

NICHOLAS A. GIUDICE, PhD



CURRICULUM VITA

University of Maine
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EDUCATION AND TRAINING

- 2005–2008 Postdoctoral Fellow, Psychology: Cognition, Perception, and Cognitive Neuroscience Program
Sponsor: Prof. Jack M. Loomis
University of California, Santa Barbara (UCSB)
- 1998–2004 Ph.D., Psychology: Cognitive and Biological Program
Advisors: Prof. Gordon E. Legge and Prof. Herbert L. Pick
University of Minnesota, Twin Cities (UMN)
- 1993–1997 B.A., (Magna Cum Laude), Psychology and Philosophy
Providence College (PC)

POSITIONS AND AFFILIATIONS

Professional Positions

- 2008–Present Assistant Professor, Department of Spatial Information Science and Engineering (SIE),
University of Maine (UMaine)
- 2008–Present Director, Virtual Environment and Multimodal Interaction Laboratory (VEMI Lab), UMaine
- 2007–Present Human Factors Engineer, Kinnexus Inc., Los Altos, CA

Cooperative Appointments

- 2009–Present Department of Psychology, UMaine
- 2008–Present National Center for Geographic Information and Analysis (NCGIA), UMaine

RESEARCH INTERESTS

- Multimodal Spatial Cognition: Comparing spatial learning, updating, and wayfinding behavior within and between modalities (3-D sound, touch, vision, and spatial language).
- Functional Equivalence of Spatial Representations: Researching whether modality-specific encoding leads to amodal representations in memory equally accessible to supporting action.
- Environmental Learning With and Without Vision: Developing multimodal displays to support seamless navigation of indoor and outdoor environments (real and virtual).
- Neurocognitive Engineering: Combining perceptual, cognitive neuroscientific, and human factors principles for theoretically motivated interface design

COMPETITIVE GRANTS AND RESEARCH SUPPORT

- 2009–2012 NSF technology supplement CDI-0936008 (PI)
- 2009–2012 NSF grant IIS-0916219, researching formal models and user interactions for navigating indoor/outdoor spaces (Co-PI, with M. Worboys, UMaine PI)
- 2009–2011 NIH grant R01-EY016817, researching functional equivalence and amodal spatial images (UMaine PI, with J.M. Loomis, UCSB (PI), and R.L. Klatzky, CMU)
- 2009–2011 NIH grant EY017228-02A2, researching accessible indoor GPS technology for the blind (UMaine PI, with Koronis Biomedical Technologies (PI), Minneapolis, MN)
- 2008–2012 Collaborative NSF grant CDI-0835689, researching a non-visual indoor navigation system (UMaine PI, with K. Daniilidis, UPenn (PI), S. Roulmeliotis, UMN, and R. Manduchi, UCSC)
- 2008–2009 NSF grant BCS-0745328, researching functional equivalence and amodal spatial images (UMaine PI, with J.M. Loomis, UCSB (PI), and R.L. Klatzky, CMU)
- 2008 Brain Imaging Center, seed funding for neuroimaging project (Co-PI with J.M. Loomis and T. Wolbers, UCSB)
- 2005–2008 NIH postdoctoral NRSA grant EY-015963, researching multimodal spatial cognition (PI)
- 2001–2004 Visual Neuroscience pre-doctoral training grant 5T32-EY07133 (Graduate Trainee)
- 2002–2003 NIH grant F32-EY015963-01 (Graduate Research Assistant)
- 2002–2007 Multi-institution NIDRR grant H133A011903, researching indoor/outdoor wayfinding technologies for the blind (Graduate Research Assistant and Collaborator)
- 2002 Center for Cognitive Sciences mini-research grant (Graduate Trainee)
- 2001 NIH Center for Cognitive Sciences fellowship T32-HD07151 (Graduate Trainee)
- 1998–2000 NSF Vision and Motor Control fellowship GER-9454163 (Graduate Trainee)
- 1998 UMN graduate school fellowship (Graduate Trainee)

