

# Richard E. Stearns

Distinguished Professor Emeritus  
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## Personal:

- Born July 5, 1936, Caldwell, New Jersey
- U.S. Citizenship
- Married, two grown children

## Education:

- B.A., 1958, Carleton College (in Mathematics)
- Ph.D., 1961, Princeton University (in Mathematics)  
Thesis: “Three Person Cooperative Games without Side Payments”

## Employment:

- June 1961 to September 1978: General Electric Company
- September 1978 to August 2000: University at Albany – State University of New York
- September 2000 to present: Retired

## Professional Societies:

- Association for Computing Machinery
- SIGACT

## Honors:

- ACM Alan M. Turing Award, 1993
- ACM Fellow, 2014
- Promoted to Distinguished Professor, University at Albany – State University of New York, 1994

## Other:

- Editor of the SIAM Journal on Computing, 1972 to 1988
- Member-at-Large, SIGACT Executive Committee, 1973 to 1975
- Visiting Professor, Hebrew University, Jerusalem, Israel, Spring 1975
- Adjunct Professor, Rensselaer Polytechnic Institute (RPI), Troy, NY, 1977 to 1978
- Visitor, Mathematical Science Research Institute, Berkeley, CA, Fall 1985
- Chair, Computer Science Department, University at Albany – State University of New York, Albany, NY, January 1982 to August 1989

## Turing Award Citation

To Juris Hartmanis and Richard E. Stearns, in recognition of their seminal joint research which established the foundations for the field of computational complexity theory. In their paper “On the Computational Complexity of Algorithms,” (Transactions of the American Mathematical Society, Vol. 117, No. 5, May, 1965, pp. 285–306) they provided a precise definition of the complexity measure defined by computation time on Turing machines and developed a theory of complexity classes. The paper sparked the imagination of many computer scientists and led to the establishment of complexity theory as a fundamental part of the discipline.

## Books Published

1. Hartmanis, J. and Stearns, R.E., *Algebraic Structure Theory of Sequential Machines*, Prentice-Hall, Englewood Cliffs, NJ, 1966.
2. Lewis, P.M., Rosenkrantz, D.J. and Stearns, R.E., *Compiler Design Theory*, Addison-Wesley, Reading, MA, 1976.
3. Aumann, R.J. and Maschler, M.B. with the collaboration of Stearns, R.E., *Repeated Games with Incomplete Information* MIT Press, 1995.  
**This book won the 1995 Lanchester Prize for the best contribution of the year to Operations Research.**

## Publications

1. Stearns, R.E., The Voting Problem, *Amer. Math. Monthly*, 66(9), 761–763, Nov. 1959.
2. Stearns, R.E. and Hartmanis, J., On the State Assignment Problem for Sequential Machines II, *IRE Transactions on Electronic Computers*, EC-10 (4), 593–603, Dec. 1961.
3. Hartmanis, J. and Stearns, R.E., Some Dangers in State Reduction of Sequential Machines, *Information & Control*, 5(3), 252–260, Sept. 1962.
4. Hartmanis, J. and Stearns, R.E., A Study of Feedback and Errors in Sequential Machines, *IEEE Transactions on Electronic Computers*, EC-12(3), 223–232, June 1963.
5. Stearns, R.E. and Hartmanis, J., Regularity Preserving Modifications of Regular Expressions, *Information & Control*, 6(1), 55–69, Sept. 1963.
6. Stearns, R.E., Three-Person Cooperative Games Without Side Payments, *Annals of Math Studies* #52, Advances in Game Theory, Princeton University Press, Princeton, NJ, 1964.
7. Stearns, R.E., On the Axioms for a Cooperative Game Without Side Payments, *Proc. Amer. Math. Soc.*, 6(1), 82–86, Feb. 1964.
8. Hartmanis, J. and Stearns, R.E., Pair Algebra and Its Application to Automata Theory, *Information & Control*, 7(4), 485–507, Dec. 1964. (Also presented in FOCS 5 (1964), 192–196.)
9. Hartmanis, J. and Stearns, R.E., On the Computational Complexity of Algorithms, *Trans. Am. Math. Soc.*, 117(5), 285–306, May 1965. (Also presented in FOCS 5 (1964), 82–90.)
10. Hartmanis, J., Lewis, P.M. and Stearns, R.E., Classification of Computations by Time and Memory Requirements, *Proc. of IFIP Congress*, 31–35, May 1965.
11. Lewis, P.M., Stearns, R.E. and Hartmanis, J., Memory Bounds for Recognition of Context Free and Context Sensitive Languages, *Proc. 6th Annual Symp. on Switching Circuit Theory & Logical Design*, 191–202, Oct. 1965.
12. Stearns, R.E., Hartmanis, J. and Lewis, P.M., Hierarchies of Memory Limited Computations, *Proc. 6th Annual Symp. on Switching Circuit Theory & Logical Design*, 179–190, Oct. 1965.
13. Hartmanis, J. and Stearns, R.E., *Algebraic Structure Theory of Sequential Machines*, Prentice-Hall, Englewood Cliffs, NJ, 1966.

