

## Curriculum Vitae

**Damian G. Kelty-Stephen** (formerly *Damian G. Stephen*)

Dept of Psychology

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### Position

- 2013–present Assistant Professor, Department of Psychology, Grinnell College  
2015–present Assistant Research Professor, Department of Kinesiology, University of Connecticut  
2013–2016 Research Scientist, Department of Psychology, Center for Ecological Study of Perception and Action, University of Connecticut  
2011–2013 Staff Research Scientist, Wyss Institute for Biologically Inspired Engineering, Harvard University  
2010–2011 Postdoctoral Fellow, Wyss Institute for Biologically Inspired Engineering, Harvard University  
Research Scientist, Children’s Hospital Boston, Harvard Medical School

### Education

- 2013 Certificate in Applied Biostatistics  
Harvard Medical School, Boston, MA  
2010 Ph.D., Perception-Action-Cognitive (Experimental) Psychology  
University of Connecticut, Storrs, CT  
2009 Certificate in Quantitative Research Methods  
University of Connecticut, Storrs, CT  
2005 B.S., Psychology College of William & Mary, Williamsburg, VA

### Honors and Awards

#### *University of Connecticut:*

- 2005-2007 Outstanding Scholarship Program Fellowship

#### *College of William and Mary:*

- 2005 Phi Beta Kappa, Alpha Chapter  
2005 *Magna cum laude*  
2005 Williams Award for Outstanding Psychology Student  
2005 Highest Departmental Honors (Psychology)  
2001-2005 James Monroe Scholar

### Funding

Principal Investigator on Grinnell College Innovation Fund \$9,685 Pilot Project  
 “Converting the motion-capture laboratory into a liberal-arts classroom”  
 (Academic year 2016-2017; co-PI: Elizabeth Queathem)

Principal Investigator on Grinnell College \$7,100 Mentored Advanced Project for  
 Undergraduate Training “Narrative structure in resolving linguistic uncertainty”  
 (Summer 2015)

Recipient, Grinnell College-Howard Hughes Medical Institute Interdisciplinary Course-  
 Development Funding, \$1,980 “The evolving physics of perceiving-acting  
 organisms: An inquiry based class in Sensation & Perception (PSY 295 01) for  
 Fall 2014” (PI on Grinnell’s HHMI grant: Leslie Gregg-Jolly).

Principal Investigator on Grinnell College \$500 Committee for Support of Faculty  
 Scholarship grant “Embodied effort reshapes touch-based foundations for  
 visually-guided perception of space” (Summer 2014)

Principal Investigator on Grinnell College \$8,650 Mentored Advanced Project for  
 Undergraduate Training “Learning novel coordinations of visual and haptic  
 perceptual information” (Summer 2014)

Consultant on NSF \$800,000 INSPIRE Track 1 project “Development of perception-  
 action in non-living, dissipative systems.” (PIs: James Dixon, Till Frank, Claudia  
 Carello, James Rusling, Jeffrey Kinsella-Shaw, University of Connecticut).

Peer-Reviewed Publications (with student coauthors indicated with asterisk “\*”)

*In press:*

Teng, D. W.\*, Wallot, S., & **Kelty-Stephen, D. G.** (in press). Single-word recognition  
 need not depend on single-word features: Narrative coherence counteracts effects  
 of single-word features that lexical decision emphasizes. *Journal of  
 Psycholinguistic Research*.

Gill, S. V., Keimig, S., **Kelty-Stephen, D. G.**, Hung, Y.-C., & DeSilva, J. M. (in press).  
 The relationship between foot arch measurements and walking parameters in  
 children. *BMC Pediatrics*.

Hajnal, A., Bunch, D., & **Kelty-Stephen, D. G.** (in press). Pulling out all the stops to  
 make the distance: Effects of effort and optical information in distance-perception  
 responses made by rope pulling. *Attention, Perception, & Psychophysics*.

Stirling, L., Qureshi Ahmad, M., **Kelty-Stephen, D. G.**, & Correia, A. (in press).  
 Examination of the torque required to passively palmar abduct the thumb CMC  
 joint in patients with hemiplegia and stroke. *Journal of Biomechanics*.

Smith, V. C., **Kelty-Stephen, D. G.**, Qureshi Ahmad, M., Mao, W., Cakert, K., Osborne, J., & Paydarfar, D. (in press). Stochastic-resonance effects on apnea, bradycardia and oxygenation: A randomized controlled trial. *Pediatrics*.

**Kelty-Stephen, D. G.**, Stirling, L. A., & Lipsitz, L. A. (in press). Multifractal temporal correlations in circle-tracing behaviors are associated with the executive function of rule-switching assessed by the Trail Making Test. *Psychological Assessment*.

**Kelty-Stephen, D. G.**, Qureshi Ahmad, M., & Stirling, L. A. (in press). Use of a tracing task to assess visuomotor performance for evidence of concussion and recuperation. *Psychological Assessment*.

*In print:*

Perisho, S., **Kelty-Stephen, D. G.**, Hajnal, A., Houser, D., & Kuczaj, S. (2016).  $1/f$  scaling in bottlenose dolphin (*Turnsiops truncatus*) echolocation. *Physica A*, *443*, 221-230.

**Kelty-Stephen, D. G.**, & Eddy, C. L.\* (2015). Self-trained perception need not be veridical: Striking can exaggerate judgments and transfer exaggeration to new stimuli. *Attention, Perception & Psychophysics*, *77*, 1854-1862.

Soberano, E. K.\*, & **Kelty-Stephen, D. G.** (2015). Demystifying cognitive science: Explaining cognition through network-based modeling. *Frontiers in Physiology*, *6*, 88.

