Daniel T Kaplan

Curriculum Vitae
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Professional Summary

My career has spanned several periods: a biomedical-engineering period when I was involved in signal processing using emerging tools from nonlinear dynamics, a physiology period as a researcher and a teacher of pre-medical physiology and biology courses, a period as an applied-mathematics/computational-science educator which has segued into statistics, statistical modeling, data science, and machine learning. In each of these periods, I have developed texts and other learning materials across a variety of fields: introductory statistics, computational-statistics & data-science, introductory calculus (taught as an applied subject), computer programming, and epidemiology. Over the past 15 years, I have worked extensively with faculty from colleges nationwide to develop their professional and computational skills in teaching the core mathematics curriculum and statistics in a genuinely applied way. I have a national and international reputation for this work. This interview from the *Journal of Statistics Education* (link) captures much of the motivation and philosophy behind this work.

A constant throughout my career has been computation. I learned to program as a 14-year old and have worked professionally with a large variety of languages including (in roughly chronological order) BASIC, FORTRAN, APL, UNIX web scripting, C, Mathematica, C++, Scheme, MATLAB, and R, and the many auxiliary systems relating to typesetting, publishing, graphics, and websites. It can't be known for sure, but I am likely the first person in North America to teach introductory statistics with R (starting 1997), and I was one of the earliest course developers in Mathematica (circa 1990).

Employment

2017 - present	**Senior Faculty**	Macalester College
2006 - present	**DeWitt Wallace Professor**	Macalester College
2000 - 2006	**Associate Professor**	Macalester College
1997 - 2000	**Assistant Professor**	Macalester College
1994 - 1997	**Assistant Professor**	McGill University Faculty of Medicine
1991 - 1994	**Post-doctoral Fellow**	McGill University Faculty of Medicine
1989 - 1991	**Scientist**	Colin Medical Instruments (Japan)

Visiting Appointments

1997	**Université de Paris VI**
2001	**University of Oxford**
2008	**University of Queensland**
2010	**Royal Melbourne Institute of Technology**
2017	**University of Minnesota Institute for Math and its Applications**

Education

1986 - 1989	**Ph.D. (Biomedical Physics)**	Harvard University
1984 - 1986	**M.S. (Biomedical Physics)**	Harvard University
1981 - 1982	**M.S. (Engineering-Economic Systems)**	Stanford University
1977 - 1981	**B.A. with high honors (Physics & Philosophy)**	Swarthmore College

Awards and Honors

2017-onward	**Daniel T Kaplan Prizes in Data Science** .	.
	Three prizes endowed by faculty colleagues and alumni awarded annually to graduating Macalester seniors	
2017	**Lifetime Achievement Award in Statistical Education**	CAUSE/USCOTS
2006	**Excellence in Teaching Award**	Macalester College

Links to *USCOTS award nomination* and *Macalester teaching award*

Books

Statistics

1. Kaplan, DT (2020 release). *Compact Guide to Classical Inference*. StatPREP.org. https://dtkaplan.github.io/CompactInference/private/.
2. Kaplan, DT (in preparation for 2020 release). *Stats for Data Science*. Project MOSAIC Books. https://dtkaplan.github.io/SDS-book/.
3. Baumer, BS, DT Kaplan, and NJ Horton (2017). *Modern data science with R*. CRC Press. https://mdsr-book.github.io/.
4. Kaplan, DT (2016). *Data Computing: An Introduction to Wrangling and Visualization with R*. Project MOSAIC Books. https://www.amazon.com/Data-Computing-Introduction-Wrangling-Visualization/dp/0983965846.
5. Horton, NJ, R Pruim, and DT Kaplan (2015). *Student's Guide to R*. Project MOSAIC Books. https://cran.r-project.org/doc/contrib/Horton+Pruim+Kaplan_MOSAIC-StudentGuide.pdf.
6. Pruim, R, NJ Horton, and DT Kaplan (2015). *Start Teaching with R*. Project MOSAIC Books. https://github.com/ProjectMOSAIC/LittleBooks/blob/master/Starting/MOSAIC-StartTeaching.pdf.
7. Kaplan, DT (2011). *Statistical Modeling: A Fresh Approach*. 2nd ed. Project MOSAIC books. https://www.amazon.com/Statistical-Modeling-Approach-Project-MOSAIC-ebook/dp/B073WDBJ57/ref=dp_kinw_strp_1.
8. Kaplan, DT (2009). *Statistical Modeling: A Fresh Approach*. 1st ed. Project MOSAIC books. https://www.amazon.com/Statistical-Modeling-Approach-Project-MOSAIC-ebook/dp/B073WDBJ57/ref=dp_kinw_strp_1.
9. Kaplan, DT (1999). *Resampling Stats in MATLAB*. resample.com. http://www.resample.com/support/user-guides/resampling-stats-for-matlab-users-guide/.
10. Cutler, CD and e Kaplan Daniel T (1997). *Nonlinear dynamics and time series: Building a Bridge Between the Natural and Statistical Sciences*. Fields Institute Communications. American Mathematical Society. https://www.amazon.com/Nonlinear-Dynamics-Time-Building-Statistical/dp/0821805215.

