

THE ISBA BULLETIN



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The official bulletin of the International Society for Bayesian Analysis

A MESSAGE FROM THE PRESIDENT

- Sylvia Frühwirth-Schnatter -
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Since I wrote my column for the March Issue, the world has become a different place. The Covid-19 virus turned from a transitory health problem into a permanent risk that changed our lives drastically. My heart goes out to all ISBA members who were impacted directly or indirectly by this crisis. I would like to offer my sincerest condolences to all of you who lost a loved one to this virus that has taken hundreds of thousands of lives and sickened millions of people. As researchers, we should have trust and hope that the joint effort of scientists from diverse disciplines will eventually resolve the many challenges associated with the Covid-19 crisis. In addition to the pandemic, the recent deaths of African Americans from police violence caused me personal pain and sadness. Many such events that threaten basic rights of communities and individuals have happened around the globe over many years. Such events stand in stark contrast to core values of our international society, which is committed to equity, diversity, and inclusion. To affirm this commitment, I am sending a Special Message to all ISBA members in this Issue. A big thank you to all ISBA Executives and ISBA Board Members who helped me to find the right words for this message.

One of our societies' highlights in June of even years is the announcement of the ISBA Prizes. ISBA bestows four prestigious awards to honor an outstanding book in Statistical Science (DeGroot Prize), an outstanding publication in Bayesian Analysis that was presented at an ISBA World Meeting (Lindley Prize), an outstanding paper that solved an important applied problem using

Bayesian methods (Mitchell Prize) and outstanding doctoral dissertations in Bayesian econometrics and statistics (Savage Awards). These awards are coordinated by the ISBA Prize Committee. Many thanks to Maria de Iorio for serving as Chair of the Committee and to the retiring members David Nott and Joyee Ghosh for their dedicated service. A warm welcome to the new members Helga Wagner and Yasuhiro Omori. Special thanks to the sub-committees that worked hard to select the winners among many excellent nominations for the individual awards.

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Another highlight in even years is the presentation of the newly elected ISBA Fellows. ISBA Fellows are elected by the Fellow Committee to recognize ISBA members who have made outstanding contributions in some aspect of statistical work. This year, the Committee bestowed this honor on nine new ISBA Fellows. Many thanks to the Fellow Committee for their hard and thoughtful work on behalf of the society.

It has been a much-valued tradition at ISBA to keep the names of the Winners of the ISBA Awards and the newly elected Fellows secret until their official presentation at the ISBA World Meeting. Since we had to postpone the 2020 World Meeting by a year, the ISBA Executives decided to break with this tradition. Almost on the day on which the official ceremony would have taken place, the ISBA Awards and the 2020 ISBA Fellows are announced later in this Issue. Congratulations to all Awardees and to all newly elected Fellows. I am looking forward to congratulate you in person at the official ceremony at the ISBA World Meeting in 2021.

In trying times like these, our society should be concerned in particular about the junior researchers among us. Due to the postponement or even cancellation of many Bayesian meetings, junior researchers will not be able for quite some time to present their ongoing work and to interact with fellow Bayesians from all over the world in the relaxed atmosphere that is so characteristic of Bayesian conferences. Support and recognition ISBA is providing for young researchers, such as the Pilar Iglesias Travel Award for young researchers from a developing nation and the competitive New Researchers Travel Award, are not effective.

I am grateful for a number of initiative to improve with this situation. Thanks to David Banks, the Savage Award finalists will present in a virtual Savage Award Session at the 2020 Joint Statistical Meeting. The j-ISBA (short for Junior-ISBA) Section is particularly energetic and creative in dealing with the current travel restrictions. j-ISBA together with the BayesLab at Bocconi University in Milan invented Junior Bayes Beyond the Borders (JB³), a new online seminar series. JB³ is a wonderful opportunity to showcase the work of outstanding junior Bayesians which, I am certain, will be welcomed enthusiastically by Bayesian researchers worldwide. I am delighted about j-ISBA's invitation to be part of this initiative. As always, it is a great pleasure to work with j-ISBA, many thanks to Chair-Elect Roberta De Vito and to Daniele Durante and Giacomo Zanella. For more details about JB³ see later in this Issue.

