

Brett R. Fajen

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Last updated 2007.12.30

AREAS OF SPECIALIZATION

Perception and action; visual perception; perceptual-motor learning; virtual environments; ecological psychology; dynamical systems modeling

EMPLOYMENT

1999 - 2001 IGERT Post-doctoral Research Associate, Brown University
2001 - 2007 Assistant Professor of Cognitive Science, Rensselaer Polytechnic Institute
2007 - present Associate Professor of Cognitive Science, Rensselaer Polytechnic Institute

EDUCATION

B.S. Mathematics, Bucknell University (May 1993)
Ph.D. Experimental Psychology, University of Connecticut (Sept 1999)

PUBLICATIONS

Refereed journal articles:

- Fajen, B. R., Riley, M. R., & Turvey, M. T. (in press). Information, affordances, and control of action in sport. *International Journal of Sports Psychology*.
- Fajen, B. R. (2007). Rapid recalibration based on optic flow in visually guided action. *Experimental Brain Research*, 183, 61-74.
- Fajen, B. R. & Warren, W. H. (2007). Behavioral dynamics of intercepting a moving target. *Experimental Brain Research*, 180 (2), 303-319.
- Fajen, B. R. (2007). Affordance-based control of visually guided action. *Ecological Psychology*, 19(4), 383-410.
- Fajen, B. R. & Devaney, M. C. (2006). Learning to control collisions: The role of perceptual attunement and action boundaries. *Journal of Experimental Psychology: Human Perception and Performance*, 32(3), 300-313.
- Huang, W., Fajen, B. R., Fink, J., & Warren, W. H. (2006). Visual navigation and obstacle avoidance using a steering potential function. *Journal of Robotics and Autonomous Systems*, 54 (4), 288-299.
- Fajen, B. R. (2005). The scaling of information to action in visually guided braking. *Journal of Experimental Psychology: Human Perception and Performance*, 31(5), 1107-1123.
- Fajen, B. R. (2005). Calibration, information, and control strategies for braking to avoid a collision. *Journal of Experimental Psychology: Human Perception and Performance*, 31 (3), 480-501.
- Fajen, B. R. (2005). Perceiving possibilities for action: On the necessity of calibration and perceptual learning for the visual guidance of action. *Perception*, 34 (6), 741-755.
- Fajen, B. R., & Warren, W. H. (2004). Visual guidance of intercepting a moving target on foot. *Perception*, 33, 689-715.

- Warren, W. H., & Fajen, B. R. (2004). Behavioral dynamics of human locomotion. *Ecological Psychology*, 16 (1), 61-66.
- Fajen, B. R., & Warren, W. H. (2003). The behavioral dynamics of steering, obstacle avoidance, and route selection. *Journal of Experimental Psychology: Human Perception and Performance*, 29 (2), 343-362.
- Fajen, B. R., Warren, W. H., Temizer, S., & Kaelbling, L. (2003). A dynamical model of steering, obstacle avoidance, and route selection. *International Journal of Computer Vision*, 54 (1/2), 13-34.
- Fajen, B. R., & Kim, N.-G. (2002). Perceiving curvilinear heading in the presence of moving objects. *Journal of Experimental Psychology: Human Perception and Performance*, 28 (5), 1100-1119.
- Fajen, B. R. (2001). Steering toward a goal by equalizing taus. *Journal of Experimental Psychology: Human Perception and Performance*, 27 (4), 953-968.
- Kim, N.-G., Fajen, B. R. & Turvey, M. T. (2000). Perceiving circular heading in non-canonical flow fields. *Journal of Experimental Psychology: Human Perception and Performance*, 26 (1), 31-56.
- Rickards, J. P., Fajen, B. R., Sullivan, J. F., Gillespie, G. (1997). Signaling, notetaking, and field independence-dependence in text comprehension and recall. *Journal of Educational Psychology*, 89 (3), 508-517.
- Shaw, R. E., Effken, J. A., Fajen, B. R., Garrett, S. R., & Morris, A. (1997). An ecological approach to the on-line assessment of problem-solving paths: Principles and applications. *Instructional Science*, 25 (2), 151-166.
- Barab, S. A., Fajen, B. R., Kulikowich, J. M., & Young, M. F. (1996). Assessing hypermedia navigation through Pathfinder: Prospects and limitations. *Journal of Educational Computing Research*, 15 (3), 185-205.

