

NAME : Akin, Ethan

DATE OF BIRTH : April 9, 1946

RANK: Professor

**RECORD AT
CITY COLLEGE:** **RANK** **DATE**

Assistant Professor 9/70

Associate Professor 1/75

Professor 1/82

EDUCATION: B.S., City College of New York, 1965

Ph.D., Princeton University, 1969

Participant, Cold Spring Harbor Summer course, "Basic Principles of Neurophysiology", 1973

Participant, Brown University, AMS Short Course on Optimal Control Theory, Summer 1978

EXPERIENCE: Lecturer, University of California, Berkeley, 1968-70

INVITED ADDRESSES:

Princeton University, Biology Dept., "Optimum Reproductive Effort", Spring 1977

York University, Toronto, Canada, (1) Biology Dept., "Eels are Iteroparous" and (2) Math Dept., "A Survey of Catastrophe Theory", Fall 1977

University of Sheffield, Sheffield, England, Conference on Animal Conflicts, "Game Dynamics", Summer 1980

Case-Western Reserve Conference on Dynamical Systems, "Differential Geometry and Uterine Cancer", Spring 1982

AMS Short Course on Population Biology, "Evolution: Game Theory and Economics", Summer 1983

A six lecture series, part of the Seminaire de Mathematiques Superieures, Universite de Montreal, Canada, "The Differential Geometry of Population Genetics and Evolutionary Games", Summer 1987

NY Academy of Sciences, "Evolution: Game Theory and Economics", Winter 1988

University of Maryland Conference on Dynamical Systems, "When Is a Transitive Map Chaotic?", Spring 1994

A four lecture series, University of Augsburg, "Dynamical Systems : The Topological Foundations", Summer 1994

University of Minnesota Conference in honor of the retirement of Robert Ellis, "Furstenberg Families and the Ellis Way", Spring 1995.

CBMS Conference on Single Orbit Dynamics, Bakersfield "The Generic Homeomorphism is Complicated but Not Chaotic", Summer 1995

Rutgers University, Camden "The Generic Homeomorphism etc.", Fall 1995

AMS Regional Conference, Wake Forest, "Simplicial Dynamics", Fall 1998

AMS Regional Conference, Gainesville, "Regular Properties and Almost Equicontinuity", Spring 1999.

University of Maryland Conference on Dynamical Systems, "On Generic Homeomorphisms: Examples", Spring 1999.

Long Island University Summer Conference on Topology and its Applications, "Simplicial Dynamical Systems, Summer 1999.

The City College Summer Conference on Topology and its Applications, "Complete Homogeneous LOTS", Summer 2001.

Max Planck Institute, Bonn, Germany, "Simplicial Dynamical Systems" and "Mycielski Sets and Dynamical Systems", Summer 2004.

Denison Summer Conference on Topology and its Applications, "Good Measures on Cantor Space", Summer 2005.

Workshop on Ergodic Theory and Dynamical Systems, Szklarska Poreba, Poland, "Which Bernoulli Measures are Good Measures?", Summer 2006.

AMS meeting, University of Illinois, Champaign-Urbana, Session on Topological Dynamics and Ergodic Theory, “Fractals a la Furstenberg and Gromov”, Spring 2009.

Oxtoby Centennial Conference, Bryn Mawr, “Good Measures on Cantor Space”, Fall 2010.

2011 International Conference on Measurable and Topological Dynamics and Related Topics “Furstenberg Fractals”, Huang Shan City, China, Summer 2011.

A four lecture workshop, Summer Conference on General Topology and its Applications, City College of New York, Summer 2011.

47th Spring Topology and Dynamics Conference, “Solutions of the Iterated Prisoner’s Dilemma”, Central Connecticut State University, Spring 2013.

Workshop on Dynamical Systems and Related Topics, University of Maryland, College Park, “Good Strategies for the Iterated Prisoner’s Dilemma”, Spring 2013.

110 Statistical Mechanics Conference, Honoring Philip Anderson and Freeman Dyson, Rutgers University, “Solving the Iterated Prisoner’s Dilemma”, Fall 2013.

Workshop on Tilings, “Ellis semigroups and the dynamics of closed relations”, University of Leicester, Winter 2015.

When Topological Dynamics Meets Model Theory Conference, “Complete Homogeneous Linearly Ordered Topological Spaces”, Marseilles, Summer 2015.

