

# Tim Burness

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## Employment

- 2021- **Professor of Pure Mathematics**, *University of Bristol*.
- 2018-21 **Reader in Pure Mathematics**, *University of Bristol*.
- 2014-18 **Senior Lecturer in Pure Mathematics**, *University of Bristol*.
- 2013-14 **Lecturer in Pure Mathematics**, *University of Bristol*.
- 2008-13 **Lecturer in Pure Mathematics**, *University of Southampton*.
- 2007-08 **Visiting Research Fellow**, *EPFL, UWA, Auckland, Caltech*.
- 2006-07 **Lady Davis Fellow**, *Hebrew University of Jerusalem*.
- 2004-07 **Junior Research Fellow**, *St John's College, University of Oxford*.

## Education

- 2001-05 **PhD Mathematics**, *Imperial College London*.  
Supervisor: Professor Martin W. Liebeck  
Thesis: *Fixed point spaces in actions of finite and algebraic simple groups*
- 2000-01 **MSc Mathematics (Distinction)**, *University of Warwick*.
- 1997-00 **BSc Mathematics (First Class)**, *University of Warwick*.

## Distinctions

- 2022- **Director of the Institute for Pure Mathematics**, *University of Bristol*.
- 2022- **Co-Editor-in-Chief**, *Journal of Group Theory*.
- 2024 **Morning speaker**, *British Mathematical Colloquium, University of Manchester*.
- 2021-22 **University Research Fellowship**, *University of Bristol*.
- 2021- **Editor**, *Journal of Algebra*.
- 2018- **Editor**, *London Mathematical Society Student Texts*.
- 2018-21 **Associate Chair**, *Heilbronn Institute for Mathematical Research*.
- 2019-22 **Managing Editor**, *Journal of Group Theory*.
- 2015-19 **Editor**, *Journal of Group Theory*.
- 2017 **Plenary speaker**, *Groups St Andrews, University of Birmingham*.
- 2015 **Kalman Visiting Fellowship**, *University of Auckland*.
- 2000 **Academic Prize**, *University of Warwick*.

## Books & monographs

- [3] T.C. Burness and M. Giudici, *Classical groups, derangements and primes*, **Australian Mathematical Society Lecture Series**, vol. 25, Cambridge University Press, 2016, xviii+346, ISBN: 978-1-1076-2944-8
- [2] T.C. Burness, S. Ghandour and D.M. Testerman, *Irreducible geometric subgroups of classical algebraic groups*, **Memoirs of the American Mathematical Society** 239 (2016), no.1130, vi+88, ISBN: 978-1-4704-1494-8

- [1] T.C. Burness, S. Ghandour, C. Marion and D.M. Testerman, *Irreducible almost simple subgroups of classical algebraic groups*, **Memoirs of the American Mathematical Society** 236 (2015), no.1114, vi+110, ISBN: 978-1-4704-1046-9

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## Journal publications & preprints