Computational Science

1. Kaplan, DT (2003). *Introduction to Scientific Computation and Programming (in MATLAB)*. Brooks/Cole Publishing Co. https://www.amazon.com/Introduction-Scientific-Computation-Programming-Daniel/dp/0534389139.
2. Kaplan, DT, SD Levy, and KA Lambert (2016). *Introduction to Scientific Computation and Programming in Python*. Project Mosaic Books. https://www.amazon.com/Introduction-Scientific-Computation-Programming-Python/dp/098396582X.

Physics/Mathematics

1. Kaplan, DT and L Glass (1995). *Understanding nonlinear dynamics*. Springer. https://www.amazon.com/Understanding-Nonlinear-Dynamics-Textbooks-Mathematical/dp/0387944400/ref=sr_1_1?s=books&ie=UTF8&qid=1549745821&sr=1-1&keywords=understanding+nonlinear+dynamics.

Articles in Refereed Journals

This listing divides my refereed-journal papers according to field. A handful of the papers below are of such a strong interdisciplinary flavor that I have included them under two headings. According to Google Scholar, my h-index – a measure of productivity and impact – is 35 (20 since 2014), falling in the range of "successful scientist" to "outstanding scientist."

Physics

1. Lasers for missile defense (1983). *The Bulletin of the Atomic Scientists*, 5–8.
2. Kaplan, DT and L Glass (1992). Direct test for determinism in a time series. *Physical Review Letters* **68**(4), 427.
3. So, P, E Ott, SJ Schiff, DT Kaplan, T Sauer, and C Grebogi (1996). Detecting unstable periodic orbits in chaotic experimental data. *Physical Review Letters* **76**(25), 4705.
4. Witkowski, FX, KM Kavanagh, PA Penkoske, R Plonsey, ML Spano, WL Ditto, and DT Kaplan (1995). Evidence for determinism in ventricular fibrillation. *Physical Review Letters* **75**(6), 1230.

5. Kaplan, DT, JR Clay, T Manning, L Glass, MR Guevara, and A Shrier (1996). Subthreshold dynamics in periodically stimulated squid giant axons. *Physical Review Letters* **76**(21), 4074.

6. Kaplan, DT and L Glass (1993). Coarse-grained embeddings of time series: random walks, Gaussian random processes, and deterministic chaos. *Physica D: Nonlinear Phenomena* **64**(4), 431–454.

7. Christini, DJ and DT Kaplan (2000). Adaptive estimation and control method for unstable periodic dynamics in spike trains. *Physical Review E* **61**(5), 5149.

8. Schreiber, T and DT Kaplan (1996a). Nonlinear noise reduction for electrocardiograms. *Chaos: An Interdisciplinary Journal of Nonlinear Science* **6**(1), 87–92.

9. Bremer, CL and DT Kaplan (2001). Markov chain Monte Carlo estimation of nonlinear dynamics from time series. *Physica D: Nonlinear Phenomena* **160**(1-2), 116–126.

10. Kaplan, DT (1994a). Exceptional events as evidence for determinism. *Physica. D, Nonlinear phenomena* **73**(1-2), 38–48.

11. Kaplan, DT and M Talajic (1991). Dynamics of heart rate. *Chaos: An Interdisciplinary Journal of Nonlinear Science* **1**(3), 251–256.

12. Kaplan, DT (1993). Evaluating deterministic structure in maps deduced from discrete-time measurements. *International Journal of Bifurcation and Chaos* **3**(3), 617–623.

13. Pilgram, B and DT Kaplan (1998). A comparison of estimators for 1/f noise. *Physica-Section D* **114**(1), 108–122.

14. Schreiber, T and DT Kaplan (1996b). Signal separation by nonlinear projections: The fetal electrocardiogram. *Physical Review E* **53**(5), R4326.

15. Little, S, S Ellner, M Pascual, M Neubert, D Kaplan, T Sauer, H Caswell, and A Solow (1996). Detecting nonlinear dynamics in spatio-temporal systems, examples from ecological models. *Physica D: Nonlinear Phenomena* **96**(1-4), 321–333.

Physiology/Medicine

1. Kaplan, DT and M Talajic (1991). Dynamics of heart rate. *Chaos: An Interdisciplinary Journal of Nonlinear Science* **1**(3), 251–256.

2. Faure, P, D Kaplan, and H Korn (2000). Synaptic efficacy and the transmission of complex firing patterns between neurons. *Journal of neurophysiology* **84**(6), 3010–3025.