Dynamical Systems for Aperiodicity Conference, “Subshifts via the Space of Labels and Weakly Almost Periodic Systems”, Lyon, Winter 2016.

PUBLICATIONS (Senior Author marked with * if not Akin)

Manifold Phenomena in the Theory of Polyhedra, Trans. AMS (1969) **143**:413-473.

(with W.E. Berg*) *Inhibition of Gastrulation by the Blastocoelic Fluid from the Sea Urchin Embryo*, *Developmental Biology*, (1971) **26**:353-359.

Transverse Cellular Mappings of Polyhedra, Trans. AMS (1972) **169**:401-438.

Stiefel Whitney Homology Classes and Bordism, Trans. AMS (1975) **205**:341-359.

K-Theory Does Not Exist, *J. Pure and Applied Algebra*, (1978) **12**:177-179.

THE METRIC THEORY OF BANACH MANIFOLDS, 1978, Springer-Verlag LNM #662, (360 pp).

THE GEOMETRY OF POPULATION GENETICS, 1979, Springer-Verlag LNMB #31, (205 pp).

Domination or Equilibrium, Math. Biosciences, (1980) **59**:238-250.

Cycling in Simple Genetic Systems, J. of Math. Bio., (1982) **13**:305-324.

Exponential Families and Game Dynamics, Can. J. Math., (1982) **34**:374-405.

(with J. Hofbauer) *Recurrence of the Unfit*, Math. Bio., (1982) **61**:51-62.

HOPF BIFURCATION IN THE TWO LOCUS GENETIC MODEL, 1983, Memoirs AMS #284, (190 pp).

(with V. Losert*) *Dynamics of Games and Genes: Discrete Versus Continuous Time*, J. of Math. Bio., (1983) **17**:241-251.

(with I. Eshel*) *Coevolutionary Instability of Mixed Nash Solutions*, J. of Math. Bio., (1983) **18**:123-133.

Evolution: Game Theory and Economics, Proc. Symp. in Applied Math., V. AMS (1984) **30**:37-61.

(with M. Lacker) *Ovulation Control: The Right Number or Nothing*, J. of Math. Bio., (1984) **20**:113-132.

(with V. Losert) *Evolutionary Dynamics of Zero-Sum Games*, J. of Math. Bio., (1984) **20**:231-258.

(with H. Levene, L. Levine and R. Rockwell) *A Conservative Procedure for the Estimation of Multiple Insemination in Drosophila*, The American Naturalist, (1984) **124**:723-737.

(with M. Davis) *Bulgarian Solitaire*, MAA Monthly, (1985) **92**:237-250.

(with L. Levine*, O. Olvera, R. Rockwell, M.E. de la Roasa, M.I. Gaso, F. Gonzalez, J. Guzman) *Chromosomal and Behavioral Studies of Mexican Drosophila V. Frequencies of Multiple Insemination in Three Natural Populations*, The American Naturalist, (1987) **129**:458-462.

Cycling in Simple Genetic Systems II, The Symmetric Cases in DYNAMICAL SYSTEMS: PROC. SOPRON, HUNGARY, 1985, ed. by A.B. Kurzhanski and K. Sigmund, 1987, Springer-Verlag, LNE&MS #287: 139-154.

Competitive Growth of Firms in an Industry in ECONOMIC EVOLUTION AND STRUCTURAL ADJUSTMENT: PROC. BERKELEY, CA 1985, ed. by D. Batten, J. Casti, B. Johansson, 1987, Springer-Verlag, LNE&MS #293: 86-116.

(with M. Lacker*, W.H. Beers and L.E. Menli) *A Theory of Follicle Selection: I. Hypothesis and Examples" and "A Theory of Follicle Selection: II. Computer Simulation of Estradiol Administration in the Primate*, Biol. of Reproduction (1987) 37:570-580 and 581-588.

(with M. Lacker*) *How Do the Ovaries Count?*, Math Biosciences (1988) 90:305-332.

Use Differential Geometry with the Secret Ingredient: Gradients in MATHEMATICAL APPROACHES TO PROBLEMS IN RESOURCE MANAGEMENT AND EPIDEMIOLOGY, PROC. ITALAA, 1987, ed. by C. Castillo-Chavez, S. Levin and C. Shoemaker, 1989, Springer-Verlag, LNMB # 81: 313-318.

