

# ANIMESH MUKHERJEE

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## PERMANENT ADDRESS

Flat B-5, South-East,  
404 Maharani Indira Devi Road,  
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## PRESENT ADDRESS

**Office:** Room 337, ISI Foundation  
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## PERSONAL DETAILS

Gender: Male  
Date of birth: 21<sup>st</sup> December, 1979  
Place of birth: Kolkata, India  
Present Citizenship: Indian  
Father's Name: Shri Kumaresh Mukherjee  
Mother's Name: Shrimati Seema Mukherjee  
Wife's Name: Shrimati Soumita Mukherjee

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## EDUCATION

- 10/2009–present Post Doctoral Researcher, Complex Systems Lagrange Lab,  
ISI Foundation, Torino, Italy.
- 08/2005–07/2009 PhD from the Department of Computer Science and Engi-  
neering. Indian Institute of Technology, Kharagpur, India.  
(Defended on Dec. 14, 2009).
- 07/2003–05/2005 Master of Technology in Computer Science and Engineer-  
ing. Indian Institute of Technology, Kharagpur, India. GPA:  
*9.43/10*
- 09/1999–06/2003 Bachelor of Technology in Computer Science and Engineer-  
ing. Haldia Institute of Technology, Haldia, India. Aggre-  
gate %: *89.8*

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|------|---|
| 1999 | Indian School Certificate Examination. Vivekananda Mission School, Joka, India. Aggregate %: 87             |
| 1997 | Indian Council of Secondary Education Examination. Vivekananda Mission School, Joka, India. Aggregate %: 89 |

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## ACADEMIC ACHIEVEMENTS

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| 01/08–04/08   | Research internship at Microsoft Research India.   |
| 05/06 onwards | <i>Microsoft Research Fellowship.</i>  |
| 03/06–05/06   | <i>AICTE National Doctoral Fellowship.</i>   |
| 01/06         | <i>Young Scientist Award</i> from Indian Science Congress Association (ISCA). The award was delivered by the Hon'ble President of India. |
| 05/05         | Ranked 4 <sup>th</sup> in MTech.   |
| 03/03         | Ranked 83 <sup>rd</sup> (among 50000 others all over India) in GATE with a percentile of 99.76.  |
| 03/03         | Ranked 1 <sup>st</sup> in BTech (Gold Medal Awarded).  |

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## RESEARCH INTERESTS

Use complex network theory and multi-agent based simulation techniques to understand various cognitive and social aspects of language like perception, evolution and change. Subsequently, apply such theoretical knowledge to devise various engineering solutions related to Natural Language Processing. In parallel, develop various theoretical models to enrich the emerging field of complex network theory.

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## SELECTED PUBLICATIONS

### Book

- Ganguly, N., Deutsch, A., and **Mukherjee, A.** (eds.). (2009). *Dynamics on and of Complex Networks: Applications to Biology, Computer Science, Economics, and the Social Sciences*, Birkhauser, Springer, Boston, ISBN: 978-0-8176-4750-6.

### Journals

- **Mukherjee, A.**, Choudhury, M. and Ganguly, N. (20XX). Understanding how both the partitions of a bipartite network affect its one-mode projection. *Physica A: Statistical Mechanics and its Applications*, (*in press*).
- **Mukherjee, A.**, Tria, F., Baronchelli, A., Puglisi, A. and Loreto, V. (2011). Aging in language dynamics. *PLoS ONE*, **6**(2): e16677.

- Choudhury, M., Ganguly, N., Maiti, A., **Mukherjee, A.**, Bruschi, L., Deutsch, A. and Peruani, F. (2010). Modeling Discrete Combinatorial Systems as Alphabetic Bipartite Networks: Theory and Applications. *Phys. Rev. E* **81**, 036103 *preprint: <http://arxiv.org/abs/0811.0499>*.
- **Mukherjee, A.**, Choudhury, M., RoyChowdhury, S., Basu, A. and Ganguly, N. (2008). Rediscovering the Co-occurrence Principles of the Vowel Inventories: A Complex Network Approach. *Advances in Complex Systems*, **11**(3), 371–392.
- Peruani, F., Choudhury, M., **Mukherjee, A.** and Ganguly, N. (2007). Emergence of a Non-scaling Degree Distribution in Bipartite Networks: a numerical and analytical study. *Euro. Phys. Letters*, **79**(2), 28001.
- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2007). Modeling the Co-occurrence Principles of the Consonant Inventories: A Complex Network Approach. *Int. Jour. of Modern Phy. C*, **18**(2), 281–295.

