than in R. Frankly, while I was growing quite fond of R's graphical capabilities, I thought it was pretty lousy for data wrangling. The base R syntax for such things was tortured!

During the workshop, Danny made several criticisms of the way that one of the presenters was teaching R syntax. Danny was concerned that the way the code was written was not reflective of the meaning of the underlying operation. He wasn't saying that the code was *\*wrong\** -- he was arguing that the syntax being used was not expressive! This was a subtlety that I had not previously considered...ever. Reading other people's code, and even my own, was a common frustration, so the notion that there might be a better way to write code was familiar. But for me, Danny was the first person who connected the *\*syntax\** for the operation to the operation itself. But far from an esoteric concern, his argument that this was really important -- especially when teaching students to code -- was something that has stuck with me ever since, and indeed, has become one of the self-evident truths that I have about teaching.

During the course of that workshop, and on countless occasions over the last five years, I have been continually astonished at the depth of Danny's thinking about programming and syntax. Each time, I remark about how he has clearly not only thought about such things deeply himself, but he has thought deeply about how these ideas would affect someone else trying to learn. It is this type, and depth, of thinking that makes Danny such a worthy recipient of this award. I was exposed to his thinking through the MOSAIC project, and our forthcoming book, *Modern Data Science in R*, but I'm sure that he has touched others in similar ways on countless other projects.

--- **Ben Baumer (Smith College)**

I have been incredibly lucky to have had the opportunity to collaborate with Danny on many projects over the past 10+ years. On any given project, Danny makes it seem that you are the expert and he is learning from you, when in fact, it is completely the opposite. He will not admit it, he is too humble, but Danny is brilliant. And not only in the "he's really smart at his research-niche" sort of way which is true for many folks in the professoriate, but more in the "If I have seen further, it is because I have been standing on the shoulders of giants" sort of way. The incredible thing is that Danny not only allows you to stand on his shoulders, but he helps you up. And he does this regardless of whether you are a student or colleague. He goes out of his way to help others succeed.

Danny has the creative, visionary type of mind that is rare. Couple that with his energy and you have an unstoppable force. In talking with a Macalester administrator about Danny's impending retirement, he mentioned that the College would likely need to hire 4–5 people to make up for the loss; he wasn't kidding. When working with him, this energy is contagious. You can't help but be energized and excited about things when you talk and work with Danny.

I cannot say enough good things about Danny, nor about what he has meant to the statistics education community, nor what he means to me personally. I know I am not alone when I say his support and collaboration has influenced my life as a scholar and as a statistics educator.

--- **Andrew Zieffler (University of Minnesota)**

With an inventive imagination untrammelled by statistical convention (because of his nonstandard background in engineering-economics systems followed by biomedical physics), Danny Kaplan is virtually unrivalled for the title of “the most creative voice in statistics education.” To pervert a cliché, the box was probably invented just to give Danny something to think outside of. My usual reaction to a Danny take on an area or method is, “And where did that come from??!” followed by, “That’s brilliant!”

Danny’s most important contribution is arguably our most ambitious innovator in making advanced topics, thinking modes and techniques in statistical data science accessible to beginning undergraduates. He spots the conceptual core, strips away the unnecessary baggage and uses the power of computer software to enable the implementation of his ideas. He then generously shares all of this with statistics educators everywhere through workshops as well as talks and writings.

For me, Danny’s deepest and most powerful idea, repurposed from discussions in computer science, has been the idea of expressive coding in statistics education – computer code not merely as a way of telling a computer what to do, but as a way of telling yourself and others what you were doing and how. This is an entirely new paradigm that Danny brought into statistics education, using computer code as a more-accessible alternative ingredient to mathematics for statistical story-telling. It goes beyond making the coding more comprehensible to making a statistical thought process itself more comprehensible. Making this work requires a language that can facilitate it, so Danny wrote a new set of R functions. The seeds of this are in his 2007 TISE paper and it was then fleshed out in the first edition of “Statistical Modeling: A Fresh Approach”. Danny’s concept and his original R functions were the forerunners of the popular mosaic package with Randy Pruim and Nick Horton and a foundation of the teaching approaches of their Project MOSAIC. Realising the full potential of this whole concept has much further to run and I’m watching developments with keen interest.

Danny Kaplan is hugely deserving of the 2017 USCOTS Lifetime Achievement Award.

--- **Chris Wild (The University of Auckland)**



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Computer Science*

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January 10, 2017

Dear Colleague;

I am honored to have the opportunity to write on behalf of Daniel Kaplan for the U.S. Conference On Teaching Statistics Lifetime Achievement Award. Danny is a rare, exceptionally gifted scholar who has made significant contributions to a number of fields and it is fortuitous that statistics has been among them. He has made unique connections between statistics and other fields such as mathematics and physics which have resulted in new and valuable insights in statistics and statistics education.

