

## **CURRICULUM VITAE**

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Last updated May 2019

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## **DEGREES AND POSITIONS**

2017- Full Professor, Dept. of Psychology and Neuroscience, Princeton University.  
2007-2017 Associate Professor, Dept. of Psychology, Princeton University.  
2001-2007 Assistant Professor, Dept. of Psychology, Princeton University.  
1998-2001 Research Staff, Princeton University.  
1996-1998 Post-Doctoral Fellow, Princeton University.  
1996 PhD in Neuroscience, Princeton University.  
1991-1996 Graduate student, Dept. of Psychology, Princeton University.  
1989-1991 Graduate student, Dept. of Brain and Cognitive Sciences, MIT.  
1989 BA, Princeton University.

## **INVITED LECTURES**

2019 TEDx Cornell  
2019 Colloquium speaker, Taipei, National University of Taiwan  
2019 Invited Speaker, NIH, Conference on Consciousness and Attention  
2018 Invited Speaker, Max Planck Symposium on Consciousness, Berlin  
2018 Keynote Speaker, European Society for Philosophy and Psychology, Rejika, Croatia  
2018 Invited Speaker, Trinity College, Dublin  
2018 Invited Speaker Chile Science Festival,  
2017 Keynote speaker, Designed Mind Conference, Edinburgh.  
2016 Colloquium speaker, Montreal  
2016 Invited speaker, Neurocom summer school, Leipzig.  
2016 Keynote speaker, ASSC, Buenos Aires.  
2016 Colloquium speaker, George Washington University.  
2016 Colloquium speaker, University College London.  
2015 Invited Speaker, Accessibility and Consciousness Conference, Paris.  
2015 Colloquium speaker, Neurospin, Paris.  
2015 Colloquium speaker, Harvard.  
2015 Invited lecture, Living Machines Workshop, Barcelona.  
2015 Invited lecture at Modeling Self on Others conference, Budapest.  
2015 Princeton Plasma Physics Laboratory, Science on Saturday public lecture.

2015 Colloquium speaker, Columbia University,  
2014 Colloquium speaker, El Colegio Nacional, Mexico.  
2014 Summer program in social neuroscience, Dartmouth  
2014 Sage Center, Santa Barbara CA, Distinguished Visitor and Speaker  
2014 Plenary Speaker, Toward a Science of Consciousness Conference, Tucson AZ  
2013 Colloquium speaker, Buffalo psychology department  
2012 Invited Speaker, Conference on Consciousness, Montreal  
2012 Colloquium speaker, NYU  
2012 Colloquium speaker, Rockefeller University, NYC  
2012 Colloquium speaker, Edmonton Canada  
2011 Colloquium speaker, Karolinska Institute, Stockholm  
2011 Invited Speaker, Conference on Vision, Rovereto Italy  
2011 Colloquium speaker, UCLA  
2011 Invited speaker, mini symposium, Stanford CA  
2010 Colloquium speaker, UC San Diego  
2010 Colloquium speaker, UC Berkeley  
2010 Keynote Speaker, Neuromechanics Symposium, University of Chicago  
2010 Colloquium speaker, City College of New York  
2009 Colloquium speaker, Rutgers  
2009 Keynote speaker, Motor Control Symposium, Chicago  
2008 Colloquium speaker, University of Chicago  
2008 Colloquium speaker, University of Lethbridge  
2008 Colloquium speaker, University of Pennsylvania  
2007 International Conference on Premotor Cortex, Leuven Belgium  
2007 International Neuroethology Conference, Vancouver Canada  
2007 Eleventh international conference on cognitive and neural systems, Boston  
2007 Colloquium speaker, University of Connecticut  
2006 Colloquium speaker, Columbia College, NY  
2006 Colloquium speaker, King's County College, NY  
2005 Neural Control of Movement, Florida  
2004 Colloquium speaker, Baylor College, Houston TX  
2004 Colloquium speaker, Max Plank Inst., Tubingen Germany  
2004 Idiomotor Apraxia Conference, Bethesda VA  
2004 Society for Neuroscience Mini-Symposium  
2004 Colloquium speaker, Stanford CA  
2004 Colloquium speaker, Birmingham Alabama  
2004 Cognitive Neuroscience Society Symposium, San Francisco  
2004 Colloquium speaker, Northwestern  
2003 Colloquium speaker, NYU  
2003 Colloquium speaker, Penn State  
2003 Progress in Motor Control IV, Caen, France  
2002 Colloquium speaker, Brandeis, MA  
2002 Attention in Action symposium, Birmingham, England  
2002 Colloquium speaker, Colombia University, New York, NY  
2002 Conference on Gain Fields, Munich Germany  
2002 AAAS symposium, Movement Control, Boston