An important mission of ISBA has always been to promote education in Bayesian methods. In this spirit, the Program Council of the 2012 ISBA World Meeting in Kyoto introduced the tradition of video-taped Bayesian Foundation Lectures which are shared with the public. Since 2012, the Continuing Education Committee (CEC) – a standing subcommittee of the ISBA Program Council – coordinates activities designed to promote knowledge and foster skills in Bayesian analysis. In the past months, many of us were involved in distance teaching and video lecturing. Antonietta Mira as current Chair of the CEC approached the ISBA Executives and several ISBA members in May with the idea to create a platform to share this educational material among members. Many thanks to Antonietta for this brilliant initiative to promote continuing education, the timing is just perfect. ISBA Executive Secretary Feng Liang together with ISBA Webmaster Daniel Williamson are now gradually building a Video Library which can be accessed at our website. Take a look at <https://bayesian.org/resources/video-library/> and watch the Bayesian Foundation Lectures from the 2012, 2016 and 2018 ISBA World Meetings, the 2016 and 2018 DeFinetti Lectures, a recent Webinar from ISBA's Bio-Pharma Section, or a video by Philip Dawid on Bayesian Networks – and more is coming. Many thanks to Feng and Daniel for managing all the material and many thanks to everybody who is already contributing. Please contact Antonietta or Feng to share video lectures or any other educational material. This project is a big undertaking. Let's build this Bayesian Video Library as a joint effort – together, we are much more than the sum of the parts.

A SPECIAL MESSAGE FROM THE ISBA 2020 PRESIDENT

We, at the International Society for Bayesian Analysis, stand in solidarity with the Black community in the US and all the communities and individuals around the globe who suffer from systemic

inequity, discrimination, violence, racism, and deprivation of basic rights and fundamental freedoms. We reaffirm our commitment to uphold and promote equal opportunities, diversity, and inclusion in all the activities of our professional society. Our code of conduct (<https://bayesian.org/governance/code-of-conduct/>) emphasizes these values and stands as a reference for all our members.

There is more that we can do as researchers, educators and practitioners. Statistics plays an important role in revealing societal problems and identifying effective policy-making and social reforms. As the President of ISBA, I invite ISBA members to reach out to me or to any Board Member about specific ideas they want to pursue within the context of ISBA's mission. Specifically, I encourage our members to collect and highlight works that employ Bayesian methods in the study of the issues of systemic racism and discrimination and, in general, for the good of society.

FROM THE EDITOR

- Gregor Kastner -

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It is a great honor to step in for Maria DeYoreo to edit this Issue of the Bulletin which is packed with prizes and merits. In addition to the president's messages above, check out the ISBA Fellows 2020 announcement and the numerous ISBA Awards 2019. Also, don't miss out on several conference announcements (some of which are virtualized and some of which are postponed) and important news from *Bayesian Analysis*. In addition, learn about a new initiative from j-ISBA and Bocconi – an online seminar series entitled *Bayes Beyond the Borders*. Last but not least, we feature an Op-Ed about taking a Bayesian stance to adjust for bias in coronavirus sampling. Enjoy!

ISBA FELLOWS 2020

- Sylvia Frühwirth-Schnatter -

ISBA President 2020

In 2012, the 20th anniversary of the foundation of ISBA, inaugural ISBA Fellows were elected to honor the members of the first ISBA Board of Directors and other individuals who were instrumental in the creation of ISBA. The inaugural ISBA Fellows were Jim Berger, Sid Chib, Enrique de Alba, Jacques Dreze, Duncan Fong, John Geweke, Jayanta Ghosh, Luis Pericchi, Dale Poirer, Herman van Dijk, and Mike West. Ever since 2012, new ISBA Fellows are elected on a bi-annual basis to recognize ISBA members who have made outstanding contributions in some aspect of statistical work such as scientific achievements, teaching, and service to the scientific community and our society.

