

Curriculum Vita

Richard N. Hinrichs, Ph.D.
Associate Professor
Department of Kinesiology
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Educational Background

1. Oberlin College, Oberlin, OH, B.A. (physics), 1975
2. University of Iowa, Iowa City, IA, M.A. (biomechanics), 1978
3. Pennsylvania State University, University Park, PA, Ph.D. (biomechanics), 1982

Professional Affiliations

1. American College of Sports Medicine (ACSM)
2. American Society of Biomechanics (ASB)
3. International Society of Biomechanics (ISB)
4. International Society of Biomechanics in Sports (ISBS)
5. USA Swimming Sports Medicine and Science Network

Professional Honors/Awards

1. Southwest District AAHPERD Scholar of the Year, 2000-2001.
2. Nominated for Centennial Professor of the Year, Arizona State University, 2004.

Professional Experience

1. University of Iowa, Iowa City, IA, Graduate Teaching and Research Assistant, August 1976 to August 1978.
2. Pennsylvania State University, University Park, PA, Graduate Research Assistant, August 1978 to August 1981.
3. University of South Carolina, Columbia, SC, Assistant Professor of Physical Education, August 1981 to June 1984.
4. North Texas State University, Denton, TX, Assistant Professor of Physical Education, June 1984 to August 1987.
5. North Texas State University, Denton, TX, Adjunct Professor, Department of Mathematics, August 1986 to August 1987.
6. Arizona State University, Tempe, AZ, Assistant Professor of Exercise Science and Physical Education, August 1987 to July 1993.
7. Arizona State University, Tempe, AZ, Associate Professor of Exercise Science and Physical Education, August 1993 to June 2002.
8. Arizona State University, Tempe, AZ, Associate Professor of Kinesiology, July 2002 to present.

Publications

Refereed Articles

1. **Hinrichs, R.N.**, Cavanagh, P.R., & Williams, K.R. (1983). Upper extremity contributions to angular momentum in running. In H. Matsui and K. Kobayashi (Eds.), *Biomechanics VIII-B* (pp. 641-647), Champaign, IL: Human Kinetics.
2. **Hinrichs, R.N.** (1985). A three-dimensional analysis of the net moments at the shoulder and elbow joints in running and their relationship to upper extremity EMG activity. In D.A. Winter et al. (Eds.), *Biomechanics IX-B* (pp. 337-342), Champaign, IL: Human Kinetics.
3. **Hinrichs, R.N.** (1985). Regression equations to predict segmental moments of inertia from anthropometric measurements: An extension of the data of Chandler et al. (1975). *Journal of Biomechanics*, **18**, 621-624.
4. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. (1986). Models of aquatic skill: Sprint front crawl stroke. *New Zealand Journal of Sports Medicine*, **14**, 6-12.
5. Maglischo, C.W., Maglischo, E.W., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Schleihauf, R.E., & Thayer, A.L. (1986). A biomechanical analysis of the 1984 U.S. Olympic Swimming Team: The distance freestylers. *Journal of Swimming Research*, **2**(3), 12-16.
6. **Hinrichs, R.N.**, Cavanagh, P.R., & Williams, K.R. (1987). Upper extremity function in running. I: Center of mass and propulsion considerations. *International Journal of Sport Biomechanics*, **3**, 222-241.
7. **Hinrichs, R.N.** (1987). Upper extremity function in running. II: Angular momentum considerations. *International Journal of Sport Biomechanics*, **3**, 242-263.
8. Maglischo, C.W., Maglischo, E.W., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Schleihauf, R.E., & Thayer, A.L. (1988). A biomechanical analysis of the 1984 U.S. Olympic freestyle distance swimmers. In B. Ungerechts et al. (Eds.), *Swimming Science V*, (pp. 351-360), Champaign, IL: Human Kinetics.
9. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. (1988). Propulsive techniques: Front crawl-stroke, butterfly, backstroke, breaststroke. In B. Ungerechts et al. (Eds.), *Swimming Science V*, (pp. 53-59), Champaign, IL: Human Kinetics.
10. **Hinrichs, R.N.** (1990). Adjustments to the segment center of mass proportions of Clauser et al. (1969). *Journal of Biomechanics*, **23**, 949-951.

