Curriculum Vitae

Surname: Boyarsky

Given Name: Abraham

Date of Birth: November 16, 1946

Higher Studies and Degrees

Degree	Year	Discipline	University
B.Eng.	1967	Engineering	McGill
M.Eng.	1968	Engineering	McGill
Ph.D.	1971	Mathematics	McGill

Prizes: Gold Medal, McGill University 1967

Professional Experience

Position Held	Dates	Department	Institution
Post Doctorate	1971-72	Mathematics	Hebrew University
Post Doctorate	1972-73	Mathematics	McGill University
Assistant Prof	1973-76	Mathematics	Concordia University
Associate Professor	1976-82	Mathematics	Concordia University
Professor	1982 -	Mathematics	Concordia University

Graduate Courses Taught

Optimal control theory
Stability theory of differential equations
Stochastic processes
Stochastic stability theory
Functional analysis
Applied functional analysis
Dynamical systems theory
Ergodic theory
Frobenius-Perron operator

Publications

Articles Published in Referred Journals

1. The Effects of Self-Noise on Error Voltage of the Delay-Lock Discriminator, IEEE Trans. Communication Technology, Vol. COM-18, No. 4, pp. 443-447, Aug. 1970 (with M. Fukada).

2. Existence of Unique Quasi-Diffusions, Jour. of Differential Equations, Vol. l2, No. 1, pp. 1-20, 1972.

3. Representation of Functions of Markov Processes as Solutions of Stochastic Integral Equations (with W. Anderson), Journal of Differential Equations, Vol. 14, pp. 263-274, 1973.

4. Limit Sets of Dynamical Systems on the Space of Probability Measures, Jour. of Differential Equations, Vol. 14, pp. 559-567, 1973.

5. Stochastic Stability Theory Using the Second Order Infinitesimal Generator, Int. J. On Control, Vol. 20, pp. 857-863, 1974.

6. A Multiple Signal Analysis of the Delay-Lock Discriminator, IEEE Trans. Aero and Elec. Systems, Vol. 11, pp. 273-278, 1975.

7. On the Optimal Growth of Cells, Mathematical Biosciences, Vol. 27, pp. 117-190, l975.

8. A Markov Chain Model for Human Granulocyte Movement, Journal of Mathematical Biology, Vol. 2, pp. 69-78, 1975.

9. Probability Density Function at the Output of the Delay-Lock Discriminator, IEEE Trans. Aero. Space and Elec. Systems, Vol. AES-12, pp. 321-327, 1976 (with S. Rauch).

10. A Lower Bound for the Transition Density Function of Stochastic Differential Equations, Can. J. Statistics, Vol. 4, 1976.

11. On the Existence of Optimal Controls for Nonlinear Systems, Jour. of Optimization Theory and Applications, Vol. 20, pp. 205-212, 1976.

12. Optimal Stochastic Control without Convexity Conditions in the Dynamical Equation, Jour. of Optimization Theory and Applications, Vol. 20, pp. 481-488, 1976.

13. Chemotaxis in Vitro: Quantitation of Human Granulocyte Movement using Stochastic Differential Equations, Biophysical Journal, Vol. 16- pp. 249-258, l976 (with P. Noble and S. Peterson).

14. Measures of Cell Motility and Adhesion, Int. J. Systems Science, Vol. 8, No. 6, pp.

705-713, l977.

15. A Time-Optimal Stochastic Control Problem, Int. J. Systems Science,Vol. 8, pp. 1193 -1199, l977 (with H. Proppe).

16. Finite-Dimensional Attainable Sets for Stochastic Control Systems, Jour. of Optimization Theory and Applications, Vol. 22, pp. 429-445, 1977.