ISBA Fellows are elected by action of the ISBA Fellows Committee, a committee of eight past ISBA Fellows. The members of the 2020 ISBA Fellows Committee were Peter Müller, serving as Chair, Sudipto Banerjee, Alicia Carriquiry, Merlise Clyde, Wes Johnson, Antonietta Mira, Sonia Petrone, and Marina Vannucci. Many thanks to Peter and all committee members for their great work. The 2020 ISBA Fellows Committee elected nine new ISBA Fellows. As ISBA President 2020, I am delighted and honored to announce the ISBA Fellows 2020:

Cathy W. S. Chen

For her outstanding contributions to research in Bayesian methodology, time series analysis and applied statistics, her impact in university teaching and programmatic leadership, and for her service to ISBA as well as leadership in the broader international statistics community.



Maria de Iorio

For her tireless work to apply and extend Bayesian methodology in science, for promoting statistical methods across the area of biomedical research, and for her active role in mentoring junior colleagues and students.

Joseph Ibrahim

For outstanding contributions to Bayesian statistical theory, methods, and applications; for high-impact contributions to incorporation of Bayesian methods in mainstream statistical software; for education and training of students and researchers in Bayesian statistics; and for exceptional service to the profession.



Robert Kohn

For outstanding contributions to the development of Bayesian methods and empirical analysis, particularly in computational statistics and econometrics, and for being instrumental in the adoption of Bayesian analysis in Australia through his extensive research supervision and advocacy.

Steven MacEachern

For foundational contributions to Bayesian computation, Bayesian robustness, and Bayesian nonparametrics, in particular the original development of now widely used dependent nonparametric models, and for his dedicated service to ISBA and the Bayesian community.

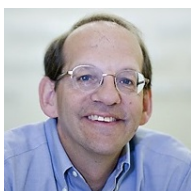


Raquel Prado

For outstanding contributions to research in Bayesian methodology, especially in time series analysis and its applications in neuroscience and other fields; her impact in university teaching and programmatic leadership; and her significant and dedicated service to ISBA.

Fernando Quintana

For key contributions to the development of Bayesian statistics and its promotion in Latin America, for extensive and influential work in nonparametric Bayesian inference, and for outstanding service to ISBA.



Hal Stern

For extraordinary contributions to Bayesian theory and methodology; for advancing Bayesian thinking and the principled use of Bayesian methods in a wide range of disciplines, and for his outstanding service to the profession through editorial and administrative positions.

Rob Weiss

For the wide-ranging impact of his work in Bayesian modeling in the health and behavioral sciences and as an extraordinary and dedicated mentor of numerous Bayesian statisticians.



Congratulations to the new ISBA Fellows!

ISBA AWARDS 2019

- Maria De Iorio -

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The 2019 ISBA Awards were supposed to be announced at the ISBA World Meeting in Kunming, China in 2020. Given the pandemic of Covid-19 the official ceremony will be held at the World Meeting in 2021. The Savage Awards will be announced after the JSM this year which will be held virtually.

Mitchell Prize

The Mitchell Prize is given in recognition of an outstanding paper that describes how a Bayesian analysis has solved an important applied problem. The winners for 2019 are: Devin Francom, Bruno Sansó, Vera Bulaevskaia, Donald Lucas and Matthew Simpson for their paper “Inferring Atmospheric Release Characteristics in a Large Computer Experiment Using Bayesian Adaptive Splines” published in the Journal of the American Statistical Association ([doi:10.1080/01621459.2018.1562933](https://doi.org/10.1080/01621459.2018.1562933)).

An honorable mention has been awarded to Chanmin Kim, Michael Daniels, Joseph Hogan, Christine Choirat, and Corwin Zigler for their paper “Bayesian Methods for Multiple Mediators: Relating Principal Stratification and Causal Mediation in the Analysis of Power Plant Emission Controls” published in the Annals of Applied Statistics ([doi:10.1214/19-AOAS1260](https://doi.org/10.1214/19-AOAS1260)).

For details on the Mitchell Prize, including names of past winners and eligibility details please visit <https://bayesian.org/project/mitchell-prize/>. For 2019 winners, the prize includes a check for \$1000 and a plaque.

DeGroot Prize

The DeGroot Prize is awarded to the author or authors of a published book in Statistical Science. The winners for 2019 are: Subhashis Ghosal and Aad van der Vaart for their book “Fundamentals of Nonparametric Bayesian Inference” published by Cambridge University Press.