PUBLICATIONS

Peer-Reviewed Journal Articles

- Giudice, N.A., Bakdash, J.Z., Legge, G.E., & Roy, R. (in press). Spatial learning and navigation using a virtual verbal display. *ACM Transactions on Applied Perception*.
- Giudice, N. A., Klatzky, R. L., & Loomis, J. M. (2009). Evidence for amodal representations after bimodal learning: Integration of haptic-visual layouts into a common spatial image. *Spatial Cognition & Computation*, 9(4), 287-304.
- Kalia, A., Legge, G.E., & Giudice, N.A. (2008). Learning building layouts with non-geometric visual information: The effects of visual impairment and age. *Perception*, 37(11), 1677-1699.
- Klatzky, R.L., Giudice, N.A., Tietz, Marston, J.R., J., Golledge, R.G., & Loomis, J.M. (2008). An n-back task using vibrotactile stimulation with comparison to an auditory analogue. *Behavior Research Methods*, 40(1), 367-372.
- Giudice, N.A., Bakdash, J.Z., & Legge, G.E. (2007). Wayfinding with words: Spatial learning and navigation using dynamically-updated verbal descriptions. *Psychological Research*, 71(3), 347-358.

Klatzky, R.L., Marston, J.R., Giudice, N.A., Golledge, R.G., & Loomis, J.M. (2006). Cognitive load of navigating without vision when guided by virtual sound versus spatial language. *Journal of Experimental Psychology: Applied*, 12(4), 223-232.

Peer Reviewed Book Chapters and Conference Proceedings

Long, R.G.*, & Giudice, N.A.* (in press). Orientation and wayfinding. In B.B. Blasch, W.R. Wiener, & R.W. Welsh (Eds.), *Foundations of Orientation and Mobility*, 3rd Edition. New York: American Foundation for the Blind. (* equal contribution)

Giudice, N.A., & Tietz, J. (2008). Learning with virtual verbal displays: Effects of interface fidelity on cognitive map development. In C. Freksa, N. Newcombe, P. Gärdenfors, & S. Wöfl (Eds.), *Spatial Cognition VI: Lecture Notes in Artificial Intelligence* (Vol. 5248, pp. 121-137). Berlin: Springer.

Giudice, N.A., & Legge, G.E. (2008). Blind navigation and the role of technology. In A. Helal, M. Mokhtari, & B. Abdulrazak (Eds.), *Engineering Handbook of Smart Technology for Aging, Disability, and Independence* (pp. 479-500).: John Wiley & Sons.

Riehle, T.H.*, Lichter, P., & Giudice, N.A.* (2008). An indoor navigation system to support the visually impaired. *Proceedings of the 30th Annual IEEE Engineering in Medicine and Biology Conference*. (Vol. 2008, PP. 4435-4438). August, Vancouver, Canada. (*corresponding authors)

Giudice, N.A., Marston, J.R., Klatzky, R.L., Loomis, J.M., & Golledge, R.G. (2008). Environmental learning without vision: Effects of cognitive load on interface design. *Proceedings of the 9th International Conference on Low Vision (vision 08)*. July, Montreal, Canada.

Tjan, B.S., Beckmann, P.J., Roy, R., Giudice, N.A., & Legge, G.E. (2005). Digital sign system for indoor wayfinding for the visually impaired. *Proceedings of the 2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR) – Workshops*. (Vol. 3, PP. 30A). San Diego, CA.

Submitted Manuscripts

Giudice, N.A., Betty, M.R., & Loomis, J.M. (in revision). Functional equivalence of spatial images from touch and vision: Evidence from spatial updating in blind and sighted individuals.

Wolbers, T.*, Zahorik, P., & Giudice, N. A.* (submitted). Predicting the direction of auditory motion from hMT+ activity in blind humans. (*corresponding authors)

Giudice, N.A., McHugh, B., & Miyanochara, M. (submitted). Haptic map learning: Effects of display orientation on the acquisition and transfer of spatial knowledge.

Unpublished Works

Giudice, N. A. (1999). Advances in personal navigation systems for the blind: A review and proposal for tomorrow's technology. *Unpublished whitepaper*. UMN.

Giudice, N.A. (December 2004). Navigating novel environments: A comparison of verbal and visual learning. *Unpublished doctoral dissertation*. UMN.

Conference Presentations

Giudice, N. A., Wutte, M., Klatzky, R. L., Loomis, J. M., & Wolbers, T. (2009). Modality independent coding of 3d layout: fMRI evidence for PPA involvement of haptic and visual scenes by sighted and blind participants, *50th Annual Psychonomics Society Meeting*. Boston, MA.

