Sang Woo Park

Princeton University
Department of Ecology and Evolutionary Biology
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Education

2014–2019 BSc in Mathematics and Statistics (Honours), McMaster University, Hamilton, ON, Canada
Thesis Title: Estimating time-varying transmission rates of the SIR model
Advisor: Benjamin. M. Bolker

2019– PhD in Ecology and Evolutionary Biology, Princeton University, Princeton, NJ, USA
Thesis Title: Cross-scale dynamics of infectious diseases
Advisor: Bryan T. Grenfell

Honours and Awards

2023 COVID Response Recognition Award, Princeton University

2023 Honorific Fellowship: Charlotte Elizabeth Procter Fellowship, Princeton University

2018 Undergraduate Student Research Awards, Natural Sciences and Engineering Research Council of Canada

Teaching

2019–2021 Graduate Assistantship in Instruction. Disease Ecology, Economics, and Policy (ENV 304 / ECO 328 / EEB 304 / SPI 455), Princeton University, Fall 2019, 2020, 2021.

Advising and mentoring

2020–2021 Joanne Wha-Eum Lee. Princeton University undergraduate senior thesis project. Title: Direct and indirect mortality impacts of COVID-19 in the US, March–December 2020.

2019–2020 Tomi Lawal. Princeton University undergraduate senior thesis project. Title: Analyzing the impact of a third dose of the measles–mumps–rubella vaccine used in a university mumps outbreak.

All publications

ORCID: 0000-0003-2202-3361. See Google Scholar for links to articles.

2023 **Park, S.W.**, Daskalaki, I., Izzo, R., Aranovich, I., te Velthuis, A., Notterman, D., Metcalf, C.J.E., and Grenfell, B.T., 2022. Relative role of community transmission and campus contagion in driving the spread of SARS-CoV-2: lessons from Princeton University. *PNAS Nexus*, 2(7): pgad201.

2023 **Park, S.W.**, Sun, K., Abbott, S., Sender, R., Bar-On, Y.M., Weitz, J.S., Funk, S., Grenfell, B.T., Backer, J.A., Wallinga, J., Viboud, C., and Dushoff, J., 2022. Inferring the differences in incubation-period and generation-interval distributions of the Delta and Omicron variants of SARS-CoV-2. *PNAS*, 120(22), e2221887120.

2023 **Park, S.W.**, Dushoff, J., Grenfell, B.T., and Weitz, J.S., 2022. Intermediate levels of asymptomatic transmission can lead to the highest levels of epidemic fatalities. *PNAS Nexus*, 2(4): pgad106.

2023 Lee, W.E., **Park, S.W.**, Weinberger, D.M., Olson, D., Simonsen, L., Grenfell, B.T., and Viboud, C., 2023. Direct and indirect mortality impacts of the COVID-19 pandemic in the United States, March 1, 2020 to January 1, 2022. *eLife*, 12:e77562.

2023 Harris, J.D.[*], **Park, S.W.**[*], Dushoff, J., and Weitz, J.S., 2022. How time-scale differences in asymptomatic and symptomatic transmission shape SARS-CoV-2 outbreak dynamics. *Epidemics*, 100664. [*]Contributed equally.

2022 Baker, R.E., Saad Roy, C.M., **Park, S.W.**, Farrar, J., Metcalf, C.J.E., and Grenfell, B.T., 2022. Long-term benefits of nonpharmaceutical interventions for endemic infections are shaped by respiratory pathogen dynamics. *PNAS*, 119(49), e2208895119.

2022 Sender, R., Bar-On, Y., **Park, S.W.**, Noor, E., Dushoff, J., and Milo, R., 2022. The unmitigated profile of COVID-19 infectiousness. *eLife*, 11:e79134.

2022 Messacar, K., Baker, R.E., **Park, S.W.**, Nguyen-Tran, H., Cataldi, J.R., and Grenfell, B.T., 2022. Preparing for uncertainty: endemic paediatric viral illnesses after COVID-19 pandemic disruption. *Lancet*.