For details on the DeGroot Prize, including names of past winners and eligibility details please visit <https://bayesian.org/project/degroot-prize/>. The prize includes a check for \$1500.

Lindley Prize

The Lindley Prize is awarded for innovative research in Bayesian statistics that is accepted for publication in Bayesian Analysis. The Prize is named after Dennis V. Lindley, and recognizes the impact and importance of his work in the foundations, theory and application of Bayesian Statistics. The winners for 2019 are Miguel de Carvalho, Garritt L. Page and Bradley J. Barney for their paper “On the Geometry of Bayesian Inference”.

Two honorable mentions have been awarded to Andrea Cremaschi, Raffaele Argiento, Katherine Shoemaker, Christine Peterson and Marina Vannucci for their paper “Hierarchical Normalized Com-

pletely Random Measures for Robust Graphical Modeling” as well as Abhirup Datta, Sudipto Banerjee, James S. Hodges and Leiwen Gao for their paper “Spatial disease mapping using directed acyclic graph auto-regressive (DAGAR) models”.

For details on the Lindley Prize, including names of past winners, eligibility, and submission information, please visit <https://bayesian.org/project/lindley-prize/>. The prize includes a check for \$1000 and a plaque.

Savage Award Finalists

The Savage Award, named in honor of Leonard J. “Jimmie” Savage, is bestowed each year to two outstanding doctoral dissertations in Bayesian econometrics and statistics, one each in Theory & Methods and Applied Methodology. The finalists for 2019 are:

- Theory & Methods:
 - Espen Bernton for his thesis entitled “Optimal Transport in Statistical Inference and Computation” (Supervisor: Pierre Jacob).
 - Francois-Xavier Briol for his thesis entitled “Statistical Computation with Kernels” (Supervisor: Mark Girolami).
 - Christian Andersson Naesseth for his thesis entitled “Machine learning using approximate inference. Variational and sequential Monte Carlo methods” (Supervisors: Fredrik Lindsten and Thomas Schön).
- Applied Methodology:
 - Alejandra Avalos-Pacheco for her thesis entitled “Factor regression for dimensionality reduction and data integration techniques with applications to cancer data” (Supervisors: Richard Savage and David Rossell).
 - Lindsay Berry for her thesis entitled “Bayesian Dynamic Modeling and Forecasting of Count Time Series” (Supervisor: Mike West).

For details on the Savage Award, including names of past winners and eligibility details please visit <https://bayesian.org/project/savage-award/>. The winners will receive a check for \$750. Finalists are invited to present their dissertation research in a special contributed session at the 2020 Joint Statistical Meetings at the end of which the winners will be announced.

Prize Sub-committees

ISBA would like to thank the members of all the prizes’ sub-committees for their dedication and excellent work.

Mitchell Prize

Chair: Alessandra Guglielmi Committee: Dani Gamerman, Long Nguyen, Francesco Stingo, Yanxun Xu.

DeGroot Prize

Chair: Judith Rousseau Committee: Anthony Lee, Gael Martin, Peter Mueller, Dan Roy.

Lindley Prize

Chair: Michele Guindani Committee: Adrian Dobra, Marco Ferreira, Clara Grazian, Gonzalo Garcia-Donato Layron, Lurdes Y.T. Inoue, Ramses Mena Chavez, Mario Peruggia, Fernando Quintana, Bruno Sanso, Mahlet Tadesse.

Savage Award

Chair: Antonietta Mira

Co-chair: Alan Gelfand

- Applied Methodology Committee: David Blei, Kate Cowles, David J. Nott, Christian Robert, Bruno Sanso.
- Theory & Methods Committee: David Frazier, Galin Jones, Rob Kohn, David Rios, David Stephens, Laura Ventura.

FROM THE PROGRAM COUNCIL**- Athanasios Kottas -**program-council@bayesian.org

The COVID-19 pandemic has affected plans for conferences and professional meetings, including ISBA endorsed/sponsored events (see below for a list of such upcoming events). As we work on the ISBA 2021 (Kunming, China) and ISBA 2022 (Montreal, Canada) World Meetings, we very much look forward to the Bayesian statistics community getting together again!