3. Kaplan, DT (1994b). The analysis of variability. *Journal of cardiovascular electrophysiology* **5**(1), 16–19.

4. Kaplan, D, M Furman, S Pincus, S Ryan, L Lipsitz, and A Goldberger (1991). Aging and the complexity of cardiovascular dynamics. *Biophysical journal* **59**(4), 945.

5. Kaplan, D and L Glass (1996). Nonlinear Dynamics in Physiology and Medicine. *Journal of Theoretical Biology* **178**, 227–228.

6. Pilgram, B and DT Kaplan (1999). Nonstationarity and 1/f noise characteristics in heart rate. *American Journal of Physiology – Regulatory, Integrative and Comparative Physiology* **276**(1), R1–R9.

7. Kaplan, DT and RJ Cohen (1990a). Is fibrillation chaos? *Circulation Research* **67**(4), 886–892.

8. Rosenbaum, DS, DT Kaplan, A Kanai, L Jackson, H Garan, RJ Cohen, and G Salama (1991). Repolarization inhomogeneities in ventricular myocardium change dynamically with abrupt cycle length shortening. *Circulation* **84**(3), 1333–1345.

9. Kaplan, DT, JM Smith, BE Saxberg, and RJ Cohen (1988). Nonlinear dynamics in cardiac conduction. *Mathematical biosciences* **90**(1-2), 19–48.

10. Burioka, N, G Cornélissen, F Halberg, DT Kaplan, H Suyama, T Sako, and E Shimizu (2003). Approximate entropy of human respiratory movement during eye-closed waking and different sleep stages. *Chest* **123**(1), 80–86.

11. Glass, L and D Kaplan (1993). Time series analysis of complex dynamics in physiology and medicine. *Medical Progress through Technology* **19**(3), 115–128.

12. Caminal, P, L Dominge, B Giraldo, M Vallverdú, S Benito, G Vázquez, and D Kaplan (2004). Variability analysis of the respiratory volume based on non-linear prediction methods. *Medical and Biological Engineering and Computing* **42**(1), 86–91.

13. Burioka, N, M Miyata, G Cornélissen, F Halberg, T Takeshima, DT Kaplan, H Suyama, M Endo, Y Maegaki, T Nomura, et al. (2005). Approximate entropy in the electroencephalogram during wake and sleep. *Clinical EEG and neuroscience* **36**(1), 21–24.

14. Kaplan, DT and RJ Cohen (1990b). Searching for Chaos in Fibrillation. *Annals of the New York Academy of Sciences* **591**(1), 367–374.

15. Jospin, M, E Jensen, P Caminal, D Kaplan, H Vereecke, and M Struys (2006). A new spectral index for assessing depth of anesthesia based on the cumulative power spectrum of the EEG: A-85. *European Journal of Anaesthesiology (EJA)* **23**, 22.

16. Barnaby, D, K Ferrick, DT Kaplan, S Shah, P Bijur, and EJ Gallagher (2002). Heart rate variability in emergency department patients with sepsis. *Academic emergency medicine* **9**(7), 661–670.

17. KAPLAN, DT and AL GOLDBERGER (1991). Chaos in cardiology. *Journal of Cardiovascular Electrophysiology* **2**(4), 342–354.

18. Kaplan, DT (1991). Geometrical techniques for analyzing ECG dynamics. *Journal of electrocardiology* **24**, 77–82.

19. Kaplan, DT (2000). Time series and the dynamics of demand pacing. *Methods of information in medicine* **39**(02), 114–117.

20. Kaplan, DT (1997). Nonlinearity and nonstationarity: the use of surrogate data in interpreting fluctuations. *Studies in Health Technology and Informatics*, 15–281.

21. Hoyer, D, D Kaplan, M Palus, B Pompe, and H Seidel (1998). New systems-analytical approaches to nonlinear coordination. *IEEE engineering in medicine and biology* **17**(6), 58–61.

Economics

1. Barnett, WA, AR Gallant, MJ Hinich, JA Jungeilges, DT Kaplan, and MJ Jensen (1997). A single-blind controlled competition among tests for nonlinearity and chaos. *Journal of econometrics* **82**(1), 157–192.

2. Barnett, W, R Gallant, M Hinch, J Jungeilges, D Kaplan, and M Jensen (1995). Robustness of nonlinearity and chaos tests to measurement error, inference method, and sample size. *Journal of Economic Behavior and Organization* **27**(2), 301–320.

Engineering

1. Schreiber, T and DT Kaplan (1996b). Signal separation by nonlinear projections: The fetal electrocardiogram. *Physical Review E* **53**(5), R4326.

2. Caminal, P, L Dominge, B Giraldo, M Vallverdú, S Benito, G Vázquez, and D Kaplan (2004). Variability analysis of the respiratory volume based on non-linear prediction methods. *Medical and Biological Engineering and Computing* **42**(1), 86–91.