Giudice, N.A. (2008). Learning with virtual verbal displays: Effects of interface fidelity on cognitive map development. *Spatial Cognition 2008 Conference*, September, Freiburg, Germany.

- Marston, J.R., Klatzky, R.L., Giudice, N.A., Loomis, J.M., & Golledge R.G. (2007). Measuring cognitive load of non-visual navigation interfaces. *Association of American Geographers (AAG) 104th Annual Meeting*, April, San Francisco, CA.
- May, M., Giudice, N.A., LaPierre, C., & Ponchillia, P. (2007). Results from 5-year NIDRR wayfinding grant and future prospects. *22nd Annual CSUN International Conference, Technology and Persons with Disabilities*, March, Los Angeles, CA.
- Giudice, N.A., Betty, M.R., & Loomis, J.M. (2006). Orientation specificity with vision and touch: Map learning, haptic updating, and functional equivalence. *Journal of Vision*, 6(6), 178a.
- Kalia, A., Legge, G.E., & Giudice, N.A. (2006). Learning virtual building layouts: The effects of age on the usefulness of geometric and nongeometric visual information. *Journal of Vision*, 6(6), 140a.
- Giudice, N.A. (2006). Wayfinding without vision: Learning real and virtual environments using dynamically-updated verbal descriptions. *Conference on Assistive Technologies for Vision and Hearing Impairment*, July, Kufstein, Austria.
- Kalia, A., Giudice, N.A., & Legge, G.E. (2005). Learning building layouts with low vision: Do realistic details help or hinder? *Vision 2005 Conference*, April, London, UK.
- Kalia, A., Giudice, N.A., & Legge, G.E. (2004). Learning building layouts: The effects of visual information on developing global knowledge. *Object Perception, Attention, and Memory Conference*, November, Minneapolis, MN.
- Giudice, N.A. & Legge, G.E. (2004). Comparing verbal and visual information displays for learning building layouts. *Journal of Vision*, 4(8), 889a.
- Giudice, N.A., Legge, G.E., & Bakdash, J.Z. (2003). Navigating without vision: A role for spatial language? *Journal of Vision*, 3(9), 489a.
- Legge, G.E., Mason, S.J., Brady, M., Giudice, N.A., & Schlicht, E.J. (2003). Maplets: Local geometrical components of human cognitive maps. *Journal of Vision*, 3(9), 136a.
- Giudice, N.A. (2002). Tactile vision: Brain-reorganization in the blind: Implications for learning and adaptive technology. *Seventeenth Annual CSUN International Conference on Technology and Persons with Disabilities*, March, Los Angeles, CA.
- Giudice, N.A., Mason, S.J., & Legge, G.E. (2002). The relation of vision and touch: Spatial learning of small-scale layouts. *Journal of Vision*, 2(7), 522a.
- Schlicht, E.J., Legge, G.E., Stankiewicz, B.J., & Giudice, N.A. (2001). Are visual landmarks necessary for effective transfer of navigational knowledge between real and virtual buildings? *Annual Meeting of the Association of Research in Vision and Ophthalmology*, Fort Lauderdale, FL.
- Giudice, N.A., Madison, C.M., Zhuang, J.C., Costello, P.A., Legge, G.E., Hu, X., & He, S. (2000). Tactile vision in the blind: An fMRI experiment on pattern recognition and brain plasticity. *Annual Meeting of the Association for Research in Vision and Ophthalmology*, Supp. IOVS, 40, S49, Fort Lauderdale, FL.
- Bruggeman, H., Giudice, N.A., Stankiewicz, B.J., & Legge, G.E. (2000). Distal target localization by the blind. *Annual Meeting of the Association for Research in Vision and Ophthalmology*, Supp. IOVS, 40, S431, Fort Lauderdale, FL.

INVITED LECTURES AND OTHER COLLABORATIONS

(Presentations Delivered By First Author)

- Giudice, N.A. (November 2009) Multimodal processing of spatial information: The intersection of spatial cognition and Neurocognitive Engineering, Institute for Research in Cognitive Science, UPenn.