Eddy, C. L.\*, & **Kelty-Stephen, D. G.** (2015). Nesting of focal within peripheral vision promotes interactions across nested time scales in head sway: Multifractal evidence from accelerometry during manual and walking-based Fitts tasks. *Ecological Psychology*, *27*, 43-67.

**Kelty-Stephen, D. G.**, & Dixon, J. A. (2014). Interwoven fluctuations in intermodal perception: Fractality in head-sway supports the use of visual feedback in haptic perceptual judgments by manual wielding. *Journal of Experimental Psychology: Human Perception & Performance*, *40*, 2289-2309.

Anastas, J. R., **Kelty-Stephen, D. G.**, & Dixon, J. A. (2014). Executive function as an interaction-dominant process. *Ecological Psychology*, *26*, 262-282.

Palatinus, Zs., **Kelty-Stephen, D. G.**, Kinsella-Shaw, J., Carello, C., & Turvey, M. T. (2014). Haptic perceptual intent in quiet standing affects multifractal scaling of postural fluctuations. *Journal of Experimental Psychology: Human Perception & Performance*, *40*, 1808-1818.

Harrison, H. S., **Kelty-Stephen, D. G.**, Vaz, D. V., & Michaels, C. F. (2014).

- Multiplicative-cascade dynamics in pole balancing. *Physical Review E*, 89, 060903(R).
- Wallot, S., & **Kelty-Stephen, D. G.** (2014). Constraints are the solution, not the problem: Commentary on Reichle and Reingold (2013): Neurophysiological constraints on the eye-mind link. *Frontiers in Human Neuroscience*, 8, 324.
- Kelty-Stephen, D. G.** (2014). Astronomical apology for fractal analysis: Spectroscopy's place in the cognitive neurosciences. *Frontiers in Computational Neuroscience*, 8, 16.
- Hajnal, A., Bunch, D., & **Kelty-Stephen, D. G.** (2014). Going for distance and going for speed: Effort and optical variables shape information for distance perception from observation to response. *Attention, Perception, & Psychophysics*, 76, 1015-1035.
- Kelty-Stephen, D. G.**, & Dixon, J. A. (2013). Notes on a journey from symbols to multifractals: A tribute to Guy Van Orden. *Ecological Psychology*, 25, 204-211. (Invited article for special issue "A Cognitive Science Slam in Honor of Guy Van Orden" edited by Rick Dale, Jay Holden, Heidi Kloos, & Michael Richardson).
- Stirling, L. A., Lipsitz, L. A., Qureshi, M., **Kelty-Stephen, D. G.**, Goldberger, A. L., & Costa, M. (2013). Use of a tracing task to assess visuomotor performance: Effects of age, gender, and handedness. *Journal of Gerontology Series A: Biological Sciences and Medical Sciences*, 68, 938-945.
- Palatinus, Zs., Dixon, J. A., & **Kelty-Stephen, D. G.** (2013). Fractal fluctuations in quiet standing predict the use of mechanical information for haptic perception. *Annals of Biomedical Engineering*, 41, 1625-1634. (Invited article for special issue "New Perspectives in Human Movement Variability" edited by Thurmon Lockhart & Nicholas Stergiou).
- Kelty-Stephen, D. G.**, & Dixon, J. A. (2013). Temporal correlations in postural sway moderate effects of stochastic resonance on postural stability. *Human Movement Science*, 32, 92-105.
- Kelty-Stephen, D. G.**, Palatinus, K., Saltzman, E., & Dixon, J. A. (2013). A tutorial on multifractality, cascades, and interactivity for empirical time series in ecological science. *Ecological Psychology*, 25, 1-62.
- Kelty-Stephen, D. G.**, & Mirman, D. (2013). Gaze fluctuations are not additively decomposable: Reply to Bogartz & Staub. *Cognition*, 126, 128-134.
- Kelty-Stephen, D. G.**, & Dixon, J. A. (2012). When physics is not "just physics": Complexity science invites new measurement frames for exploring the physics of cognitive and biological development. *Critical Reviews in Biomedical*

- Engineering*, 40, 471-483. (Invited review for special issue “Complex Systems in Neurobiology” edited by Ramesh Balasubramaniam and Kjerstin Torre).
- Goldfield, E. C., Park, Y.-L., Chen, B.-R., Hsu, W.-H., Wessendorf, A., Young, D., Wehner, M., **Kelty-Stephen, D. G.**, Stirling, L., Newman, D., Nagpal, R., Saltzman, E., Holt, K. G., Walsh, C., Wood, R. J. (2012). Bio-inspired design of soft robotic assistive devices: The interface of physics, biology, and behavior. *Ecological Psychology*, 24, 300-327.
- Dixon, J. A., & **Kelty-Stephen, D. G.** (2012). Multi-scale interactions in Dictyostelium discoideum aggregation. *Physica A*, 391, 6470-6483.
- Stephen, D. G.**, Hsu, W.-H., Young, D., Saltzman, E., Holt, K. G., Newman, D. J., Weinberg, M., Wood, R. J., Nagpal, R., & Goldfield, E. C. (2012). Multifractal fluctuations in joint angles during infant spontaneous kicking reveal multiplicativity-driven coordination. *Chaos, Solitons, & Fractals*, 45, 1201-1219.
- Stephen, D. G.**, Wilcox, B., Niemi, J. B., Franz, J. R., Kerrigan, D. C., & D’Andrea, S. E. (2012). Baseline-dependent effect of noise-enhanced insoles on gait variability in healthy elderly walkers. *Gait & Posture*, 36, 537-540.
- Stephen, D. G.**, Anastas, J. R., & Dixon, J. A. (2012). Scaling in executive control reflects multiplicative multifractal cascade dynamics. *Frontiers in Physiology*, 3, 102.
- Van Orden, G., & **Stephen, D. G.** (2012). Is cognitive science usefully cast as complexity science? *Topics in Cognitive Science*, 4, 3-6.
- Dixon, J. A., Holden, J. G., Mirman, D., & **Stephen, D. G.** (2012). Multifractal dynamics in the emergence of cognitive structure. *Topics in Cognitive Science*, 4, 51-62.
- Stephen, D. G.**, & Van Orden, G. (2012). Searching for general principles in cognitive performance: Reply to commentators. *Topics in Cognitive Science*, 4, 94-102.
- Mirman, D., Irwin, J. R., & **Stephen, D. G.** (2012). Eye movement dynamics and cognitive self-organization in typical and atypical development. *Cognitive Neurodynamics*, 6, 61-73. (Selected for inclusion in Psychology Progress, URL: <http://www.psychologyprogress.com>).
- Stephen, D. G.**, & Hajnal, A. (2011). Transfer of calibration between hand and foot: Functional equivalence and fractal fluctuations. *Attention, Perception, & Psychophysics*, 73, 1302-1328.
- Stephen, D. G.**, & Anastas, J. (2011). Fractal fluctuations in gaze speed visual search.