- 2002 Conference on Body Representation, London
- 2001 Colloquium speaker, Johns Hopkins
- 2001 Conference on Neuromorphic Engineering, Telluride Co
- 2001 Sloan Speaker Series, Caltech
- 2001 Colloquium speaker, Salk Institute
- 2001 Colloquium speaker, MIT
- 2000 Colloquium speaker, Princeton University
- 2000 Colloquium speaker, University of Pennsylvania
- 2000 Invited speaker, Attention and Performance XVI
- 2000 Invited speaker, Conference on spatial processing, Monterey CA
- 2000 Invited Speaker, Spring Brain Conference, Sedona AZ
- 2000 Colloquium speaker, University of Rochester
- 2000 Colloquium speaker, Rowan College
- 2000 Invited Speaker, NIH
- 1999 Colloquium speaker, Baylor College
- 1999 Colloquium speaker, Rutgers College
- 1998 Colloquium speaker, University of Texas at Austin
- 1998 Invited Speaker, Conference on spatial processing, Duesseldorf Germany
- 1997 Colloquium speaker, Columbia University, NY
- 1997 Colloquium speaker, University of Buffalo
- 1997 Colloquium speaker, UC Irvine
- 1997 Invited speaker, conference on spatial processing, Bethesda
- 1996 Invited speaker, satellite symposium on spatial processing, Society for Neuroscience
- 1996 Invited speaker, neuroscience conference, Trieste Italy
- 1996 Invited speaker, neuroscience conference, Santorini Greece
- 1996 Invited speaker, neuroscience conference, University of Rochester
- 1996 Invited speaker, Neural Control of Movement conference, Florida
- 1995 Invited speaker, neuroscience conference, Ouyama Japan
- 1995 Invited speaker, neuroscience conference, Saproo Japan
- 1994 Invited speaker, Attention and Performance conference, Osaka Japan
- 1993 Invited speaker, Cognitive Neuroscience conference, Lake Tahoe

## **BOOKS**

### ***1. Books on neuroscience***

Graziano MSA (2019) *Rethinking Consciousness: A Scientific Theory of Subjective Experience*. W. W. Norton, New York.

Graziano MSA (2018) *The Spaces Between Us: A Story of Neuroscience, Evolution, and Human Nature*. Oxford University Press, Oxford UK.

Graziano MSA (2013) *Consciousness and the Social Brain*. Oxford University Press, Oxford UK.

Graziano MSA (2010) *God, Soul, Mind, Brain: A Neuroscientist's Reflections on the Spirit World*. Leapfrog Press, Teaticket MA.

Graziano MSA (2008) *The Intelligent Movement Machine: An Ethological Perspective on the Primate Motor System*. Oxford University Press, Oxford UK.

## **2. Novels**

Graziano MSA (2012) *Death My Own Way*. Leapfrog Press, Teaticket MA.

Graziano MSA (2009) *The Divine Farce*. Leapfrog Press, Teaticket MA.

Graziano MSA (2008) *The Love Song of Monkey*. Leapfrog Press, Teaticket MA.

## **3. Books for young readers (under the penname B. B. Wurge)**

Wurge BB (2010) *The Last Notebook of Leonardo*. Leapfrog Press, Teaticket MA.  
Winner of the Moonbeam Award, 2010.

Wurge BB (2009) *Squiggle*. Leapfrog Press, Teaticket MA.

Wurge BB (2008) *Billy and the Birdfrogs*. Leapfrog Press, Teaticket MA.

## **ARTICLES IN PUBLIC MEDIA**

Graziano MSA (2018) Our primal need for personal space. *The Wall Street Journal*.

Graziano MSA (2018) The unconscious rules of personal space. *The Atlantic*.

Graziano MSA (2018) How you react when startled is a window into your soul. *The Atlantic*.

Graziano MSA (2016) The brain damage that hides half the world. *The Atlantic*.

Graziano MSA (2016) Why you should believe in the digital afterlife. *The Atlantic*.

Graziano MSA (2016) A new theory explains how consciousness evolved. *The Atlantic*.

Graziano MSA (2016) How consciousness explains ventriloquists and religion. *The Atlantic*.