17. Pattern Prediction for Moving Cells, Journal of Mathematical Biology, Vol. 4, pp. 35-47, 1977.

18. On the Magnetic Force in Moving Cells, Mathematical Biosciences, Vol. 33, pp. 63-71, 1977.

19. Growth Control of Cell Motion, Int. J. Systems Science, Vol. 8, No. 4, pp. 457-465, 1977

20. Markov Chain Characterization of Neutrophil Locomotion under Control and Chemotactic Conditions, Can. Jour. Phys. and Pharm., Vol. 55, No. l, pp. l-6, l977 (with P. Noble).

21. An Application of Time-Optimal Control to Cell Growth, Int. J. Systems Science, Vol. 8, pp. 447-456, 1977.

22. A new Stochastic Time-Optimal Control Problem, SIAM J. Control and Optimization, Vol. l6, pp. 1-15, 1978 (with U. Haussman and W. Anderson).

23. Attainable Sets for Linear Stochastic Control Systems, Jour. of Mathematical Analysis and Applications, Vol. 63, pp. 490-501,1978.

24. A Model for Trap Action in Biological Systems, Int. Jour. Systems Science, Vol. 9, pp. 1145-1165, l978.

25. A Decomposition Property for Prolongational Limit Sets of Homogeneous Markov Processes, Jour. of Math. Analysis and Appl., Vol. 69, No. 2, pp. 428-435, June 1979.

26. In-Vitro Characterization and Quantitation of Human Lymphocyte Locomotry Parameters, Can. Jour. Pharm. and Phys., Vol. 57, No. 1, pp. 108-112, 1979.

27. A Markov Random Field Model for Quantitation and Prediction of Biological Patterns, Int. J. Systems Science, Vol. 10, pp. 1129-1141, l979.

28. On a Class of Transformation which have unique Absolutely Continuous Invariant Measures, Trans. of the Amer. Math. Soc., Vol. 222, pp. 243-262, l979 (with M. Scarowsky).

29. The Quantitation of Blood Cell Motion by a Method of Automatic Digital Picture Processing, EEE Trans. on Pattern Analysis and Machine Intelligence, Vol. PAMI-2, No. 5,

pp. 444-451, Sept. 980 (with P. Noble, M. Levine and Y. Youssef).

30. Properties of piecewise linear expanding maps, Jour. of Nonlinear Analysis: Theory, Methods and Appl., Vol. 4, No. 1, pp. 109-121, 1980 (with M. Scarowsky and H. Proppe).

31. On n-dimensional Piecewise Linear Difference Equations, Jour. of Nonlinear Analysis, Vol. 4, No. 4, pp. 715-731, 1980 (with M. Scarowsky).

32. Randomness implies Order, Jour. Math. Analysis and Appl., Vol. 76, pp. 483-497, 1980.

33. Approximating the finite Measure Invariant Under a Non-Expanding Map, Jour. of Math. and Appl., Vol. 78, No. l, pp. 222-232, Nov. 1980.

34. Weak Continuity of Invariant Measures for a Class of Piecewise Monotonic Transformations, Proceedings of Amer. Math. Soc., Vol. 80, No. 4, pp. 574-576, Dec. 1980.

35. A Theorem on the Denseness of Orbits in Metric Spaces, Can. Math. Bull., Vol. 23, 469-471, 1980.

36. A Bound on the Number of Invariant Measures, Can. Math. Bull., Vol. 24, No. 1, pp. 123-124, 1981.

37. Irreducibility and Primitivity using Markov Maps, Linear Algebra and Its Applications, Vol. 37, pp. 103-117, 1981 (with N. Friedman).

38. Matrices and Eigenfunctions Induced by Markov Maps, Linear Algebra and Its Appl., 38, 141-147, l981 (with N. Friedman).

39. All Absolutely Continuous Invariant Measures of Piecewise Linear Markov Maps are Piecewise Constant, Advances in Appl. Math., Vol. 2, pp. 284-289. 1981 (with G. Haddad).

40. A Result Related to a Theorem by Pianigiani, Proc. Amer. Math. Soc., Vol. 82, No. 4, pp. 538-540, l981 (with G. Haddad).

