



Dr. Mark Changizi

Columbus, OH 43215

mchangizi@gmail.com

<http://www.changizi.com>

<http://www.humanfactorylab.com/>

<https://www.linkedin.com/in/changizi/>

WORK

2010 - PRESENT: **2ai Labs, Institute for Human and Machine Cognition** / VP R&D, OH

2010 - PRESENT: **VINO OPTICS** / Founder & CEO, OH

2009 - PRESENT: **Human Factory** / Founder & CEO, OH

2016 - 2019: **Yamaha** / Augmented Reality & HMI Consultant, CA

2014 - 2017: **MONA Museum** / Guest Scientist, Human-Tech Interface Curator, AU

2007-2010: **Department of Cognitive Science, RPI** / Assistant Professor, NY

2002 - 2006: **Caltech** / Sloan-Swartz Fellow in Theoretical Neurobiology, CA

1999 - 2002: **Department of Neuroscience, Duke** / Postdoctoral Fellow, NC

1998 - 1999: **Schafer Corporation** / Neurotechnology Researcher, VA

1997 - 1998: **Dept Computer Science, University College Cork** / Asst Professor, IR

1989 - 1997: **Misc Teaching / Research Positions while undergrad / grad**

- 1993-1997. Theoretical neuroscience research, w/ Dr. Cherniak, U Maryland
- 1996-1997. Teaching assistant for calculus, U Maryland
- 1994-1997. Lecturer for logic, and also education-major math, U Maryland
- 1992-1995. Lab teacher, physics and astronomy, George Mason University
- 1991. Post-graduate researcher, Fly's Eye, University of Utah
- 1990-1991. Undergraduate researcher for SLAC
- 1990. Undergraduate researcher at FermiLab, Experiment 771
- 1989. Undergraduate researcher in physics lab, Prof. Deaner, UVA

EDUCATION

University of Maryland / PhD, Applied Mathematics 1992 - 1997, College Park, MD

University of Virginia / Bachelor of Science, Physics and Math 1987 - 1991, Charlottesville, VA

Thomas Jefferson High School for Science and Technology / Diploma 1986 - 1987, Alexandria, VA

BOOKS

- *THE POKER ORIGINS OF EMOTIONAL EXPRESSIONS: How We Know When to Hold, Fight, or Fold.* Benbella, 2021. w/ Tim Barber.
- *ON THE ORIGIN OF ART, MONA,* 2016. w/ Steven Pinker, Geoffry Miller, Brian Boyd.
- *HUMAN 3.0: What's Next, After Humans.* Self-published, 2012.
- *HARNESSED: How Language and Music Mimicked Nature and Transformed Ape to Man.* Benbella, 2011. Translated into Japanese and Korean.
 - "...this book might hold the key to one of humanity's longstanding mysteries..." Stanislas Dehaene, author of *Reading in the Brain*
 - "I'd be amazed if everything he says is right; but at this point I'd be even more surprised if his main ideas, which crack open riddles that have annoyed me for years, aren't on the right track." Frank Wilczek, Recipient, Nobel Prize in Physics, 2004
 - "Top 10 Books of 2011" New Scientist.
- *VISION rEVOLUTION* Benbella, 2009. Translated into German, Russian, Japanese, Korean and Chinese.
 - "...one of the best works of theoretical vision science since Gibson," Dan Simons, author, *The Invisible Gorilla.*
 - "...a book full of invention and originality..." -- Peter Lucas, Professor of Anthropology.
 - Glowing review in the [Wall Street Journal](#).
- *BRAIN FROM 25000 FEET* Kluwer, 2003.

GRANTS

- 2008. The Class of 1951 Outstanding Teaching Development Grant. Topic: Visual circuits: A novel notation system for undergraduate education of digital circuits and propositional logic. Amount: Partial summer salary, student funds and miscellaneous expenses.
- 2004-2007. NIH Ruth L. Kirschstein National Research Service Award (NRSA) Postdoctoral Fellowship. Topic: Perceiving-the-present: A general theory of illusions. Amount: Three year grant, funding full salary and miscellaneous expenses. [1 F32 EY015370-01]
- 2002-2004. Sloan-Swartz Fellowship. Topic: Theoretical neurobiology. Amount: Two year grant, funding partial salary and miscellaneous expenses.