14. Hennie, F.C. and Stearns, R.E., Two-tape Simulation of Multitape Turing Machines, *J. ACM*, 13(4), 533–546, Oct. 1966.
15. Hartmanis, J. and Stearns, R.E., Sets of Numbers Defined by Finite Automata, *Amer. Math. Monthly*, 74(5), 539–542, May 1967.
16. Stearns, R.E., A Regularity Test for Pushdown Machines, *Information & Control*, 11(1), 323–340, Sept. 1967.
17. Stearns, R.E., A Formal Information Concept for Games with Incomplete Information, *Models of Gradual Reduction of Arms*, vol. 11, US ACDA report ST-116, 405–434, Sept. 1967. (Appears as Chapter 3 in *Repeated Games with Incomplete Information* by R. J. Aumann and M. B. Maschler with the collaboration of R. E. Stearns, MIT Press, Cambridge, MA, 1995.)
18. Lewis, P.M. and Stearns, R.E., Syntax-Directed Transduction, *J. ACM*, 15(3), 465–488, July 1968. (Also presented in FOCS 7 (1966), 21–35.)
19. Aumann, R.J., Maschler, M., and Stearns, R.E., Repeated Games of Incomplete Information: An Approach to the Non-Zero-Sum Case, *The Indirect Measurement of Utility*, vol. 11, US ACDA Report ST-143, 117–216, Nov. 1968. (Appears as Chapter 5 in *Repeated Games with Incomplete Information* by R. J. Aumann and M. B. Maschler with the collaboration of R. E. Stearns, MIT Press, Cambridge, MA, 1995.)
20. Stearns, R.E., Convergent Transfer Schemes for N-Person Games, *Trans. Am. Math. Soc.*, 134(3), 449–459, Dec. 1968.
21. Stearns, R.E. and Lewis, P.M., Property Grammars and Table Machines, *Information & Control*, 14(6), 524–549, June 1969. (Also presented in FOCS 9 (1968), 106–119.)
22. Stearns, R.E. and Rosenkrantz, D.J., Table Machine Simulation, *Conference Record of 10th Annual Symp. on Switching & Automata Theory*, 118–128, Oct. 1969.
23. Hartmanis, J. and Stearns, R.E., Automata-Based Computational Complexity, *Information Sciences*, 1(2), 173–184, 1969.
24. Foster, W.H., Gans, R., Stearns, E.I. and Stearns, R.E., Weights for Calculation of Tristimulus Values from Sixteen Reflectance Values, *Color Engineering*, 8(3), 35–47, June 1970.
25. Rosenkrantz, D.J. and Stearns, R.E., Properties of Deterministic Top-Down Grammars, *Information & Control*, 17(3), 226–256, Oct. 1970. (Also presented in STOC 1 (1969), 165–180.)
26. Stearns, R.E., Deterministic Top-Down Parsing, *Proc. 5th Annual Princeton Conf. on Inf. Sciences & Systems*, 182–188, Mar. 1971.