- [67] T.C. Burness and M. Fusari, *On derangements in simple permutation groups*, submitted, 58 pages (arXiv:2409.01043), 2024.
- [66] M. Anagnostopoulou-Merkouri and T.C. Burness, *On the regularity number of a finite group and other base-related invariants*, **Journal of the London Mathematical Society**, to appear, 52 pages
- [65] T.C. Burness, S. Gerhardt and R.M. Guralnick, *Topological generation of simple algebraic groups*, **Journal of the European Mathematical Society (JEMS)**, to appear, 87 pages
- [64] T.C. Burness, *On the topological generation of exceptional groups by unipotent elements*, **Transformation Groups**, to appear, 30 pages
- [63] T.C. Burness and R.M. Guralnick, *On the generation of simple groups by Sylow subgroups*, **Contemporary Mathematics** (Amitsur Centennial Symposium), vol. 800 (2024), 81–100, Amer. Math. Soc. Providence, RI.
- [62] B. Baumeister, T.C. Burness, R.M. Guralnick and H.P. Tong-Viet, *On the maximal overgroups of Sylow subgroups of finite groups*, **Advances in Mathematics** 444 (2024), 109632, 65 pp.
- [61] T.C. Burness and R.M. Guralnick, *Strongly base-two groups*, **Vietnam Journal of Mathematics** 51 (2023), 657–683.
- [60] T.C. Burness and M. Lee, *On the classification of extremely primitive affine groups*, **Israel Journal of Mathematics** 255 (2023), 265–282.
- [59] T.C. Burness, R.M. Guralnick, A. Moretó and G. Navarro, *On the commuting probability of  $p$ -elements in a finite group*, **Algebra and Number Theory** 17 (2023), 1209–1229.
- [58] T.C. Burness, *On soluble subgroups of sporadic groups*, **Israel Journal of Mathematics** 254 (2023), 313–340.
- [57] T.C. Burness and A.R. Thomas, *Normalisers of maximal tori and a conjecture of Vdovin*, **Journal of Algebra** 619 (2023), 459–504.
- [56] T.C. Burness, A. Lucchini and D. Nemmi, *On the soluble graph of a finite group*, **Journal of Combinatorial Theory, Series A** 194 (2023), 105708, 39 pp.
- [55] T.C. Burness and H.Y. Huang, *On base sizes for primitive groups of product type*, **Journal of Pure and Applied Algebra** 227 (2023), 107228, 43 pp.
- [54] T.C. Burness and R.M. Guralnick, *Fixed point ratios for finite primitive groups and applications*, **Advances in Mathematics** 411 (2022), 108778, 90 pp.
- [53] T.C. Burness and H.Y. Huang, *On the Saxl graphs of primitive groups with soluble stabilisers*, **Algebraic Combinatorics** 5 (2022), 1053–1087.
- [52] T.C. Burness and A.R. Thomas, *The classification of extremely primitive groups*, **International Mathematics Research Notices IMRN** (2022), no.13, 10148–10248.
- [51] T.C. Burness, M. Garonzi and A. Lucchini, *Finite groups, minimal bases and the intersection number*, **Transactions of the London Mathematical Society** 9 (2022), 20–55.
- [50] T.C. Burness and A. Shalev, *Permutation groups with restricted stabilizers*, **Journal of Algebra** 607 (2022), 160–185.

- [49] T.C. Burness and E.V. Hall, *Almost elusive permutation groups*, **Journal of Algebra** 594 (2022), 519–543.
- [48] T.C. Burness, *Base sizes for primitive groups with soluble stabilisers*, **Algebra and Number Theory** 15 (2021), 1755–1807.
- [47] T.C. Burness and E. Covato, *On the involution fixity of simple groups*, **Proceedings of the Edinburgh Mathematical Society** 64 (2021), 408–426
- [46] T.C. Burness, R.M. Guralnick and S. Harper, *The spread of a finite group*, **Annals of Mathematics** 193 (2021), 619–687
- [45] T.C. Burness and A.R. Thomas, *A note on extremely primitive affine groups*, **Archiv der Mathematik** 116 (2021), 141–152
- [44] T.C. Burness and C.H. Li, *On solvable factors of almost simple groups*, **Advances in Mathematics** 377 (2021), 107499, 36pp.
- [43] T.C. Burness and S. Harper, *Finite groups, 2-generation and the uniform domination number*, **Israel Journal of Mathematics** 239 (2020), 271–367
- [42] T.C. Burness, S. Gerhardt and R.M. Guralnick, *Topological generation of exceptional algebraic groups*, **Advances in Mathematics** 369 (2020), 107177, 50 pp.
- [41] T.C. Burness, M. Garonzi and A. Lucchini, *On the minimal dimension of a finite simple group* (with an appendix by T.C. Burness and R.M. Guralnick), **Journal of Combinatorial Theory Series A** 171 (2020), 105175, 32 pp.
- [40] T.C. Burness, M.W. Liebeck and A. Shalev, *The length and depth of compact Lie groups*, **Mathematische Zeitschrift** 294 (2020), 1457–1476
- [39] T.C. Burness and M. Giudici, *On the Saxl graph of a permutation group*, **Mathematical Proceedings of the Cambridge Philosophical Society** 168 (2020), 219–248
- [38] T.C. Burness, M.W. Liebeck and A. Shalev, *On the length and depth of finite groups* (with an appendix by D.R. Heath-Brown), **Proceedings of the London Mathematical Society** 119 (2019), 1464–1492
- [37] T.C. Burness, *Simple groups, generation and probabilistic methods*, **London Mathematical Society Lecture Note Series** 455 (Groups St Andrews 2017 in Birmingham), Cambridge University Press, pp. 200–229, 2019
- [36] T.C. Burness and D.M. Testerman, *Irreducible subgroups of simple algebraic groups – a survey*, **London Mathematical Society Lecture Note Series** 455 (Groups St Andrews 2017 in Birmingham), Cambridge University Press, pp. 230–260, 2019
- [35] T.C. Burness and D.M. Testerman,  *$A_1$ -type subgroups containing regular unipotent elements*, **Forum of Mathematics, Sigma** 7 (2019), e12, 61 pp.
- [34] T.C. Burness and S. Harper, *On the uniform domination number of a finite simple group*, **Transactions of the American Mathematical Society** 372 (2019), 545–583
- [33] T.C. Burness, M.W. Liebeck and A. Shalev, *The length and depth of algebraic groups*, **Mathematische Zeitschrift** 291 (2019), 741–760
- [32] T.C. Burness, *On base sizes for almost simple primitive groups*, **Journal of Algebra** 516 (2018), 38–74
- [31] T.C. Burness and A.R. Thomas, *On the involution fixity of exceptional groups of Lie type*, **International Journal of Algebra and Computation** 28 (2018), 411–466
- [30] T.C. Burness and M. Giudici, *Locally elusive classical groups*, **Israel Journal of Mathematics** 225 (2018), 343–402

