

# David A. Raichlen

## Curriculum Vitae

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Department of Anthropology  
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### Education

- Ph.D., 2004, Anthropology, The University of Texas at Austin  
Dissertation: The relationship between limb mass distribution and locomotor mechanics and energetics in infant baboons (*Papio cynocephalus*).  
Advisor: Liza J. Shapiro
- M.A., 2000, Anthropology, The University of Texas at Austin  
Thesis: Convergence of the forelimb and hind limb natural pendular periods in primates and its implication for the evolution of primate limb shape.  
Advisor: Liza J. Shapiro
- B.S., 1998, cum laude, Biological Anthropology and Anatomy (with honors), Duke University

### Professional Appointments

- Assistant Professor*, Department of Anthropology, University of Arizona, 2006-present
- Post-doctoral Research Fellow*, Department of Anthropology, Harvard University, 2004-2006, with Daniel Lieberman
- Instructor*, Department of Anthropology, Harvard University Extension, Fall, 2005  
Course: "The Human Machine"
- Teaching Assistant*, Department of Anthropology, The University of Texas at Austin, 1998 – 2004

### Editorial Appointments

- Associate Editor*, Journal of Human Evolution, 2009-present

### Publications (in review)

- Raichlen, D.A.**, Gordon, A.D., Muchlinks, M.N., Snodgrass, J.J. (*in review*) Causes and significance of variation in mammalian basal metabolism. *Journal of Comparative Physiology – B*.
- Pontzer, H, **Raichlen, D.A.**, Sockol, M.D. (*in review*) From treadmill to tropics: calculating ranging cost in chimpanzees. In: D'Aout, K. and Vereecke, E.E. (eds) Studying primate locomotion: linking in situ and ex situ research. New York, Springer.

### Publications (in press or published)

- Lieberman, D.E., Bramble, D.M., **Raichlen D.A.**, Shea, J.J. (*in press*) Brains

versus brawn and the evolution of *Homo*. In: Grine, F. and Leakey, R.E.F. (eds) *The Origin of Homo*. New York, Plenum.

- Raichlen, D.A.**, Shapiro, L.J., Pontzer, H., & Sockol, M.D. (2009) Understanding increased hind limb weight support in chimpanzees and the evolution of primate kinetics. *American Journal of Physical Anthropology*. 138: 395-402.
- Pontzer, H, Holloway, J, **Raichlen, D.A.**, Lieberman, D.E. (2009) Control and function of arm swing in human walking and running. *Journal of Experimental Biology*. 212: 523-534
- Pontzer, H., **Raichlen, D.A.**, Sockol, M.D. (2009) The metabolic cost of walking in humans, chimpanzees, and early hominins. *Journal of Human Evolution*. 56: 43-54.
- Keeney, B.K., **Raichlen, D.A.**, Meek, T.H., Wijeratne, R.S., Middleton, K.M., Gerdeman, G.L., Garland, T. Jr. (2008) Differential response to a selective cannabinoid receptor antagonist (SR141716: rimonabant) in female mice from lines selectively bred for high voluntary wheel running behavior. *Behavioral Pharmacology*. 19: 812-820.
- Raichlen, D.A.** (2008) Predicting the effects of gravity on human walking using a kinematic model: A new test of the dynamic similarity hypothesis. *Journal of Experimental Biology*. 211: 2767-2772.
- Raichlen, D.A.**, Pontzer, H., & Sockol, M. (2008) The Laetoli footprints and early hominin locomotor kinematics. *Journal of Human Evolution*. 54:112-117.
- Sockol, M., **Raichlen, D.A.**, & Pontzer, H. (2007) Chimpanzee locomotor energetics and the origin of human bipedalism. *Proceedings of the National Academy of Sciences*. 134: 12265-12269.
- Lieberman, D.E., Bramble, D.M., **Raichlen, D.A.**, & Shea, J.J. (2007) Endurance running and the tyranny of ethnography: A reply to Pickering and Bunn. *Journal of Human Evolution*. 53: 434-437.
- Shapiro, L.J. and **Raichlen, D.A.** (2007) Primate gaits and arboreal stability: A response to Cartmill et al. *American Journal of Physical Anthropology*. 133: 825-827.
- Raichlen, D.A.** (2006) Effects of limb mass distribution on mechanical power outputs during quadrupedalism. *Journal of Experimental Biology*. 209: 633-644.
- Shapiro, L.J. & **Raichlen, D.A.** (2006) The influence of limb proportions on the ontogeny of quadrupedal walking in infant baboons (*Papio cynocephalus*). *Journal of Zoology*. 269: 191-203.
- Lieberman, D.E., **Raichlen, D.A.**, Pontzer, H., Bramble, D. & Cutright-Smith, E. (2006) The human *gluteus maximus* and its role in running. *Journal of Experimental Biology*. 209: 2143-2155.
- Raichlen, D.A.** (2005) Effects of limb mass distribution on the ontogeny of quadrupedalism in infant baboons (*Papio cynocephalus*) and implications for the evolution of primate quadrupedalism. *Journal of Human Evolution*. 49: 415-431.
- Raichlen, D.A.** (2005) Ontogeny of limb mass distribution in *Papio cynocephalus*. *Journal of Human Evolution*. 49: 452-467.