2022 **Park, S.W.**, Bolker, B.M., Funk, S., Metcalf, C.J.E., Weitz, J.S., Grenfell, B.T., and Dushoff, J., 2022. The importance of the generation interval in investigating dynamics and control of new SARS-CoV-2 variants. *Journal of The Royal Society Interface*, 19: 20220173-20220173

2022 Nguyen-Tran, H., **Park, S.W.**, Messacar, K., Dominguez, S.R., Vogt, M.R., Permar, S., Permaul, P., Hernandez, M., Douek, D.C., McDermott, A.B., Metcalf, C.J.E., Grenfell, B., and Spaulding, A.B., 2022. Enterovirus D68: a test case for the use of immunological surveillance to develop tools to mitigate the pandemic potential of emerging pathogens. *The Lancet Microbe*, 3(2): e83-e85.

2022 Lizewski, R.A.[*], Sealfon, R.S.G.[*], **Park, S.W.**[*], Smith, G.R.[*], Porter, C.K.[*], Gonzalez-Reiche, A.S.[*], Ge, Y.[*], Miller, C.M.[*], Goforth, C.W., Pincas, H., Termini, M.S., Ramos, I., Nair, V.D., Lizewski, S.E., Alshammary, H., Cer, R.Z., Chen, H.W., George, M.-C., Arnold, C.E., Glang, L.A., Long, K.A., Malagon, F., Marayag, J.J., Nunez, E., Rice, G.K., Santa Ana, E., Schilling, M.A., Smith, D.R., Sugiharto, V.A., Sun, P., van de Guchte, A., Khan, Z., Dutta, J., Vangeti, S., Voegtly, L.J., Weir, D.L., Metcalf, C.J.E., Troyanskaya, O.G., Bishop-Lilly, K.A., Grenfell, B.T., van Bakel, H., Letizia, A.G.[*], and Sealfon, S.C.[*], 2022. SARS-CoV-2 outbreak dynamics in an iso-

lated US military recruit training center with rigorous prevention measures. *Epidemiology*, 33(6): 797-807.
*Contributed equally.

2021 Baker, R.E., **Park, S.W.**, Wagner, C.E., and Metcalf, C.J.E., 2021. The limits of SARS-CoV-2 predictability. *Nature Ecology & Evolution*, 5(8): 1052-1054.

2021 Dushoff, J., and **Park, S.W.**, 2021. Speed and strength of an epidemic intervention. *Proceedings of the Royal Society B*, 288(1947): 20201556.

2021 **Park, S.W.**, Pons-Salort, M., Messacar, K., Cook, C., Meyers, L., Farrar, J., Grenfell, B.T., 2021. Epidemiological dynamics of enterovirus D68 in the United States and implications for acute flaccid myelitis. *Science Translational Medicine*, 13(584): eabd2400.

2020 **Park, S.W.**, Sun, K., Champredon, D., Li, M., Bolker, B.M., Earn, D.J.D., Weitz, J.S., Grenfell, B.T. and Dushoff, J., 2020. Forward-looking serial intervals correctly link epidemic growth to reproduction numbers. *Proceedings of the National Academy of Sciences*, 118(2): e2011548118.

2020 Weitz, J.S., **Park, S.W.**, Eksin, C. and Dushoff, J., 2020. Awareness-driven behavior changes can shift the shape of epidemics away from peaks and toward plateaus, shoulders, and oscillations. *Proceedings of the National Academy of Sciences*, 117(51): 32764-32771.

2020 Baker, R.E., **Park, S.W.**, Yang, W., Vecchi, G.A., Metcalf, C.J.E. and Grenfell, B.T., 2020. The impact of COVID-19 nonpharmaceutical interventions on the future dynamics of endemic infections. *Proceedings of the National Academy of Sciences*, 117(48): 30547-30553.

2020 Metcalf, C.J.E., Morris, D.H., and **Park, S.W.**, 2020. Mathematical models to guide pandemic response. *Science*, 369(6502): 368-369.

2020 **Park, S.W.**, Bolker, B.M., Champredon, D., Earn, D.J.D., Li, M., Weitz, J.S., Grenfell, B.T. and Dushoff, J., 2020. Reconciling early-outbreak estimates of the basic reproductive number and its uncertainty: framework and applications to the novel coronavirus (SARS-CoV-2) outbreak. *Journal of the Royal Society Interface*, 17: 20200144.

2020 **Park, S.W.**, Champredon, D., and Dushoff, J., 2020. Inferring generation-interval distributions from contact-tracing data. *Journal of the Royal Society Interface*, 17(167): 20190719.