ISBA 2021 is scheduled to be held in Kunming, China, during the week of June 28 to July 2, 2021, with short courses on June 27, 2021. The invited sessions and plenary talks have been determined. There will be a new call for Contributed Talks/Posters and Junior Researcher Travel Award applications with submissions to open on October 1, 2020 and a deadline of November 30, 2020. The submission forms will become available on the World Meeting website at <https://bayesian.org/isba2020-home/> where the latest updates can also be found.

As for this summer, the program of the JSM 2020 virtual conference contains several ISBA sponsored sessions, including the Savage Award session. If you will participate at JSM 2020, please plan to attend the Savage Award session!

(Co-)sponsorship/endorsement requests

The ISBA Program Council considers applications for financial sponsorship (or co-sponsorship) or non-financial endorsement of meetings. Detailed information on how to submit a request for either sponsorship or endorsement from ISBA can be found on the ISBA webpage at <https://bayesian.org/events/request-sponsorshipendorsement/>.

Upcoming ISBA-sponsored/endorsed events

1. 11th BAYES-PHARMA Applied Bayesian Biostatistics Workshop (BAYES2020), September 20–22, 2020, Rockville, MD, USA (BAYES2020 may be converted into a virtual conference).
2. 11th European Seminar on Bayesian Econometrics (ESOB), Madrid, Spain (Postponed to 2021).
3. ABC in Svalbard, April 12–13, 2021, Svalbard, Norway.
4. The 5th EAC-ISBA Conference: A Satellite Meeting of the 2021 ISBA World Meeting in Celebrating James O Berger's 70th Birthday, June 25–26, 2021, Dali, Yunnan, China.
5. BAYSM 2021, June 25–26, 2021, Kunming, China.
6. NSF-CBMS Conference on “Bayesian Forecasting and Dynamic Models”, August 2–6, 2021, University of California, Santa Cruz, CA, USA.

UPDATES FROM BA

- Michele Guindani -
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BA Editor

- In consultancy with the Executive and the Prize Committees of ISBA, I am glad to announce the call for the **2020 Lindley Prize**. The Lindley Prize is named for Dennis V. Lindley, and recognizes the impact and importance of his work in the foundations, theory and application of Bayesian statistics, and his marked influence on the evolution and spread of the discipline, over many decades.

Award winning papers present research in Bayesian statistics that is judged important, timely and notably original. The Prize may be awarded for work in foundations, theory, methodology or applications of Bayesian statistics. For more details about the Prize, including its origins and past winners, see <https://bayesian.org/project/lindley-prize/>.

Due to the postponement of this year's World Meeting, eligible papers for the 2020 Lindley Prize will be considered all papers that have a *high a priori probability* to be presented at the 2021 ISBA World Meeting, are under review at Bayesian Analysis before or after the meeting, and are accepted for publication in Bayesian Analysis.

All presentations (Oral or Poster, Invited or Contributed) that are expected to be given at the 2021 ISBA World Meeting are eligible for the Prize.

New submissions to *Bayesian Analysis* that are also nominated for the Lindley Prize needs to be received by **September 30th, 2020**. Authors who have already submitted their manuscript to *Bayesian Analysis* and they would like it to be considered for the Lindley Prize can do so by directly sending an email to micheleguindani@gmail.com. All submissions should indicate that the authors plan to present the manuscript at the ISBA 2021 World Meeting. All submitted manuscript will undergo the thorough peer-review process of the journal. All accepted manuscripts competing for the Lindley Prize will be published in the December 2021 issue of the journal.

- The **June 2020 issue** of Bayesian Analysis is now available at <https://projecteuclid.org/euclid.ba/1584669759>. The issue features ten articles, one invited case-study, and one Discussion paper.

The invited case-study, by Bohai Zhang and Noel Cressie, proposes a Bayesian spatio-temporal hierarchical model to study binary Arctic sea ice data over two decades since 1997. Arctic sea ice extent has drawn increasing interest and alarm from geoscientists, owing to its rapid decline. The manuscript will be discussed in a special BA Webinar on **Wednesday, July 1st, 2020 (9pm UTC)**, moderated by Bruno Sansó (former EiC of BA). You can download the manuscript at <https://projecteuclid.org/euclid.ba/1589421852>.