Shapiro, L.J. and **Raichlen, D.A.** (2005) Lateral sequence walking in infant *Papio cynocephalus*: implications for the evolution of diagonal sequence walking in primates. *American Journal of Physical Anthropology*. 126: 205-213.

**Raichlen, D.A.** (2004) Convergence of forelimb and hind limb natural pendular periods in baboons (*Papio cynocephalus*) and its implication for the evolution of primate quadrupedalism. *Journal of Human Evolution*. 46: 719-738.

### **Grants (PI or CO-PI)**

2008-2011: *Principal Investigator*, The National Science Foundation: Born to run? The evolution of the runner's high in humans and cursorial mammals (G. Gerdeman & A. Giuffrida, Co-PIs), \$224,800

2007: University of Arizona Faculty International Travel Grant, \$700.00

2005: *Principal Investigator*, The L.S.B. Leakey Foundation Research Grant: Energetics and the evolution of bipedalism: Insights from chimpanzee biomechanics. (H. Pontzer & D.E. Lieberman, Co-PIs), \$19,781.00

2003: *Co-Principal Investigator*, The National Science Foundation Doctoral Dissertation Improvement Grant: The relationship between limb shape and locomotor mechanics and energetics. (L.J. Shapiro, PI), \$9,800.00

2002: *Principal Investigator*, The L.S.B. Leakey Foundation Research Grant: The relationship between limb shape and locomotor mechanics and energetics. (L.J. Shapiro, Co-PI), \$5,000.00

2000: *Principal Investigator*, Liberal Arts Graduate Research Fellowship, University of Texas at Austin: Convergence of the forelimb and hind limb natural pendular periods in primates and its implication for the evolution of primate limb shape, \$2,000.00

1999: *Principal Investigator*, Liberal Arts Graduate Research Fellowship, The University of Texas at Austin: The function of the arms during human walking, \$2,000.00

1997: *Co-Principal Investigator*, Undergraduate Research Fellowship, Duke University: Toothwear Patterns on Great Ape Post-canine Dentition. (Elwyn Simons, PI), \$1000.00

1996: *Co-Principal Investigator*, Explorer's Club of New York: Eocene Mammals of the Bighorn Basin. (Elwyn Simons, PI), \$1,000.00

### **Awards**

2002: Sherwood L. Washburn Student Prize at the Meetings of the American Association of Physical Anthropologists for paper entitled: "Swing phase and the use of diagonal sequence gait in primates."

2002: Maurice T. Galpert award for graduate student achievement

2002: Professional Development Award, Department of Anthropology, University of Texas at Austin

2001: Professional Development Award, Department of Anthropology, University of Texas at Austin

2000: Professional Development Award, Department of Anthropology, University of Texas at Austin

1999: Professional Development Award, Department of Anthropology, University of Texas at Austin.

### **Invited Lectures**

2009: Comparative biomechanics and the evolution of human walking and running. Eckerd College, St. Petersburg, FL, April, 2009.