11. **Hinrichs, R.N.** & McLean, S.P. (1991). A mathematical model of competitive swimming in pools with currents. *International Journal of Sport Biomechanics*, **7**, 163-174.
12. **Hinrichs, R.N.** (1992). Case studies of asymmetrical arm action in running. *International Journal of Sport Biomechanics*, **8**, 111-128.
13. **Hinrichs, R.N.** & McLean, S.P. (1995). NLT and extrapolated DLT: 3-D cinematography alternatives for enlarging the activity volume. *Journal of Biomechanics*, **28**, 1219-1223.
14. Vint, P.F. & **Hinrichs, R.N.** (1996). Differences between one-foot and two-foot vertical jump performances. *Journal of Applied Biomechanics*, **12**, 341-361.
15. Vint, P.F. & **Hinrichs, R.N.** (1996). Endpoint problems in smoothing raw kinematic data: An evaluation of four popular methods. *Journal of Biomechanics*, **29**, 1637-1642.
16. McLean, S.P. & **Hinrichs, R.N.** (1998). Gender differences in the center of buoyancy location of competitive swimmers. *Journal of Sports Sciences*, **16**, 373-383.
17. Sucher, B.M. & **Hinrichs, R.N.** (1998). Manipulative treatment of carpal tunnel syndrome: Biomechanical and osteopathic intervention to increase the length of the transverse carpal ligament. *Journal of the American Osteopathic Association*, **98**, 679-686.
18. Vint, P.F. & **Hinrichs, R.N.** (1999). Longer integration intervals reduce variability and improve reliability of EMG derived from maximal isometric exertions. *Journal of Applied Biomechanics*, **15**, 210-220.
19. Yan, J.H., **Hinrichs, R.N.**, Payne, V.G., & Thomas, J.R. (2000). Normalized jerk: A measure to capture developmental characteristics of young girls' overarm throwing. *Journal of Applied Biomechanics*, **16**, 196-203.
20. McLean, S.P. & **Hinrichs, R.N.** (2000). Influence of arm position and lung volume on the center of buoyancy of competitive swimmers. *Research Quarterly for Exercise and Sport*, **71**, 182-189.
21. McLean, S.P. & **Hinrichs, R.N.** (2000). Buoyancy, gender, and swimming performance. *Journal of Applied Biomechanics*, **16**, 248-263.
22. McLean, S.P., Holthe, M.J., Vint, P.F., Beckett, K.D., & **Hinrichs, R.N.** (2000). Addition of an approach to a relay swimming start. *Journal of Applied Biomechanics*, **16**, 343-356.
23. Sucher, B.M., **Hinrichs, R.N.**, Welcher, R.L., Quiroz, L.D., St. Laurent, B.F., & Morrison, B.J. (2005). Manipulative treatment of Carpal Tunnel Syndrome: Biomechanical and osteopathic intervention to increase the length of the transverse carpal ligament—Part II: Effect of gender and manipulative “priming.” *Journal of the American Osteopathic Association*, in press.
24. Colloca, C.J. & **Hinrichs, R.N.** (2005). The biomechanical and clinical significance of the lumbar erector spinae flexion-relaxation phenomenon: a review of the literature. *Journal of Manipulative and Physiological Therapeutics*, accepted for publication.
25. **Hinrichs, R.N.**, Sucher, B.M., Welcher, R.L., Quiroz, L.D., St. Laurent, B.F., & Morrison, B.J. The use of close-range 3-D photogrammetry to measure the elongation of the transverse carpal ligament in cadavers: Application to carpal tunnel syndrome. (Submitted to *Journal of Biomechanics*, in review)
26. Vint, P.F. & **Hinrichs, R.N.** Decoupling the bilateral deficit: The effect of task initiation time on the expression of maximum muscular force. (In preparation for submission to *Medicine and Science in Sports and Exercise*.)
27. Welcher, R.L., **Hinrichs, R.N.**, & George, T.R. An analysis of velocity and temporal characteristics of three starts in competitive swimming. (In preparation for submission to *Sports Biomechanics*.)
28. **Hinrichs, R.N.**, Morrison, B.J., & McLean, S.P. Buoyant forces and center of buoyancy in five bodysuits vs. conventional swimsuits. (In preparation for submission to *Research Quarterly for Exercise and Sport*.)
29. **Hinrichs, R.N.** & Vint, P.F. The Sargent test is not a valid measure of raw vertical jumping ability. (In preparation for submission to *Research Quarterly for Exercise and Sport*.)