- [29] T.C. Burness, *Simple groups, fixed point ratios and applications*, **EMS Series of Lectures in Mathematics** (Local Representation Theory and Simple Groups), European Mathematical Society, pp. 267–322, 2018
- [28] T.C. Burness, M.W. Liebeck and A. Shalev, *The depth of a finite simple group*, **Proceedings of the American Mathematical Society** 146 (2018), 2343–2358
- [27] T.C. Burness, M.W. Liebeck and A. Shalev, *Generation of second maximal subgroups and the existence of special primes*, **Forum of Mathematics, Sigma** 5 (2017), e25, 41 pp.
- [26] T.C. Burness, R.M. Guralnick and J. Saxl, *On base sizes for algebraic groups*, **Journal of the European Mathematical Society (JEMS)** 19 (2017), 2269–2341
- [25] T.C. Burness and M. Giudici, *Permutation groups and derangements of odd prime order*, **Journal of Combinatorial Theory Series A** 151 (2017), 102–130
- [24] T.C. Burness, C. Marion and D.M. Testerman, *On irreducible subgroups of simple algebraic groups*, **Mathematische Annalen** 367 (2017), 1259–1309
- [23] T.C. Burness and H.P. Tong-Viet, *Primitive permutation groups and derangements of prime power order*, **Manuscripta Mathematica** 150 (2016), 255–291
- [22] T.C. Burness and Á. Seress, *On Pyber’s base size conjecture*, **Transactions of the American Mathematical Society** 367 (2015), 5633–5651
- [21] T.C. Burness and H.P. Tong-Viet, *Derangements in primitive permutation groups, with an application to character theory*, **Quarterly Journal of Mathematics** 66 (2015), 63–96
- [20] T.C. Burness and E. Covato, *On the prime graph of simple groups*, **Bulletin of the Australian Mathematical Society** 91 (2015), 227–240
- [19] S.H. Alavi and T.C. Burness, *Large subgroups of simple groups*, **Journal of Algebra** 421 (2015), 187–233
- [18] T.C. Burness, R.M. Guralnick and J. Saxl, *Base sizes for  $S$ -actions of finite classical groups*, **Israel Journal of Mathematics** 199 (2014), 711–756
- [17] T.C. Burness, M.W. Liebeck and A. Shalev, *Generation and random generation: from simple groups to maximal subgroups*, **Advances in Mathematics** 248 (2013), 59–95
- [16] T.C. Burness and E. Crestani, *On the generating graph of direct powers of a simple group*, **Journal of Algebraic Combinatorics** 38 (2013), 329–350
- [15] T.C. Burness and S. Guest, *On the uniform spread of almost simple linear groups*, **Nagoya Mathematical Journal** 209 (2013), 35–109
- [14] T.C. Burness, C.E. Praeger and Á. Seress, *Extremely primitive sporadic and alternating groups*, **Bulletin of the London Mathematical Society** 44 (2012), 1147–1154
- [13] T.C. Burness, C.E. Praeger and Á. Seress, *Extremely primitive classical groups*, **Journal of Pure and Applied Algebra** 216 (2012), 1580–1610
- [12] T.C. Burness, M. Giudici and R.A. Wilson, *Prime order derangements in primitive permutation groups*, **Journal of Algebra** 341 (2011), 158–178
- [11] T.C. Burness, R.M. Guralnick and J. Saxl, *On base sizes for symmetric groups*, **Bulletin of the London Mathematical Society** 43 (2011), 386–391
- [10] T.C. Burness, E.A. O’Brien and R.A. Wilson, *Base sizes for sporadic simple groups*, **Israel Journal of Mathematics** 177 (2010), 307–334
- [9] T.C. Burness and S.D. Scott, *On the number of prime order subgroups of finite groups*, **Journal of the Australian Mathematical Society** 87 (2009), 329–357