3. Hoyer, D, D Kaplan, M Palus, B Pompe, and H Seidel (1998). New systems-analytical approaches to nonlinear coordination. *IEEE engineering in medicine and biology* **17**(6), 58–61.

4. Roulston, MS, DT Kaplan, J Hardenberg, and LA Smith (2003). Using medium-range weather forcasts to improve the value of wind energy production. *Renewable Energy* **28**(4), 585–602.

5. Richter, M, T Schreiber, and DT Kaplan (1998). Fetal ECG extraction with nonlinear state-space projections. *IEEE Transactions on Biomedical Engineering* **45**(1), 133–137.

Statistics

1. Kaplan, D (2018). Teaching stats for data science. *The American Statistician* **72**(1), 89–96.

2. Kaplan, D (2007). Computing and introductory statistics. *Technology Innovations in Statistics Education* **1**(1).

3. Pruim, R, DT Kaplan, and NJ Horton (2017). The mosaic Package: Helping Students to 'Think with Data' Using R. *R Journal* **9**(1).

4. Garfield, J, A Zieffler, D Kaplan, GW Cobb, BL Chance, and JP Holcomb (2011). Rethinking assessment of student learning in statistics courses. *The American Statistician* **65**(1), 1–10.

Mathematics

1. Kaplan, DT (2013). *Start R in Calculus*. Project Mosaic Books. https://www.amazon.com/Start-Calculus-Daniel-T-Kaplan/dp/0983965897.

Reviews

1. Kaplan, D (2013). Calculus and statistics. *AMSTAT News* (433), 26.

2. Kaplan, DT (2008). Google's PageRank and Beyond: The Science of Search Engine Rankings by Amy N. Langville; Carl D. Meyer. *The American Mathematical Monthly* **115**(8), 765–768.

3. Allan Rossman, A and DT Kaplan (2017). Interview With Danny Kaplan. *Journal of Statistics Education* **25**(2), 103–109.

Online Courses

DT Kaplan (2017-19) "Statistical Modeling in R" (parts 1 and 2, each approximately 4 hours), at DataCamp.com. As of Dec. 2019, approximately 7000 people have *completed* the courses.

R Packages on CRAN

2019 **mosaic**
Project MOSAIC Statistics and Mathematics Teaching Utilities Data sets and utilities from Project MOSAIC (<http://mosaic-web.org>) used to teach mathematics, statistics, computation and modeling. Funded by the NSF, Project MOSAIC is a community of educators working to tie together aspects of quantitative work that students in science, technology, engineering and mathematics will need in their professional lives, but which are usually taught in isolation, if at all.

2019 **ggformula**
Formula Interface to the Grammar of Graphics Provides a formula interface to 'ggplot2' graphics.

2018 **mosaicCore**
Common Utilities for Other MOSAIC-Family Packages Common utilities used in other MOSAIC-family packages are collected here.

2018 **mosaicData**
Project MOSAIC Data Sets Data sets from Project MOSAIC (<http://mosaic-web.org>) used to teach mathematics, statistics, computation and modeling. Funded by the NSF, Project MOSAIC is a community of educators working to tie together aspects of quantitative work that students in science, technology, engineering and mathematics will need in their professional lives, but which are usually taught in isolation, if at all.

2017 **mosaicCalc**
Function-Based Numerical and Symbolic Differentiation and Antidifferentiation Part of the Project MOSAIC (<http://mosaic-web.org/>) suite that provides utility functions for doing calculus (differentiation and integration) in R. The main differentiation and antidifferentiation operators are described using formulas and return functions rather than numerical values. Numerical values can be obtained by evaluating these functions.

2017 **mosaicModel**
An Interface to Statistical Modeling Independent of Model Architecture Provides functions for evaluating, displaying, and interpreting statistical models. The goal is to abstract the operations on models from the particular architecture of the model. For instance, calculating effect sizes rather than looking at coefficients. The package includes interfaces to both regression and classification architectures, including lm(), glm(), rlm() in 'MASS', random forests and recursive partitioning, k-nearest neighbors, linear and quadratic discriminant analysis, and models produced by the 'caret' package's train(). It's straightforward to add in other other model architectures.

Patents

1. Kaplan, DT and RJ Cohen (1988). *Method and apparatus for quantifying beat-to-beat variability in physiologic waveforms*. US Patent 4,732,157.
2. Ripley, KL and DT Kaplan (1993). *Method and apparatus for ECG signal analysis and cardiac arrhythmia detection*. US Patent 5,271,411.
3. Risk, MR, AM Cohen, and DT Kaplan (2002). *Methods and apparatus for providing an indicator of autonomic nervous system function*. US Patent 6,416,473.