SAMPLE APPEARANCES

- CBC / Living Colour, 2019
- Mind Field, YouTube Premium / [Color and VINO OPTICS tech](#), 2017
- Head Games, Discovery Channel / [Head Games on MSNBC](#), 2016
- TEDxSaintThomas / [Colorblindness and Health-Blindness](#), 2015
- TED / [Why We See Illusions](#), 2013
- TED / [Prune Fingers: A Gripping Story](#), 2013
- Brain Games, National Geographic / [Illusions](#), 2013

ARTICLES

Suegami T, Wu D, Changizi M, Shimojo S (2019) Auditory Cue Suppresses Visual Detection in Extreme-Periphery. *Perception* 48 (S1): 129.

Suegami T, Berger CC, Daw-An J, Changizi M, Shimojo S (2019) Vision in the extreme-periphery (2): Concurrent auditory stimuli degrade visual detection. *Journal of Vision*. 2019 Sep 6;19(10):19c-.

Changizi MA, Brucksch M, Kotecha R, McDonald K, Rio K (2013) Ecological warnings. *Safety Science* 61: 36-42.

Changizi MA, Weber R, Kotecha R & Palazzo J (2011) Are Wet-Induced Wrinkled Fingers Primate Rain Treads? *Brain, Behavior and Evolution* 77: 286-290.

Changizi MA (2010) Neuroscientist's embarrassment: Artificial Intelligence's opportunity. *Brain, Behavior and Evolution* 75: 85

Changizi MA & Rio K (2009) Harnessing color vision for visual oximetry in central cyanosis, *Medical Hypotheses* 74: 87-91.

Changizi MA & Destefano M (2009) Common scaling laws for city highway systems and the mammalian neocortex. *Complexity* 15: 11-18.

Changizi MA & Shimojo S (2009) Response to H.C. Howland, "Orbital orientation is not visual orientation." *Journal of Theoretical Biology* 257: 524-525.

Changizi MA & Shimojo S (2008) A functional explanation for the effects of visual exposure on preference. *Perception* 37: 1510-1519.

Changizi MA (2008) The trade-off between speed and complexity. Commentary on Nijhawan R, Visual Prediction: Psychophysics and neurophysiology of compensation for time delays. *Behavioral and Brain Sciences* 31: 203.

Changizi MA & Shimojo S (2008) "X-ray vision" and the evolution of forward-facing eyes. *Journal of Theoretical Biology* 254: 756-767.

Changizi MA (2008) Harnessing vision for computation. *Perception* 37: 1131-1134.

Changizi MA (2008) Economically organized hierarchies in WordNet and the Oxford English Dictionary. *Journal of Cognitive Systems Research* 9: 214-228.

Changizi MA, Hsieh A, Nijhawan R, Kanai R & Shimojo S (2008) Perceiving-the-present and a systematization of illusions. *Cognitive Science* 32: 459-503.

Changizi MA (2006) The optimal human ventral stream from estimates of the complexity of visual objects. *Biological Cybernetics* 94: 415-426.

Changizi MA, Zhang Q & Shimojo S (2006) Bare skin, blood, and the evolution of primate color vision. *Biology Letters* 2: 217-221.

Changizi MA, Zhang Q, Ye H & Shimojo S (2006) The structures of letters and symbols throughout human history are selected to match those found in objects in natural scenes. *The American Naturalist* 167: E117-E139.

Changizi MA & He D (2005) Four correlates of complex behavioral networks: differentiation, behavior, connectivity and compartmentalization. *Complexity* 10: 13-40.

Changizi MA & Shimojo S (2005) Parcellation and area-area connectivity as a function of neocortex size. *Brain, Behavior and Evolution* 66: 88-98.

Changizi MA & Shimojo S (2005) Character complexity and redundancy in writing systems over human history. *Proc Roy Soc Lond B* 272: 267-275.

Changizi MA (2003) The relationship between number of muscles, behavioral repertoire size, and encephalization in mammals. *Journal of Theoretical Biology* 220: 157-168.

McShea D & Changizi MA (2003) Three puzzles in hierarchical evolution. *Integrative and Comparative Biology* 43: 74-81.