- [8] T.C. Burness, M.W. Liebeck and A. Shalev, *Base sizes for simple groups and a conjecture of Cameron*, **Proceedings of the London Mathematical Society** 98 (2009), 116–162
- [7] T.C. Burness, *On base sizes for actions of finite classical groups*, **Journal of the London Mathematical Society** 75 (2007), 545–562
- [6] T.C. Burness, *Fixed point ratios in actions of finite classical groups, IV*, **Journal of Algebra** 314 (2007), 749–788
- [5] T.C. Burness, *Fixed point ratios in actions of finite classical groups, III*, **Journal of Algebra** 314 (2007), 693–748
- [4] T.C. Burness, *Fixed point ratios in actions of finite classical groups, II*, **Journal of Algebra** 309 (2007), 80–138
- [3] T.C. Burness, *Fixed point ratios in actions of finite classical groups, I*, **Journal of Algebra** 309 (2007), 69–79
- [2] T.C. Burness, *Fixed point spaces in actions of classical algebraic groups*, **Journal of Group Theory** 7 (2004), 311–346
- [1] T.C. Burness, *Fixed point spaces in primitive actions of simple algebraic groups*, **Journal of Algebra** 265 (2003), 744–771

## Theses

- 2005 **PhD thesis:** *Fixed point spaces in actions of finite and algebraic simple groups*, Imperial College London
- 2001 **MSc thesis:** *Reductive algebraic groups and Tits systems*, University of Warwick

## Research visits

- 2025 SUSTech, Shenzhen, China (3 weeks)
- 2022 Caltech, USA (2 months); EPFL, Switzerland (2 months)  
Isaac Newton Institute, Cambridge (1 month)
- 2021 University of Padua, Italy (3 months)
- 2020 Isaac Newton Institute, Cambridge (6 weeks)
- 2019 SUSTech, Shenzhen, China (3 weeks); EPFL, Switzerland (1 week)
- 2017 EPFL, Switzerland (1 week)
- 2016 Bernoulli Center (EPFL), Switzerland (2 months)
- 2015 University of Auckland, New Zealand (3 weeks); EPFL, Switzerland (2 weeks)
- 2014 Universität Bielefeld, Germany (1 week); EPFL, Switzerland (3 weeks)
- 2013 EPFL, Switzerland (2 weeks); UWA, Australia (2 weeks)
- 2012 Ohio State University, USA (2 weeks); EPFL, Switzerland (1 week)
- 2011 Università degli Studi di Padova, Italy (1 week); UWA, Australia (3 weeks)
- 2010 EPFL, Switzerland (2 weeks)
- 2009 ETHZ, Switzerland (1 week); Isaac Newton Institute, Cambridge (1 month)
- 2008 University of Auckland, NZ (4 months); University of Canterbury, NZ (2 weeks)  
Caltech, USA (1 month); UWA, Australia (3 months); University of Helsinki (1 week)
- 2007 EPFL, Switzerland (3 months)
- 2005 EPFL, Switzerland (2 months)

## Conference organisation

- 2023 *CMI-HIMR Summer School: Probabilistic Group Theory*, University of Bristol