2009: Lucy's locomotion. Arizona State Museum, Tucson, AZ, March 2009

2008: Are two legs better than four? The evolution of human bipedalism. Oberlin College, Oberlin, OH, March, 2008

2008: The evolution of bipedal walking and running. Green Valley Forum, Green Valley, AZ, January, 2008.

2007: Are two legs better than four? New approaches to studying human locomotor evolution. Santa Clara University, October, 2007

2007: Are two legs better than four? New approaches to studying human locomotor evolution. University of California, Santa Cruz, October, 2007

2007: Are two legs better than four? New approaches to studying human locomotor evolution. Arizona State University, September, 2007

2007: The evolutionary compromises of human bipedalism. Keynote Address for the Gait and Clinical Movement Analysis Society, March 2007

2006: Linking anatomy and motion: What drives visual aspects of locomotion? Walt Disney Imagineering, August, 2006

### **Conference Presentations (\* denotes invited symposium)**

Raichlen, D.A., Gordon, A.D., Muchlinski, M., Snodgrass, J.J. (2009) Variation in primate basal metabolism: explanations and ecological implications. AAPA annual meeting, April, 2009 Abstract in *American Journal of Physical Anthropology Suppl.* 48: 305.

Zeininger, A., Shapiro, L.J., Raichlen, D.A. (2009) The effects of digitigrades cheiridial postures on speed and gait in infant baboons. AAPA annual meeting, April, 2009 Abstract in *American Journal of Physical Anthropology Suppl.* 48: 406-407.

Pontzer, H., Ocobock, C., Shumaker, R.W., Raichlen, D.A. (2009) Daily energy expenditure in orangutans measured using doubly labeled water. AAPA annual meeting, April, 2009 Abstract in *American Journal of Physical Anthropology Suppl.* 48: 299-300.

Foster, A.D., Raichlen, D.A., Pontzer, H., Sockol, M.D. (2009) Muscle force production during bent-knee, bent-hip walking in humans. AAPA annual meeting, April, 2009 Abstract in *American Journal of Physical Anthropology Suppl.* 48: 163-164.

Bezanson, M., Raichlen, D.A. (2009) A field study of kinematics during quadrupedal walking in *Cebus capucinus*. AAPA annual meeting, April, 2009 Abstract in *American Journal of Physical Anthropology Suppl.* 48: 101-102.

\*Raichlen, D.A. (2008) Are two legs better than four? Comparative biomechanics and the evolution of human walking and running. American Association of Anatomy Meetings.