The Discussion paper of the June 2020 issue is "*A Unified Framework for De-Duplication and Population Size Estimation*" by Andrea Tancredi, Rebecca Steorts, and Brunero Liseo. Data de-duplication is the process of detecting records in one or more datasets which refer to the same entity. In this paper, the authors tackle the de-duplication process via a latent entity model, where the observed data are perturbed versions of a set of key variables drawn from a finite population of N different entities, where N is unknown. The manuscript is complemented by two lively invited discussions, written by a) Mauricio Sadinle and b) Jared Scott Murray, respectively. In addition, the issue features two contributed discussions by a) Christian P. Robert and b) Nianqiao Ju, Niloy Biswas, Pierre Jacob, Gonzalo Mena, John O'Leary and Emilia Pompe. The Discussion paper will be presented in a Webinar on **Tuesday, July 7th, 2020 (3pm UTC)**. Specific details about the incoming Webinars, including how to register and join the presentation, will be distributed through the ISBA mailing lists.

- We welcome **public contributions** to the Discussion of the manuscript “*Bayesian Regression Tree Models for Causal Inference: Regularization, Confounding, and Heterogeneous Effects*” by P. Richard Hahn, Jared S. Murray, and Carlos M. Carvalho, which will be featured as a **Discussion Paper in the September 2020** issue of the journal. You can find the manuscript in the Advance publication section of the journal website. The contributions should be no more than two pages in length, using the **BA latex style**. The contributions should be submitted to the journal using the **Electronic Journal Management System (EJMS)** submission page, before **July 31st, 2020**.
- The tradition of featuring a dedicated *Bayesian Analysis* session will continue also with JSM 2020, which will be held virtually for the first time. The Bayesian Analysis session is titled *Highlights from “Bayesian Analysis”: Bayesian Methods for the Public Good*, in accordance with the overall theme of JSM, which this year is *Everyone Counts: Data for the Public Good*. Our session will be held on **Thursday, August 6th, 10:00 AM to 11:50 AM** and it will include four presentations, respectively by Jarno Vanhatalo, S. E. F. Spencer, Zehang Richard Li and Kurtis Shuler. You can find more details about the session (# 420 in the JSM program) [here](#). Book your calendars!

j-ISBA

- Daniele Durante -

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Junior Bayes Beyond the Borders (JB³)

We are delighted to announce Junior Bayes Beyond the Borders (JB³), an online seminar series jointly organized by the BayesLab at Bocconi University (<https://www.bayeslab.unibocconi.eu/>) and the junior section (j-ISBA, <https://j-isba.github.io/>) of the International Society for Bayesian Analysis. The initiative aims at transforming the restrictions of the recent worldwide health emergency into a new opportunity to offer visibility to outstanding junior Bayesians beyond the space-time-budget barriers that usually make it difficult for them to present their research in seminars across a diverse range of countries and institutions.

With this goal in mind, JB³ will provide an online dynamic environment where outstanding junior Bayesians will have the chance to present their research to the worldwide Bayesian community. The first series will run from mid June to mid July 2020, and will feature talks by the five Savage award finalists, who will have 45 minutes to present their research, followed by a 10-minute discussion by a senior scholar and 5 minutes of floor discussion. More information can be found at <http://www.bayeslab.unibocconi.eu/webinarseries/>.

Due to the importance of the above endeavor, JB³ will continue after the health emergency as an annual series. It will include various refinements aimed at increasing the involvement of the whole junior Bayesian community and facilitating a broader participation to the online seminars all over the world via various online solutions. Stay tuned for another announcements regarding the details of the annual series!

Scientific and Organizing Committee

- Roberta De Vito (j-ISBA Chair Elect)
- Daniele Durante (BayesLab)
- Giacomo Zanella (BayesLab)
- Sylvia Frühwirth-Schnatter (ISBA President)
- Igor Prünster (BayesLab and ISBA President-Elect)

NEWS FROM THE WORLD

- Francesco Denti -
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Meetings and conferences

The ongoing COVID-19 pandemic constitutes a serious challenge for organizers of aggregating events like meetings, workshops, and conferences. However, many organizers have promptly addressed this issue by implementing changes in the schedule/format of previously planned events. Below you can find some of the changes that are taking place:

Postponed conferences

Postponement of the **ISBA World Meeting**: Due to the ongoing coronavirus epidemic, the 2020 ISBA World Meeting and its satellite events have now been postponed by one year. The new date of the World Meeting is now June 28 to July 2, 2021, and the short courses will be on June 27, 2021. URL: <https://bayesian.org/isba2020-home/>.