- 2014-19 LMS Triangle meetings: *Groups and their applications*  
 2018 *Simple Groups: New Perspectives and Applications*, University of Bristol  
 2017 *Permutation groups and related topics*, Universität Bielefeld, Germany  
 2016 Branching problems for reductive groups, Institut Mittag-Leffler, Stockholm  
*British Mathematical Colloquium*, University of Bristol (Algebra Workshop)  
 2015 *Simple groups, representations and related topics*, University of Cambridge

## Conference invitations

- 2024 *Groups and Representation Theory in Lausanne*, EPFL, Switzerland  
*Topics in Group Theory*, University of Padua, Italy  
*Groups in Florence IV*, University of Florence, Italy  
*New Perspectives in Computational Group Theory*, University of Warwick  
*British Mathematical Colloquium*, University of Manchester
- 2023 *Group Theory and Number Theory: Interactions*, Princeton University, USA  
*Northern Group Theory conference*, Bielefeld University, Germany
- 2022 *Simple Groups, Representations and Applications*, Isaac Newton Institute, Cambridge  
*14th Iranian Group Theory Conference*, Tehran, Iran [online]
- 2021 *Totally Disconnected Locally Compact Groups via Group Actions*, Banff, Canada [online]  
*Graphs and Groups, Geometries and GAP*, Rogla, Slovenia [online]
- 2020 *Interactions between group theory, number theory, combinatorics and geometry*, Isaac Newton Institute, Cambridge
- 2019 *Groups and Geometries*, BIRS, Banff, Canada
- 2018 *Groups, Geometry and Representations*, Oxford  
*British Mathematical Colloquium*, University of St Andrews
- 2017 *Topics on Groups and their Representations*, Lake Garda, Italy  
*Groups St Andrews*, University of Birmingham  
*Groups and Combinatorics*, Sobolev Institute, Novosibirsk, Russia
- 2016 *Permutation Groups*, BIRS, Banff, Canada  
*Some Problems in the Theory of Finite Simple Groups*, EPFL, Switzerland  
*Algebraic Combinatorics and Group Actions*, Herstmonceux Castle, Sussex  
*Postgraduate Group Theory Conference*, Imperial College
- 2015 *Groups and Geometries*, BIRS, Banff, Canada
- 2014 *Young Algebraists' Conference*, EPFL, Switzerland  
*British Mathematical Colloquium*, QMUL, London
- 2013 *Permutation Groups*, BIRS, Banff, Canada  
*International Conference on Group Theory*, Novosibirsk, Russia
- 2012 *Groups and Geometries*, BIRS, Banff, Canada
- 2009 *Permutation groups*, BIRS, Banff, Canada  
*Algebraic Lie theory*, Isaac Newton Institute, Cambridge
- 2008 *Infinite Groups and Related Topics*, University of Edinburgh
- 2007 *Nikolaus Conference*, RWTH Aachen, Germany  
*Permutation groups*, Oberwolfach, Germany
- 2004 *Groups and Representations*, University of Oregon, USA

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## Seminars

- 2024 Warwick (colloquium talk); Imperial College
- 2023 Xiamen (China); Warwick; SUSTech (China)
- 2022 Bielefeld (Germany); Rutgers (USA); Cambridge; Birmingham; UWA (Australia); York
- 2021 Padua (Italy; 5 seminars)
- 2020 York
- 2019 SUSTech (China); EPFL (Switzerland); Warwick; Manchester; South Wales
- 2018 Bristol; Cambridge
- 2017 Aberdeen; Southampton
- 2016 City
- 2015 Auckland (NZ); EPFL (Switzerland); Birmingham; Oxford; St Andrews; Bristol
- 2014 Bielefeld (Germany); Louvain (Belgium)
- 2013 UWA (Australia); Bristol; Cambridge; Lancaster; York; Exeter
- 2012 Ohio State (USA); RHUL; Imperial; Birmingham
- 2011 UWA (Australia); Padua (Italy); Cambridge
- 2010 EPFL (Switzerland)
- 2009 ETHZ (Switzerland); Bristol; Oxford; Birmingham
- 2008 Auckland (NZ); Canterbury (NZ); UWA (Australia); USC (USA); Helsinki (Finland); York; Southampton; QMUL
- 2007 ETHZ (Switzerland); EPFL (Switzerland)
- 2006 Hebrew University of Jerusalem (Israel); Birmingham; Cambridge; RHUL
- 2004 Oxford; QMUL

