

Curriculum vitae

Søren Eilers
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Personal:

- Born **9/67**, Danish citizen, resident of Sweden.
- Married to Ingrid Kristin Skanser, daughter Lea born **6/97**, son Andreas born **4/04**.

Education:

- **1/93**: M.S., University of Copenhagen. Mathematics, computer science, Indo-European comparative linguistics.
- **12/95**: PhD, University of Copenhagen. Mathematics. Advisor: Gert K. Pedersen.

Positions:

- **1/96–2/96**: Research assistant, University of Copenhagen.
- **5/96–6/98, 1/99–8/99**: Assistant professor, University of Copenhagen.
- **7/98–12/98**: Assistant research professor, The Carlsberg Foundation.
- **9/99–2/08**: Associate professor, University of Copenhagen.
- **3/07–**: Associate chair for education, University of Copenhagen.
- **3/08–4/10**: Professor with special duties, University of Copenhagen.
- **5/10**: Professor, University of Copenhagen.

International experience:

- **9/91–6/92**: University of California at Santa Barbara.
- **7/94–8/94**: Universidade de São Paulo.
- **9/94–6/95**: The Fields Institute for Research in Mathematical Sciences, Ontario, Canada.
- **2/98–6/98**: Purdue University.
- **7/98–12/98**: University of New Mexico.
- **8/00–11/00**: Mathematical Sciences Research Institute, California, USA.
- **9/03–10/03 & 1/04**: Mittag-Leffler Institutet, Stockholm, Sweden.
- **9/07–11/07**: The Fields Institute for Research in Mathematical Sciences, Ontario, Canada.

Publications:

- [1] A complete invariant for AD algebras with real rank zero and bounded torsion in K_1 . *Journal of Functional Analysis* **139** (1996), 325–348.
- [2] Morita equivalence for crossed products by Hilbert C^* -bimodules (with B. Abadie and R. Exel). *Transactions of the American Mathematical Society* **350** (1998), 3043–3054.
- [3] Connectivity and components for C^* -algebras. *Mathematica Scandinavica* **84** (1999), 119–136.
- [4] Noncommutative end theory (with C. A. Akemann). *Pacific Journal of Mathematics* **185** (1998), 47–88
- [5] *Invariants for AD algebras*. PhD thesis, University of Copenhagen, **11/95**.
- [6] Künneth splittings and classification of C^* -algebras with finitely many ideals. *Fields Institute Communications Series* **13**, “Operator Algebras and their Applications”, 81–90, American Mathematical Society, 1997.
- [7] Morphisms of extensions of C^* -algebras: Pushing forward the Busby invariant (with T.A. Loring and G.K. Pedersen). *Advances in Mathematics*, **147** (1999), 74–109.
- [8] Compressing coefficients while preserving ideals in the K -theory for C^* -algebras (with M. Dădărlat). *K-Theory* **14** (1998), 281–304.
- [9] Stability of anticommutation relations. An application of noncommutative CW complexes (with T.A. Loring and G.K. Pedersen). *Journal für die reine und angewandte Mathematik* **499** (1998), 101–143.
- [10] Fragility for subhomogeneous C^* -algebras with one-dimensional spectrum (with T.A. Loring and G.K. Pedersen). *Bulletin of the London Mathematical Society* **31** (1999), 337–344.
- [11] Quasidiagonal extensions and AF algebras (with T.A. Loring and G.K. Pedersen). *Mathematische Annalen* **311** (1998), 233–249.
- [12] Approximate homogeneity is not a local property (with M. Dădărlat). *Journal für die reine und angewandte Mathematik* **507** (1999), 1–14.
- [13] The Bockstein map is necessary (with M. Dădărlat). *Canadian Mathematical Bulletin* **42** (1999), 274–284.
- [14] Computing contingencies for stable relations (with T.A. Loring). *International Journal of Mathematics* **10** (1999), 301–326.
- [15] On the classification of nuclear C^* -algebras (with M. Dădărlat). *Proceedings of the London Mathematical Society* **85** (2002), 168–210
- [16] Finite dimensional representations of the soft torus (with R. Exel). *Proceedings of the American Mathematical Society* **130** (2002), 727–731.