(with M. Lacker* & M. Feuer) *Cell to Cell Signaling through Circulatory Feedback: A Mathematical Model of the Mechanism of Follicle Selection in the Mammalian Ovary* in CELL TO CELL SIGNALING: FROM EXPERIMENTS TO THEORETICAL MODELS, ed. by A. Goldbetter, 1989, Academic Press: 359-387.

The Differential Geometry of Population Genetics and Evolutionary Games in MATHEMATICAL AND STATISTICAL DEVELOPMENTS OF EVOLUTIONARY THEORY, ed. by S. Lessard, NATO ASI SERIES, 1990, Kluwer: 1-94.

The Spiteful Computer, The Mathematical Intelligencer, (1992) 14(#2): 45-47; letters and responses (1993) 15(#2): 3-5 , (1994) 16(#2): 3.

THE GENERAL TOPOLOGY OF DYNAMICAL SYSTEMS, 1993, Grad. Studies in Mathematics v. 1, Amer. Math. Soc (259 pp.); Second printing 1996.

'Chaos Unimportant' Claims Topologist, The Mathematical Intelligencer, (1994) 16(#4): 45-47.

(with J. Szucs) *Approaches to the Hardy-Weinberg Manifold*, J. of Math. Bio., (1994) 32:633-643.

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The Logic of Error in THE ART OF PROBLEM SOLVING, ed. by A. Posamentier and W. Schulz, 1996, Corwin Press: 131-140.

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(with J. Auslander and K. Berg) *When is a Transitive Map Chaotic?* in CONFERENCE IN ERGODIC THEORY AND PROBABILITY, ed. by V. Bergelson, March and Rosenblatt, 1996, de Gruyter and Co. : 25-40.

Dynamical Systems: The Topological Foundations in SIX LECTURES ON DYNAMICAL SYSTEMS, ed. by B. Aulbach and F. Colonius, 1996, World Scientific : 1-43.

RECURRENCE IN TOPOLOGICAL DYNAMICS: FURSTENBERG FAMILIES AND ELLIS ACTIONS, 1997, Plenum Press, New York (276 pp.).

(with E. Glasner*) *Topological Ergodic Decomposition and Homogeneous Flows* in TOPOLOGICAL DYNAMICS AND APPLICATIONS: A VOLUME IN HONOR OF ROBERT ELLIS, ed. by M. Nerurkar, D. Dokken and D. Ellis, 1998, Amer. Math. Soc. Contemp. Math. # 215:43-52.

(with J. Auslander and K. Berg) *Almost Equicontinuity and the Enveloping Semigroup* in TOPOLOGICAL DYNAMICS AND APPLICATIONS: A VOLUME IN HONOR OF ROBERT ELLIS, ed. by M. Nerurkar, D. Dokken and D. Ellis, 1998, Amer. Math. Soc. Contemp. Math. # 215:75-81.

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(with M. Hurley and J. Kennedy) *Generic Homeomorphisms of Compact Manifolds*, Topology Proceedings, (1998) 23:317-337.

(with W. Miller*) *Invariant Measures for Set-Valued Dynamical Systems*, Trans. AMS, (1999) 351:1203-1225.

SIMPLICIAL DYNAMICAL SYSTEMS, 1999, Memoirs AMS # 667, Amer. Math. Soc., Providence (190 pp.)

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(with S. Kolyada) *Li-Yorke Sensitivity*, Nonlinearity, (2003) 16:1421-1433.

(with M. Hurley and J. Kennedy) DYNAMICS OF TOPOLOGICALLY GENERIC HOMEOMORPHISMS, 2003, Memoirs AMS # 783, Amer. Math. Soc., Providence (130 pp.)

(with J. Auslander*) *Almost Periodic Sets and Subactions in Topological Dynamics*, Proc. AMS, (2003) **131**:3059-3062.

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Good Measures on Cantor Space, Trans. AMS, (2005) **357**:2665-2679.

(with W. Ott) *On a theorem of Shchepin and Repovs concerning the smoothness of compacta*, Topology Appl., (2007) **154**:2496-2500.

(with R. Dougherty, R. D. Mauldin, A. Yingst) *Which Bernoulli measures are good measures?*, Colloq. Math., (2008) **110**:243-291.