Invited Book Chapters

1. Cavanagh, P.R. & **Hinrichs, R.N.** (1981). Biomechanics of sport: The state of the art. In G.A. Brooks (Ed.), *Perspectives on the Academic Discipline of Physical Education* (pp. 137-157), Champaign, IL: Human Kinetics.
2. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. (1985). Biomechanics of swimming propulsion. In T.F. Welsh (Ed.), *The 1984 ASCA World Clinic Yearbook* (pp. 19-24), Ft. Lauderdale, FL: American Swimming Coaches Association.
3. Maglischo, E.W., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Schleihauf, R.E., & Thayer, A.L. (1986). Biomechanical analysis of U.S. Olympic freestylers. In T.F. Welsh (Ed.), (pp. 212-217), Ft. Lauderdale, FL: American Swimming Coaches Association.
4. Thayer, A.L., Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., & Maglischo, E.W. (1986). A hydrodynamic analysis of breaststroke swimmers. In J.G. Hay (Ed.), *Starting, Stroking, & Turning* (pp. 131-144), Iowa City, IA: University of Iowa.
5. **Hinrichs, R.N.** (1990). Upper extremity function in distance running. In P.R. Cavanagh (Ed.), *Biomechanics of Distance Running* (pp. 107-134), Champaign, IL: Human Kinetics.
6. **Hinrichs, R.N.** (1990). Whole body movement: Coordination of arms and legs in walking and running. In J. Winters & S.L.Y. Woo (Eds.), *Multiple Muscle Systems: Biomechanics and Movement Organization* (pp. 694-705), New York: Springer-Verlag.

7. **Hinrichs, R.N.** (1996). On the mechanisms of propulsion in swimming: Is it lift, drag, or something else? In *The '96 Seoul International Sport Science Congress Proceedings — The Pursuit of Athletic Excellence* (pp. 1013-1021), Seoul, Korea, KAHPERD.

Published Government Technical Reports

1. **Hinrichs, R.N.**, Lallemand, S.R., & Nelson, R.C. (1982). *An Investigation of the Inertial Properties of Backpacks Loaded in Various Configurations*. Natick, MA: U.S. Army Natick Research and Development Laboratories, Technical Report NATICK/ TR-82/023.
2. Martin, P.E., **Hinrichs, R.N.**, Shin, I., & Nelson, R.C. (1982). *A Mathematical Model of the Inertial Properties of a Carrier-Backpack System, Volume IV*. Natick, MA: U.S. Army Natick Research and Development Laboratories, Technical Report NATICK/ TR-82/022.

Non-refereed Journal Articles

1. Cavanagh, P.R., **Hinrichs, R.N.**, & Williams, K.R. (1980). Testing procedure for the 1981 Runner's World Shoe Survey. *Runner's World*, **15**(10), 38-47.
2. **Hinrichs, R.N.** & Cornelius, W.L. (1986). The importance of arm-swing during a front somersault. *International Gymnast*, **28**(6), 44-45.
3. Maglischo, C.W., Maglischo, E.W., Luedtke, D.L., Schleihauf, R.E., Higgins, J.R., Thayer, A.L., & **Hinrichs, R.N.** (1987). The swimmer: A study of propulsion and drag. *Soma*, **2**(2), 40-44.
4. **Hinrichs, R.N.** & Morrison, B.J. (2000, Oct.-Dec.). Analysis: New "long john" swimming suits worn at the 2000 Olympics. *ACSM Fit Society Page*, pp. 1, 7. (to view a copy of this, click on www.public.asu.edu/~hinrichs/cv/bodysuits.pdf)