27. Lewis, P.M., Rosenkrantz, D.J. and Stearns, R.E., Attributed Translations, *J. Computer & System Sciences*, 9(3), 279–307, Dec. 1974. (Also presented in STOC 5 (1973), 160–171.)
28. Lewis, P.M., Rosenkrantz, D.J. and Stearns, R.E., *Compiler Design Theory*, Addison Wesley Publishing Co., Reading, MA, 1976.
29. Stearns, R.E., Lewis, P.M. and Rosenkrantz, D.J., Concurrency Control for Database Systems, *Proc. 17th IEEE Annual Symp. on Foundations of Computer Science*, 19–32, Oct. 1976.
30. Rosenkrantz, D.J., Stearns, R.E. and Lewis, P.M., An Analysis of Several Heuristics for the Traveling Salesman Problem, *SIAM J. Computing*, 6(3), 563–581, Sept. 1977. (Also presented in FOCS 15 (1974), 33–42.)
31. Rosenkrantz, D.J., Stearns, R.E. and Lewis, P.M., A System Level Concurrency Control for Distributed Database Systems, *ACM Trans. on Database Systems*, 3(2), 179–198, June 1978.
32. Rosenkrantz, D.J. and Stearns, R.E., A Lattice of Reducibilities, Technical Report TR 79–2, *Dept. of Computer Science, SUNY at Albany*, Albany, NY, May 1979.
33. Stearns, R.E. and Rosenkrantz, D.J., Distributed Concurrency Controls Using Before-Values, *Proc. ACM SIGMOD 1981 Int. Conf. on Manag. Data*, 74–83, Apr.-May 1981.
34. Rosenkrantz, D.J., Stearns, R.E. and Lewis, P.M., Consistency and Serializability in Concurrent Database Systems, *SIAM J. Computing*, 13(3), 508–530, Aug. 1984.
35. Stearns, R.E. and Hunt III, H.B., On the Equivalence and Containment Problems for Unambiguous Regular Expressions, Grammars and Automata, *SIAM J. Computing*, 14(3), 598–511, 1985. (Also presented in FOCS 22 (1981), 74–81.)
36. Hunt, III, H.B. and Stearns, R.E., Monotone Boolean Formulas, Distributive Lattices, and the Complexities of Logics, Algebraic Structures and Computation Structures (Preliminary Report), *Proc. Third Annual Symposium on Theoretical Aspects of Computer Science (STACS 1986)*, Lecture Notes in Computer Science, vol. 210, Springer-Verlag (Editors: B. Monien and G. Vidal-Naquet), 277–291, 1986.
37. Hunt, III, H.B. and Stearns, R.E., Nonlinear Algebra and Optimization on Rings are “Hard”, *SIAM J. Computing*, 16(5), 910–929, 1987.
38. Hunt III, H.B. and Stearns, R.E., On the Complexities of Equivalence Problems for Algebraic Structures, in *Abstracts of Communication at the Fifth International Conference on Applied Algebra, Algebraic Algorithms, and Error-Corrected Codes*, Menorca, Spain, 43–44, June 1987.

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40. Fiduccia, C.M., Mattheyses, R.M. and Stearns, R.E., Efficient Scan Operators for Bit-Serial Processor Arrays, *Second Symp. on the Frontiers of Massively Parallel Computation*, Fairfax, VA, 105–111, Oct. 1988.
41. Keohane, J. and Stearns, R.E., Routing Linear Permutations Through the Omega Network in Two Passes, *Second Symp. on the Frontiers of Massively Parallel Computation*, Fairfax, VA, 479–482, Oct. 1988.
42. Hunt III, H.B. and Stearns, R.E., On the Complexity of Satisfiability Problems for Algebraic Structures (Preliminary Report), *Proceedings of the 6th Int. Conf. on Applied Algebra, Algebraic Algorithms, and Error-Correcting Codes*, Rome, Italy, July 1988, Lecture Notes in Computer Science, vol. 357 (Editor: T. Mora), Springer-Verlag, Berlin, 250–258, 1989.
43. Stearns, R.E., Memory-Bounded Game Playing Computing Devices, Technical Report No. 547, *The Economics Series, Institute for Mathematical Studies in the Social Sciences*, Stanford University, July 1989.
44. Hunt III, H.B. and Stearns, R.E., The Time Complexity of Very Simple Boolean Formulas with Applications, *SIAM J. Computing*, 19(1), 44–70, Feb. 1990. Also appears as *TR 87-23, Dept. of Computer Science, SUNY at Albany*, Albany, NY.
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46. Hunt III, H.B. and Stearns, R.E., The Complexity of Equivalence for Commutative Rings, *J. Symbolic Computation*, 10(5), 411–436, 1990. Also appears as *TR 87-22, Dept. of Computer Science, SUNY at Albany*, Albany, NY.
47. Stearns, R.E. and Hunt III, H.B., Power Indices and Easier NP-complete Problems, *Mathematical Systems Theory*, 23(4), 209–225, 1990.
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49. Radhakrishnan, V., Hunt III, H.B. and Stearns, R.E., Efficient Algorithms for Solving Systems of Linear Equations and Path Problems, *Proc. 9th Annual Symp. on Theoretical Aspects of Computer Science (STACS 1992)*, Lecture Notes in Computer Science, vol. 577 (Editors: A. Finkel and M. Jantzen), Springer-Verlag, Berlin, 109–120, 1992.