- Attention, Perception, & Psychophysics*, 73, 666-677.
- Anastas, J. R., **Stephen, D. G.**, & Dixon, J. A. (2011). The scaling behavior of hand motions reveals self-organization during an executive-function task. *Physica A*, 390, 1539-1545.
- Stephen, D. G.**, & Dixon, J. A. (2011). Strong anticipation: Multifractal cascade dynamics modulate scaling in synchronization behaviors. *Chaos, Solitons, & Fractals*, 44, 160-168.
- Stephen, D. G.**, Arzamarski, R., & Michaels, C. F. (2010). The role of fractality in perceptual learning: Exploration in dynamic touch. *Journal of Experimental Psychology: Human Perception & Performance*, 36, 1161-1173.
- Stephen, D. G.**, & Mirman, D. (2010). Interactions dominate the dynamics of visual cognition. *Cognition*, 115, 154-165.
- Stephen, D. G.**, Dixon, J. A., & Isenhower, R. W. (2009). Dynamics of representational change: Entropy, action, and cognition. *Journal of Experimental Psychology: Human Perception & Performance*, 35, 1811-1832.
- Stephen, D. G.**, Boncoddò, R. A., Magnuson, J. S., & Dixon, J. A. (2009). The dynamics of insight: Mathematical discovery as a phase transition. *Memory & Cognition*, 37, 1132-1149.
- Stephen, D. G.**, & Arzamarski, R. (2009). Self-training of dynamic touch: Striking improves judgment by wielding. *Attention, Perception, & Psychophysics*, 71, 1717-1723.
- Stephen, D. G.**, Mirman, D., Magnuson, J. S., & Dixon, J. A. (2009). Lévy-like diffusion in eye movements during spoken-language comprehension. *Physical Review E*, 79, 056114. (Reprinted in *Virtual Journal of Biological Physics Research*, 17, June 1, 2009, URL: <http://www.vjbio.org>).
- Blau, J. J. C., **Stephen, D. G.**, Carello, C., & Turvey, M. T. (2009). Prism adaptation of underhand throwing: Rotational inertia and the primary and latent aftereffect. *Neuroscience Letters*, 456, 54-58.
- Stephen, D. G.**, & Dixon, J. A. (2009). The self-organization of insight: Entropy and power laws in problem solving. *Journal of Problem Solving*, 2, 72-101. (Invited review).
- Stephen, D. G.**, Stepp, N., Dixon, J. A., & Turvey, M. T. (2008). Strong anticipation: Sensitivity to long-range correlations in synchronization behavior. *Physica A*, 387, 5271-5278.

*Under review:*

**Kelty-Stephen, D. G.**, Cavanaugh, J. T., & Stergiou, N. Multifractality and the adaptable behavioral state: A conceptual framework for optimizing movement. Under review at *Physical Therapy* (revision invited)

Booth, C. R.\*, Brown, H. L.\*, Eason, E. G.\*, Wallot, S., & **Kelty-Stephen, D. G.** Interactions across the hierarchical scales of discourse processing: Multifractal evidence from self-paced word-reading times predicts both short- and long-range effects of reader surprise at finding gender stereotypes unfulfilled. Under review at *Discourse Processes*.

*In preparation:*

Ebersole, T. M.\*, & **Kelty-Stephen, D. G.** Psychology as an evolving, interdisciplinary science: Teaching Sensation & Perception from Fourier to fluid dynamics.

Raymakers, E. P.\*, Matthews-Saugstad, K. M.\*, & **Kelty-Stephen, D. G.** Affective prosody clarifies intended semantics when the speaker distorts phonemic sequence.

Book Chapters (with student coauthors indicated with asterisk “\*”)

Brown, H. L.\*, Booth, C. R.\*, Eason, E. G.\*, & **Kelty-Stephen, D. G.** (in press). Multifractal signatures of intersectionality: Nonlinear dynamics permits quantitative modeling of hierarchical patterns in gender dynamics at the cultural level. In E. Mitleton-Kelly, A. Paraskevas, & C. Day (Eds.), *Handbook of research methods in complexity science and their application*. Cheltenham: Edward Elgar.

Dixon, J. A., **Kelty-Stephen, D. G.**, & Anastas, J. R. (2014). The embodied dynamics of problem solving: New structure from multi-scale interactions. In L. S. Shapiro (Ed.), *The Routledge handbook of embodied cognition* (pp. 160-170). New York: Routledge.

Dixon, J. A., **Stephen, D. G.**, Boncoddio, R. A., & Anastas, J. (2010). The self-organization of cognitive structure. In B. H. Ross (Ed.), *The psychology of learning & motivation, vol. 52* (pp. 343-384). Burlington: Academic Press.