The **2020 Orange County Biostatistics Symposium** will be conducted on Friday/Saturday, 16/17 October 2020. The location, as originally scheduled, is going to be the Allergan Auditorium and Theater, 2525 Dupont Drive, Irvine, CA. URL: <https://community.amstat.org/oclb/home/>.

Due to the virus outbreak, the **Applied Bayesian Statistics School in Bayesian Causal Inference** has been postponed to 7–11 June 2021 in the same location in Firenze. New registrations can be held starting from November 1st, 2020. URL: <http://www.mi.imati.cnr.it/conferences/abs20/index.html>

Due to the uncertainty caused by the current situation with the COVID-19 outbreak, **European Seminar on Bayesian Econometrics (ESOB)** 2020 is postponed to 2021. URL: <https://esobe.org/>.

Virtual conferences

The **Joint Statistical Meetings** is going virtual. More information about this will be available in the coming weeks. Check the conference website for updates. Information about how to access the wide variety of sessions and networking options will be communicated as soon as it is available. URL: <https://ww2.amstat.org/meetings/jsm/2020/conferenceinfo.cfm>.

The **Bayes-pharma – Applied Bayesian Biostatistics Workshop** will be held in Rockville, MD, USA. As of today, the conference is maintained on September 20–22 but might be converted into a virtual conference.

Good news! The call for abstracts has been extended until June 30th. Send your abstract (Title + Authors + Max 300 words) to info@bayes-pharma.org before July 1st, 2020. You will be notified of the acceptance of your abstract around mid of July. URL: <https://www.bayes-pharma.org/>.

And don't forget

The next **EnviBayes** workshop will be in Provo, Utah USA on October 8–10, 2020. Environmental and Ecological Statistical Research and Applications with Societal Impacts is the 2020 biennial workshop of the section on Statistics and the Environment (ENVR) of the American Statistical Association. Invited sessions will cover topics in environmental health, climate extremes, large spatial data, statistical methods in forestry and ecology, and environmental and ecological sampling and monitoring. More information can be found at <https://community.amstat.org/envr/events/envr2020workshop/>.

Two **JASP summer workshops** will take place in Amsterdam next August. There will be one workshop focused on Bayesian cognitive modeling and one dedicated to Bayesian hypothesis testing in JASP. The Bayesian cognitive modeling course will also feature Stan. For both the workshops, a call for posters is open. URL: <https://jasp-stats.org/2019/12/23/two-workshops-on-bayesian-statistics/>.

The **One World Approximate Bayesian Computation (ABC) Seminar** is a bi-weekly series of seminars that takes place on Blackboard Collaborate on Thursdays at 11.30am GMT+1. Neither registration nor attendance list or download is required. The seminar is part of the “One World” seminars and supported by the IMS. The organizers intend to perpetuate the seminar past the summer break. URL: <https://warwick.ac.uk/fac/sci/statistics/news/upcoming-seminars/abcworldseminar/>.

BAYES IN ACTION

USING BAYESIAN ANALYSIS TO ACCOUNT FOR UNCERTAINTY AND ADJUST FOR BIAS IN CORONAVIRUS SAMPLING

- Andrew Gelman, Bob Carpenter -

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In early April 2020, a team of researchers based at Stanford University conducted an opt-in survey in the surrounding county, testing for coronavirus antibodies. The result was that 50 out of 3330 people in the survey (1.5%) tested positive. Extrapolating this to the population of the county as a whole yields an estimate of 29,000 exposed, which was much larger than the number of confirmed positive cases in the county (under 1000 at the time). Coronavirus tests were hard to come by at that time, and everyone knew that the number of confirmed cases was much less than the total number of people exposed, but it was not clear how much lower.