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- [17] Approximate homogeneity of C^* -algebras with finitely many ideals. *Proceedings of the Royal Irish Society* **101A** (2001), 149–162.
- [18] Asymptotic unitary equivalence in KK -theory (with M. Dădărlat). *K-Theory* **23** (2001), 305–322.
- [19] Regularity revisited (with C.A. Akemann). *Journal of Operator Theory* **48** (2002), 515–534.
- [20] Riesz properties of K -groups associated to C^* -algebras of minimal ranks (with G.A. Elliott). *Comptes Rendus Mathématiques de l'Académie des Sciences (La Société Royale du Canada)* **25** (2003), 108–113.
- [21] Augmenting dimension group invariants for substitutional dynamical systems (with T.M. Carlsen). *Ergodic Theory & Dynamical Systems* **24** (2004), 1015–1039.
- [22] A graph approach to computing nondeterminacy in substitutional dynamical systems (with T.M. Carlsen). *RAIRO - Theoretical Informatics and Applications* **41** (2007), 285–306.
- [23] Matsumoto K -groups associated to certain shift spaces (with T.M. Carlsen). *Documenta Mathematica* **9** (2004), 639–671.
- [24] Ordered K -groups associated to substitutional dynamics (with T.M. Carlsen). *Journal of Functional Analysis* **38** (2006), 99–117.
- [25] Inductive Limits of K -theoretic Complexes with Torsion Coefficients (with A. Toms). *Journal of K-theory* **1** (2008), 145–168.
- [26] C^* -algebras associated to symbolic dynamics. *Discrete and Continuous Dynamical Systems* **15** (2006) 177–192.
- [27] On Rørdam's classification of certain C^* -algebras with one nontrivial ideal (with G. Restorff) In "Operator algebras: The Abel symposium 2004", Abel Symposia 1 (2006), 87–96.
- [28] On the entropy of LEGO[®] (with B. Durhuus). Submitted for publication.
- [29] Dimension groups associated to β -expansions (with T. Bates and T.M. Carlsen). *Mathematica Scandinavica* **100** (2007), 198–208.
- [30] Classification of extensions of classifiable C^* -algebras (with G. Restorff and E. Ruiz). *Advances in Mathematics* **222** (2009), 2153–2172.
- [31] On the asymptotic enumeration of LEGO[®] structures (with M. Abrahamsen). To appear in *Journal of Experimental Mathematics*.
- [32] Erratum for "Augmenting dimension group invariants for substitutional dynamical systems" (with T.M. Carlsen). Submitted for publication.
- [33] Nonsplitting in Kirchberg's ideal-related KK -theory. (with G. Restorff and E. Ruiz). *Canadian Mathematical Bulletin*, in press.

- [34] On warped crossed products (with T. Katsura). In preparation.
- [35] Automorphisms of Cuntz-Krieger algebras (working title, with G. Restorff and E. Ruiz). In preparation.
- [36] Reducibility of covers of AFT shifts (with T. Bates and D. Pask). To appear in *Israel Journal of Mathematics*.
- [37] On some new invariants for strong shift equivalence for shifts of finite type (with I. Kiming). Submitted for publication.
- [38] On the classification of nonsimple graph C^* -algebras (with M. Tomforde). *Mathematische Annalen* **346** (2010), 393–418.
- [39] Flow equivalence of sofic shifts (working title, with M.M. Boyle and T.M. Carlsen). In preparation.
- [40] Enumeration of pyramids of one-dimensional pieces of arbitrary fixed integer length (with B. Durhuus). *Discrete Mathematics and Theoretical Computer Science proc. AM* (2010), 145-160.
- [41] Index maps in the K -theory of graph algebras (with T.M. Carlsen and M. Tomforde). Preprint.
- [42] On graph C^* -algebras with a linear ideal lattice (with G. Restorff and E. Ruiz). *Bulletin of the Malaysian Mathematical Sciences Society* (2) **33** (2010), 233–241.
- [43] Classifying C^* -algebras with both finite and infinite subquotients (with G. Restorff and E. Ruiz). Preprint.
- [44] Symbolic Dynamics (with M.-P. Béal, J. Berstel, and D. Perrin). Chapter for “Handbook in Automata Theory”. Preprint.