41. On the Fullness of Surjective Maps of an Interval, Trans. Amer. Math. Soc., Vol. 269, No. 2, pp. 445-452, l982 (with H. Proppe).

42. Construction of Ergodic Transformations, Advances in Mathematics, Vol. 45, No. 3, pp. 213-254, 1982 (with N. Friedman).

43. Fullness of Maps, Can. Math. Bull., Vol. 25, No. 3, pp. 375-376, 1982 (with W. Byers).

44. On the Stability of Perturbed Linear, Nonstationary Systems, Jour. Math. Anal. and Appl., Vol. 88, No. 1, pp. 245-256, 1982 (with M. Vidyasagar and A. Vannelli).

45. Approximating the Absolutely Continuous Measures Invariant under General Maps of the Interval, Proc. Amer. Math. Soc., Vol. 87, No. 3, pp. 475-480, 1983.

46. Singularity of Topological Conjugacies betweeen Certain Unimodal Maps of the Interval, Israel J. Math., Vol. 44, No. 4, pp. 277-288, 1983 (with H. Proppe and W. Byers).

47. Entropy verses Speed in Ergodic Markov Maps, SIAM J. Alg. Disc. Meth., Vol. 5, No. 1, pp. 82-93, March 1984 (with N. Friedman).

48. On the Significance of Absolutely Continuous Invariant Measures, Physica IID, pp. 130-144, 1984.

49. On the Diophantine Education $x^n + y^n + z^n = 3$, Math. of Computation (with M. Scarowsky), Vol. 42, No. 165, pp. 235-237, Jan. 1984.

50. On the supports of Absolutely Continuous Ergodic Measures for Piecewise Monotonic Transformations, Nonlinear Analysis: Theory, Methods and Applications, Vol. 8, No. 5, pp. 549-551, 1984.

51. Dynamical properties of maps derived from maps with strong negative Schwarzian derivative, Int. J. Math. and Math. Sciences, Vol. 7, No. 4, pp. 803-808, 1984.

52. Continuity of invariant measures for families of maps, Advances in Applied Mathematics, Vol. 6, pp. 113-l23, 1985.

53. Absolutely continuous invariant measures that are maximal, Trans. Amer. Math. Soc., (with W. Byers), Vol. 290, No. 1, pp. 303-314, July 1985.

54. A practical two dimensional ergodic theorem, Can. Math. Bull. (with M. Scarowsky) Can. Math. Bull., Vol. 29 (3), 352-357, 1986.

55. Long periodic orbits of the triangle map (with M. Scarowsky), Proc. American Math. Society, Vol. 97, No. 2, 247-254, 1986.

56. A stochastic model for wound healing, Mathematical Modelling, Vol. 7, 371-375, 1986.

57. A functional equation for a segment of the Henon map unstable manifold, Physica 21D, 415-426, 1986.

58. Computer orbits, Computers and Mathematics with Applications, Vol. 12A, No. 10, 1057-1064, 1986.

59. Piecewise monotonic functions that commute, Applicable Analysis, (with M. Scarowsky), Applicable Analysis, Vol. 23, pp. 1-10, 1986.

60. On the computation of the class numbers of some cubic fields (with M. Scarowsky) Int.

Jour. of Math. and Math. Sciences, Vol. 9, No. 4, pp. 797-800, 1986.

61. Constant slope condition and the spectral radius of 0-1 matrices (with W. Byers), SIAM J. Disc. & Alg. Methods, Vol. 8, No.3, 364-374, 1987.

62. Higher dimensional analogues of the tent maps (with W. Byers and P. Gauthier), Jour. of Nonlinear Anal. & Applic., V. II, No. 11, 1317-1324, 1987.