Changizi MA, McDannald MA & Widders D (2002) Scaling of differentiation in networks: Nervous systems, organisms, ant colonies, ecosystems, businesses, universities, cities, electronic circuits, and Legos. *Journal of Theoretical Biology* 218: 215-237.

Changizi MA & Widders D (2002) Latency correction explains the classical geometrical illusions. *Perception* 31: 1241-1262.

Changizi MA, McGehee RMF & Hall WG (2002) Evidence that appetitive responses for dehydration and food-deprivation are learned. *Physiology and Behavior* 75: 295-304.

Changizi MA & Hall WG (2001) Thirst modulates a perception. *Perception* 30: 1489-1497.

Changizi MA (2001) 'Perceiving the present' as a framework for ecological explanations of the misperception of projected angle and angular size. *Perception* 30: 195-208.

Changizi MA (2001) Principles underlying mammalian neocortical scaling. *Biological Cybernetics* 84: 207-215.

Changizi MA (2001) Universal laws for hierarchical systems. *Comments on Theoretical Biology* 6: 25-75.

Changizi MA (2001) Universal scaling laws for hierarchical complexity in languages, organisms, behaviors and other combinatorial systems. *Journal of Theoretical Biology* 211: 277-295.

Changizi MA (2001) The economy of the shape of limbed animals. *Biological Cybernetics* 84: 23-29.

Changizi MA & Cherniak C (2000) Modeling the large-scale geometry of human coronary arteries. *Canadian J. of Physiol. and Pharmacol.* 78: 603-611.

Cherniak C, Changizi MA & Kang D (1999) Large-scale optimization of neuron arbors. *Physical Review E* 59: 6001-6009.

Changizi MA (1999) Vagueness, rationality and undecidability: A theory of why there is vagueness. *Synthese* 120: 345-374.

Changizi MA (1999) Vagueness and computation. *Acta Analytica* 14: 39-45.

Changizi MA & Barber T (1998) A paradigm-based solution to the riddle of induction. *Synthese* 117: 419-484.

Changizi MA (1997) Learning with natural imprecision. *Int. J. of Foundations of Computer Science* 8: 409-424.

Changizi MA (1996) Function identification from noisy data with recursive error bounds. *Erkenntnis* 45: 91-102.

Changizi MA (1996) Self-monitoring machines and an w^w -hierarchy of loops. *Information and Computation* 128: 127-138.

CONTRIBUTED CHAPTERS

Changizi MA & Shimojo S (2008) Social color vision. In R. B. Adams, Jr., N. Ambady, K. Nakayama & S. Shimojo (Eds.) *The Science of Social Vision*. New York, Oxford U. Press.

Shimojo S & Changizi MA (2008) Influence of gaze behavior on preference. In R. B. Adams, Jr., N. Ambady, K. Nakayama & S. Shimojo (Eds.) *The Science of Social Vision*. New York, Oxford U. Press.

Changizi MA, Hsieh A, Nijhawan R, Kanai R & Shimojo S (2007) Perceiving-the-present and a unified theory of illusions. In R. Nijhawan & B. Khurana (Eds.), *Problems of Space and Time in Perception and Action*. Cambridge, Cambridge U. Press.

Changizi MA (2009) Brain scaling laws. In Squire LR (ed.) *New Encyclopedia of Neuroscience*. Oxford, Academic Press.

Changizi MA (2007) Scaling the brain and its connections. In Kaas JH (ed.) *Evolution of Nervous Systems*. Oxford, Elsevier.

BOOK REVIEWS

Changizi MA (2009)

A review of Melanie Mitchell (2009) *Complexity: A Guided Tour*, Oxford University Press, Oxford.

The Quarterly Review of Biology.

Changizi MA (2003)

The politically correct monkey.

A review of Ian Tattersall (2002) *The Monkey in the Mirror*, Oxford University Press, Oxford.

Heredity 90: 278.

Changizi MA (2003)

Mathematica's first academic monograph.

A review of Stephen Wolfram (2002) *A New Kind of Science*, Wolfram Media, Champaign, IL.

Complexity 8(2): 63-65.

Changizi MA (2002)

The intricate process of implication.

A review of Mark C. Taylor (2001) *The Moment of Complexity*, The University of Chicago Press.

Complexity 7(3): 17-18.