- \*Raichlen, D.A., Keeney, B.K., Gerdeman, G., Meek, T.H., Wijeratne, R.S., Garland, T. Jr. (2008) Wired to run? The evolution of novel locomotor behaviors in hominins. American Association of Physical Anthropologists (AAPA) Annual Meeting, April, 2008. Abstract in *American Journal of Physical Anthropology Suppl.* 46: 176.
- Whitcome, K.K., Lieberman, D.E., Bramble, D.M., Raichlen, D.A., Sloan, C. (2008) Head roll stabilization and muscle mitigation mechanism in human distance running. AAPA Annual Meeting, April, 2008. Abstract in *American Journal of Physical Anthropology Suppl.* 46: 222.
- \*Pontzer, H., Raichlen, D.A., Sockol, M.D. (2008) Endurance versus efficiency in humans and chimpanzees: a new look at the old problem of becoming bipedal. AAPA Annual Meeting, April, 2008. Abstract in *American Journal of Physical Anthropology Suppl.* 46: 173.
- \*Lieberman, D.E., Bramble, D.M., Raichlen, D.A., Whitcome, K.W. (2008) Functional, developmental and morphological integration: the case of the head and the forelimb in bipedal hominins. AAPA Annual Meeting, April, 2008. Abstract in *American Journal of Physical Anthropology Suppl.* 46: 140.
- Keeney, B.K., Raichlen, D.A., Meek, T.H., Wijeratne, R.S., Gerdeman, G.L., Garland, T. Jr. (2008) Differential response to a selective cannabinoid receptor antagonist in mice bred for high voluntary wheel-running behavior. The Society for Integrative and Comparative Biology Annual Meeting.
- Zeininger, A., Shapiro, L.J., Raichlen, D.A. (2008) The effects of digitigrades cheiridial postures on speed and gait in infant baboons. The Society for Integrative and Comparative Biology Annual Meeting.
- Raichlen, D.A., Shapiro, L.J. and Pontzer, H. (2007) The evolution of mammalian locomotor biomechanics: Adaptations or spandrels? International Congress of Vertebrate Morphology Meeting, July, 2007.
- \*Raichlen, D.A., Pontzer, H., and Sockol, M.D. (2007) Joint kinetics in chimpanzees and other mammals: Are large bodied primates unique? American Association of Physical Anthropologists (AAPA) Annual Meeting, March, 2007. Abstract in *American Journal of Physical Anthropology Suppl.* 44: 194.
- \*Pontzer, H., Raichlen, D.A., and Sockol, M.D. (2007) Contributions of muscular and skeletal morphology to locomotor performance: How much can bones tell us about locomotion? AAPA Annual Meeting, March, 2007. Abstract in *American Journal of Physical Anthropology Suppl.* 44: 191.
- \*Shapiro, L.J. and Raichlen, D.A. (2007) Center of mass position, quadrupedalism, and stability: Where do primates fall? AAPA Annual Meeting, March, 2007. Abstract in *American Journal of Physical Anthropology Suppl.* 44: 215.
- Zeininger, A., Shapiro, L.J., and Raichlen, D.A. (2007) Ontogeny of digitigrade hand and foot postures in infant baboons (*Papio cynocephalus*). AAPA Annual Meeting, March, 2007. Abstract in *American Journal of Physical Anthropology Suppl.* 44: 255.
- Raichlen, D.A., Pontzer, H., and Sockol, M.D. (2007) The energetics of quadrupedal and bipedal locomotion in chimpanzees. The Society for Integrative and Comparative Biology Annual Meeting
- Pontzer, H., Raichlen, D.A., and Lieberman, D.E. (2007) Is arm swing active or passive during human walking and running? The Society for Integrative and Comparative Biology Annual Meeting
- Lieberman, D.E., Bramble, D.M., and Raichlen, D.A. (2007) Humans use a unique

- mechanism to stabilize the head during running. The Society for Integrative and Comparative Biology Annual Meeting.
- Raichlen, D.A., Pontzer, H., and Sockol, M. (2006) Chimpanzee locomotor biomechanics and the evolution of hominid bipedalism. Paleoanthropology Society Annual Meeting.
- Raichlen, D.A., Pontzer, H., and Sockol, M. (2006) Energetics of chimpanzee locomotion: Force production during bipedal and quadrupedal walking. AAPA Annual Meeting, March, 2006. Abstract in *American Journal of Physical Anthropology Suppl.* 42: 150.
- Raichlen, D.A., Pontzer, H., and Sockol, M. (2005) Muscular force production during chimpanzee bipedal and quadrupedal walking. Division of Vertebrate Morphology, Society of Integrative and Comparative Biology Northeast Regional Meeting, September, 2005.
- Raichlen, D.A. (2005) Relationships among limb mass distribution, kinematics, and mechanical power in primates compared to non-primate quadrupeds. AAPA Annual Meeting, April, 2005. Abstract in *American Journal of Physical Anthropology Suppl.* 40: 175-176.
- Lieberman, D.E., Ponzter, H., Cutright-Smith, E. & Raichlen, D. (2005) Why is the human gluteus so maximus. AAPA annual meeting, April, 2005. Abstract in *American Journal of Physical Anthropology Suppl.* 40: 142-143.
- Raichlen, D.A. (2004) The effects of distally distributed limb mass on quadrupedal locomotion. The Society for Integrative and Comparative Biology Annual Meeting, Jan 2004. Abstract in *Integrative and Comparative Biology.* p. 286
- Raichlen, D.A. (2004) The effects of limb mass distribution on primate quadrupedalism. AAPA Annual Meeting, April 2004. Abstract in *American Journal of Physical Anthropology Suppl.* 38: 164
- Raichlen, D.A. (2003) A strategy for the reduction of mechanical internal work in primates. AAPA Annual Meeting. Abstract in *American Journal of Physical Anthropology Suppl.* 36: 173
- Shapiro, L.J. and Raichlen, D.A. (2003) Locomotor development and the uniqueness of primate quadrupedalism. AAPA Annual Meeting. Abstract in *American Journal of Physical Anthropology Suppl.* 36: 189-190.
- Raichlen, D.A. and Shapiro, L.J. (2002) Swing phase and the use of diagonal sequence gait in primates. AAPA Annual Meeting. Abstract in *American Journal of Physical Anthropology Suppl.* 34:128-129
- Raichlen, D.A. (2001) The effect of restricted arm swing on human walking. AAPA Annual Meeting. Abstract in *American Journal of Physical Anthropology Suppl.* 32:122.
- Shapiro, L.J. and Raichlen, D.A. (2001) Ontogeny of gait in *Papio Cynocephalus*. AAPA Annual Meeting. Abstract in *American Journal of Physical Anthropology Suppl.* 32:135.
- Raichlen, D.A. (2000) Application of a predictive model of segment inertial properties to the study of primate quadrupedalism. AAPA Annual Meeting. Abstract in *American Journal of Physical Anthropology Suppl.* 30:258.