## Conferences

- Choudhury, M., Chatterjee, D., and **Mukherjee, A.** (2010). Global topology of word co-occurrence networks: Beyond the two-regime power-law, *In the proceedings of COLING-10*, Beijing, China.
- Biemann, C., Choudhury, M., and **Mukherjee, A.** (2009). Syntax is from Mars while Semantics from Venus! Insights from Spectral Analysis of Distributional Similarity Networks, *In the proceedings of ACL-09* (short paper), Suntec, Singapore.
- **Mukherjee, A.**, Choudhury, M., and Kannan, R. (2009). Discovering Global Patterns in Linguistic Networks through Spectral Analysis: A Case Study of the Consonant Inventories, *In the proceedings of EACL-09*, Athens, Greece.
- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2008). Modeling the Structure and Dynamics of the Consonant Inventories: A Complex Network Approach, *In the proceedings of COLING-08*, Manchester, UK.
- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2007). Redundancy ratio: An Invariant Property of the Consonant Inventories of the World’s Languages. *In the Proceedings of ACL-07*, Prague, Czech Republic, 104–111.

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## SCIENTIFIC RESPONSIBILITIES

*Editor* – Special issue of *Computer Speech and Language*, Elsevier on “Network based Models of Cognitive and Social Dynamics of Language”; Book volume on Dynamics on and of Complex Networks: Applications to Biology, Computer Science, Economics, and the Social Sciences.

*Referee* – Journal of Phonetics, Elsevier, Advances in Complex Systems, World Scientific.

*Co-Organizer* – Dynamics on and of Complex Networks – V, (In conjunction with the European Conference on Complex Systems – ECCS 2011), Vienna, Austria; Dynamics on and of Complex Networks – IV, (In conjunction with the European Conference on Complex Systems – ECCS 2010), Lisbon, Portugal; TextGraphs-4: Graph-based Methods for Natural Language Processing (In conjunction with the 47<sup>th</sup> Annual Meeting of the Association for Computational Linguistics and the 4<sup>th</sup> International Joint Conference on Natural Language Processing – ACL/IJCNLP), Singapore.

*Member Program Committee* – TextGraphs-6, (In conjunction with the 49<sup>th</sup> Annual Meeting of the Association for Computational Linguistics: Human Language Technologies – ACL HLT), 23<sup>rd</sup> International Conference on Computational Linguistics – COLING), Beijing, China (Area: Semantics); TextGraphs-5, (In conjunction with the 48<sup>th</sup> Annual Meeting of the Association for Computational Linguistics – ACL), Uppsala, Sweden; 7<sup>th</sup> International Conference on Language Resources and Evaluation (LREC), Valletta, Malta; TextGraphs-3 (In conjunction with the 22<sup>nd</sup> International Conference on Computational Linguistics – COLING), Manchester, United Kingdom; Dynamics On and Of Complex Networks: A Satellite Workshop of the 4<sup>th</sup> European Conference on Complex Systems (ECCS), Dresden, Germany.

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#### TRAVEL ASSISTANCE

|       |  |
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| 03/09 | Partial travel grant from IARCS (Indian Association for Research in Computing Science) for visiting EACL 2009. |
| 03/09 | Partial travel grant from Microsoft Research India for visiting EACL 2009.                                     |
| 03/09 | Partial travel grant from the department for visiting EACL 2009.   |
| 09/08 | Institute travel grant for visiting ECCS 2008.   |
| 09/08 | Full financial support by ISI Foundation, Italy for attending the Fourth European Complexity PhD School 2008.  |
| 06/07 | Don and Betty Walker International Student Grant for visiting ACL 2007.  |