Abstracts

1. **Hinrichs, R.N.** (1979). Principal axes and moments of inertia of the human body: An investigation of the stability of rotary motions. In *Completed Research in Health, Physical Education, and Recreation, Vol. 21* (p. 240), Reston, VA: AAHPERD.
2. **Hinrichs, R.N.** (1980). Human body principal moments and axes of inertia: An investigation of rotational stability. *Medicine and Science in Sports and Exercise*, **12**, 119.
3. **Hinrichs, R.N.** (1981). Human somersaulting stability: A key to understanding how airborne twists are initiated. *Journal of Biomechanics*, **14**, 494-495.
4. **Hinrichs, R.N.** & Cavanagh, P.R. (1981). Upper extremity function in treadmill walking. *Medicine and Science in Sports and Exercise*, **13**, 96.
5. **Hinrichs, R.N.** (1982). Segmental contributions to angular momentum in treadmill running at various speeds. *Medicine and Science in Sports and Exercise*, **14**, 144.
6. **Hinrichs, R.N.** (1983). Upper extremity function in running. *Dissertation Abstracts International*, **43**, 3532A.
7. **Hinrichs, R.N.**, Werner, P.H., Rink, J.E., Jackman, T.W., & Josephs, R.A. (1985). Impact forces upon landing from a height in children. *Journal of Biomechanics*, **18**, 232.
8. **Hinrichs, R.N.**, Schleihauf, R.E., Higgins, J.R., Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. (1986). A kinetic analysis of U.S. Olympic butterfly swimmers. *Medicine and Science in Sports and Exercise*, **18** (2 Suppl.), S64.
9. **Hinrichs, R.N.** Biomechanics of butterfly. (1987). In T.F. Welsh (Ed.), *The 1986 ASCA World Clinic Yearbook* (p. 94), Ft. Lauderdale, FL: American Swimming Coaches Association.
10. **Hinrichs, R.N.**, Cavanagh, P.R., & Williams, K.R. (1987). Upper extremity contributions to propulsion and center of mass excursions in running. *Medicine and Science in Sports and Exercise*, **19** (2 Suppl.), S11.
11. **Hinrichs, R.N.** (1987). On the nature of asymmetrical arm actions in running. *Journal of Biomechanics*, **20**, 911.
12. **Hinrichs, R.N.** (1988). Adjustments to the center of mass proportions of Clauser et al. (1969). *Journal of Biomechanics*, **21**, 883.
13. **Hinrichs, R.N.**, Munkasy, B.M., and Chinworth, S.A. (1989). An analysis of angular momentum during the run-up and takeoff in long jumping. *Journal of Biomechanics*, **22**, 1023.
14. Chinworth, S., Wilkerson, J., **Hinrichs, R.**, & Jackson, A. (1990). Ground reaction forces and ankle and knee moments during rope skipping. *Medicine and Science in Sports and Exercise*, **22** (2 Suppl.), S133.
15. DeWitt, J.K., **Hinrichs, R.N.**, & Yamaguchi, G.T. (1992). A 3-D simulation of a soccer kick: The effect of varying hip and knee torques. *Journal of Biomechanics*, **25**, 667.
16. **Hinrichs, R.N.** (1992). Endpoint problems in smoothing raw kinematic data: An evaluation of four popular smoothing techniques. *Journal of Biomechanics*, **25**, 682.
17. McLean, S., **Hinrichs, R.**, DeWitt, J., Heise, G., Hreljac, A., Joganich, T., Marsh, T., & Munkasy, B. (1992). A comparison of DLT with and without extrapolation and NLT 3-D cinematography methods. *Journal of Biomechanics*, **25**, 683.
18. Munkasy, B.A. & **Hinrichs, R.N.** (1992). Arm swing and toe-touch movement effects on vertical jump performance. *Journal of Biomechanics*, **25**, 680.
19. Sucher, B.M., Heath, D.M., Andrews, S., & **Hinrichs, R.N.**, (1992). Myofacial and somatic dysfunction in repetitive strain syndrome. *Scandinavian Journal of Rheumatology*, **Suppl. 94**, 40.
20. **Hinrichs, R.N.**, Thomas, J.R., Martin, P.E., Thomas, K.T., Marzke, M., Joganich, T., DeWitt, J., & Sherwood, C.P. (1994). 3-D analysis of throwing patterns of young boys and girls. *Journal of Biomechanics*, **27**, 597.
21. McLean, S.P., & **Hinrichs, R.N.** (1994). Gender differences in the location of the center of buoyancy of competitive swimmers. *Journal of Biomechanics*, **27**, 597.

22. Vint, P.F. & **Hinrichs, R.N.** (1995). Segmental contributions to vertical impulse in one-foot and two-foot vertical jump takeoffs. *Medicine and Science in Sports and Exercise*, **27** (5 Suppl.), S170.
23. McLean, S.P. & **Hinrichs, R.N.** (1995). Factors affecting buoyancy and performance in competitive swimming. *Medicine and Science in Sports and Exercise*, **27** (5 Suppl.), S232.
24. O'Connor, K.M. & **Hinrichs, R.N.** (1998). Effect of induced mild leg length inequality on ground reaction forces during walking and running. *Medicine and Science in Sports and Exercise*, **30** (5 Suppl.), S294.
25. Yan, J, Payne, G., Thomas, J., & **Hinrichs, R.** (1998). Movement control characteristics in young females' overarm throwing. *Journal of Sport & Exercise Psychology*, **20** (suppl), S115.
26. **Hinrichs, R.N.**, Sucher, B.M., Welcher, R.L., & Quiroz, L.D. (2000). Try stretching the transverse carpal ligament rather than cutting it as a means of treating or preventing Carpal Tunnel Syndrome. *Medicine and Science in Sports and Exercise*, **32** (5 Suppl.), S40.
27. McLean, S.P., Vint, P.F., Beckett, K.D., **Hinrichs, R.N.**, & Holthe, M.J. (2000). Kinematics of step-through swimming starts. *Medicine and Science in Sports and Exercise*, **32** (5 Suppl.), S196.
28. Sucher, B.M., **Hinrichs, R.N.**, Morrison, B.J., Quiroz, L.D., & Welcher, R.L. (2001). Effect of gender and method of stretching the transverse carpal ligament in cadavers: Application to Carpal Tunnel Syndrome. *Journal of the American Osteopathic Association*, **101**, 472.