- Giudice, N.A. (July, 2009). A year with Giudice: Research, development, and future directions. The Minnesota Laboratory for Low-Vision Research, UMN.
- Giudice, N.A. (April, 2009). Spatial learning from different sensory modalities: The intersection of experimental psychology and neurocognitive engineering. UMaine Psychology Colloquium, Orono, ME.
- Marston, J.R., Golledge, R.G., Loomis, J.M., Klatzky, R.L., & Giudice, N.A. (April, 2008). Accessible and portable navigation devices for the blind: Interface options. Atlanta Center for the Visually Impaired and Georgia Institute of Technology, Atlanta, GA.
- Marston, J.R., Golledge, R.G., Loomis, J.M., Klatzky, R.L., & Giudice, N.A. (April, 2008). Substituting for vision: Field experiments with several orientation and navigation devices. Atlanta VA Rehabilitation Research and Development Center of Excellence in Vision Loss, Atlanta, GA.
- Loomis, J.M., Golledge, R.G., Klatzky, R.L., Marston, J.R., & Giudice, N.A. (April, 2008). Twenty years of research on the Personal Guidance System: What did we learn? ThinkSpatial Forum on Spatial Thinking, UCSB, CA.
- Giudice, N.A. (February, 2008). Spatial learning in real and virtual environments: Navigation, cognitive mapping, and the development of multimodal displays. Department of Psychology, Wichita State University, KS.
- Giudice, N.A. (February, 2008). Multimodal learning: When different spatial displays lead to the same spatial behavior. Department of Geography, University of Oregon, Eugene, OR.
- Giudice, N.A. (December, 2007). Spatial Learning in Real and Virtual Environments: Development of Mental Representations using Multimodal Displays. Department of Spatial Information Science and Engineering, UMaine.
- Giudice, N.A. (June, 2006). What's going on in GiudiceLand: Research past, present, and future. The Minnesota Laboratory for Low-Vision Research, UMN.
- Giudice, N.A. (May, 2006). Orientation specificity with vision and touch: Map learning, haptic updating, and functional equivalence. Cognition, Perception, & Cognitive Neuroscience Colloquium, UCSB, CA.
- Giudice, N.A. (April, 2005). Wayfinding with words: The use of spatial language for navigating real and virtual environments. Cognitive and Perceptual Sciences Colloquium, UCSB, CA.
- Legge, G.E., Beckmann, P.J., Giudice, N.A., Kalia, A., Roy, R., & Tjan, B.S. (April, 2005). Wayfinding in buildings with vision impairment: Research and adaptive technology. Vision 2005 Conference, London, UK.
- Giudice, N.A. (March, 2004). NIH: National Eye Institute, Scientific workshop on blindness, brain plasticity, and spatial function. Invited participant, Vanderbilt University, Nashville, TN.
- Giudice, N.A. (October, 2002). Universal design, adaptive technology, and integration. Usability Professionals Association (UPA), Minneapolis, MN.
- Giudice, N.A. (January, 2000). The relation of vision and touch in an angle estimation and production task. Vision Science Colloquium, UMN.

CONSULTING AND ADVISORY

- 2008–Present Consultant for Advanced Medical Electronics Corporation on technology for blind/low-vision information access for SBIR Phase I funding
- 2008–2011 Advisory board for NIH grant 9R44AG033522-02 on indoor navigation (PI: G.E. Legge, UMN, and Advanced Medical Electronics Corporation, Minneapolis, MN)
- 2007–Present Consultant for Koronis Biomedical Technologies on blind/low-vision navigation for SBIR Phase I and Phase II funding

- 2007–Present Advisory board for Kinnexus Inc., factors affecting age-related vision loss for gerontechnology start-up company, Los Altos, CA
- 2006–2007 Efficacy testing of Touch Graphics Talking Tactile Tablet for multimodal navigation research (www.touchgraphics.com)
- 2003–2006 Usability testing during several Beta cycles with Sendero Group's accessible GPS navigation system (www.senderogroup.com)

STUDENT ADVISING AND MENTORING

Masters Thesis Research Advising:

- 2010–Present Monoj Kumar Raja, indoor navigation technology
- 2008–2010 Kate Cuddy, spatialized audio

Undergraduate Research Advising:

- 1998–Present Supervised 2-4 research assistants per year

GRADUATE COMMITTEE PARTICIPATION

Doctoral Committees:

- Lisa Walton, SIE, UMaine (Member)

Masters Committees:

- Kate Cuddy, SIE, UMaine (chair)
- Richard Corey, Intermedia, UMaine (member)
- Timothy Garay, Physics, UMaine (member)