As an educator, his contributions are many. He has pioneered innovations in course content and pedagogy. One of Danny's many engaging class(room) demonstrations has students wandering about in an open area simulating Brownian motion. His textbook takes a fresh, innovative approach to the study of introductory statistics. His work was out of the mainstream yet it provided insights that have been adopted in a variety of more traditional settings. We have used this text in our honors level Statistics for Science course at St. Olaf College. Danny's work with technology, specifically R and RStudio, have dramatically changed and supported the teaching of statistics and research. His cutting edge contributions in this area cannot be overstated. I anticipate his work as an educator and author will make a lasting contribution to the teaching of college-level statistics.

Danny's sustained support of USCOTS nationally has contributed to its success. He has also supported statistics education on a more local level through a regional "Stat Chat". Together with Joan Garfield and me, he has organized and convened a gathering of statistics educators from across the region monthly for over a decade. These meetings were well attended drawing participation from across Minnesota and Wisconsin and sometimes Iowa. Educators exchanged ideas from their own personal experience and learned about new ideas from invited speakers. Danny has been committed to this effort, arranging to host all of these meetings at Macalester College. His dedication to this effort has continued to inspire me throughout the years.

To me, Danny's tireless energy and enthusiasm for the field have been inspiring. Danny is an outstanding candidate for the USCOTS Lifetime Achievement Award.

Sincerely,  
Julie Legler  
Professor, Statistics Mathematics, Statistics, and Computer Science  
St. Olaf College

I was Chair of the Department of Mathematics and Computer Science at Macalester College when Danny was hired. The fact that it is now the Department of Mathematics, Statistics, and Computer Science is almost entirely his doing. He was the driving force at Macalester behind expanding our statistics offerings, developing our major in Applied Mathematics and Statistics, developing a college-wide quantitative reasoning requirement that is built around statistical reasoning, and totally revamping our introductory courses in calculus and statistics to tie the two together around an emphasis on modeling.

Others can speak to his contributions to statistics education. That's not my area of expertise, although every statistician I meet seems to be well acquainted with his contributions. I have been most impressed with what he did with our introductory calculus and statistics. The first Calculus and first Statistics courses are now offered as an articulated year-long sequence, using R throughout as the technology platform, and viewing both as introductions to modeling, first modeling dynamical systems, then statistical modeling. It is a sequence that serves our biology and economics majors particularly well and has been very effective at both demonstrating the continuity between these two courses and attracting many students into further mathematics and statistics. It is Danny's vision that has enabled Macalester to be so far out in front in terms of offering the kind of curriculum that most students need if they are to face the challenges of the 21st century.

--- **David Bressoud (Director, Conference Board of the Mathematical Sciences)**



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January 24, 2017

Dear Members of the USCOTS Lifetime Achievement Award Selection Committee:

I am writing in enthusiastic support for Danny Kaplan's nomination for the USCOTS Lifetime Achievement Award. Danny's energy, conviction, fearlessness, and unconventional thinking make him a leading voice in statistics education. More than tiny incremental improvements, Danny is often thinking about entire paradigm shifts – from being an early advocate of R throughout the curriculum, to teaching multivariate analyses in a first course, to incorporating data science ideas. Hot on a new idea, Danny is a convincing presenter and passionate advocate, while also tirelessly producing excellent materials to help others join him on his quest – from R packages to textbooks to online materials.

The field of statistics education owes Danny a big debt for helping our discipline take those first frightening steps into a world where computing and new sources of data can be harnessed to make undergraduate statistics more exciting and impactful. The local Twin Cities statistics education community also owes Danny a big debt for leading an energizing series of Stat Chats over many years. Personally, I have benefitted from many Danny Kaplan materials in my own undergraduate teaching, and even more, I have been challenged over and over again, in good ways, to rethink my teaching after interacting with Danny.

I believe Danny Kaplan is highly worthy of the USCOTS Lifetime Achievement Award, and I hope you will give him your strongest consideration.

Sincerely,

Dr. Paul Roback  
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January 15, 2017

Dear Colleagues:

I write in strong support of Danny Kaplan's nomination for the 2017 United States Conference on Teaching Statistics Lifetime Achievement Award. I joined the Macalester faculty in 1991, served on the search committee that hired Danny, and have worked with him for twenty years. He is a terrific colleague and dear friend. He has done so much at Macalester, nationally in curriculum reform, and in our Twin Cities community organizing a monthly Stat Chat.

Danny has truly transformed the Macalester curriculum at the introductory level in all three areas represented in our joint Department of Mathematics, Statistics, and Computer Science. He has completely overhauled each introductory course—the courses we now call *Applied Multivariable Calculus I*, *Introduction to Statistical Modeling*, and *Core Concepts in Computer Science*, respectively. He has also introduced a course called *Data and Computing Fundamentals*, taken one of our other core statistics courses and re-branded and re-visioned it as *Statistical Computing and Machine Learning*, and helped shepherd our Data Science Minor into existence. I chaired the department for 6.5 years and it is unarguable to me that Danny is the single most visionary member of our outstanding department. Over my chairship, there was pressure to split up as a department; Danny's explanations of *why* we should stay together was always remarkably compelling and cogent.