Papers Presented at Professional Meetings

Refereed Presentations

1. **Hinrichs, R.N.** Human somersaulting stability: A key to understanding how airborne twists are initiated. Paper presented at the Fourth Annual Meeting of the American Society of Biomechanics, Burlington, VT, October 1980.
2. **Hinrichs, R.N.**, & Cavanagh, P.R. Upper extremity function in treadmill walking. Paper presented at the Annual Meeting of the American College of Sports Medicine, Miami, FL, May 1981.
3. **Hinrichs, R.N.**, Cavanagh, P.R., & Williams, K.R. Upper extremity contributions to angular momentum and propulsion in running. Paper presented at the Eighth International Congress of Biomechanics, Nagoya, Japan, July 1981.
4. **Hinrichs, R.N.** Segmental contributions to angular momentum in treadmill running at various speeds. Paper presented at the Annual Meeting of the American College of Sports Medicine, Minneapolis, MN, May 1982.
5. **Hinrichs, R.N.** A three-dimensional analysis of the net moments at the shoulder and elbow joints in running their relationship to upper extremity EMG activity. Paper presented at the Ninth International Congress of Biomechanics, Waterloo, Ontario, August 1983.
6. Werner, P.H., Rink, J.E., & **Hinrichs, R.N.** Effects of intervention in the teaching process on jumping and landing abilities of second grade children. Paper presented at the Olympic Scientific Congress, Eugene, OR, July 1984.
7. **Hinrichs, R.N.**, Werner, P.H., Rink, J.E., Jackman, T.W., & Josephs, R.A. Impact forces upon landing from a height in children. Paper presented at the Eighth Annual Meeting of the American Society of Biomechanics, Tucson, AZ, October 1984.
8. **Hinrichs, R.N.**, Schleihauf, R.E., Higgins, J.R., Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. U.S. Swimming biomechanics research project: Preliminary results. Paper presented at the Engineering Foundation Conference on Sport Biomechanics, Santa Barbara, CA, February 1985.
9. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. Propulsive efficiency: A movement level analysis. Paper presented at the FINA Sports Medicine Congress, Dunedin, New Zealand, August 1985.
10. **Hinrichs, R.N.**, Schleihauf, R.E., Higgins, J.R., Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. A kinetic analysis of U.S. Olympic butterfly swimmers. Paper presented at the Annual Meeting of the American College of Sports Medicine, Indianapolis, IN, May 1986.
11. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. Propulsive techniques: Front crawlstroke, butterfly, backstroke, breaststroke. Paper presented at the Fifth International Symposium of Biomechanics and Medicine in Swimming, Bielefeld, West Germany, July 1986.
12. **Hinrichs, R.N.**, Cavanagh, P.R., & Williams, K.R. Upper extremity contributions to propulsion and center of mass excursions in running. Paper presented at the Annual Meeting of the American College of Sports Medicine, Las Vegas, NV, May 1987.
13. **Hinrichs, R.N.** On the nature of asymmetrical arm actions in running. Paper presented at the Eleventh Annual Meeting of the American Society of Biomechanics, Davis, CA, September 1987.
14. **Hinrichs, R.N.** Adjustments to the center of mass proportions of Clauser et al. (1969). Paper presented at the Twelfth Annual Meeting of the American Society of Biomechanics, Urbana, IL, September 1988.
15. Munkasy, B.M. & **Hinrichs, R.N.** Relative contributions of the run-up and takeoff to the total flight-phase angular momentum in long jumping. Paper presented at the 1989 Arizona Exercise Science Symposium, Flagstaff, AZ, February 1989.
16. **Hinrichs, R.N.**, Munkasy, B.M., and Chinworth, S.A. An analysis of angular momentum during the run-up and takeoff in long jumping. Paper presented at the XII International Congress of Biomechanics, Los Angeles, CA, June 1989.
17. Chinworth, S., Wilkerson, J., **Hinrichs, R.**, & Jackson, A. Ground reaction forces and ankle and knee moments during rope skipping. Paper presented at the Annual Meeting of the American College of Sports Medicine, Salt Lake City, UT, May 1990.