Conference Proceedings

Wallot, S., O’Brien, B., Coey, C. A., & **Kelty-Stephen, D. G.** (in press). Power-law fluctuations in eye movements predict text comprehension during connected text reading. *Proceedings of the 37th annual conference of the Cognitive Science Society*.

Blau, J. J. C., **Stephen, D. G.**, Frank, T. D., Turvey, M. T., & Carello, C. (2009). Nonlinear attractor dynamics and symmetry breaking in prism adaptation and re-adaptation. In J. Wagman, & C. Pagano (Eds.) *Studies in perception and action X: Proceedings from the fifteenth International Conference on Perception and Action* (pp. 1-4). New York: Erlbaum.

Dotov, D. G., & **Stephen, D. G.** (2009). Variability of uni-manual pendulum oscillation at and away from resonance. In J. Wagman, & C. Pagano (Eds.) *Studies in perception and action X: Proceedings from the fifteenth International Conference on Perception and Action* (pp. 8-11). New York: Erlbaum.

**Stephen, D. G.**, & Dixon, J. A. (2007). Fractality and the attunement of perceptual systems. In S. Cummins-Sebree, M. A. Riley, & K. Shockley (Eds.), *Studies in perception and action IX: Proceedings from the fourteenth International Conference on Perception and Action* (pp. 172-175). New York: Erlbaum.

### Teaching

#### *Experience:*

- Spring 2016 Instructor, Introduction to Psychology (Grinnell College [GC]; Undergraduate [UG])  
 Instructor, Longitudinal and Time-Series Analysis (GC; UG)
- Fall 2015 Instructor, Introduction to Psychology (GC;UG)  
 Instructor, Special Topics in Sensation & Perception (GC; UG)  
 Advisor, Directed Research: “Multifractal Haptics” (GC; UG)  
*Student researchers:* Alexis Acosta, Christopher Bell, Jun-Taek Lee  
 Advisor, Mentored Advanced Project (GC; UG)  
*Student researcher:* Krista Matthews-Saugstad
- Summer 2015 Advisor, Mentored Advanced Projects (GC; UG)  
*Student researchers:* Krista Matthews-Saugstad & Erik Raymakers
- Spring 2015 Instructor, Introduction to Psychology (GC; UG)  
 Instructor, Special Topics in Ecological Psychology (GC; UG)  
 Advisor, Directed Research: “Collegiate Mental Health” (GC; UG)  
*Student researcher:* Eliana Schechter
- Fall 2014 Instructor, Introduction to Psychology (GC; UG)  
 Instructor, Special Topics in Sensation & Perception (GC; UG)  
 Advisor, Directed Research: “Dynamics of Gender” (GC; UG)  
*Student researchers:* Hannah Brown, Chase Booth, & Elizabeth Eason



- Summer 2014 Advisor, Mentored Advanced Projects (GC; UG)  
*Student researchers:* Charles Eddy & Dan Teng
- Spring 2014 Instructor, Introduction to Psychology (GC; UG)  
 Instructor, Special Topics in Ecological Psychology (GC; UG)  
 Advisor, Directed Research: “Perception and Motor Control” (GC; UG)  
*Student researcher:* Charles Eddy  
 Guest Lecturer, Language Development (GC; UG)  
 January 27: “Associationism and Behaviorist Approaches”
- Fall 2013 Instructor, Introduction to Psychology (GC; UG)  
 Instructor, Introduction to Statistics (GC; UG)
- Fall 2011 Co-Instructor, Approaches to Emergent Structure (University of Connecticut [UConn]; Graduate [G])
- Spring 2011 Guest Lecturer, Longitudinal Data Analysis (UConn; G)  
 March 15: “Modeling Nonlinear and Discontinuous Change”  
 Guest Lecturer, General Psychology II (UConn; UG)  
 March 31: “Fundamental Attribution Error: Random and Reliable Behavior”

During graduate school at University of Connecticut:

- Spring 2010 Sensation and Perception Laboratory Teaching Assistant  
 Fall 2009 Introductory Psychology Laboratory Instructor (2 sections)  
 Spring 2009 Research Methods Laboratory Instructor (1 section)  
 Fall 2008 Research Methods Laboratory Instructor (1 section)  
 Spring 2008 Cognition Laboratory Teaching Assistant  
 Spring 2008 “Nonlinear Dynamics in Gottlieb’s Probabilistic Epigenesis” Discussion  
 Co-Leader (Graduate students and faculty)  
 Fall 2007 Statistics Consultant for Research Methods Laboratory  
 Fall 2006 Graduate Statistics Teaching Assistant  
 Spring 2006 Introductory Psychology Discussion Leader (2 sections)  
 Fall 2005 Introductory Psychology Laboratory Instructor (2 sections)

*Prepared to teach:*

- Introductory Psychology (Undergraduate)  
 Research Methods (Undergraduate)  
 Statistics (Undergraduate/Graduate)  
 Cognition (Undergraduate/Graduate)  
 Learning & Memory (Undergraduate/Graduate)  
 Sensation & Perception (Undergraduate/Graduate)  
 Developmental Psychology (Undergraduate/Graduate)  
 Special Topics in Complexity, Emergence, and Embodiment (Graduate)

*Training:*

Spring 2008 Course in Teaching Experimental Psychology

Presentations (with student coauthors indicated with asterisk “\*”)

*Invited Colloquia and Workshops:*

**Kelty-Stephen, D. G.** (2016, March). Multifractal analysis lays bare the hierarchical patterning in movement that supports hierarchical patterning in cognition. Invited colloquium for the Kinesiology Department, University of Minnesota-Twin Cities, Minneapolis, MN.

**Kelty-Stephen, D. G.** (2016, February). [title]. Invited colloquium for the Center for Cognition, Action, & Perception, University of Cincinnati, Cincinnati, OH.