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## Postdoctoral mentoring

- Jack Saunders, since 10/2023
- Justin McInroy, 10/2013–08/2022
- Dan Fretwell, 07/2021–04/2022
- Alex Malcolm, 10/2017–06/2021
- James Williams, 10/2019–05/2021
- Adam Thomas, 10/2015–08/2018
- Jason Semeraro, 10/2013–08/2016
- Simon Guest, 02/2012–07/2013
- Eleonora Crestani, 02/2012–08/2012

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## PhD supervision

- Current Marina Anagnostopoulou-Merkouri, since 08/2023  
Hongyi Huang, since 01/2021
- Former Emily Hall, since 10/2019–08/2023, *Almost elusive permutation groups*  
Scott Harper, 10/2015–05/2019, *On the spread of classical groups*  
Elisa Covato, 10/2013–05/2018, *The involution fixity of simple groups*  
Raffaele Rainone, 10/2010–03/2014, *Geometric actions of classical algebraic groups*

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## Teaching (last five years)

- 2024/25 *Algebra 2*: Year 2, 36 lectures

- Analysis*: Year 1, 24 tutorials  
 MSci project student: J. Gidney  
 3rd year project students: K. Chen, R. de Caires, K. Stone
- 2023/24 *Algebra 2*: Year 2, 36 lectures  
*Introduction to Group Theory*: Year 1, 18 tutorials  
 3rd year project students: W. Cleeves, N. Bhamrah Harley, S. Roach
- 2022/23 *Representation Theory*: Year 4, 36 lectures  
*Algebra 2*: Year 2, 36 lectures  
 MSci project student: M. Saflekos  
 MSc thesis supervision: Juliet Treip
- 2021/22 Sabbatical
- 2020/21 *Representation Theory*: Year 4, 36 lectures  
 MSci project students: J. Delitroz, O. Desbruslais, S. Gates, M. Turner

## Professional activities

- Co-Editor-in-Chief, *Journal of Group Theory* (since 08/2022)  
 Editor, *Journal of Algebra* (since 08/2021)  
 Editor, *London Mathematical Society Student Texts* (since 10/2017)  
 Managing Editor, *Journal of Group Theory* (01/2020–07/2022)  
 Editor, *Journal of Group Theory* (01/2015–12/2019)
- Referee for dozens of journals, publishers and research funders (since 2003)  
 Reviewer for *AMS Mathematical Reviews* (100 reviews, 2003–2020)
- Member of the *London Mathematical Society* (since 01/2009)  
 Fellow of the *UK Higher Education Academy* (since 01/2012)
- External PhD examiner: Auckland (2021); Imperial College (2020); Warwick (2017); EPFL (2015); Birmingham (2013); Padua (2013)
- MSc Mathematical Sciences external assessor (York, 2017)

## University service (last five years)

- Director of the Institute for Pure Mathematics (since 08/2022)  
 Associate Chair of the Heilbronn Institute for Mathematical Research (08/2018–07/2021)  
 University Research Staff Working Party (2019/20)  
 Postgraduate Admissions Tutor (01/2015–07/2018)  
 University Open Day presentations (2016–2019; 2023–2024)
- 2023 Chair of Pure Mathematics Curriculum Review Committee  
 Interview panel member, Lectureship in Mathematics  
 Interview panel member, Heilbronn Research Professorship  
 Interview panel member, Professorship in Pure Mathematics  
 Interview panel member, Lectureship in Mathematics
- 2020 Interview panel member, Heilbronn Chair in Data Science  
 Interview panel member, Lectureship in Pure Mathematics
- 2019 Chair of Search Committee (Chair of HIMR)  
 Search Committee member (Head of School of Mathematics)

2018 EPSRC CDT bid team member

2016 Curriculum Review Committee

2014 Two *Numberphile* videos on the Monster group (May 2014; ~850,000 views)

[www.youtube.com/watch?v=jsSeoGpiWsw](http://www.youtube.com/watch?v=jsSeoGpiWsw)

[www.youtube.com/watch?v=MXKiih4JJvQ](http://www.youtube.com/watch?v=MXKiih4JJvQ)