Book chapters:

- Richardson, M. J., Shockley, K., Fajen, B. R., Riley, M. A., & Turvey, M. T. (submitted). Ecological psychology: Six principles for an embodied-embedded approach to behavior. In *Elsevier Handbook of New Directions in Cognitive Science/Embodied Cognitive Science: Towards an Integrated Approach*. Elsevier.
- Fajen, B. R. (in press). Themes in perception and action. In D. Sternad (Ed.) *Progress in Motor Control V: A Multidisciplinary Perspective*.
- Warren, W.H. & Fajen, B.R. (in press) Behavioral dynamics of visually-guided locomotion. In A. Fuchs & V. Jirsa (Eds.), *Coordination: Neural, Behavioral, and Social Dynamics*. Springer.
- Fajen, B. R. (2005). The role of calibration in visually guided braking. In H. Heft & K. Marsh (Eds.) *Studies in Perception and Action VIII*. Mahwah, NJ: Erlbaum (pp. 73-76).
- Warren, W. H., & Fajen, B. R. (2004). From optic flow to laws of control. In L. M. Vaina, S. A. Beardsley, and S. Rushton (Eds.), *Optic Flow and Beyond*. Kluwer (pp. 307-337).
- Fajen, B. R. (1999). Is heading perception absolute or nominal? In M. A. Grealey & J. A. Thomson (Eds.) *Studies in Perception and Action V*. Mahwah, NJ: Erlbaum (pp. 109-112).
- Fajen, B. R. & Kim, N.-G. (1997). Robustness of heading perception along circular paths. In M. A. Schmuckler & J. M. Kennedy (Eds.) *Studies in Perception and Action IV*. Mahwah, N.J.: Erlbaum (pp. 73-76).

Commentaries:

Fajen, B. R., & Turvey, M. T. (2003). Perception, categories, and possibilities for action. *Adaptive Behavior*, 11 (4), 276-278.

Letters of correspondence:

Fajen, B. R. & Warren, W. H. (2000). Go with the flow. *Trends in Cognitive Sciences*, 4(10), 369-370.

Submitted manuscripts:

Bastin, J., Fajen, B. R., & Montagne, G. (revision in preparation). Controlling speed and direction during interception: an affordance-based control model. Submitted to *Journal of Experimental Psychology: Human Perception and Performance*.

Fajen, B. R. (accepted pending revision). Perceptual learning and the visual control of braking. *Perception & Psychophysics*.

Fajen, B. R. (revision in preparation). Learning novel mappings from optic flow to the control of action. Submitted to *Journal of Vision*.

Manuscripts in preparation:

Diaz, G., & Fajen, B. R. (in preparation). Locomotor interception of unpredictable targets.

Fajen, B. R., Diaz, G., & Cramer, C. (in preparation). Reconsidering the role of action in perceiving affordances.

Fajen, B. R., & Warren, W. H. (in preparation). Route selection emerges from the behavioral dynamics of steering and obstacle avoidance.

Published Abstracts:

Fajen, B. R. (2006). Perceptual learning and the visual guidance of braking. *Journal of Vision*, 6(6), 139a, <http://journalofvision.org/6/6/139/>, doi:10.1167/6.6.139.

Diaz, G. J., & Fajen, B. R. (2006). Flexible attunement to different optical variables in visually guided action. *Journal of Vision*, 6(6), 138a, <http://journalofvision.org/6/6/138/>, doi:10.1167/6.6.138.

Fajen, B. R. (2005). Perceptual learning and the visual control of collision avoidance. *Proceedings of the 46th Annual Meeting of the Psychonomic Society*, Toronto, CA.

Fajen, B. R. (2005). Rapid recalibration in visually guided braking. *Journal of Vision*, 5(8), 318a, <http://journalofvision.org/5/8/318/>, doi:10.1167/5.8.318.

Diaz, G. J., & Fajen, B. R. (2005). Visual control of braking behind a moving lead vehicle. *Journal of Vision*, 5(8), 317a, <http://journalofvision.org/5/8/317/>, doi:10.1167/5.8.317.

Diaz, G., Phillips, F., & Fajen, B. (2007). Locomotor interception of unpredictable moving targets. *Journal of Vision*, 7(9):144, 144a, <http://journalofvision.org/7/9/144/>, doi:10.1167/7.9.144.