Conference talks 2000- (● = invited, ○ = contributed) :

- **4/00**: *Regular projections revisited*. British Mathematical Colloquium 2000. Leeds, England.
- **9/00**: *Invariants for C^* -algebras with one/two/many ideals*. Workshop on Simple C^* -algebras and Non-commutative Dynamical Systems, Mathematical Sciences Research Institute. Berkeley, California, USA.
- **6/01**: *Comparative classification of operator algebra and symbolic dynamics*. Joint meeting of Dansk Matematisk Forening and Svenska Matematikersamfundet. Lund, Sweden.
- **05/02**: *Augmenting dimension group invariants for substitutional dynamical systems*. Great Plains Operator Theory Seminar, North Carolina, USA.
- **08/02**: *Augmenting dimension group invariants for substitutional dynamical systems*. Short communication, ICM, Beijing, China.

- **08/02:** *Matsumoto algebras for substitutional shift spaces.* Satellite conference on Operator Algebras and their Applications, Chengde, China.
- **11/02:** *Computing K -theory for certain C^* -algebras associated to shift spaces.* Danish/Norwegian operator algebra workshop, Schæffergården, Denmark.
- **05/03:** *Distinguishing substitutions with ordered groups.* 2nd Øresund Symposium in non-commutative analysis and non-commutative geometry, University of Copenhagen.
- **08/03:** *Non-simple C^* -algebras are sometimes better tools for dealing with minimal dynamics than simple ones.* C^* -Algebren, Oberwolfach, Germany.
- **09/03:** *Non-simple C^* -algebras associated to minimal dynamics.* NOG Workshop I, Institut Mittag-Leffler, Stockholm, Sweden.
- **05/04:** *C^* -Algèbres.* Ecole pluri-thématique de théorie ergodique, Centre International de Rencontres Mathématiques, Luminy, France.
- **06/04:** *C^* -algebras associated to shift spaces, C^* -algebras/Quantum Information Theory Meeting,* Los Angeles, California, USA.
- **09/04:** *Automorphisms on purely infinite C^* -algebras with ideals,* Abel symposium 2004, Oslo, Norway.
- **11/04:** *Automorphisms on purely infinite C^* -algebras with ideals,* The structure of amenable systems, Banff International Research Station, Canada.
- **04/05:** *Lifting with Gert,* Symposium in Honour of the Memory of Gert K. Pedersen, University of Copenhagen.
- **06/05:** *Known and unknown ranges,* 33rd Canadian Operator Symposium on the Occasion of George Elliott's 60th Birthday. University of Ottawa, Canada.
- **05/06:** *Classification of non-simple C^* -algebras (with applications),* Operator Algebra Workshop, Queen's University, Belfast, Northern Ireland.
- **05/06:** *Classification of C^* -algebras associated to minimal dynamics,* featured talk, Great Plains Operator Theory Seminar, Iowa, USA.
- **12/06:** *Classification of C^* -algebras associated to irreducible shift spaces,* Operator Methods in Fractal Analysis, Wavelets and Dynamical Systems The Banff International Research Station, Alberta, Canada.
- **6/07:** *Computing Kirchberg's Ideal-Related KK -groups,* Barcelona Conference on C^* -Algebras and Their Invariants, CRM, Spain.
- **7/07:** *Tilings, substitutions, and C^* -algebras,* Meeting on the structure of C^* -algebras in honor of Eberhard Kirchberg on the occasion of his 60th birthday. Münster, Germany.