Graziano MSA (2016) Your brain sees things you don't. *The Atlantic*.

Graziano MSA (2016) Most popular theories of consciousness are worse than wrong. *The Atlantic*.

Graziano MSA (2016) How phantom limbs explain consciousness. The Atlantic.

Graziano MSA (2016) Consciousness is not mysterious. The Atlantic.

Graziano MSA (2016) The Hunger Mood. Aeon Magazine.

Graziano MSA (2015) Build-A-Brain. Aeon Magazine.

Graziano MSA (2014) Are We Really Conscious? New York Times, Gray Matter.

Graziano MSA (2014) The First Smile: The evolution of human expression. Aeon Magazine.

Graziano MSA (2014) An inconvenient child. Aeon Magazine.

Graziano MSA (2013) How the light gets out: a new theory of consciousness. Aeon Magazine.

Graziano MSA (2013) Endless fun: will we ever upload our minds to computers? Aeon Magazine.

Graziano MSA (2013) Consciousness and the unashamed rationalist. Huffington Post.

Graziano MSA (2011) The spirit ends when the brain dies. Huffington Post.

Graziano MSA (2011) Is spirituality a byproduct of evolution? Huffington Post.

Graziano MSA (2011) Why is music a religious experience? Huffington Post.

Graziano MSA (2011) The spirit constructed in the brain. Huffington Post.

Graziano MSA (2011) The Darwinian evolution of religion. Huffington Post.

## **PEER REVIEWED PAPERS AND CHAPTERS**

Graziano MSA, Morsella E (2019) A new motor approach to consciousness: implications for the simulation of future behavior. In: Radman Z (Ed.) *Acting Ahead of Actuality*. In Press.

Graziano MSA (2019) Human emotional expression and the peripersonal margin of safety. In: De Vignemont F. and Serino A. (Eds) *Peripersonal Space*. Oxford University Press, in press.

Graziano MSA (2019) We are machines that claim to be conscious. *Journal of Consciousness Studies*, in press.

Graziano MSA (2019) Attributing awareness to others: The attention schema theory and its relationship to behavioral prediction. *Journal of Consciousness Studies*, 26: 17-37.

Guterstam A, Kean HH, Webb TW, Kean FS, Graziano MSA (2018) An implicit model of other people's visual attention as an invisible, force-carrying beam projecting from the eyes. *Proceedings of the National Academy of Sciences USA*, 116: 328-333.

Graziano MSA (2018) The temporoparietal junction and awareness. *Neuroscience of Consciousness*, 4(1): niy005

Graziano MSA, Webb TW (2018) Understanding consciousness by building it. In: *Bloomsbury Companion to Philosophy of Consciousness*. Jacqueline D., Ed. London, Bloomsbury.

Graziano MSA (2018) The Attention Schema Theory of Consciousness. In: *Routledge Handbook of Consciousness*. Gennaro R., Ed. Abingdon, UK: Routledge.

Bio BJ, Webb TW, Graziano MSA (2017) Projecting one's own spatial bias onto others during a theory-of-mind task. *Proceedings of the National Academy of Sciences USA*, doi:10.1073/pnas.1718493115.

Graziano MSA (2017) The Attention Schema Theory: a foundation for engineering artificial consciousness. *Frontiers in Engineering*, DOI: 10.3389/frobt.2017.00060.

Igelström K, Graziano MSA (2017) The inferior parietal lobe and temporoparietal junction: a network perspective. *Neuropsychologia*, 105: 70-83.

Igelström K, Webb TW, Graziano MSA (2017) Functional connectivity between the temporoparietal cortex and cerebellum in autism spectrum disorder. *Cerebral Cortex*. 27: 2617-2627.

Graziano MSA, Webb TW (2016) From sponge to human: the evolution of consciousness. In: Kaas, J (ed.), *Evolution of Nervous Systems 2e*. vol. 3, pp. 547-554. Oxford: Elsevier.

Webb TW, Igelström K, Schurger A, Graziano MSA (2016) Cortical networks involved in visual awareness independently of visual attention. *Proceedings of the National Academy of Sciences USA*, 113: 13923-13928.

Graziano MSA (2016) Consciousness engineered. *Journal of Consciousness Studies*. 23: 98-115.

Igelström K, Webb TW, Kelly YT, Graziano MSA (2016) Topographical organization of attentional, social and memory processes in the human temporoparietal cortex. *eNEURO*, 3: ENEURO.0060-16.2016.