Hanchar, W. M., Fajen, B. R., & Devaney, M. C. (2004). Learning to perceive action boundaries in visually guided braking. *Journal of Vision*, 4(8), 813a, <http://journalofvision.org/4/8/813/>, doi:10.1167/4.8.813.

Fajen, B. R. (2004). Scaling information to action in visually guided braking. *Journal of Vision*, 4(8), 811a, <http://journalofvision.org/4/8/811/>, doi:10.1167/4.8.811.

Fajen, B. R. (2003). Calibration, information, and control strategies for braking to avoid a collision. *Proceedings of the 44th Annual Meeting of the Psychonomic Society*, Vancouver, BC.

- Fajen, B. R., & Rom, D. S. (2003). Speed information and the visual control of braking to avoid a collision. *Journal of Vision*, 3(9), 555a, <http://journalofvision.org/3/9/555/>, doi:10.1167/3.9.555.
- Warren, W. H., Di, S., & Fajen, B. R. (2003). Behavioral dynamics of avoiding a moving obstacle. *Journal of Vision*, 3(9), 134a, <http://journalofvision.org/3/9/134/>, doi:10.1167/3.9.134.
- Fajen, B. R., Beem, N. O., & Warren, W. H. (2002). Route selection emerges from the dynamics of steering and obstacle avoidance. *Journal of Vision*, 2(7), 418a, <http://journalofvision.org/2/7/418/>, DOI 10.1167/2.7.418.
- Fajen, B., & Cramer, C. (2007). Visual control of hand position and orientation during one-handed catching. *Journal of Vision*, 7(9):165, 165a, <http://journalofvision.org/7/9/165/>, doi:10.1167/7.9.165.
- Fajen, B. R. & Warren, W. H. (2001). Behavioral dynamics of on-line route selection in complex scenes. *Proceedings of the 42nd Annual Meeting of the Psychonomic Society, Orlando, FL*.
- Fajen, B.R. & Warren, W.H. (2001). Interception of moving objects on foot. *Journal of Vision*, 1(3), 187a, <http://journalofvision.org/1/3/187/>, DOI 10.1167/1.3.187.
- Sims, C. R., & Fajen, B. R. (2007). A reinforcement learning model of visually guided braking. *Journal of Vision*, 7(9):151, 151a, <http://journalofvision.org/7/9/151/>, doi:10.1167/7.9.151.
- Warren, W., Fajen, B., & Belcher, D. (2001). Behavioral dynamics of steering, obstacle avoidance, and route selection. *Journal of Vision*, 1(3), 184a, <http://journalofvision.org/1/3/184/>, DOI 10.1167/1.3.184.
- Warren, W. H. & Fajen, B. R. (2000). Behavioral dynamics of steering and obstacle avoidance. *Proceedings of the 41st Annual Meeting of the Psychonomic Society, New Orleans, LA*.
- Fajen, B. R. (2000). Steering toward a goal by equalizing taus. *Investigative Ophthalmology and Visual Science*, 41, S799.

PRESENTATIONS

Department colloquia:

- Perceptual-motor learning and control in humans. Presented to the *CS Robotics Lab*, Rensselaer Polytechnic Institute, Troy, NY on October 17, 2007.
- Affordance-based control of visually guided action. Presented to the *Movement and Perception Group* at the University of the Mediterranean, France on September 21, 2006, the *Issues in Cognitive Science Lecture Series*, Rensselaer Polytechnic Institute, Troy, NY on Dec 6, 2006, and the *Department of Psychology*, University of Virginia, Charlottesville, VA on Feb 28, 2007.
- Perceiving and acting in real and virtual environments. Presented at the *INTERFACE: Research @ EMPAC Seminar Series*, Rensselaer Polytechnic Institute, Troy, NY on April 25, 2006.
- Learning to control collisions: Perceptual attunement and action boundaries. Presented at the *Issues in Cognitive Science Lecture Series*, Rensselaer Polytechnic Institute, Troy, NY on Dec 1, 2004.
- Know your limits: The necessity of calibration and perceptual learning in visually guided braking. Presented to the *Department of Psychology*, University of Cincinnati, on May 17, 2004, and to the *Department of Psychology*, Wright State University, on May 18, 2004.