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#### SEMINARS, SUMMER SCHOOLS AND CONFERENCES ATTENDED

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| 12/09 | Visiting Researcher, Microsoft Research India, Bangalore  |
| 04/09 | 12 <sup>th</sup> Meeting of the European Chapter of the Association for Computational Linguistics (EACL), Athens, Greece. |

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| 09/08 | Fifth European Conference on Complex Systems, Jerusalem, Israel.  |
| 09/08 | Fourth European Complexity PhD School, Jerusalem, Israel.   |
| 10/07 | Fourth European Conference on Complex Systems, Dresden, Germany.  |
| 07/07 | Statistical Physics of Social Dynamics: Opinions, Semiotic Dynamics, and Language, Erice, Sicily, Italy.        |
| 07/07 | Technical University of Dresden, Dresden, Germany.  |
| 06/07 | 45 <sup>th</sup> Annual Meeting of the Association for Computational Linguistics (ACL), Prague, Czech Republic. |
| 01/07 | International Joint Conference on Artificial Intelligence (IJ-CAI), Hyderabad, India.                           |
| 05/06 | Microsoft Summer School on “Algorithms, Complexity and Cryptology”, IISC Bangalore.                             |
| 02/06 | International Conference on Computer Processing of Bangla (ICCPB), Dhaka, Bangladesh.                           |
| 01/06 | 93 <sup>rd</sup> Indian Science Congress, Hyderabad, India.   |
| 12/04 | International Conference on Human Machine Interfaces (ICHMI), Bangalore, India.                                 |

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## ALL PUBLICATIONS

### Thesis

- **Mukherjee, A.** (2009). *Self-Organization of Speech Sound Inventories in the Framework of Complex Networks*, Doctoral Thesis, Indian Institute of Technology, Kharagpur.

### Book

- Choudhury, M., Hassan, S., **Mukherjee, A.** and Muresan, S. (eds.). (2010). *Special issue on Network Models for Cognitive and Social Dynamics of Language, Computer Speech and Language*, **25**(3).
- Ganguly, N., Deutsch, A., and **Mukherjee, A.** (eds.). (2009). *Dynamics on and of Complex Networks: Applications to Biology, Computer Science, Economics, and the Social Sciences*, Birkhauser, Springer, Boston, ISBN: 978-0-8176-4750-6.

### Journals and Book Chapters

- **Mukherjee, A.**, Choudhury, M. and Ganguly, N. (20XX). Understanding how both the partitions of a bipartite network affect its one-mode projection. *Physica A: Statistical Mechanics and its Applications*, (*in press*).

- **Mukherjee, A.**, Choudhury, M., Ganguly, N. and Basu, A. (20XX). Language Dynamics in the Framework of Complex Networks: A Case Study on Self-organization of the Consonant Inventories. In *Cognitive Aspects of Computational Language Acquisition*, Poibeau, T., Villavicencio, A., Korhonen, A. and Alishahi, A. (eds.), Springer (*in press*).
- Ghosh, S., Banerjee, A., Sharma, N., Agarwal, S., Ganguly, N., Bhattacharya, S. and **Mukherjee, A.** (2011). Statistical Analysis of the Indian Railway Network: A Complex Network Approach, *Acta Physica Polonica B Proceedings Supplement*, **4**(2), 123–137.
- Loreto, V., Baronchelli, A., **Mukherjee, A.**, Puglisi, A. and Tria, F. (2011). Statistical physics of language dynamics, *Journal of Statistical Mechanics: Theory and Experiment*, P04006.
- **Mukherjee, A.**, Tria, F., Baronchelli, A., Puglisi, A. and Loreto, V. (2011). Aging in language dynamics. *PLoS ONE*, **6**(2): e16677.
- Choudhury, M., Ganguly, N., Maiti, A., **Mukherjee, A.**, Bruschi, L., Deutsch, A. and Peruani, F. (2010). Modeling Discrete Combinatorial Systems as Alphabetic Bipartite Networks: Theory and Applications. *Phys. Rev. E* **81**, 036103 *preprint: <http://arxiv.org/abs/0811.0499>*.
- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2010). Modeling the Redundancy of Human Speech Sound Inventories: An Information Theoretic Approach. *Journal of Quantitative Linguistics*, **17**(4), 317–343.
- Pal, R., **Mukherjee, A.**, Mitra, P., and Mukherjee, J. (2010). Modelling Visual Saliency Using Degree Centrality. *IET Computer Vision*, **4**(3), 218–229.
- Choudhury, M. and **Mukherjee, A.** (2009). The Structure and Dynamics of Linguistic Networks. In *Dynamics on and of Complex Networks: Applications to Biology, Computer Science, Economics, and the Social Sciences*, Ganguly, N., Deutsch, A., and Mukherjee, A. (eds.), Birkhauser, Springer, Boston, ISBN: 978-0-8176-4750-6.
- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2009). Self-organization of Sound Inventories: Analysis and Synthesis of the Occurrence and Co-occurrence Network of Consonants. *Journal of Quantitative Linguistics* **16**(2), 157–184.
- **Mukherjee, A.**, Choudhury, M., RoyChowdhury, S., Basu, A. and Ganguly, N. (2008). Rediscovering the Co-occurrence Principles of the Vowel Inventories: A Complex Network Approach. *Advances in Complex Systems*, **11**(3), 371–392.
- **Mukherjee, A.**, Chakraborty, K. and Basu, A. (2008). An Adaptive Virtual Mouse for People with Neuro-Motor Disorders. *Assistive Technology Journal of the Rehabilitation Engineering Society of North America*, **20**(2), 111–124.