The Stanford study was posted on the preprint server medRxiv on April 11, and its authors were writing op-eds and explaining the implications of their findings on national television. The key result from their preprint: “a range between 48,000 and 81,000 people infected in Santa Clara County by early April, 50–85-fold more than the number of confirmed cases.” Three statistical questions arose:

1. Can we trust the results, given that the survey was not a random sample?
2. How did the raw rate of 1.5% in the data become an estimate of 2.5% to 4.2% in the preprint?
3. Where did the range of uncertainty come from, and is it appropriate given sampling variability in the data?

Questions 1 and 2 go together: the increase from 1.5% to 2.5% or more comes from a statistical adjustment done by the authors to correct for the sample not matching the population (as summarized by census totals for the county) by sex, ethnicity, and zip code. Unfortunately there are a few reasons we do not feel comfortable with these adjustments: first, they don't adjust for age; second, the

adjustment for zip code is potentially very noisy (there are 58 zip codes in the county, which makes adjustment difficult, given that the sample contains only 50 positive tests); third, there is concern that, even after demographic and geographic adjustment, people who were more at risk were more likely to get tested; and, fourth, there are many “researcher degrees of freedom” in the adjustment process, leading us to be skeptical of any particular published result.

Question 3 is more challenging than it might seem at first, given that any estimate of prevalence must account for the specificity and sensitivity of the test—specificity is the probability of getting a positive test, conditional on the true underlying state being positive, and the sensitivity is the probability of getting a negative test, conditional on the true underlying state being negative. But the specificity and sensitivity are not precisely known; they are estimated based on results from testing known positive and negative blood samples. Beyond this, the specificity and sensitivity can vary according to testing conditions.

During the week after the Stanford study appeared, there was increasing concern on social media regarding its data collection and statistical analysis, and it became clear that the calculations of confidence intervals in the preprint were wrong, even setting aside concerns about the demographic and geographic adjustments. In retrospect, it was not so easy to use classical statistical methods to account for all these uncertainties and adjustments at once.

But this is exactly the sort of problem where Bayesian analysis excels: combining information and propagating uncertainty from multiple data sources. Indeed, we were quickly able to program up a model in Stan to analyze the testing data more appropriately. Actually, we programmed up a series of models, starting with a simple analysis with uncertain specificity and sensitivity, then allowing the properties of the test to vary between experiments, then adding multilevel regression and poststratification (MRP) to adjust for measured differences between sample and population.

Based on our analysis, we do not think the data support the claim that the number of infections in Santa Clara County was between 50 and 85 times the count of cases reported at the time. These numbers are consistent with the data, but the data are also consistent with a near-zero infection rate in the county. The data in the study do not provide strong evidence about the number of people infected or the infection fatality ratio; the number of positive tests in the data is just too small, given uncertainty in the specificity of the test.

Unfortunately the Stanford team was not able to share their raw data with us, so we were not able to perform the MRP adjustment. However, our code is freely available, so they can perform this analysis with their data on their own computers.

Going forward, the analyses in this article suggest that future studies should be conducted with full awareness of the challenges of measuring specificity and sensitivity, that relevant variables be collected on study participants to facilitate inference for the general population, and that (de-identified) data be made accessible to external researchers.

Our paper describing our models and analyses is on medRxiv (<https://www.medrxiv.org/content/10.1101/2020.05.22.20108944v2/>), and R and Stan code for the computations in the paper are on Github (<https://bob-carpenter.github.io/diagnostic-testing/>). In addition to explaining our models and fitting them to data, we also discuss informative hyperprior distributions for the hierarchical model (these are necessary because of the small number of experiments measuring specificity and sensitivity) and the challenge of summarizing posterior inferences near a boundary (in this case, the boundary of zero prevalence, which we know is not possible but is consistent with the data in this experiment).

We do not claim that Bayesian analysis was necessary to solve this problem. As with any statistical analysis, alternative approaches are possible that would use the same information and give similar results. But we will say that Bayesian inference for this example was transparent, direct, and relatively easy compared to the messy classical approximations used in the Stanford preprint. We hope that our paper and code can be a useful resource for future disease prevalence studies, as well as a jumping-off point for more elaborate models for more complex data including multiple tests, symptom reports, and additional patient-level information.

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