Calibration, information, and control strategies for braking to avoid a collision. Presented at the *Issues in Cognitive Science Lecture Series*, Rensselaer Polytechnic Institute, Troy, NY on Jan 14, 2004.

Calibration, information, and control strategies for braking to avoid a collision. Presented to the *Center for the Ecological Study of Perception and Action*, University of Connecticut, Storrs, CT on May 30, 2003 and to the *Department of Cognitive and Linguistic Sciences*, Brown University, Providence, RI on June 1, 2003.

Behavioral dynamics of steering, obstacle avoidance, and route selection. Presented to the *Department of Physical Therapy*, Boston University, Boston, MA in May, 2002.

On the separation of perception and action. Presented at the *Minds & Machines Lecture Series*, Rensselaer Polytechnic Institute, Troy, NY in Nov, 2002.

Behavioral dynamics of steering, obstacle avoidance, and route selection. Presented to the *Department of Computer Science*, Rensselaer Polytechnic Institute, Troy, NY in Oct, 2001.

Conference presentations:

Fajen, B. R. (2007). The perception of action-scaled affordances. Talk presented at the *48 Annual Meeting of the Psychonomic Society*, Long Beach, CA.

Fajen, B. R. (2007). Know your limits! The perception of action-scaled affordances. Talk presented at *Interactions among Movement, Physical Exertion, and Cognitive Performance (IMPAC)*, Natick, MA.

Fajen, B. R. & Cramer, C. (2007). Visual control of hand position and orientation during one-handed catching. Poster presented at the *7th Annual Meeting of the Vision Sciences Society*, Sarasota, FL.

Diaz, G. J., Phillips, F., & Fajen, B. R. (2007). Locomotor interception of unpredictable moving targets. Poster presented at the *7th Annual Meeting of the Vision Sciences Society*, Sarasota, FL.

Sims, C., & Fajen, B. R. (2007). A reinforcement learning model of visually guided action. Poster presented at the *7th Annual Meeting of the Vision Sciences Society*, Sarasota, FL.

Fajen, B. R. (2006). Affordance-based control of visually guided action. Talk presented at the *2006 North American Meeting of the International Society for Ecological Psychology*, Cincinnati, OH.

Fajen, B. R. (2006). Perceptual learning and the visual guidance of action. Talk presented at the *2006 North American Meeting of the International Society for Ecological Psychology*, Cincinnati, OH.

Fajen, B. R. (2006). Perceptual learning and the visual control of braking. Poster presented at the *6th Annual Meeting of the Vision Sciences Society*, Sarasota, FL.

Fajen, B. R. (2005). Perceptual learning and the visual control of collision avoidance. Poster presented at the *46th Annual Meeting of the Psychonomic Society*, Toronto, Canada.

Fajen, B. R. (2005). Learning to control collisions: Perceptual attunement and action boundaries. Talk presented at *13th International Conference of Perception and Action*, Monterey, CA.

Fajen, B. R. (2005). The role of calibration in visually guided braking. Poster presented at the *13th International Conference of Perception and Action*, Monterey, CA.

Fajen, B. R. (2005). Rate of recalibration in visually guided braking. Poster presented at the *5th Annual Meeting of the Vision Sciences Society*, Sarasota, FL.

Diaz, G. J., & Fajen, B. R. (2005). Visual control of braking behind a moving lead vehicle. Poster presented at the *5th Annual Meeting of the Vision Sciences Society*, Sarasota, FL.