50. Radhakrishnan, V., Hunt III, H.B. and Stearns, R.E., Efficient Algorithms for Delta-Near-Planar Graph and Algebraic Problems, in *Complexity in Numerical Optimization* (Editor: P.M. Pardalos), World Scientific, Singapore, 323–350, 1993.
51. Hunt III, H.B., Marathe, M.V., Radhakrishnan, V., Ravi, S.S., Rosenkrantz, D.J. and Stearns, R.E., Every Problem in MAX SNP has a Parallel Approximation Algorithm, Technical Report No. 93-8, *Dept. of Computer Science, SUNY at Albany*, Albany, NY, May 1993.
52. Marathe, M.V., Hunt III, H.B., Stearns, R.E. and Radhakrishnan, V., Approximation Schemes for PSPACE-Complete Problems for Succinct Specifications, in *Proceedings of 26th Annual ACM Symposium on the Theory of Computing* (STOC 1994), 468–478, May 1994.
53. Hunt III, H.B., Marathe, M.V. and Stearns, R.E., Generalized CNF Satisfiability Problems and Non-Efficient Approximability, in *Proceedings of 9th IEEE Annual Conference on Structure in Complexity Theory* (Structures 1994), 355–366, June 1994.
54. Hunt III, H.B., Marathe, M.V., Radhakrishnan, V., Ravi, S.S., Rosenkrantz, D.J. and Stearns, R.E., A Unified Approach to Approximation Schemes for NP- and PSPACE-Hard Problems for Geometric Graphs, *Proc. 2nd Annual European Symposium on Algorithms* (ESA 1994), Lecture Notes in Computer Science, vol. 855, Springer-Verlag, 468–477, June 1994.
55. Hunt III, H.B., Marathe, M.V., Radhakrishnan, V., Stearns, R.E. and Rosenkrantz, D.J., A Unified Approach for Proving Both Easiness and Hardness Results for Succinct Specifications, Technical Report No. 94-5, *Dept. of Computer Science, SUNY at Albany*, Albany, NY, June 1994.
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59. Hunt III, H.B., Marathe, M.V., Radhakrishnan, V., Stearns, R.E. and Rosenkrantz, D.J., Periodically Specified Problems: An Exponential Complexity Gap Between Exact and Approximate Solutions, Technical Report No. LA-UR-95-20, Los Alamos National Laboratory, Mar. 1995.

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61. Shukla, S.K., Rosenkrantz, D.J., Hunt III, H.B. and Stearns, R.E. A HORNSAT Based Approach to the Polynomial Time Decidability of Simulation Relations on Finite State Processes, *DIMACS Workshop on Satisfiability Problems: Theory and Applications*, 603–642, Mar. 1996. (Also Technical Report No. TR-95-6, *Dept. of Computer Science, SUNY at Albany*, Albany, NY.)
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63. Shukla, S.K., Rosenkrantz, D.J., Hunt III, H.B., Ravi, S.S. and Stearns, R.E., I/O Automata-Based Verification of Distributed Systems: Complexity Issues, *Proc. 15th Annual ACM Symposium on Principles of Distributed Computing (PODC 1996)*, page 122, May 1996.
64. Shukla, S.K., Rosenkrantz, D.J., Hunt III, H.B. and Stearns, R.E., On the Complexity of Relational Problems for Finite State Processes, *Proc. 23rd International Colloquium on Automata, Languages and Programming (ICALP 1996)*, Lecture Notes in Computer Science, vol. 1009 (Editors: F. Meyer auf der Heide and B. Monien), 466–477, July 1996. (Also Technical Report No. TR-95-7, *Dept. of Computer Science, SUNY at Albany*, Albany, NY.)
65. Marathe, M.V., Hunt III, H.B. and Stearns, R.E., Level Treewidth Property: Exact Algorithms and Approximation Schemes, Technical Report No. LA-UR-97-479, Los Alamos National Laboratory, Jan. 1997.
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