(with E. Glasner and B. Weiss) *Generically there is but one self homeomorphism of the Cantor set*, Trans. AMS, (2008) **360**:3613-3630.

(with J. Auslander and E. Glasner) THE TOPOLOGICAL DYNAMICS OF ELLIS ACTIONS, 2008, Memoirs AMS # 913, Amer. Math. Soc., Providence (152 pp.)

An Everywhere Two-to-One Map, J. of Difference Equations and Applications, (2009) **15.1**:13-15.

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(with E. Glasner, W. Huang, S. Shao, X. Ye) *Sufficient conditions under which a transitive system is chaotic*, J. Ergod. Theo. & Dyn. Sys., (2010) **30**:1277-1310.

(with J. Auslander) *Generalized recurrence, compactifications and the Lyapunov topology*, Studia Mathematica, (2010) **201**:49-63.

(with J. Carlson) *Conceptions of topological transitivity*, Topology and Its Applications, (2012) **159**:2015-2030.

Dynamics of discontinuous maps via closed relations, Topology Proceedings, (2013) **41**:271-310.

In Defense of "Mindless Rote", (2014) Nonpartisan Education Review, **10**:1-13.

Furstenberg fractals, in ERGODIC THEORY AND DYNAMICAL SYSTEMS, ed. by I. Assani, 2014, De Gruyter, Berlin: 1-19.

What you gotta know to play good in the Iterated Prisoner's Dilemma, Games, (2015) **6**:175-190.

(with E. Glasner) *Is there a symmetric version of Hindman's Theorem*, J. of Combinatorial Theory, Series A, (2016) **142**: 29-43.

The iterated Prisoner's Dilemma : good strategies and their dynamics, in ERGODIC THEORY, ADVANCES IN DYNAMICS, ed. by I. Assani, 2016, De Gruyter, Berlin: 77-107.

Conjugacy in the Cantor set automorphism group, in Ergodic Theory, Dynamical Systems, and the Continuing Influence of John C. Oxtoby, 2016, Contemporary Mathematics, vol. 678, Amer. Math. Soc., Providence, RI, 2016: 1-42.

(with J. Auslander and A. Nagar) *Variations on the concept of topological transitivity*, Studia Mathematica, (2016) **235**:225-249.

(with J. Auslander and A. Nagar) *Dynamics of induced systems*, J. Ergod. Theo. & Dyn. Sys., (2017) **37**:2034-2059.

Good strategies for the Iterated Prisoner's Dilemma: Smale vs Markov, Journal of Dynamics and Games, (2017) **4**:217-253.

(with J. Rautio) *Chain transitive homeomorphisms on a space: all or none*, Pacific Journal of Mathematics, (2017) **291**:1-49.

(with S. Plaskasz and J. Zwierzchowska) *Smale strategies for the n-person iterated Prisoner's Dilemma*, Top. Meth. in Nonlin. Anal. (2019) **53**: 351-361.

(with J. Wiseman) *Varieties of mixing*, Trans. AMS (2019) **372**:4359-4390.

(with J. Wiseman) *Chain recurrence and strong chain recurrence on uniform spaces*, 2019, Contemporary Mathematics, vol. 736, Amer. Math. Soc., Providence, RI, 2016: 1-29.

Approximation Dynamics, Topology and Its Applications, (2019) **268**:01-32.

(with E. Glasner) WAP SYSTEMS AND LABELED SUBSHIFTS, 2019, Memoirs AMS # 1265, Amer. Math. Soc., Providence (117 pp.)

(with E. Glasner and B. Weiss) *On weak rigidity and weakly mixing enveloping semigroups*, 2020, Contemporary Mathematics, vol. 744, Amer. Math. Soc., Providence, RI, 2016: 181-190.

Generalized intransitive dice: mimicking an arbitrary tournament, Journal of Dynamics and Games, (2021) **8**:01-20.

(with J. Saccamano) *Generalized intransitive dice II: partition constructions*, Journal of Dynamics and Games, (2021) **8**:187-202.

(with M. Mrozek, M. Przybylski and J. Wiseman) *A complete invariant for shift equivalence for Boolean matrices and finite relations*, Topology and Its Applications, (2024) **357**:01-13.

(with N. Glynatsi*, M. Nowak and C. Hilbe) *Conditional cooperation with longer memory*, PNAS, (2024) **121**:1-8.