- Fajen, B. R. (2004). Scaling information to action in visually guided braking. Poster presented at the 4th Annual Meeting of the Vision Sciences Society, Sarasota, FL, and the 2004 North American Meeting of the International Society of Ecological Psychology, Storrs, CT.
- Hanchar, W., Fajen, B. R., & Devaney, M. (2004). Learning to perceive action boundaries in visually guided braking. Poster presented at the 4th Annual Meeting of the Vision Sciences Society, Sarasota, FL.
- Fajen, B. R. (2003). Calibration, information, and control strategies for braking to avoid a collision. Poster presented at the 44th Annual Meeting of the Psychonomic Society, Vancouver, BC.
- Fajen, B. R. (2003). Calibration, information, and control strategies for braking to avoid a collision. Talk presented at the 2003 ONR Workshop, Troy, NY.
- Fajen, B. R., & Rom, D. S. (2003). Speed information and the control of braking to avoid a collision. Poster presented at the 3rd Annual Meeting of the Vision Sciences Society, Sarasota, FL.
- Fajen, B. R., Beem, N., & Warren, W. H. (2002). Route selection emerges from the dynamics of steering and obstacle avoidance. Talk presented at the 2nd Annual Meeting of the Vision Sciences Society, Sarasota, FL.
- Fajen, B. R. (2002). Interception of moving objects in a virtual environment: Making the open-field tackle. Talk presented at the North American Meeting of the International Society for Ecological Psychology, Oxford, OH.
- Fajen, B. R. (2001). Visual control of locomotion is task-specific. Talk presented at *Optic Flow and Beyond: A Boston Area Meeting*, Boston University, Boston, MA.
- Fajen, B. R. & Warren, W. H. (2001). Interception of moving objects on foot. Talk presented at the 1st Annual Meeting of the Vision Sciences Society, Sarasota, FL.
- Fajen, B. R. & Warren, W. H. (2001). Behavioral dynamics of on-line route selection in complex scenes. Poster presented at the 42nd Annual Meeting of the Psychonomic Society, Orlando, FL.
- Warren, W. H. & Fajen, B. R. (2001). Behavioral dynamics of steering and obstacle avoidance. Talk presented at the 11th International Conference of Perception and Action, Storrs, CT.
- Warren, W. H. & Fajen, B. R. (2000). Behavioral dynamics of steering and obstacle avoidance. Talk presented at the 41st Annual Meeting of the Psychonomic Society, New Orleans, LA.
- Fajen, B. R. (2000). Steering toward a goal by equalizing taus. Poster presented at the 41st Annual Meeting of the Psychonomic Society, New Orleans, LA.

SYMPOSIA ORGANIZED

- Perceptual learning and the control of action. Symposium presented at the 13th International Conference of Perception and Action, Monterey, CA. (Speakers include Claire F. Michaels, John M. Flach, Brett R. Fajen, and Hugo Bruggeman.)
- Visually guided action. Symposium presented at the 2006 North American Meeting of the International Society for Ecological Psychology, Cincinnati, OH. (Speakers include Mark Mon-Williams, Geoffrey Bingham, Rob Gray, Richard Wilkie, and Brett R. Fajen)

GRANTS AND AWARDS

- Visual space and the visual guidance of locomotion*. National Science Foundation. Three-year continuing grant beginning 7/1/2006. (Role on project: PI)

Braking to avoid a collision: Information, control, and dynamics. National Science Foundation.

Three-years beginning 7/15/2003. (Role on project: PI)

Acquisition of System for Multi-Site Networked Motion Capture and Visually Immersive Laboratory for Social and Behavioral Research. National Science Foundation. (Role on project: Senior Project Personnel)

Young Faculty Research Award. Awarded by Rensselaer Polytechnic Institute (April 2004, April 2005, 2007).

TEACHING EXPERIENCE

Sensation & Perception; Perception & Action; Seminar in Human Factors; Motor Control and Coordination; Dynamics of Perception, Action, and Cognition; Proseminar in Cognitive Science

PROFESSIONAL AFFILIATIONS

Member, Vision Sciences Society

Member, International Society for Ecological Psychology

Associate Member, Psychonomic Society

REVIEWER

National Science Foundation (reviewer and panel member for PAC and IGERT programs); Journal of Experimental Psychology: Human Perception and Performance; Journal of Experimental Psychology: Learning, Memory, and Cognition; Quarterly Journal of Experimental Psychology; Perception and Psychophysics; Perception; Current Biology; Neuroscience Letters; Vision Research; Experimental Brain Research; Behavioral Research Methods, Instruments, and Computers; Child Development; Human Factors; IEEE/Systems, Man and Cybernetics; Journal of Motor Behavior; Cambridge University Press; Journal of Vision; Adaptive Behavior; Autonomous Robots

SERVICE

Undergraduate advisor for Psychology (2002-2006)

Director of doctoral program in Cognitive Science (2006-present)

Chair of departmental committee on curriculum for BS in Psychology (2004-2006)

Chair of departmental committee charged with developing a new BS in Cognitive Science (2004-2006)

Chair of departmental committee charged with overhauling the Cognitive Science Department web site (2007)

Member on Institute Review Board (2001-2003)

Member on Middle States Accreditation Subcommittee on Institutional Assessment (2004-2005)