**Kelty-Stephen, D. G.** (2015, March). When the “ceteris” aren’t so “paribus”:  
Individual differences in cognitive performance and the full-body, multiscaled imbalances that participants lay at our laboratory doorsteps. Invited colloquium for the Psychology Department, Illinois State University, Normal, IL.

**Kelty-Stephen, D. G.** (2014, November). When the “ceteris” aren’t so “paribus”:  
Individual differences in cognitive performance and the full-body, multiscaled imbalances that participants lay at our laboratory doorsteps. Invited colloquium for the School of Health, Physical Education, and Recreation, University of Nebraska-Omaha, Omaha, NE.

**Kelty-Stephen, D. G.** (2014, June). Getting to know the cascades in our data: A workshop on multifractality and dimensionality. Three-day workshop for the Interacting Minds Centre, Aarhus University, Aarhus, Denmark.

**Kelty-Stephen, D. G.** (2013, April). Nested structure of exploratory movements: Interactions across scales in perception and action. Invited colloquium for the Psychology Department, Grinnell College, Grinnell, IA.

**Stephen, D. G.** (2012, May). Dimensionality: The maybe-linear, maybe-nonlinear problem in our measurements. Invited colloquium for the Cognitive and Information Sciences Department, University of California-Merced, Merced, CA.

**Stephen, D. G.** (2012, May). Cascades in perception-action-cognition: Fractal and multifractal evidence. Invited colloquium for the Cognitive and Information Sciences Department, University of California-Merced, Merced, CA.

**Stephen, D. G.** (2012, April). Temporal coordination: A matter of prediction or multifractal cascades? Invited colloquium for the Movement to Health Laboratory, EuroMov, University of Montpellier-1, Montpellier, France.

**Stephen, D. G.** (2011, January). Perception and action as a self-organizing cascade:

Clues from fractality. Invited colloquium for the Perception-Action-Cognition Division of the Psychology Department at University of Connecticut, Storrs, CT.

**Stephen, D. G.** (2010, April). Fluctuations indicate the flow of information through the perceptual system. Invited colloquium for the Psychology Department at University of Southern Mississippi, Hattiesburg, MS.

**Stephen, D. G.** (2007, February). Cognitive representation as a thermodynamic phenomenon. Invited colloquium for the Perceptual-Motor Dynamics Lab at University of Cincinnati, Cincinnati, OH.

*Invited Symposium Papers:*

**Kelty-Stephen, D. G.** (2015, July). Strong anticipation or good old-fashioned sharing of multifractal fluctuations. Invited symposium paper at the 18<sup>th</sup> International Conference of Perception and Action, Minneapolis, MN.

**Kelty-Stephen, D. G.** (2015, March). Haptic perception: Fractal fluctuations during multi-modal learning. Invited symposium paper at the 1<sup>st</sup> International Convention of Psychological Science, Amsterdam, the Netherlands.

**Stephen, D. G., & Hajnal, A.** (2011, July). Fractality of exploration predicts learning and transfer in dynamic touch. Invited symposium paper at the 16<sup>th</sup> International Conference of Perception and Action, Ouro Preto, Brazil.

Dixon, J. A., & **Stephen, D. G.** (2011, July). On the behavior of beads and cells. Invited symposium at the 16<sup>th</sup> International Conference of Perception and Action, Ouro Preto, Brazil.

**Stephen, D. G.** (2010, July). Power-law fluctuations in eye and hand movements during problem solving predict strategy change. Invited symposium paper presented at Rethinking Problem Solving: A Symposium on Distributed Cognition, London, UK.

Dixon, J. A., & **Stephen, D. G.** (2010, June). Multifractal analysis of cell aggregation. Invited symposium paper presented at the 2<sup>nd</sup> Physical Intelligence Workshop, Davis, CA.

**Stephen, D. G.** (2008, July). Cognition as the breaking and reforming of constraints. Invited symposium paper presented at the 29<sup>th</sup> annual meeting of the International Congress of Psychology, Berlin, Germany.

**Stephen, D. G., Sullivan, R. A., Dixon, J. A., & Isenhower, R. W.** (2007, July). Dynamics in development: New structures through self-organization. Invited symposium paper presented at the 14<sup>th</sup> International Conference of Perception and Action, Yokohama, Japan.

*Conference papers:*

- Palatinus, Zs., Palatinus, K., **Kelty-Stephen, D. G.**, & Hajnal, A. (2015, July). The width of the multifractal spectrum. Paper presented at the 18<sup>th</sup> International Conference of Perception and Action, Minneapolis, MN.
- Harrison, H. S., **Kelty-Stephen, D. G.**, Vaz, D., & Michaels, C. F. (2014, February). Multifractality in pole-balancing data. Paper presented at the annual meeting of New England Sequencing and Timing, New Haven, CT.
- Kello, C. T., & **Kelty-Stephen, D. G.** (2012, August) Multifractal analysis of observed and simulated  $1/f$  noise. Paper presented at the 3<sup>rd</sup> annual Cognition & Dynamics Workshop at University of Connecticut, Storrs, CT.
- Palatinus, Zs., Dixon, J. A., & **Stephen, D. G.** (2012, July). Shifting the perspective on biological movement perception. Paper presented at the 8<sup>th</sup> Asia-Pacific Conference on Vision, Incheon, Korea.
- Dixon, J. A., & **Stephen, D. G.** (2011, July). The emergence of reaching behavior: Local and aggregative dynamics of beads and cells. Paper presented at the 2<sup>nd</sup> meeting of the Society for Complex Systems in Cognitive Science, Boston, MA.
- Palatinus, Zs., **Stephen, D. G.**, Kobayashi, Y., Kinsella-Shaw, J., & Turvey, M. T. (2011, July). Multifractal heterogeneity in exploration for whole-part selective attention. Paper presented at the 16<sup>th</sup> International Conference of Perception and Action, Ouro Preto, Brazil.
- Palatinus, Zs., **Stephen, D. G.**, Kobayashi, Y., Kinsella-Shaw, J., Carello, C., & Turvey, M. T. (2010, July). Perceiving length by dynamic touch without use of limbs and without active exploration. Paper presented at the 2010 North American Meeting of the International Society of Ecological Psychology, Normal, IL.
- Blau, J. J. C., **Stephen, D. G.**, & Carello, C. (2009, July). Fractal structure in event perception: Lessons from film editing. Paper presented at the 15<sup>th</sup> International Conference of Perception and Action, Minneapolis, MN.
- Stephen, D. G.**, & Dixon, J. A. (2009, July). A multifractal approach to development in *D. discoideum*. Paper presented at the 15<sup>th</sup> International Conference of Perception and Action, Minneapolis, MN.
- Dotov, D. G., **Stephen, D. G.**, Frank, T. D., & Turvey, M. T. (2009, March). Dynamics of rhythms at resonance: Variability of Unimanual pendulum oscillation at and away from resonance. Paper presented at the 19<sup>th</sup> annual meeting of New England Sequencing and Timing at Haskins Laboratories, New Haven, CT.