63. Computerized ventilation management system for neonates, Jour. of Perinatology, Vol. VII, No. 1, 21-29, 1987.

64. Optimal pressure waveforms for pressure-limited ventilation (with J. Senez), IMAJ of Math. Appl. Med. and Biol., 4, 201-205, 1987.

65. Uniqueness of invariant densities for certain random maps of the interval, Canadian Math. Bull., Vol.30 (3), 301-308, 1987.

66. Singular perturbations of piecewise monotonic maps of the interval, Jour. of Statistical Physics, Vol. 48, Nos 3/4, 561-569, 1987.

67. A matrix method for estimating the Lyapunov exponent of one-dimensional systems, Jour. of Statistical Physics, Vol. 50, Nos. 1/2, 213-229, 1988.

68. Pressure waveforms that minimize work on the lung parenchyme, Mathematical and Computer Modelling, Vol. 10, No. 8, 563-569, 1988.

69. Ergodic properties of computer orbits for piecewise monotonic maps(with N. Friedman and M. Scarowsky), Computers and Mathematics with Appl., Vol. 15, No. 12, 997-1006, 1988.

70. Constructive approximations to densities invariant under non-expanding transformations (with P. Gora and H. Proppe), Journal of Statistical Physics, Vol. 51, Nos. 1/2, 179-194, 1988.

71. A bound on the number of period orbits of certain piecewise linear maps (with M. Scarowsky) Jour. of Math. Analysis & Appl., Vol. 132, No. 1, 247-250, 1988.

72. Spectral decomposition for combinations of Markov operators (with R. Levesque), Jour. of Math. Analysis & Appl., Vol. 132, No. 1, 251-263, 1988.

73. Why computers like Lebesque measure (with P. Gora), Computers and Mathematics, with Applications, Vol. 16, No. 4, 321-329, 1988.

74. Analysis of cell three-dimensional locomotory vectors (with P. Noble), Experimental Cell Biology, V. 56, 289-296, 1988.

75. Period orbits of maps with an infinite number of partition points (with M. Scarowsky), Int.

Jour. of Math., Jour. of Math. Analysis & Appl., Vol. 132, No. 1, 247-250, 1988.

76. A graph theoretic bound on the number of independent absolutely continuous invariant measures, (with W. Byers), Jour. of Math. Anal. Appl., Vol. 139, No. 1, 139-151, 1989.

77. Approximating the invariant densities of transformations with infinitely many pieces on the interval (with P. Gora), Proc. Amer. Math. Soc., Vol. 105, N0. 4, 922-928, 1989.

78. Compactness of invariant densities for families of expanding, piecewise monotonic transformations (with P. Gora), Canadian Journal of Mathematics, Vol. XLI, No. 5, 855-869, 1989.

79. Absolutely continuous invariant measures for piecewise expanding C^2 transformations in R_N, (with P. Gora), Israel Jour. Math., Vol. 67, No. 3, 272-286, 1989.

80. Higher dimensional transformations and asymptotic measures for cellular automata, Computer Math. Appl., Vol. 19, N0.12, 13-31, 1990.

81. Existence of absolutely continuous invariant measures for families of maps $x \to rxe^{-bx}$ with application to the Belousov-Zhabotinskii reaction (with P. Gora), Dynamics and Stability of Systems, Vol. 5, No. 2, 65-81, 1990.

82. Compactness of eigenvectors for families of non-negative matrices (with P. Gora), Jour. of Math. Anal. Appl., Jour. Math. Anal. Appl. Vol. 150, No.2 , 425-438, 1990.

83. Inadequacy of the bounded variation technique in the ergodic theory of higher dimensional transformations (with H. Proppe and P.Gora), Nonlinearity 3, 1081-1087, 1990.

84. Discontinuity of physical measures, Physics Letters A, Vol. 149, No. 1, 12-16, Sept. 1990.

85. The pseudo-orbit shadowing property for Markov operators in the space of probability density functions (with P. Gora), Canadian Journal of Mathematics, Vol. XLII, No. 6, 1000-1017, 1990.