2020 Weitz, J.S., Beckett, S.J., Coenen, A.R., Demory, D., Dominguez-Mirazo, M., Dushoff, J., Leung, C.-Y., Li, G., Măgălie, A., **Park, S.W.**, Rodriguez-Gonzalez, R., Shivam, S., and Zhao, C.Y., 2020. Modeling shield immunity to reduce COVID-19 epidemic spread. *Nature medicine*, 26(6): 849-854.

2020 **Park, S.W.**, Cornforth, D.M., Dushoff J., and Weitz J.S., 2020. The time scale of asymptomatic transmission affects estimates of epidemic potential in the COVID-19 outbreak. *Epidemics*, 31: 100392.

2020

Park, S.W., and Bolker, B.M., 2020. A note on observation processes in epidemic models. *Bulletin of Mathematical Biology*, 82(3): 1-8.

2020 **Park, S.W.**, Sun, K., Viboud, C., Grenfell, B.T., and Dushoff, J., 2020. Potential Role of Social Distancing in Mitigating Spread of Coronavirus Disease, South Korea. *Emerging Infectious Diseases*, 26(11): 2697–2700.

2019 **Park, S.W.**, Champredon, D., Weitz, J.S., and Dushoff, J., 2019. A practical generation-interval-based approach to inferring the strength of epidemics from their speed. *Epidemics*, 27: 12-18.

2018 **Park, S.W.**, Dushoff, J., Earn, D.J.D., Poinar, H., and Bolker, B.M., 2018. Human ectoparasite transmission of the plague during the Second Pandemic is only weakly supported by proposed mathematical models. *Proceedings of the National Academy of Sciences*, 115(34): E7892-E7893.

2017 **Park, S.W.**, and Bolker, B.M., 2017. Effects of contact structure on the transient evolution of HIV virulence. *PLoS Computational Biology*, 13(3): e1005453.

2017 Rekart, M.L., Ndifon, W., Brunham, R.C., Dushoff, J., **Park, S.W.**, Rawart, S., and Cameron, C.E., 2017. A double-edged sword: does highly active antiretroviral therapy contribute to syphilis incidence by impairing immunity to Treponema pallidum?. *Sexually Transmitted Infections*, 93(5): 374-378.

Software

2022 **Park, S.W.**, and Bolker, B.M., `fitode`: Tools for Ordinary Differential Equations Model Fitting. https://cran.r-project.org/web/packages/fitode/index.html.

Textbook

2017 Alama S., and **Park. S.W.**, MATH 2XX3 – Advanced Calculus II: Class notes recorded, adapted, and illustrated by Sang Woo Park. Available at McMaster University Library.

Professional service

Manuscript reviewer for Nature Ecology & Evolution, PNAS, PLOS Computational Biology, BMC Medicine, Emerging Infectious Diseases, Proceedings of the Royal Society A, Proceedings of the Royal Society B, Epidemics, Scientific Reports, Mathematical Biosciences, PLOS One, PeerJ, etc.

Modeling SARS-CoV-2 outbreak responses and control strategies for Princeton University and the US Navy.

Invited presentations

2022

Dynamical biases in epidemic inference. *Institut de Biologie de l'Ecole Normale Superieure*.

2021 Characterizing the dynamics of enterovirus D68. *Acute Flaccid Myelitis (AFM) working group meeting* and *CDC Acute Flaccid Myelitis (AFM) task force meeting*.

2020 Potential roles of social distancing in mitigating the spread of coronavirus disease 2019 (COVID-19) in South Korea. *WHO modelling call*.

2020 Quantifying the time scale of disease transmission: generation and serial intervals. *Georgia Institute of Technology*.

Poster presentations

2019 **Park. S.W.**, Dushoff, J., and Bolker, B.M., 2019. Transmission mechanisms of plague cannot be uniquely identified from historical mortality data. *Ecology and Evolution of Infectious Diseases (EEID)*.

2017 Dushoff, J., **Park. S.W.**, and Champredon, D., 2017. Generation intervals in space. *Epidemics6*.

2016 Bolker, B.M., and **Park. S.W.**, 2016. HIV virulence evolution in structured epidemic models. *Ecology and Evolution of Infectious Diseases (EEID)*.