Webb TW, Kean HH, and Graziano MSA (2016) Effects of awareness on the control of attention. *Journal of Cognitive Neuroscience*, 28: 842-851.

Graziano MSA (2015) Ethological action maps: A paradigm shift for the motor cortex. *Trends in Cognitive Sciences*, 20: 121-132.

Igelström K, Webb TW, Graziano MSA (2015) Neural processes in the human temporoparietal cortex separated by localized independent component analysis. *Journal of Neuroscience*, 35: 9432-9445.

Graziano MSA (2015) A new view of the motor cortex and its relation to social behavior. In *Shared Representations: Sensorimotor Foundations of Social Life*. Obhi SS, Cross ES (Eds), Cambridge, UK: Cambridge University Press.

Graziano MSA (2015) Cortical action representations. In: *Brain Mapping: An Encyclopedic Reference*. Toga AW, Poldrack RA (Eds) Amsterdam: Elsevier.

Webb TW, Graziano MSA (2015) The attention schema theory: a mechanistic account of subjective awareness. *Frontiers in Psychology*, Vol 6, article 500, doi: 10.3389/fpsyg.2015.00500.

Graziano MSA, Webb TW (2014) A mechanistic theory of consciousness. *International Journal of Machine Consciousness*, 6, 163-176.

Graziano MSA (2014) Speculations on the evolution of awareness. *Journal of Cognitive Neuroscience*, 26, 1300-1304.

Kelly YT, Webb TW, Meier JD, Arcaro MJ, Graziano MSA (2014) Attributing awareness to oneself and to others. *Proceedings of the National Academy of Sciences USA*, 111: 5012-5017.

Graziano MSA (2014) How Ventriloquism Works. *Frontiers for young minds*, DOI:10.3389/frym.2014.00004.

Graziano MSA and Kastner S (2011) Human consciousness and its relationship to social neuroscience: A novel hypothesis. *Cognitive Neuroscience*, 2: 98-113.

Graziano MSA and Kastner S (2011) Awareness as a perceptual model of attention. *Cognitive Neuroscience*, 2: 125-133.

Graziano MSA (2011) New Insights into Motor Cortex. *Neuron*, 71: 387-388.

Graziano MSA (2011) Cables vs networks: Old and new views on the function of motor cortex. *Journal of Physiology*, 589: 2439.

Aflalo TN and Graziano MSA (2011) The organization of the macaque extrastriate visual cortex re-examined using the principle of spatial continuity of function. *Journal of Neurophysiology*, 105: 305-320.

- Graziano MSA (2010) Ethologically relevant movements mapped on the motor cortex. In: Primate Neuroethology, Ghazanfar and Platt (Eds). Oxford University Press, Oxford UK.
- Dombeck DA, Graziano MSA and Tank DW (2009) Functional clustering of neurons in motor cortex determined by cellular resolution imaging in awake behaving mice. *Journal of Neuroscience*, 29: 13751-13760.
- Macfarlaine N and Graziano MSA (2009) Diversity of Grip in *Macaca mulatta*. *Experimental Brain Research*, 197: 255-268.
- Meier JD, Aflalo TN, Kastner S, Graziano MSA (2008) Complex organization of human primary motor cortex: A high resolution fMRI study. *Journal of Neurophysiology*, 100: 1800-1812.
- Aflalo TN and Graziano MSA (2008) Four dimensional spatial reasoning in humans. *Journal of Experimental Psychology, Human Perception and Performance*, 34: 1066-1077.
- Graziano MSA and Aflalo TN (2007) Mapping behavioral repertoire onto the cortex. *Neuron*, 56: 239-251.
- Graziano MSA and Aflalo TN (2007) Rethinking cortical organization: Moving away from discrete areas arranged in hierarchies. *The Neuroscientist*, 13: 138-147.
- Aflalo TN and Graziano MSA (2007) Relationship between unconstrained arm movement and single neuron firing in the macaque motor cortex. *Journal of Neuroscience*, 27: 2760-2780.
- Aflalo TN and Graziano MSA (2006) Possible origins of the complex topographic organization of motor cortex: reduction of a multidimensional space onto a 2-dimensional array. *Journal of Neuroscience*, 26: 6288-6297.
- Aflalo TN and Graziano MSA (2006) Partial tuning of motor cortex neurons to final posture in a free-moving paradigm. *Proceedings of the National Academy of Sciences*, 103: 2909-2914.
- Graziano MSA (2006) The organization of behavioral repertoire in motor cortex. *Annual Review of Neuroscience*, 29: 105-134.
- Graziano MSA (2006) Progress in understanding spatial coordinate systems in the primate brain. *Neuron*, 51: 7-9.
- Graziano MSA and Cooke DF (2006) Parieto-frontal interactions, personal space, and defensive behavior. *Neuropsychologia*. 44: 845-859.
- Graziano MSA (2006) Feedback remapping and the cortical control of movement. In: Latash (Ed.) *Motor Control and Learning*. Springer, New York NY.
- Graziano MSA, Aflalo T, and Cooke DF (2005) Arm movements evoked by electrical stimulation in the motor cortex of monkeys. *Journal of Neurophysiology*, 94: 4209-4223.