86. On the number of absolutely continuous measures invariant under higher dimensional transformations, (with P. Gora and H. Proppe) Jour. Statistical Physics, Vol. 62, Nos. 3/4, Feb. 1991.

86. Fractal approximation by absolutely continuous invariant measures, Phys. Lett. A, Vol. 149, No. 9, 452-456, 1990.

87. Maximal absolutely continuous invariant measures for piecewise linear Markov transformations (with W. Byers and P. Gora), Ergodic Theory and Dynamical Systems Theory, Vol. 10, 645-656, 1990.

88. Computing the topological entropy of general one-dimensional maps, Trans. Amer. Math.

Soc., Vol. 323, No. 1, 39-49, 1991.

89. The Frobenius-Perron operator on spaces of curves, (with P.Gora), Trans. Amer. Math. Soc., Vol. 324, No. 2, 731-746, 1991.

90. Approximating measures invariant under higher dimensional chaotic transformations (with S.Y. Lou), J. Approx. Theory, Vol. 65, No. 2, 231-244, 1991.

91. Measures on periodic orbits for continuous transformations on the interval, (with P. Gora and W. Byers), Stochastic Analysis and Applications, Vol. 9, No. 3, 263-270, 1991.

92. A mathematical model for growth advantage conferred by abnormally high levels of mitogen receptors in neoplastic cells (with M. Pollak and P. Gora), Cancer Investigations, 9(5), 513-520, 1991.

93. On functions of bounded variation in higher dimensions, (with P. Gora), Amer. Math. Monthly, Vol. 99, No. 2, 159-160, 1992.

94. A dynamical systems model for interference effects and the two-slit experiment of quantum physics, (with P. Gora), Phys. Lett. A, 168, 103-112, 1992.

95. A matrix method for approximating fractal measures (with Y.S. Lou), International Journal of Bifurcations and Chaos, Vol. 2, No. 1, 167-175, 1992.

96. Modelling and simulating higher dimensional chaotic data (with P. Gora), Computers Math. Appl.   Vol. 24, No. 11, 101-105, 1992.

97. Probing space with the two-slit experiment, Phys. Lett. A., 171-173, 1992.

98. Existence of absolutely continuous invariant measures for higher dimensional random maps, (with Y.S. Lou), Dynamics and Stability of Systems, Vol. 7, No. 4, 233-244, 1992.

99. Chaotic behavior of higher dimensional transformations defined on countable partitions (with Y.S. Lou), Bifurcations and Chaos, Vol. 3, N0.4, 1045-1049, 1993.

100. A matrix solution to the inverse Frobenius-Perron problem, (with P. Gora), Proc. Amer. Math. Soc., Vol. 118, No. 2, 409-414, June 1993.

101. A compactness theorem for approximating the invariant densities of higher dimensional transformations (with Y.S. Lou), Jour. Math. Anal. Appl., Vol. 173, No. 1, 173-190, Feb. 1993.

102. Constructive approximations to the invariant densities of higher dimensional chaotic transformations, (with P. Gora and Y.S. Lou), Constructive Approximation, Vol. 19, 1-13, 1994.

103.   Invariant measures generated by sequences of approximating transformations, (with M. Jablonski and P. Gora), Computers & Mathematics with Appl., Vol. 30, 1995, 75-91.

104.   Iterated function systems and dynamical system, (with P. Gora), Chaos 5, p. 634, 1995.

105.   General existence theorem for transformations on bounded and unbounded intervals, (with M. Jablonski, P. Gora), Nonlinear World, 3, 183-200, 1996.

106.   An algorithm to control chaotic behavior, (with P. Gora), Computers & Mathematics with Applications, 31, 13-22. 1996.

107.   A model for the structure of spacetime and quantum physics (with P. Gora), Chaos, Solitons,and Fractals, Vol. 7, No. 5, 611-630, 1996.