Danny is a national leader in undergraduate statistics curriculum. There is his book writing, notably *Statistical Modeling: A Fresh Approach* which is changing how introductory statistics is taught in a first college course. He has also recently been awarded (as a co-PI) almost \$2 million by the NSF for StatPREP, a program that "will stimulate community transformation by increasing faculty capacity to enact curricular change by incorporating statistical analysis software and computing technology, complex data, open-ended investigations, and statistical thinking into their existing courses."

I know I am supposed to limit my comments to one page. I will do so, though it would be very easy to write page after page about his contributions. As his past chair, and longtime colleague I view Danny as a visionary in interdisciplinary undergraduate education. As a past vice president of the Mathematical Association of America, I am heartened to see him working with the MAA to share his vision with many other faculty members across the country through the StatPREP award (of which MAA is the fiscal agent).

Sincerely,

A handwritten signature in black ink that reads "Karen Saxe". The signature is fluid and cursive, with the first name "Karen" being more prominent than the last name "Saxe".

Karen Saxe

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Dear Lifetime Achievement Award Committee:

It is with great pleasure that I recommend Danny Kaplan for the USCOTS Lifetime Achievement Award. I have known and worked with Danny for, well, a very long time, and admire and respect him greatly. Danny has changed the way I think about teaching statistics. Here are two examples:

1) Through his book on modeling, and through discussions about his book on modeling, Danny taught me to engage my students (particularly science majors) in the context of real-life scientific investigations right away, and not after they've mastered minor technical nuances of particular statistical methods. For example, I am currently teaching statistics to life science students. Rather than ensuring that they understand the many nuances of the central limit theorem, I am beginning with real-life examples and making sure they understand how the CLT helps them with those particular problems, and making sure they understand how and why failure to satisfy the conditions of the CLT can affect conclusions they might reach in the field. This sense of fidelity to the scientific issues is a sense I owe directly to Danny.

2) I have long been inspired by Danny's ability to craft activities and explanations in concrete, understandable terms. For example, for a long while I had introducing randomization-based tests by asking students to use a deck of playing cards to model their simulation. While doing a workshop with Danny, I saw him cover the same lesson but instead using strips of paper on which, on the left he had written the group-label, and the right the observed value. Danny then asked the attendees to rip the strips in two, severing the connection between group membership and observed value. This hands-on simulation was much more visceral than shuffling cards and, more importantly, was a more direct metaphor with the randomization paradigm. I saw the attendees "get it" in a way I had never seen when I had done this with the cards, and forever after I have used strips of paper. This is a small example but, I think, is illustrative of the many other ways that Danny has conceptualized abstract issues to improve learning.

I understand that two examples hardly indicate a lifetime of achievement, even if they have had a long an enduring affect on my own teaching. But it is also worth mentioning that I think Danny has done much to help bring the study of causality to introductory statistics. I have had many conversations with Judea Pearl on the topic, but his approach is far too rarified for introductory students. As always, Danny has been able to bring this down to a nice visceral chunk and allowed me to better teach the importance of causal reasoning to my students.

Finally, Danny is a part of the Mosaic project and, while I don't know the day-to-day role he played in developing the *mosaic* R package, this package has been of great use in my own teaching and also in teaching high school students to "code" in R. I would go so far as to say that without mosaic it would not be possible to teach large numbers of high school students to analyze data with R. Thus Danny's influence reaches beyond college students in Minnesota to thousands of high school students in Los Angeles.

Sincerely,



Robert Gould, Ph.D.  
Vice-chair, Undergraduate Studies  
UCLA Department of Statistics  
Fellow, American Statistical Association



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February 6, 2017

Dear Selection Committee Members,

We write in enthusiastic support of Danny Kaplan's nomination for the USCOTS Lifetime Achievement Award. Danny has been extremely influential at the intersection of statistics, education, and technology, and richly deserves this award.

Danny has shown great insight in the ways in which technology and advancements in computational capabilities can affect how basic statistics can and should be taught. His involvement in the MOSAIC project has led to the creation of powerful and expressive tools built on a small, consistent foundation ("less volume, more creativity"). This makes it possible to teach fundamental statistics concepts without getting bogged down in mathematical machinery.

He has catalyzed the adoption of this material in introductory statistics courses around the world by coupling software, open education materials, and training for educators. Danny has spent considerable time and energy empowering other teachers. This has included chairing sections at the JSM, running summer workshops, developing software, creating re-usable materials, and writing books that help others improve their teaching.

Danny has had a strong positive influence on the development of the RStudio IDE, which is now used broadly within statistics education. He and his students were the very first users of RStudio and his feedback and suggestions led to many improvements. Danny's keen insight at the frontiers of education and technology have helped us make RStudio a better environment for teaching and learning, and his insights led directly to the development of R Markdown (a system for reproducible research) and Shiny (a system for interactive web-based R applications).

Danny Kaplan is an excellent researcher, an insightful technologist, and a kind and thoughtful educator. We could not recommend him more strongly.

Two handwritten signatures in blue ink. The first signature is 'Hadley Wickham' and the second is 'JJ Allaire'.

Hadley Wickham and JJ Allaire