18. McLean, S., **Hinrichs, R.**, DeWitt, J., Heise, G., Hreljac, A., Joganich, T., Marsh, T., & Munkasy, B. Accuracy of extrapolation using the DLT method of 3D cinematography. Paper presented at the 1991 Arizona Exercise Science Symposium, Flagstaff, AZ, April 1991.
19. DeWitt, J.K., **Hinrichs, R.N.**, & Yamaguchi, G.T. A 3-D simulation of a soccer kick: The effect of varying hip and knee torques. Paper presented at the 15th Annual Meeting of the American Society of Biomechanics, Tempe, AZ, October 1991.
20. **Hinrichs, R.N.** Endpoint problems in smoothing raw kinematic data: An evaluation of four popular smoothing techniques. Paper presented at the 15th Annual Meeting of the American Society of Biomechanics, Tempe, AZ, October 1991.
21. McLean, S., **Hinrichs, R.**, DeWitt, J., Heise, G., Hreljac, A., Joganich, T., Marsh, T., & Munkasy, B. A comparison of DLT with and without extrapolation and NLT 3-D cinematography methods. Paper presented at the 15th Annual Meeting of the American Society of Biomechanics, Tempe, AZ, October 1991.
22. Munkasy, B.A. & **Hinrichs, R.N.** Arm swing and toe-touch movement effects on vertical jump performance. Paper presented at the 15th Annual Meeting of the American Society of Biomechanics, Tempe, AZ, October 1991.
23. Sucher, B.M., Heath, D.M., Andrews, S., & **Hinrichs, R.N.** Myofacial and somatic dysfunction in repetitive strain syndrome. Paper presented at the 2nd World Congress on Myofacial Pain and Fibromyalgia, Copenhagen, Denmark, August 1992.
24. **Hinrichs, R.N.**, Thomas, J.R., Martin, P.E., Thomas, K.T., Marzke, M., Joganich, T., DeWitt, J., & Sherwood, C.P. 3-D analysis of throwing patterns of young boys and girls. Paper presented at the 17th Annual Meeting of the American Society of Biomechanics, Iowa City, IA, October 1993.
25. McLean, S.P., & **Hinrichs, R.N.** Gender differences in the location of the center of buoyancy of competitive swimmers. Paper presented at the 17th Annual Meeting of the American Society of Biomechanics, Iowa City, IA, October 1993.
26. McLean, S.P., & **Hinrichs, R.N.** Gender differences in the location of the center of buoyancy of competitive swimmers. Paper presented at the 1993 Arizona Exercise Science Symposium, Phoenix, AZ, October 1993.
27. **Hinrichs, R.N.** & Vint, P.F. A comparison of Sargent jump height and actual flight height in vertical jumping. Paper presented at the 18th Annual Meeting of the American Society of Biomechanics, Columbus, OH, October 1994.
28. Vint, P.F., DeWitt, J.K., Marsh, A.P., McLean, S.P., Seidler, R.D., Sherwood, C.P., **Hinrichs, R.N.**, & Martin, P.E. Differences between one-foot and two-foot vertical jump performances. Paper presented at the 18th Annual Meeting of the American Society of Biomechanics, Columbus, OH, October 1994.
29. Vint, P.F. & **Hinrichs, R.N.** Segmental contributions to vertical impulse in one-foot and two-foot vertical jump takeoffs. Paper presented at the 1995 Annual Meeting of the American College of Sports Medicine, Minneapolis, MN, June 1995.
30. McLean, S.P. & **Hinrichs, R.N.** Effects of body composition on the gender difference in competitive swimming. Paper presented at the 1995 Annual Meeting of the American College of Sports Medicine, Minneapolis, MN, June 1995.
31. McLean, S.P. & **Hinrichs, R.N.** Indirect static and dynamic measurement of the center of buoyancy in competitive swimmers. Paper presented at the 19th Annual Meeting of the American Society of Biomechanics, Stanford, CA, August 1995.
32. Sherwood, C.P., **Hinrichs, R.N.**, & Yamaguchi, G.T. 3D angular velocities most related to ball release velocity in baseball throwing. Paper presented at the 16th Congress of the International Society of Biomechanics, Tokyo, Japan, August 1997.
33. Sherwood, C.P., **Hinrichs, R.N.**, & Yamaguchi, G.T. Relationships between ball release velocity and 3D joint kinematics in baseball throwing. Paper presented at the 21st Annual Meeting of the American Society of Biomechanics, Clemson, SC, September 1997.
34. Vint, P.F. & **Hinrichs, R.N.** Decoupling the bilateral deficit: the effect of task initiation time on the expression of maximum muscular force. Paper presented at the 21st Annual Meeting of the American Society of Biomechanics, Clemson, SC, September 1997.
35. Vint, P.F. & **Hinrichs, R.N.** The effect of fatigue induced asymmetry on the expression of maximum simultaneous muscular force. Paper presented at the 21st Annual Meeting of the American Society of Biomechanics, Clemson, SC, September 1997.
36. O'Connor, K.M. & **Hinrichs, R.N.** Effect of induced mild leg length inequality on ground reaction forces during walking and running. Paper presented at the 1998 Annual Meeting of the American College of Sports Medicine, Orlando, FL, June 1998.
37. Yan, J, Payne, G., Thomas, J., & **Hinrichs, R.** Movement control characteristics in young females' overarm throwing. Paper presented at the 1998 NASPSPA Conference, Boulder, CO, June 1998.
38. **Hinrichs, R.N.**, Sucher, B.M., & St. Laurent, B.F. Lengthening the transverse carpal ligament under static loads in cadavers. Paper presented at the 1998 North American Congress of Biomechanics, Waterloo, Ontario, Canada, August 1998.
39. Vint, P.F. & **Hinrichs, R.N.** The bilateral deficit is not solely responsible for the relative decrements in two-legged vertical jumping performances. Paper presented at the 1998 North American Congress of Biomechanics, Waterloo, Ontario, Canada, August 1998.
40. Vint, P.F. & **Hinrichs, R.N.** Temporal decoupling improves force production in two-legged vertical jumping performances. Paper presented at the 1998 North American Congress of Biomechanics, Waterloo, Ontario, Canada, August 1998.
41. **Hinrichs, R.N.**, Sucher, B.M., & St. Laurent, B.F. The use of close-range 3-D photogrammetry to measure the elongation of the transverse carpal ligament in cadavers: application to carpal tunnel syndrome. Paper presented at the 17th Congress of the International Society of Biomechanics, Calgary, Alberta, Canada, August 1999.
42. Welcher, R.L. & **Hinrichs, R.N.** An analysis of velocity and time characteristics of three starts in competitive swimming. Paper presented at the 17th Congress of the International Society of Biomechanics, Calgary, Alberta, Canada, August 1999.