ARXIV POSTS:

(with J. Auslander) *Compactifications of dynamical systems*, (2010) ArXiv1004.0323v1.

Maximal R-diameter sets and solids of constant width, (2010) ArXiv1003.5824v2.

(with J. Carlson) *Conceptions of topological transitivity*, (2011) ArXiv1108.4710v1.

Dynamics of discontinuous maps via closed relations, (2012) ArXiv1209.4341v1.

Good strategies for the iterated prisoner's dilemma, (2012) ArXiv1211.0969v3.

(with E. Glasner) *WAP systems and labeled subshifts*, (2014) ArXiv1410.4753v3.

(with J. Auslander and A. Nagar) *Dynamics of induced systems*, (2014) Arxiv1412.2388v1.

(with E. Glasner) *Is there a Ramsey-Hindman theorem?*, (2015) ArXiv 1504.00218v1.

(with J. Rautio) *Chain transitive homeomorphisms on a space: all or none*, (2015) ArXiv11511.02072v1.

(with J. Auslander and A. Nagar) *Variations on the concept of topological transitivity*, (2015) ArXiv1601.05614v1.

Good strategies for the iterated prisoner's dilemma :- Smale vs Markov (2016) ArXiv1610.05262v2.

(with J. Wiseman) *Varieties of mixing*, (2017) ArXiv1710.04980v1.

(with J. Wiseman) *Chain recurrence for general spaces*, (2017) ArXiv1707.09601v1.

(with E. Glasner and B. Weiss) *On weak rigidity and weakly mixing enveloping semigroups*, (2017) ArXiv1711.03169v2.

Approximation dynamics. (2017) ArXiv1702.02596v2.

(with S. Plaskacz and J. Zwierzchowska) *Smale strategies for the N person iterated prisoner's dilemma*, (2018) ArXiv1802.03829v1.

Induced fuzzy topological spaces: a characterization, (2018) ArXiv1802.01905v1.

Rock, paper, scissors, etc - topics in the theory of regular tournaments, (2018) ArXiv1806.11241v4.

Conjugacy in the Cantor set automorphism group, (2019) ArXiv1907.12098v1.

Generalized intransitive dice: mimicing an arbitrary tournament, (2019) ArXiv1901.09477v2.

(with J. Saccamano) *Generalized intransitive dice II: partition constructions*, (2019) ArXiv1905.01750v1.

(with A. Artigue and L. Ferrari) *Asymptotic pairs for interval exchange transformations*, (2020) ArXiv2009.02592v2.

(with K. Hrbacek) *Trees and homogeneous LOTS*, (2021) ArXiv2107.13299v2.

Topological tournaments, (2023) ArXiv2304.00055v1.

Dynamical systems: discrete, continuous and hybrid, (2023) ArXiv2307.03815v1.

(with M. Mrozek, M. Przybylski and J. Wiseman) *A complete invariant for shift equivalence for Boolean matrices and finite relations*, (2024) ArXiv2405.16243v2.

(with M. Davis) *The simple yield curve models*, (2024) ArXiv2403.13531v1.

BOOK REVIEWS:

on “The Games of Life” by K. Sigmund, in *Quart. Rev. Bio.*, (1994) **69**: 573-574.

on “The Essence of Chaos” by E. Lorenz, in *Quart. Rev. Bio.*, (1995) **70**: 260-261.

on “Why Race Matters: Race Differences and What They Mean” by M. Levin, in *Quart. Rev. Bio.*, (1998) **73**: 542-543.

on “Belief and Resistance: Dynamics of Contemporary Intellectual Controversy” by B. H. Smith, in *Quart. Rev. Bio.*, (1999) **74**:61.

on “Chaos and Life: Complexity and Order in Evolution and Thought” by R. J. Bird, in *Quart. Rev. Bio.*, (2004) **79**:302-303.

on “Proof and Other Dilemmas: Mathematics and Philosophy” ed. by Bonnie Gold and Roger A. Simons, *MAA Monthly*, (2010) **117**:937-940.

on “A New Basis for Animal Ethics: Telos and Common Sense” by Bernard E. Rollin, in *Quart. Rev. Bio.*, (2017) **92**:174-175.

BOOKS EDITED:

edited 1992 translation of **MATHEMATICAL STRUCTURES IN POPULATION GENETICS** by Yu. Lyubich , *Biomathematics # 22*, Springer-Verlag, New York.