## **Courses Taught**

### *Graduate:*

Primate Bioenergetics

Introduction to Human Evolutionary Biology  
Paleoanthropology

*Undergraduate:*

Paleoanthropology  
The Human Machine  
The Primate Skeleton

**Professional Service**

2007: Co-organizer, Principles of Primate Locomotion Symposium, Meetings of the American Association of Physical Anthropology (with M. O'Neil and H. Pontzer)

2001-2004: *Liberal Arts Graduate Research Fellowship Committee, University of Texas Austin* (responsible for awarding \$50,000.00 in grants per year to graduate students in aid of dissertation research)

- Chair of the selection committee (2002-2004)
- Member of selection committee (2001)

Reviewer for: American Journal of Physical Anthropology

Journal of Human Evolution  
Journal of Anatomy  
Evolutionary Anthropology  
Journal of Theoretical Biology  
Journal of Mammology  
Anatomical Record  
Folia Primatologica  
Oxford University Press  
Springer Press  
Journal of Experimental Biology  
Current Anthropology  
Yearbook of Physical Anthropology  
Biological Journal of the Linnaean Society  
Behavioral Processes  
Leakey Foundation  
National Science Foundation

**Instructional Software Development**

- Development of computer-based multimedia laboratories for kinematics of human and great ape bipedalism (summer 2003)
- Development of computer-based multimedia testing software (summer 2000)
- Development of computer-based multimedia laboratories for electromyography and kinematics of primate locomotion (summer 1999)

**Professional Membership**

American Association of Physical Anthropologists  
The Society for Integrative and Comparative Biology  
Paleoanthropology Society

### **Field Experience**

- 1999: Wyoming, Eocene mammals of the Bighorn Basin
- 1997: Hungary, Great Ape and Human Origins in Hungary: The Rudabanya Field School
- 1996: Wyoming, Eocene mammals of the Bighorn Basin

### **Laboratory Experience**

- Kinematics data collection with Vicon 3-D motion analysis system, Qualysis, and Redlake
- Force Plate data collection
- Electromyography
- Bioenergetics, doubly labeled water, oxygen consumption
- Computer programming experience: Matlab, Mathematica, Visual Basic, SAS

### **Graduate Students Advised:**

Adam Foster, Ph.D. student (*current*)

### **Graduate Advisors**

#### **Ph.D. Supervisor:**

Dr. Liza Shapiro, Department of Anthropology, University of Texas at Austin

#### **Ph.D. Committee Members:**

Dr. Deborah Overdorff, Department of Anthropology, University of Texas at Austin

Dr. John Kappelman, Department of Anthropology, University of Texas at Austin

Dr. Marcus Pandy, Department of Biomedical Engineering, University of Texas at Austin

Dr. Susan Larson, Department of Anatomical Sciences, SUNY at Stony Brook

#### **Post-Doctoral Advisor:**

Dr. Daniel Lieberman, Department of Anthropology, Harvard University