43. Sucher, B.M., **Hinrichs, R.N.**, Welcher, R.L., & Quiroz, L.D. Manipulative treatment of Carpal Tunnel Syndrome: Biomechanical and osteopathic intervention to increase the length of the transverse carpal ligament—Part II. Paper presented at the American Osteopathic College of Rehabilitation Medicine Mid-Year Meeting, Chicago, IL, May 2000.
44. **Hinrichs, R.N.**, Sucher, B.M., Welcher, R.L., & Quiroz, L.D. Try stretching the transverse carpal ligament rather than cutting it as a means of treating or preventing Carpal Tunnel Syndrome. Paper presented at the 47th Annual Meeting of the American College of Sports Medicine, Indianapolis, IN, May 2000.
45. McLean, S.P., Vint, P.F., Beckett, K.D., **Hinrichs, R.N.**, & Holthe, M.J. Kinematics of step-through swimming starts. Paper presented at the 47th Annual Meeting of the American College of Sports Medicine, Indianapolis, IN, June 2000.
46. **Hinrichs, R.N.**, Sucher, B.M., Welcher, R.L., Quiroz, L.D. & Morrison, B.J. Creep response of the transverse carpal ligament in cadavers: application to carpal tunnel syndrome. Paper presented at the 25th Annual Meeting of the American Society of Biomechanics, San Diego, CA, August 2001.
47. Sucher, B.M., **Hinrichs, R.N.**, Morrison, B.J., Quiroz, L.D., & Welcher, R.L. Effect of gender and method of stretching the transverse carpal ligament in cadavers: application to carpal tunnel syndrome. Paper presented at the Annual Meeting of the American Osteopathic Association, Chicago, IL, October 2001.
48. DeWitt, J.K. & **Hinrichs, R.N.** Factors related to ball velocity during an instep soccer kick. Paper presented at the IV World Congress of Biomechanics, Calgary, Alberta, Canada, August 2002.
49. **Hinrichs, R.N.**, Morrison, B.J., & McLean, S.P. Do bodysuits from different manufacturers aid a swimmer's buoyancy? Paper presented at the 27th Annual Meeting of the American Society of Biomechanics, Toledo, OH, September 2003.
50. Morrison, B.J. & **Hinrichs, R.N.** Accuracy of using multiple zones for the DLT in swimming. Paper presented at the 27th Annual Meeting of the American Society of Biomechanics, Toledo, OH, September 2003.
51. McLean, S.P., Vint, P.F., **Hinrichs, R.N.**, DeWitt, J.K., Morrison, B., & Mitchell, J. Factors affecting the accuracy of 2D-DLT calibration. Paper presented at the 28th Annual Meeting of the American Society of Biomechanics, Portland, OR, September 2004.
52. Gaines, A.R., **Hinrichs, R.N.**, & Martin, P.E. Muscle function in the generation of propulsive and braking forces during running. Paper presented at the 28th Annual Meeting of the American Society of Biomechanics, Portland, OR, September 2004.
53. **Hinrichs, R.N.**, Morrison, B., Vint, P.F., DeWitt, J.K., Mitchell, J., & McLean, S.P. Predicting out-of-plane point locations using the 2D-DLT. Paper presented at the 28th Annual Meeting of the American Society of Biomechanics, Portland, OR, September 2004.
54. Kim, Y.K., Yamaguchi, G.T., & **Hinrichs, R.N.** 3D computer simulation of roundhouse kick in Taekwondo. Paper presented at the 28th Annual Meeting of the American Society of Biomechanics, Portland, OR, September 2004.
55. Novotny, S.C. & **Hinrichs, R.N.** Factors in producing a "soft" landing in terms of both force and sound. Paper presented at the 28th Annual Meeting of the American Society of Biomechanics, Portland, OR, September 2004.
56. Larsen, B. & **Hinrichs, R.** Transition from the glide phase to free swimming following a freestyle flip turn: which arm pulls first? Paper to be presented at the 52nd Annual Meeting of the American College of Sports Medicine, Nashville, TN, June 2005.
57. Sultvedt, S.M. & **Hinrichs, R.N.** The effect of a hurdle preflight approach on takeoff velocities in springboard diving. Paper to be presented at the 52nd Annual Meeting of the American College of Sports Medicine, Nashville, TN, June 2005.
58. Kim, Y.K. & **Hinrichs, R.N.** Does warming up with a weighted bat help or hurt bat speed in baseball? Paper submitted for presentation at the combined 20th Congress of the International Society of Biomechanics and the 29th Annual Meeting of the American Society of Biomechanics, Cleveland, OH, August 2005.
59. Morrison, B., **Hinrichs, R.**, & Larsen, B. The effect of aging on stroke parameters in swimming. Paper submitted for presentation at the combined 20th Congress of the International Society of Biomechanics and the 29th Annual Meeting of the American Society of Biomechanics, Cleveland, OH, August 2005.
60. Novotny, S.C. & **Hinrichs, R.N.** The effects of quantitative feedback on the reduction of landing force. Paper submitted for presentation at the combined 20th Congress of the International Society of Biomechanics and the 29th Annual Meeting of the American Society of Biomechanics, Cleveland, OH, August 2005.