108.   Nelson's drift coefficient and the structure of quantum spacetime, (with P. Gora), Chaos, Solitons and Fractals, Vol. 7, No. 6, 939-954, 1996.

109.   Lyapunov exponents for higher dimensional random maps, (with P. Gora and Y.S. Lou), Jour. Applied Mathematics and Stochastic Analysis, 10:3, 209-218, 1997.

110.   Dynamics on spaces of compact subsets with application to brain modeling, (with P. Gora and V. Lioubimov), Jour. Math. Anal. Appl., 216, 569-580, 1997.

111.   A lattice spacetime for the slit experiments of quantum mechanics, Physics Letters A, 236, 263-269, 1997.

112.   A new approach to controlling chaotic dynamical systems, (with P. Gora), Physica D, 111. 1-15, 1998.

113.   Toward a Theory of Mind, Discrete Dynamical Systems in Nature and Society, Vol. 3, 88. 1-8, 1999.

114.   On the existence of ergodic continuous invariant measures for folding transformations, (with P. Gora, and V. Lioubimov), Ergodic Theory and Dynamical Systems, 20, 47-53, 2000.

115.   A comparative dynamical analysis of Hebrew texts, (with P. Gora), Discrete Dynamics in Nature and Society, Vol. 4, No. 4, pp. 293-295, 2000.

116.   Snap-back repellors and scrambled sets in general topological spaces, (with P. Gora and V. Lioubimov), Nonlinear Analysis, 43, 591-604, 2001.

117.   Optimal control of chaotic systems, (with P. Gora), International Journal of Bifurcation and Chaos, Vol. 11, No. 7, 2007-2018, 2001.

118.   Invariant measures for Chebycheff maps, (with P. Gora), Vol. 14, No. 3, 257-264, Journal

of Applied Mathematics and Stochastic Analysis, 2001.

119.   Energy and information for chaotic systems, (with P. Gora), Chaos, Solitons and Fractals, 12, 1611-1618, 2001.

120.   Deriving chaotic dynamical systems from energy functionals, (with P. Bracken and P. Gora) Stochastics and Dynamics, Vol. 1, No. 3, 377-388, 2001.

121.   Chaotic maps derived from data (with P. Gora), CHAOS, 12, No. 1, 42-48, 2002.

122.   A dynamic system interpretation of irreducible complexity (with P. Gora), Discrete Dynamics in Nature and Society, Vol. 7 (7), 23-26, 2002.

123.   A minimal principle for chaotic systems, (with P. Bracken and P. Gora), Physica D, 166/1-2, 63-75, 2002.

124.   On the significance of the Tent Map, (with P. Gora), International Journal of Bifurcation and Chaos, Vol. 13, No. 5, 1299-1301, 2003.

125.   Absolutely continuous invariant measures for position dependent random maps, (with P. Gora), Jour. Math. Analysis and Appl. Vol. 278, 225-242, 2003.

126.   A model for calculating the quantum potential for time-varying multi-slit systems (with P. Bracken), Chaos, Solitons and Fractals, vol 18/1 pp. 45–53, 2003.

127.   Stochastic perturbation of position dependent random maps, (with W. Bahsoun and P. Gora), Stochastics and Dynamics, Vol. 3, No. 4, 545-557, 2003.

128.   Filtering entropy, (with W. Bahsoun, P. Gora, M. Ebrahimi), Physica D, 183, No. 3, 260-272, 2004.

129.   Calculus of variations for functionals containing compositions, (with P. Bracken and P. Gora), Jour. Math. Analysis and Applications, Vol, 296, 658-664, 2004.

130.   A new statistical method for estimating metric entropy, (with G. Babu, Y.Chaubey, P. Gora), 2004, Inter. J. Bifurcation and Chaos, Vol. 14, No. 11, 1-6, 2004.

131.   A description of stochastic processes using chaotic maps, (with P. Gora), J. Applied Math and Stochastic Analysis, 2, 137-141, 2004.