- **9/07**: *From substitutions to tiling spaces and C^* -algebras*, Fifth Annual East Coast Operator Algebra Symposium. Wellesley College, Massachusetts, USA.
- **11/07**: *Semiprojectivity of non-commutative CW-complexes*, Workshop on The Structure of C^* -algebras, The Fields Institute, Toronto, Canada.
- **12/07**: *AF-embedability of warped crossed products*, Danish/Norwegian operator algebra workshop, Oslo, Norway.
- **5/08**: *Warped crossed products*, Operator algebras and operator theory, University College Cork, Ireland.
- **8/08**: *Irreducible sofic shifts and non-simple Cuntz-Krieger algebras*, Concentration week on "Operator Algebras, Dynamics, and Classification". Texas A & M, USA.
- **8/08**: *The automorphism groups of non-simple Cuntz-Krieger algebras*, C^* -Algebren, Oberwolfach, Germany.
- **12/08**: *Classification of graph algebras*. Danish/Norwegian operator algebra workshop, Lysebu, Norway.
- **6/09**: *Classification of graph algebras*. 25th Nordic and 1st British-Nordic Congress of Mathematicians, Oslo, Norway.
- **6/09**: *Classification of graph algebras*. 5th Asian Mathematical Congress, Kuala Lumpur, Malaysia.
- **9/09**: *On the classification of graph algebras*. 7th Øresund Symposium in non-commutative analysis and non-commutative geometry, University of Copenhagen.
- **3/10**: *On the classification of graph algebras*. North British Functional Analysis Seminar, Nottingham, England.
- **7/10**: *Enumeration of pyramids of one-dimensional pieces of arbitrary fixed integer length*, 21st International Meeting on Probabilistic, Combinatorial and Asymptotic methods for the Analysis of Algorithms, Vienna, Austria.
- **9/10**: *Extensions of graph C^* -algebras*, LMS Midlands Regional Meeting and Workshop on C^* -algebras, Nottingham, England.
- **11/10**: *Classification of Symbolic Dynamical Systems*, Highlights of AutoMathA, Vienna, Austria.

Seminars and colloquia:

- Arizona State University, The Fields Institute for Research in Mathematical Sciences (4), Lunds Universitet, Institut Mittag-Leffler, Montana State University, Norges Teknisk-Naturvitenskapelige Universitet, Syddansk Universitet Odense (3), Purdue University (2), UC Los Angeles, UC Santa Barbara (3), Universidade de São Paulo, Universitat Autònoma de Barcelona, Université de Lyon 1, University of Nevada at Reno (2), University of New Mexico, University of Oregon at Eugene (2), University of Toronto, Westfälische Wilhelms-Universität Münster (2), Washington University at Saint Louis, Århus Universitet (3).

Conference organization:

- Organizer (with E. Christensen and R. Nest), *Symposium in Honour of Gert K. Pedersen on the Occasion of his Sixtieth Birthday*, Carlsberg Academy, Copenhagen **5/00**.
- Organizer (with N. Higson) of special session “K-theory and Operator Algebras” at *First AMS-Scandinavian International Mathematics Meeting/XXIII Scandinavian Congress of Mathematicians*, Odense **6/00**.
- Organizer (with S. Silvestrov) *1st Øresund Symposium on non-commutative analysis and non-commutative geometry*. Lund, Sweden, **5/02**.
- Organizer (with S. Silvestrov) *3rd Øresund Symposium on non-commutative analysis and non-commutative geometry*. Lund, Sweden, **1/04**.
- Organizer (with E. Christensen and R. Nest), *Symposium in Honour of the Memory of Gert K. Pedersen*, University of Copenhagen **4/05**.
- Organizer (with I. Kiming) Summer school, Danish Mathematical Society, University of Copenhagen **8/06**.
- Program committee member *Symbolic dynamics and coding*, Marne-la-Vallée, France, **7/07**.
- Organizer (with G.A. Elliott, A. Kumjian, D. Pask, I. Raeburn, and A. Toms), *C*-algebras Associated to Discrete and Dynamical Systems*. Banff International Research Station, Alberta, Canada, **1/08**.
- Main organizer *EMS-DMF Joint Mathematical Weekend* **2/08**.
- Organizer (with S. Silvestrov) *5th Øresund Symposium on non-commutative analysis and non-commutative geometry*. University of Copenhagen, **4/08**.
- Organizer (with K. Thomsen) *Symbolic dynamics and homeomorphisms of the Cantor set*. PhD school, University of Copenhagen, **6/08**.
- Organizer (with S. Silvestrov) *6th Øresund Symposium on non-commutative analysis and non-commutative geometry*. University of Copenhagen, **11/08**.
- Organizer (with P. Jorgensen and S. Silvestrov) of special session “Operator Methods for Wavelets, Dynamics and Fractals. Special session dedicated to 70th birthday of Christian Skau” at *25th Nordic and 1st British-Nordic Congress of Mathematicians*, Oslo **6/09**.
- Organizer (with T.A. Loring and T. Shulman), *Semiprojectivity and asymptotic morphisms*. University of Copenhagen, **05/10**.
- Organizer (with M. Dadarlat, G.A. Elliott, M. Rørdam, and A. Toms), *Classification of C*-algebras*. Banff International Research Station, Alberta, Canada, **9/10**.