Cooke DF and Graziano MSA (2004) Super-flinchers and nerves of steel: Defensive movements altered by chemical manipulation of a cortical motor area. *Neuron*, 43: 585-593.

Graziano MSA, Patel KT, and Taylor CSR (2004) Mapping from motor cortex to biceps and triceps altered by elbow angle. *Journal of Neurophysiology*, 92: 395-407.

Cooke DF and Graziano MSA (2004) Sensorimotor integration in the precentral gyrus: Polysensory neurons and defensive movements. *Journal of Neurophysiology*, 91: 1648-1660.

Graziano MSA, Cooke DF, Taylor CSR, and Moore T (2004) Distribution of hand location in monkeys during spontaneous behavior. *Experimental Brain Research*, 155: 30-36.

Graziano MSA, Taylor CSR, Cooke DF, and Moore T (2004a) A map of complex movements in motor cortex of primates. In Humphries and Riddoch (Eds.) *Action In Attention*. Psychology Press, Hove, pp. 211-232.

Graziano MSA, Gross CG, Taylor CSR, and Moore T (2004b) A system of multimodal areas in the primate brain. In: *Crossmodal Space and Crossmodal Attention*. Spence and Driver, Eds, Oxford University Press, Oxford UK, pp. 51-67.

Graziano MSA, Gross CG, Taylor CSR, and Moore T (2004c) Multisensory neurons for the control of defensive movements. In: *The Handbook of Multisensory Processes*. Gemma Calvert, Charles Spence and Barry Stein Eds. MIT Press, pp. 443-452.

Cooke DF and Graziano MSA (2003) Defensive Movements Evoked by Air Puff in Monkeys. *Journal of Neurophysiology*, 90: 3317-3329.

Cooke DF, Taylor CSR, Moore T, and Graziano MSA (2003) Complex movements evoked by microstimulation of Area VIP. *Proceedings of the National Academy of Sciences USA*, 100: 6163-6168.

Graziano MSA, Taylor CSR, Moore T, and Cooke DF (2002) The cortical control of movement revisited. *Neuron*, 36: 349-362.

Graziano MSA, Taylor CSR, and Moore T (2002) Probing cortical function with electrical stimulation. *Nature Neuroscience*, 5: 921.

Graziano MSA, Alisharan SA, Hu X, and Gross CG (2002) The clothing effect: Tactile neurons in the precentral gyrus do not respond to the touch of the familiar primate chair. *Proceedings of the National Academy of Sciences USA*, 99: 11930-11933.

Graziano MSA, Taylor CSR, and Moore T (2002) Complex movements evoked by microstimulation of precentral cortex. *Neuron*, 34: 841-851.

Graziano MSA and Botvinick MM (2002) How the brain represents the body: insights from neurophysiology and psychology. In: *Common Mechanisms in Perception and Action: Attention and Performance XIX*. Eds. W. Prinz and B. Hommel. Oxford University Press, Oxford UK, pp. 136-157.

Graziano MSA (2001) Is reaching eye-centered, body-centered, hand-centered, or a combination? *Reviews in the Neurosciences*, 12: 175-186.

Graziano MSA (2001) A system of multimodal areas in the primate brain. *Neuron*, 29: 4-6.

Graziano MSA (2001) An awareness of space. *Nature*, 411: 903-904.

Graziano MSA, Cooke DF, and Taylor CSR (2000) Coding the location of the arm by sight. *Science*, 290: 1782-1786.

Graziano MSA and Gandhi S (2000) Location of the polysensory zone in the precentral gyrus of anesthetized monkeys. *Experimental Brain Research*, 135: 259-266.