- Choudhury, M., Saraf, R., Jain, V., **Mukherjee, A.**, Sarkar, S. and Basu, A. (2007). Investigation and Modeling of the Structure of Texting Language. Special Issue of the *International Journal of Document Analysis and Recognition on Noisy Text Analytics*, Springer, **10**(3-4), 157–174.
- Peruani, F., Choudhury, M., **Mukherjee, A.** and Ganguly, N. (2007). Emergence of a Non-scaling Degree Distribution in Bipartite Networks: a numerical and analytical study. *Euro. Phys. Letters*, **79**(2), 28001.
- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2007). Modeling the Co-occurrence Principles of the Consonant Inventories: A Complex Network Approach. *Int. Jour. of Modern Phy. C*, **18**(2), 281–295.
- Mukhopadhyay, D., **Mukherjee, A.**, Ghosh, S., Chakraborty, P. and Biswas, S. (2005). A New Approach for Message Hiding in Steganography and Audio Hiding using Substitution Technique. *Journal of The Institution of Engineers, Computer Engineering Division*, India, Vol. 86, November 2005, 41–44.

### Conferences

- Choudhury, M., Chatterjee, D., and **Mukherjee, A.** (2010). Global topology of word co-occurrence networks: Beyond the two-regime power-law, *In the proceedings of COLING-10*, Beijing, China.
- **Mukherjee, A.**, Baronchelli, A., Loreto, V., Puglisi, A. and Tria, F. (2010). Ageing in the Emergence of Linguistic Categories, *ALIFE XII*, (abstract), Odense, Denmark.
- Choudhury, M. and **Mukherjee, A.** (2010). Computational Modeling of Language Evolution: Gaps and Challenges, workshop on *Mathematical Models of Language Evolution: Does the Math Add Up?*, *Evolang-10*, (abstract), Utrecht, The Netherlands.
- Biemann, C., Choudhury, M., and **Mukherjee, A.** (2009). Syntax is from Mars while Semantics from Venus! Insights from Spectral Analysis of Distributional Similarity Networks, *In the proceedings of ACL-09* (short paper), Suntec, Singapore.
- **Mukherjee, A.**, Choudhury, M., and Kannan, R. (2009). Discovering Global Patterns in Linguistic Networks through Spectral Analysis: A Case Study of the Consonant Inventories, *In the proceedings of EACL-09*, Athens, Greece.
- Choudhury, M., **Mukherjee, A.**, Garg, A., Jalan, V., Basu, A., and Ganguly, N. (2009). Language Diversity across the Consonant Inventories: A Study in the Framework of Complex Networks, workshop on *Cognitive Aspects of Computational Language Acquisition*, *EACL-09*, Athens, Greece.
- Bhowmick, P. K., **Mukherjee, A.**, Banik, A., Mitra, P., and Basu, A. (2008). A Comparative Study of the Properties of Emotional and Non-Emotional Words in the Wordnet: A Complex Network Approach, *In the proceedings of ICON-08* (poster session), Pune, India.

- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2008). Modeling the Structure and Dynamics of the Consonant Inventories: A Complex Network Approach , *In the proceedings of COLING-08*, Manchester, UK.
- Nath, J., Choudhury, M., **Mukherjee, A.**, Biemann, C., and Ganguly, N. (2008). Unsupervised Parts-of-Speech Induction for Bengali, *LREC'08*, Morocco, Marrakech.
- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2007). Redundancy ratio: An Invariant Property of the Consonant Inventories of the World's Languages. *In the Proceedings of ACL'07*, Prague, Czech Republic, 104–111.
- **Mukherjee, A.**, Choudhury, M., Basu, A. and Ganguly, N. (2007). Emergence of Community Structures in Vowel Inventories: An Analysis based on Complex Networks. *In the Proceedings of ACL SIGMORPHON9*, Prague, Czech Republic, 101–108.
- Gupta, A., **Mukherjee, A.**, Chakraborty, S., and Basu, A. (2007). Mapping Graphical User Interfaces to Scanning Mechanisms: A Fuzzy Approach. *In the proceedings of AACCC(07)*, Kathmandu, Nepal.
- Choudhury, M., Thomas, M., **Mukherjee, A.**, Basu, A. and Ganguly, N. How difficult is it to develop a perfect spell-checker? A Cross-linguistic Analysis through Complex Network Approach. (2007). *In Proceedings of HLT-NAACL Workshop - TextGraphs 2*, Rochester, NY, USA, 81–88.
- Choudhury, M., **Mukherjee, A.**, Basu, A., and Ganguly, N. (2006). Analysis and Synthesis of the Distribution of Consonants over Languages: A Complex Network Approach. *In Proceedings of COLING-ACL (2006)*, Sydney, Australia.
- **Mukherjee, A.**, and Basu, A. (2006). A Bangla Predictive Keyboard for people with Neuro-Motor Disorders. *Proceedings of the International Conference on Computer Processing of Bangla (ICCPB 2006)*, Dhaka, Bangladesh.
- **Mukherjee, A.**, Bhattacharya, T., Chakraborty, K., and Basu, A. (2005). An Intelligent Tutoring System In Promotion of Bangla Literacy in the Rural Scenario. *In Proceedings of the National Conference on Computer Processing of Bangla (NCCPB 2005)*, Dhaka, Bangladesh.
- **Mukherjee, A.**, Bhattacharya, S., Halder, P. K., and Basu, A. (2005), A Virtual Predictive Keyboard as a Learning Aid for People with Neuro-Motor Disorders. *In Proceedings of the 5th IEEE Conference on Advanced Learning Technologies, (ICALT 2005)*, Kaohsiung, Taiwan.
- **Mukherjee, A.**, Bhattacharya, S., Chakraborty, K., and Basu, A. (2004). Breaking the Accessibility Barrier: Development of Special Computer Access Mechanisms for the Neuro-Motor Disabled in India. *In Proceedings of the International Conference on Human Machine Interfaces - 2004 (ICHMI 2004)*, Bangalore, India.

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## EXTRA ACHIEVEMENTS

*Invited Talk* – Max Planck Institute of Evolutionary Anthropology, Leipzig, Germany. Topic: Self-organization of Sound Inventories.

*Tutorial* – International Joint Conference on Natural Language Processing (IJCNLP), Hyderabad, India. Topic: Social Network inspired Models of NLP and Language Evolution.

Name included in the 2009 edition of Marquis Who's Who in the World.

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## REFERENCES

- **Anupam Basu**  
Professor  
Department of Computer Science and Engineering,  
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- **Ravi Kannan**  
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- **Bidyut Baran Chaudhuri**  
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and  
Research Scientist  
Complex Systems Lagrange Lab,  
ISI Foundation, Torino, Italy – 10133.  
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Torino, Italy, June 6, 2011