- Organizer (with S.Silvestrov and L. Turowska), *Operator algebras, dynamics, applications*. AGMP-10, Tjärnö, Sweden, **10/10**.

Teaching:

- Course development:
 - **97,99,01** Datalogi A [Computer science for mathematicians]
[Average student population $\simeq 100$] Complete redesign following instructions from the study board and in continuing dialogue with an ad hoc board representing the statistics, actuarial sciences and math/economy programs. Choice of 2 textbooks, design of 4 projects (Maple, \LaTeX , C++), multiple choice problem sets.
Awarded a Faculty of Science teaching prize in 9/98.
 - **99–02** Matematik 3AN [Functional analysis]
[Average student population $\simeq 30$] Complete redesign of the course, including choice of a new textbook. Development of supplemental material resulting in the booklet “3AN Nøgle” also available online with hints for difficult exercises. Introduction of diversification scheme in which students work on an advanced topic of their own choice.
Awarded a Faculty of Science teaching prize in 9/00.
 - **99,07** Symbolic Dynamics
[Average student population $\simeq 10$] Full course development from idea to implementation, including a scheme in which participating students give introductory lectures on applications of the material. The course plan was adopted at a similar course at the Universidad Autónoma del Estado de Hidalgo in Mexico.
 - **01–03** Matematik 1GA [Fundamental course in mathematics A]
[Average student population $\simeq 200$] Continuing revision of curriculum and activities based on an existing and well functioning course. Development of supplemental material, including a theme on Fibonacci numbers to motivate diagonalization. Full responsibility for lectures, program for problem sessions and design of written exam.
 - **03–06,08** Experimental mathematics
[Average student population $\simeq 20$] Complete development of a distance learning course for prospective high school teachers. Design of a compact two-day on-site introductory period with take-home problems. Development of a project catalog with open or open-ended research problems suitable for experimental approach.
 - **04–06** MatIntro [Introduction to Mathematics]
[Average student population $\simeq 450$] Complete design of a new course jointly with J.P. Solovej. Negotiations with study boards for biochemistry, chemistry, mathematics and physics concerning form, evaluation and content. Development of lectures, problem session programs, multiple-choice tests and mandatory exercises (some of the involving computer algebra and visualization with Maple). Shared responsibility for the activities of roughly 30 instructors each year.
 - **04–07** LinAlg [Linear Algebra]
[Average student population $\simeq 250$] Complete redesign of the course Matematik 1GA for quarter system, jointly with J.P.Solovej. Development of lectures, problem session programs, mandatory exercises (some of them involving computer algebra with Maple) and written exams. Shared responsibility for the activities for roughly 20 instructors each year.
Received a student nomination for the Faculty of Science teaching prize in 7/08.

- **08**– DiMS [Discrete Mathematical Structures]
[Average student population $\simeq 150$] Development of new course for computer science students in cooperation with key lecturers at the Department of Computer Science: Lectures, exams, problem session programs, home page.
- **10**– An0 [Analysis 0]
[Average student population $\simeq 150$] Development of new course on fundamental of mathematical analysis, jointly with E. Hansen. Lectures and organization of exercise sessions, production of an updated version of T. Gutmann's classical notes from the mid-eighties and the development of notes on systems of linear differential equations based on a draft by G. Grubb. Design and execution of oral exams.
- **12/97**: Completion of course "Teaching and Learning in Higher Education".

Supervision:

- 13 M.S. theses (S.B. Jensen **11/97**, E.M. Hansen **4/00**, T.M. Carlsen **2/01**, T.K. Have **10/01**, O.L. Jensen **9/02**, G. Restorff **11/03**, K.V. Rasmussen **12/04**, M. Bakkedal **8/06**, J. Thamsborg **8/06**, R. Johansen **10/06**, S.E. Arklint **1/08**, A.P.W. Sørensen **8/09**, R. Rani **9/10**).
- T.M. Carlsen, PhD, **05/01–04/04**.
- A. Toms, Canadian National Research Council postdoc fellow, **01/03–12/03**.
- M. Abrahamsen, Aspiring researcher prize winner, **12/04**.
- G. Restorff, PhD, **06/05–08/08**.
- K. Medynets, INTAS fellow, **04/07–08/07**.
- R. Johansen, PhD, **05/07–04/11**.
- S. Arklint, PhD, **05/08–10/11**.
- A.P.W. Sørensen, PhD, **10/09–09/12**.
- R. Bentmann, PhD, **10/10–09/13**.