Dixon, J. A., & **Stephen, D. G.** (2008, August). Thermodynamics of a developmental system. Paper presented at the 3<sup>rd</sup> annual Cognition & Dynamics Workshop at University of Connecticut, Storrs, CT.

**Stephen, D. G.**, Mirman, D., Kukona, A. P., Magnuson, J. S., Rueckl, J., & Dixon, J. A. (2008, August). Scale-invariant foraging at the vision-language interface. Paper presented at the 3<sup>rd</sup> annual Cognition & Dynamics Workshop at University of Connecticut, Storrs, CT.

**Stephen, D. G.**, Boncoddio, R. A., Dixon, J. A., & Magnuson, J. S. (2007, November). Cognitive dynamics from eye-movements: Representational change as a phase transition. Paper presented at the annual meeting of the Psychonomic Society, Long Beach, CA.

Boncoddio, R. A., **Stephen, D. G.**, & Dixon, J. A. (2007, August). Dynamics of representational change in preschoolers. Paper presented at the 2<sup>nd</sup> annual Cognition & Dynamics Workshop at University of Connecticut, Storrs, CT.

**Stephen, D. G.**, Stepp, N., Dixon, J. A., & Turvey, M. T. (2007, August). Strong anticipation strikes back: Data and more. Paper presented at the 2<sup>nd</sup> annual Cognition & Dynamics Workshop at University of Connecticut, Storrs, CT.

**Stephen, D. G.**, & Dixon, J. A. (2006, August). Negentropy and the emergence of novel representation. Paper presented at the 1<sup>st</sup> annual Cognition & Dynamics Workshop at University of Connecticut, Storrs, CT.

*Poster Sessions:*

Teng, D. W.\*, Wallot, S., & **Kelty-Stephen, D. G.** (2015, November). Lexical decision accentuates effects on word recognition that narrative coherence diminishes. Poster presented at the annual meeting of the Psychonomic Society, Chicago, IL.

Eddy, C. L.\*, Dixon, J. A., & **Kelty-Stephen, D. G.** (2015, July). Head-sway multifractality carries optical nestings to visual and haptic perception. Poster presented at the 18<sup>th</sup> International Conference of Perception and Action, Minneapolis, MN.

Eason, E. G.\*, **Kelty-Stephen, D. G.**, & Fausto-Sterling, A. (2015, June). Gender development during the presymbolic stage: Disentangling infant-caretaker interactions using vector autoregressive and impulse response modeling. Poster presented at the 45<sup>th</sup> annual meeting of the Jean Piaget Society, Toronto.

Teng, D. W.\*, Eddy, C. L.\*, Wallot, S., & **Kelty-Stephen, D. G.** (2015, April). Single-word recognition does not depend on single-word properties. Poster presented at the 87<sup>th</sup> annual meeting of the Midwestern Psychological Association, Chicago, IL.

- Hajnal, A., **Kelty-Stephen, D. G.**, & Bunch, D. (2013, November). Perception of distance on sloped terrain: Effects of optics and effort. Poster presented at the annual meeting of the Psychonomic Society, Toronto.
- Gill, S. V., DeSilva, J. M., & **Kelty-Stephen, D. G.** (2013, November). The medial longitudinal arch as an adaptation to increase step length in children. Poster presented at the 46<sup>th</sup> annual meeting of the International Society for Developmental Psychobiology, San Diego, CA.
- Gill, S. V., Vora, I., & **Kelty-Stephen, D. G.** (2013, November). Walking to the beat of their own drum: Differences in how children and autism meet task constraints. Poster presented at the 46<sup>th</sup> annual meeting of the International Society for Developmental Psychobiology, San Diego, CA.
- Smith, V. C., Qureshi, M., Cakert, K., **Kelty-Stephen, D. G.**, & Osborne, J. (2013, May). Stochastic resonance mattress for preterm infant oxygenation. Poster presented at the annual meeting of the Pediatric Academic Societies, Washington, DC.
- Stirling, L. A., Lipsitz, L. A., Qureshi, M., **Kelty-Stephen, D. G.**, Goldberger, A. L., & Costa, M. D. (2013, May). A simple tracing task to assess visuomotor performance. Poster presented at the annual meeting of the Gait and Clinical Movement Analysis Society, Cincinnati, OH.
- Palatinus, Zs., Dixon, J. A., & **Kelty-Stephen, D. G.** (2012, November). A new frame of reference for the perception of biological motion. Poster presented at the annual meeting of the Psychonomic Society, Minneapolis, MN.
- Stephen, D. G.**, & Hajnal, A. (2011, November). Fractal fluctuations support perceptual learning and transfer. Poster presented at the annual meeting of the Psychonomic Society, Seattle, WA.
- Hsu, W.-H., Holt, K., Young, D., **Stephen, D. G.**, & Goldfield, E. C. (2011, August). Re-education of injured nervous systems: Infant spontaneous kicking study. Poster presented at the annual National Science Foundation Cyber-Physical Systems Principal Investigator meeting, National Harbor, MD.
- Palatinus, Zs., **Stephen, D. G.**, Frank, T. D., & Turvey, M. T. (2010, July). Differential learning in aiming at a target. Poster presented at the 2010 North American Meeting of the International Society of Ecological Psychology, Normal, IL.
- Stephen, D. G.**, & Dixon, J. A. (2009, November). Beyond prediction: Timing emerges from multifractality of perception-action. Poster session at the annual meeting of the Psychonomic Society, Boston, MA.
- Anastas, J., **Stephen, D. G.**, & Dixon, J. A. (2009, November). Fractal dynamics of