132.   Nonobservable space dimensions and the discreteness of time (with P. Gora), Solitons, Chaos and Fractals, 24, 13-18, 2005.

133.   Randomly chosen maps can give rise to nearly ordered behavior, (with P. Gora and S. Islam), Physica D, 210, 284-294, 2005.

134. A generalization of Straube's theorem: Existence of absolutely continuous Invariant measures for random maps, (with S. Islam and P. Gora), Journal of applied mathematics and stochastic analysis, 2005:2, 133-141, 2005.

135. Markov switching and position dependent maps with application to forecasting financial markets, (with P. Gora, W. Bahsoun), SIAM Journal on Applied Dynamical Systems 4, No. 2 , 391-406, 2005.

136. Randomly chosen chaotic maps can give rise to nearly ordered behaviour, (with P. Gora and S. Islam), Physica D: Nonlinear Phenomena 210, issues 3-4, 284-294, 2005.

137. Approximation of acim's for Markov switching position dependent random maps, (with S. Islam and P. Gora), International journal of Pure and Applied Mathematics", 25, No. 1, 51-78, 2005.

138. Strong chaotification of discrete time systems by small feedback control (with P. Gora), Int. Journal Bifurcation and Chaos, Vo. 16, No. 3, 715-719, 2006.

139. Absolutely Continuous Invariant Measures that Cannot be Observed Experimentally", (with P. Gora, Md Shafiqul Islam and Wael Bahsoun) SIAM Journal on Applied Dynamical Systems 5, No. 1, 84-90, 2006.

140. Folding maps and functional equations (with P. Gora, W. Bahsoun), Dynamical Systems, an International Journal 21, no. 2, 235-43, 2006.

141. Attainable densities for random maps, (with P. Gora), J. Math. Anal. Appl. Vol. 317, No. 1, 257-270, 2006.

142. A discrete time interpretation of the Planck-Einstein Equation, in press, Discrete Dynamics in Nature and Society, Volume 2006 (2006), Article ID 86793, 5 pages doi:10.1155/DDNS/2006/86793.

143. Invariant densities of random maps have lower bounds on their supports, (with P. Gora, and S. Islam), in press, Journal of Applied Mathematics and Stochastic Analysis 2006:1 (2006), 1-13.

144. Invariant measures in brain dynamics, (with P. Gora), Physics Letters A 358 (2006), 27-30.

145. An example of irreducible dynamics represented by reversible ones, (with P Gora), IJBC, in press, 2007.

146. The measurement of time, (with P Gora), Foundations of Physics, submitted 2007.

147.	An ergodic theory of consciousness, (with P. Gora), BMC Neurosciences, submitted 2007.
148.	Dark Energy: A Calculation, Physical Review Letters, submitted November 2007.

Papers in Progress:

1.	Phase transition as function of scale

2.	Vector addition in Quantum Mechanics as a random map.

3.	Heisenberg's uncertainty principle in discrete time.

4.	A dynamical system example of the Holographic Principle.

5.	Existence of position dependent random maps for interference patterns.

6.	Pseudo roots of non-invertible maps.

Advanced Mathematics Book: **LAWS OF CHAOS**, (with P. Gora) published by Birkhauser Boston, August 1997.

Literary publications:

36 short stories

1.	A Pyramid of Time, A collection of short stories, Porcupine's Quill, Canada, 1979.

2.	Shreiber, A Novel, General Publishing, Canada 1982, Beaufort Books, USA 1982. Winner of the Gerald Lampert Award for best first novel in Canada.

3.	The Number Hall, Oberon Press, Canada, 1992, Winner of Toronto Jewish Literary Prize, 1994.

4.	A Gift of Rags, Lester Publishing, Canada, 1995.

5.	The Rat Catcher, Oberon Press, 2006.

6.	Seizure, a novel in progress.