Grants and stipends: (● = prime investigator, ○ = co-applicant) :

- **97** The Carlsberg Foundation:
6 months salary during a research visit to USA.
- **99** Danish Centre for Science Education:
Development of a computer-based system for teaching basic geometry
- **99** Carlsberg Academy
Permission to use the Academy's buildings on the Carlsberg Brewery for the conference on the occasion of G.K. Pedersen's sixtieth birthday.
- **99** Danish Research Council for Sciences
Expenses for a research visit at Mathematical Sciences Research Institute.

- **01 [With E. Hansen and H.L. Pedersen]:** The Faculty of Science's IT centre, University of Copenhagen
Development of an online system for multiple-choice exercise containing mathematical notation.
- **02** The Faculty of Science's IT centre, University of Copenhagen
Further development of a computer-based system for teaching basic geometry.
- **05 [With G. Restorff]** The Faroese Research Council:
1/3 of a PhD stipend for G. Restorff.
- **06** Danish Research Council for Nature and Universe:
Expenses for a research visit to the Fields Institute.
- **06** Danish Research Council for Nature and Universe:
Support for conference "EMS-DMF Joint Mathematical Weeekend".
- **09** NordForsk: Researcher Network: Operator algebras and dynamics.

Formalized research group memberships:

- **1/97–12/11** Danish Science Research Council grant "Operator algebras in Denmark", member.
- **1/05–12/07** *NCG* – SNF Center for Non-commutative Geometry, University of Copenhagen, member.
- **1/05–12/06:** University of New South Wales, Australia, Functional Analysis Research Group, collaborator.
- **5/05–5/10:** *AutoMathA*, European Science Foundation program "Automata from mathematics to applications", steering committee member
- **01/07–12/12** Marie Curie Research Training Network "Conformal Structure and Dynamics", Denmark/Sweden team, associated researcher.
- **03/07–02/09** INTAS South Caucasian republics program "K-theory, non-commutative geometry, homology theories, homotopy theory, operator and normed algebras", Copenhagen team, member.
- **07/08–12/14** University of Copenhagen Excellence/Danish National Research Foundation Center "Symmetry and deformation", member.
- **08/09–07/12** NordForsk Researcher Network "operator algebras and dynamics", principal investigator of network with nodes in Copenhagen, Trondheim, Faeroe Islands, Aarhus, Odense, Oslo, Lund, and Gothenburg.

Evaluation:

- **09/03:** PhD evaluation committee for Rune Eliassen, University of Aarhus.
- **02/05:** Licentiate evaluation committee for Tomas Persson, University of Lund.
- **03/06:** PhD evaluation committee for Simen Gaure, University of Oslo.

- **7/06**: Habilitation evaluation concerning Wilhelm Winter, Westfälische Wilhelms-Universität Münster.
- **04/09**: Opponent regarding PhD for Christian Svensson, University of Lund.
- **06/09**: PhD evaluation committee for Randi Rohde, University of Southern Denmark.
- **06/09**: Chairman of PhD evaluation committee for Adam Sierakowski, University of Copenhagen.
- **08/09**: Opponent regarding PhD for Johan Öinert, University of Lund.
- **02/10–05/10**: Hiring committee, university lecturer, University of Lund.
- **05/10**: Hiring committee, associate professor, Århus University.
- **09/10**: PhD evaluation committee for Jan Agentoft Nielsen, Århus University.

Various appointments and duties:

- **01/98–03/14**: Danish corps of external examiners.
- **01/02–04/04**: Auditor, Danish Mathematical Society
- **05/04–05/06**: Treasurer, Danish Mathematical Society.
- **05/06–04/08**: President, Danish Mathematical Society.
- **11/06–2/07**: Chairman, "Den gode underviser" [Committee for furthering of teaching and teachers], The Faculty of Science, University of Copenhagen.
- **01/09**: International expert, The Danish Evaluation Institute
"Mathematics A and B at upper-secondary level (STX and HTX) in an international perspective"