- perception-action in the dimensional card sort. Poster session at the annual meeting of the Psychonomic Society, Boston, MA.
- Blau, J. J. C., **Stephen, D. G.**, Frank, T. D., Turvey, M. T., & Carello, C. (2009, July). Nonlinear attractor dynamics and symmetry breaking in prism adaptation and re-adaptation. Poster session at the 15<sup>th</sup> International Conference of Perception and Action, Minneapolis, MN.
- Dotov, D. G., & **Stephen, D. G.** (2009, July). Variability of uni-manual pendulum oscillation at and away from resonance. Poster session at the 15<sup>th</sup> International Conference of Perception and Action, Minneapolis, MN.
- Boncoddo, R. A., **Stephen, D. G.**, & Dixon, J. A. (2008, November). Embodied relations self-organize into representations. Poster session at the annual meeting of the Psychonomic Society, Chicago, IL.
- Boncoddo, R. A., **Stephen, D. G.**, & Dixon, J. A. (2008, May). Self-organization and embodiment: Evidence from preschoolers' problem solving. Poster session at the annual meeting of the Association for Psychological Science, Chicago, IL.
- Stephen, D. G.**, & Dixon, J. A. (2007, July). Fractality and the attunement of perceptual systems. Poster session at the 14<sup>th</sup> International Conference of Perception and Action, Yokohama, Japan.
- Stephen, D. G.**, Whitney, P. G., Green, J. A., Dixon, J. A. (2007, March). Dynamical organization of infant crying. Poster session presented at the biannual meeting of the Society for Research in Child Development, Boston, MA.
- Stephen, D. G.**, Dixon, J. A., & Isenhower, R. W. (2006, November). Dynamic emergence of new cognitive structure. Poster session presented at the annual meeting of the Psychonomic Society, Houston, TX.
- Dixon, J. A., & **Stephen, D. G.** (2006, May). Getting time on your side: Modeling microgenetic data with longitudinal methods. Poster session presented at the annual meeting of the Association for Psychological Science, New York, NY.
- Stephen, D. G.**, & Ball, C. T. (2005, February). What are the cognitive determinants of a coincidence? Poster session presented at the annual meeting of the North Carolina Cognition Group, Winston-Salem, NC.
- In-house presentations:*
- Raymakers, E. P.\*, Matthews-Saugstad\*, K. M., & **Kelty-Stephen, D. G.** (2015, August). Betting a getter feeling for loken spanguage/Getting a better feeling for spoken language. Invited presentation in the Scholars' Convocation series, Grinnell College, Grinnell, IA.

- Kelty-Stephen, D. G.** (2015, February). Under the hood of multifractal analysis: Working backwards from skewed distributions to cascade dynamics. Invited colloquium for the Perceiving-Acting Workshop, Center for Ecological Study of Perception and Action, University of Connecticut, Storrs, CT.
- Kelty-Stephen, D. G.** (2012, November). Baseline-dependent effects of stochastic-resonance insoles on elderly gait. Invited symposium paper at the 4<sup>th</sup> Wyss Retreat.
- Osborne, J., Qureshi, M., Cakert, K., **Kelty-Stephen, D. G.**, & Smith, V. C., (2012, November). Exploring biomarkers and interventions for infant apnea with new technologies: A stochastic-resonance mattress and VueLogger. Poster presented at the 4<sup>th</sup> annual Wyss Retreat.
- Stirling, L., Kim, L., **Kelty-Stephen, D. G.**, Niemi, J., Lipsitz, L., Goldberger, A., & Costa, M. (2012, November). NeuroAssess: Quantifying neuromotor performance. Poster presented at the 4<sup>th</sup> annual Wyss Retreat.
- Young, D., Burykin, A., Costa, M., Goldberger, **Kelty-Stephen, D. G.**, Lemberg, T., Niemi, J., Osborne, J., Qureshi, M., Stirling, L., D'Agli, C., Helfer, B., Malyska, N., Quatieri, T., Williamson, J., Yu, B., Nayak, T., Rajj, T., Lee, A. K. C., Durham, K., Inamori, A., & Nierenberg, A. (2012, November). Exploring biomarkers for depression. Poster presented at the 4<sup>th</sup> annual Wyss Retreat, Boston, MA.
- Stephen, D. G.**, Hsu, W.-H., Young, D., Saltzman, E., Holt, K. G., Newman, D. J., Weinberg, M., Wood, R. J., Nagpal, R., & Goldfield, E. C. (2011, November). Multifractal dynamics of infant spontaneous kicking reveal multiplicative basis for exploration. Poster presented at the 3<sup>rd</sup> annual Wyss Retreat, Boston, MA.
- Stephen, D. G.**, Niemi, J. B., Collins, J. J., D'Andrea, S. E., Wilcox, B., Franz, J., & Kerrigan, D. C. (2011, November). Baseline-dependent reduction in elderly gait variability from stochastic resonance. Poster presented at the 3<sup>rd</sup> annual Wyss Retreat, Boston, MA.
- Stirling, L., **Stephen, D. G.**, Hsu, W.-H., Young, D., Nagpal, R., Wood, R., & Goldfield, E. C. (2010, November). Re-education of injured nervous systems: Infant supine kicking study. Poster presented at the 2<sup>nd</sup> annual Wyss Retreat, Boston, MA.
- Stephen, D. G.**, & Arzamarski, R. (2008, February). A nonlocal anatomy of error and learning. Perception-Action Workshop at University of Connecticut, Storrs, CT.
- Stephen, D. G.** (2007, December). Dynamics of problem solving. Workshop for Complexity, Cognition, and Coordination at University of Connecticut, Storrs, CT.