TEACHING

- Spring '10 Graduate Seminar, UMaine
- Spring ('09,'10) Human-computer interaction, UMaine
- Fall '09 Virtual environment technology and research, UMaine
- Spring ('01,'03) Perceptual correlates of low vision, co-taught, UMN
- Spring ('01,'03) Vision laboratory, UMN
- Fall '02 Honors seminar: Navigation and spatial development, co-taught, UMN
- Fall '00 Human-machine interaction, teaching assistant, UMN

HONORS AND AWARDS

- 2009 UMaine F&A recovery award
- 2000–2003 Recipient of the UMN's Center for Cognitive Sciences James J. Jenkins Award for outstanding contributions to the center
- 2000 American Foundation for the Blind Award for academic excellence
- 1998 American Foundation for the Blind Award for excellent research potential

- 1998 American Council of the Blind Award for work in vision sciences
- 1998 NSF facilitation award for scientists & engineers with disabilities
- 1997 Inducted into Psychology Honors Society - Psi Chi
- 1997 Inducted into Philosophy Honors Society - Phi Sigma Tau

PROFESSIONAL SERVICE AND LEADERSHIP

- 2010–Present Faculty Representative, President's Council on Disabilities, UMaine
- 2009–Present Faculty Representative, Academic Excellence Committee, UMaine
- 2009 (Jan) General Chair, workshop on virtual environment technology, UMaine
- 2008–Present Faculty Representative, Accessible Information Committee, UMaine
- 2006–2008 Coordinator, monthly interdisciplinary spatial cognition research meeting, UCSB
- 2006 (July) Session Chair, Conference on Assistive Technologies for People with Vision and Hearing Impairments, Kufstein, Austria
- 2003–2004 Student Representative, Center for Cognitive Sciences Governing Council, UMN
- 2000–2003 Chair, Center for Cognitive Sciences external colloquium series, UMN
- 2001–2002 Chair, bi-weekly colloquium of vision science lectures, UMN
- 1999–2000 Editorial Board, Center for Cognitive Science's Millennium Project, UMN
- 1994–1997 Presidential Appointee, ADA Advisory Committee, Providence College, Providence RI
- 1996–1997 Vice Chair, Legislative Affairs Committee, Providence College
- 1995–1996 Student Representative, Curriculum Review Committee for Providence College Accreditation
- 1993–1997 Student Congress Representative, Junior Class Vice President, Providence College
- 1993–1997 Dean's List, Providence College

PROFESSIONAL MEMBERSHIPS & ORGANIZATIONS

- 2010–Present Learning Circle on Universal Design, UMaine
- 2009–Present Learning Science Special Interest Group, UMaine
- 2009–Present Full Member, Psychonomics Society
- 2009–Present Delegate, University Consortium for Geographic Information Science
- 2002–2006 Member, The Vision Sciences Society

EDITORIAL SERVICE

Ad hoc journal reviewer: ACM Transactions on Applied Perception; ACM SIGCHI; Cognition; Cognitive Processing; IEEE Transactions on Systems, Man, and Cybernetics; Journal of Experimental Psychology- Learning, Memory, and Cognition; Memory and Cognition; Perception; Perception

and Psychophysics; Spatial Cognition and Computation; UAIS; and Visual Impairment Research.

External grant reviewer: 2009 NSF BCS proposal; 2008 Netherlands Organization for Health Research and Development Grant for In-sight, ZonMw, Netherlands; and 2005 Ophthalmic Research Grant by the Institute of Ophthalmology, UCL, UK.

Book Reviewer: 2008 MIT Press , Cambridge, MA.

COMMUNITY SERVICE

2007–2008 Member of the Access Advisory Committee for the City of Santa Barbara, CA

2007 Volunteer computer instructor, Braille Institute, Santa Barbara, CA

NEWS AND PUBLIC RELATIONS

2009 (Oct) VEMI Lab featured in news article for the UMaine College of Engineering Magazine.

2009 (April) Featured on the Economic Report, (CNN & Discovery), as part of a news piece on the Maine-based company Intelligent Spatial Technologies

2007 (April) *The boy who sees with sound.*
Helped design and run experiments during filming of this BBC and Discovery channel documentary on echolocation.

2007 (March) *Checking the coordinates.*
Interviewed for Op-Ed piece on the connection between psychology and geography by R. Adelson (March 2007): APA Monitor on Psychology, 38(3), 16.

REFERENCES AND REPRINTS AVAILABLE ON REQUEST