Graziano MSA, Wheeler ME, and Gross CG (2000) From vision to action: How the primate brain encodes and remembers visuomotor space. In: JJ Bolhuis (Ed) *Brain, Perception, Memory: Advances in Cognitive Neuroscience*. Oxford University Press, Oxford UK, pp. 7-15.

Graziano MSA (1999) Where is my arm? The relative role of vision and proprioception in the neuronal representation of limb position. *Proceedings of the National Academy of Sciences USA*, 96: 10418-10421.

Gould E, Reeves AJ, Graziano MSA, and Gross CG (1999) Neurogenesis in the neocortex of adult primates. *Science*, 286: 548-552.

Graziano MSA, Reiss LAJ, and Gross CG (1999) A neuronal representation of the location of nearby sounds. *Nature*, 397: 428-430.

Nakamura K, Chung HH, Graziano MSA, and Gross CG (1999) A dynamic representation of eye position in the parieto-occipital sulcus. *Journal of Neurophysiology*, 81: 2374-2385.

Graziano MSA and Gross CG (1998) Visual responses with and without fixation: Neurons in premotor cortex encode spatial locations independently of eye position. *Experimental Brain Research*, 118: 373-380.

Graziano MSA and Gross CG (1998) Spatial maps for the control of movement. *Current Opinion in Neurobiology*, 8: 195 -201.

Graziano MSA, Hu XT, and Gross CG (1997) Coding the locations of objects in the dark. *Science*, 277: 239-241.

Graziano MSA, Hu XT, and Gross CG (1997) Visuo-spatial properties of ventral premotor cortex. *Journal of Neurophysiology*, 77: 2268-2292.

Graziano MSA and Gross CG (1997) Vision, Movement, and The Monkey Brain. In: *The Association Cortex: Structure and Function*. H. Sakata, A. Mikami, and J. Fuster, Eds. (Harwood Academic Publishers, Amsterdam): pp. 219-232.

Graziano MSA and Gross CG (1996) Multiple pathways for processing visual space. In *Attention and Performance XVI*. Edited by T. Inui and J.L. McClelland. MIT Press, Cambridge MA, pp.181-207.

Gross CG and Graziano MSA (1995) Multiple representations of space in the brain. *The Neuroscientist*, 1: 43-50.

Graziano MSA and Gross CG (1995) From vision to action. In: *Scale in Conscious Experience: Is the Brain too Important to be Left to Specialists to Study?* J. King and K.H. Pribram, Eds. (Laurence Erlbaum Associates, Mahwah, N.J.): pp. 117-129.

Graziano MSA and Gross CG (1994) Mapping space with neurons. *Current Directions in Psychological Sciences*, 3: 164-167.

Graziano MSA, Yap GS, and Gross CG (1994) Coding of visual space by pre-motor neurons. *Science*, 266: 1054-1057.

Graziano MSA, Andersen RA, and Snowden R (1994) Tuning of MST neurons to spiral stimuli. *Journal of Neuroscience*, 14: 54-67.

Colombo M and Graziano MSA (1994) The effects of auditory and visual interference on auditory-visual delayed matching-to-sample in monkeys. *Behavioral Neurosciences*, 108: 636-639.

Graziano MSA and Gross CG (1994) The representation of extrapersonal space: A possible role for bimodal, visual-tactile neurons, in *The Cognitive Neurosciences*, M.S. Gazzaniga, Ed. (MIT Press, Cambridge): pp. 1021 -1034.

Graziano MSA and Gross CG (1993) A bimodal map of space: somatosensory receptive fields in the macaque putamen with corresponding visual receptive fields. *Experimental Brain Research*, 97: 96-109.

Graziano MSA and Gross CG (1992) Somatotopically organized maps of near visual space exist. *Behavioral Brain Sciences*, 15: 750.

Andersen RA, Treue S, Graziano MSA, Snowden RJ, and Quin N (1992) From direction of motion to patterns of motion: Hierarchies of motion analysis in the visual cortex. In: *Brain Mechanism of Perception and Memory: From Neuron to Behavior*. Ono and Taketoshi, Eds. (Oxford University Press, New York).

Andersen RA, Snowden RJ, Treue S, Graziano MSA (1990) Hierarchical Processing of Motion in the Visual Cortex of Monkey. Cold Spring Harbor Symposium on Quantitative Biology, Vol. LV, pp 741-748.