Blau, J. J. C., Turvey, M. T., Carello, C., & **Stephen, D. G.** (2007, November). Perception and action in the context of prism adaptation and weighted limbs. Invited colloquium for the Perception-Action Workshop at University of Connecticut, Storrs, CT.

**Stephen, D. G.** (2007, January). Cognitive representation as a thermodynamic phenomenon. Invited colloquium for the Perception-Action Workshop at University of Connecticut, Storrs, CT.

**Stephen, D. G.**, Dixon, J. A., & Isenhower, R. W. (2006, March). In search of the dynamics of representation. Invited colloquium for Perception-Action Workshop at University of Connecticut, Storrs, CT.

Professional service

Associate editor at *Topics in Cognitive Science*, 2010-present  
(Co-editor for the special issue “Great Debates: Complex Systems Approach to Cognitive Science”)

Editorial Board member at *Frontiers in Physiology*, 2011-present  
Editorial Board member at *Fractal Laboratory Journal*, 2011-present

Ad-hoc reviewer: *Cognitive Science*; *Cognition*; *Journal of Experimental Psychology: Human Perception and Performance*; *Journal of Experimental Psychology: Applied*; *Acta Psychologica*; *Attention, Perception, & Psychophysics*; *Experimental Brain Research*; *Human Movement Science*; *Frontiers in Computational Neuroscience*; *Journal of Neurophysiology*; *Journal of Neuroscience Methods*; *Minds & Machines*; *Psychophysiology*; *Psychomusicology*; *PLoS ONE*; *Annals of Biomedical Engineering*; *Physica A: Statistical Mechanics & its Applications*; *Chaos, Solitons & Fractals*; *Complexity*; *Clinical Nutrition*; *Current Bioinformatics*; National Science Foundation: Developmental and Learning Sciences Panel; Annual Meetings of the Cognitive Science Society (2013, 2015)

Bachelor’s degree advising

Tela M. Ebersole, General Science – Psychology, Grinnell College, Class of 2016  
Christopher A. Bell, Psychology, Grinnell College, Class of 2018  
Joseph MacDonald, Grinnell College, Class of 2017

Thesis advising (according to type of thesis, my role, and thesis student’s name)

Doctoral thesis:

*Reader*

Zsolt Palatinus, University of Connecticut, 2012-2013

Master’s thesis:

*Committee member*

David Bunch, University of Southern Mississippi, 2011-2012  
Honor's undergraduate thesis:

*Main advisor*

Jean J. Shiao, Harvard University, 2012-2013

Undergraduate research advising

Erik Raymakers, Grinnell College, Summer 2015  
Krista Matthews-Saugstad, Grinnell College, Summer 2015-Fall 2015  
Eliana Schechter, Grinnell College, Spring 2015  
Elizabeth Eason, Grinnell College, Fall 2014-Spring 2015  
Chase Booth, Grinnell College, Fall 2014  
Hannah Brown, Grinnell College, Fall 2014  
Dan W. Teng, Grinnell College, Summer 2014  
Charles Eddy, Grinnell College, Fall 2013- Summer 2014

Founding faculty advisor of Grinnell College Pre-Physical Therapy Society, Fall 2015-present

Faculty advisor for Grinnell College's QuestBridge Scholars, Fall 2015-present

Member of Grinnell College's Harm Reduction Committee, Fall 2015-Spring 2016

Faculty attendant at Grinnell College's Second-Year Retreat for Science Students, Fall 2015

Assisting in preparation of policy documents for Grinnell College's Institutional Review Board, Summer 2015

Coordinating visit by Brown University's Anne Fausto-Sterling for campus-wide talk and interaction with students in Gender, Women's Studies, and Sexuality Department, Spring 2015

Preparing Future Faculty (PFF) mentor for Bryce Kennedy, University of Nebraska-Lincoln, Fall 2014

Faculty host at Grinnell Science Project Fall 2013 Orientation

Graduate Advisor Committee Representative (Perception-Action-Cognition Division), Psychology Department, University of Connecticut, 2009-2010

Data collection methods

Motion capture (magnetic and optical)

Eye tracking

Force-plate postural measurement

Electromyography

Treadmill

Metabolic data logging

Quantitative methods

Analysis of variance

Multiple regression

Hierarchical linear modeling (also known as growth-curve or multi-level modeling)

Survival analysis (also known as event-history analysis)  
Autoregressive moving average (ARMA)/Autoregressive fractionally integrated moving average (ARFIMA) modeling  
Vector autoregression  
Zero-inflated negative binomial modeling/Hurdle modeling

Phase-space reconstruction  
Recurrence quantification analysis  
Detrended fluctuation analysis (DFA)  
Variations on detrended fluctuation analysis (i.e., multifractal and Fourier DFA)  
Direct estimation of the multifractal spectrum  
Diffusion entropy analysis

Affiliations

2012-present Psychonomic Society

2008-present International Society of Ecological Psychology