Invited Presentations

1. **Hinrichs, R.N.** On the control of the arm swing in walking and running. Paper presented at the First Annual Carolinas Biomechanics Symposium, Greensboro, NC, December 1983.
2. **Hinrichs, R.N.** Conservation of angular momentum: How Newton's laws apply to cycling. Paper presented at the 1983 South Carolina AHPERD Convention, Myrtle Beach, SC, November 1983.
3. **Hinrichs, R.N.** Why do runners swing their arms? Paper presented at the Winter Meeting of the Southeast Chapter of the American College of Sports Medicine, Gainesville, FL, February 1983.
4. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. Biomechanics of swimming propulsion. Paper presented at the American Swimming Coaches Association World Clinic, Chicago, IL, September 1984.
5. Maglischo, E.W., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Schleihauf, R.E., & Thayer, A.L. Biomechanical analysis of U.S. Olympic freestyle swimmers. Paper presented at the American Swimming Coaches Association World Clinic, Ft. Lauderdale, FL, September 1985.

6. Maglischo, E.W., Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., & Thayer, A.L. A biomechanical analysis of the U.S. Olympic Swimming Team. Four papers (one on each stroke) presented at the Olympic Solidarity International Coaches Seminar, Colorado Springs, CO, October 1985.
7. **Hinrichs, R.N.** Biomechanics of swimming: Butterfly techniques. Paper presented at the American Swimming Coaches Association World Clinic, Dallas, TX, September 1986.
8. Maglischo, E.W., Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., & Thayer, A.L. Future directions in swimming biomechanics. Paper presented at the Annual Meeting of United States Aquatic Sports, Fort Worth, TX, September 1986.
9. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. Swimming biomechanics. Paper presented at the Annual Meeting of United States Aquatic Sports, Fort Worth, TX, September 1986.
10. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. Basic stroke biomechanics. Paper presented at the U.S. Swimming Elite Coaches College, Colorado Springs, CO, October 1986.
11. **Hinrichs, R.N.** Biomechanical evaluation of "ideal form" in running. Paper presented at the Annual Meeting of the Texas Chapter of the American College of Sports Medicine, Austin, TX, November 1986.
12. Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. Basic swimming biomechanics. Paper presented at the U.S. Swimming Elite Coaches College, Denver, CO, December 1986.
13. Thayer, A.L., Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Luedtke, D.L., Maglischo, C.W., & Maglischo, E.W. Biomechanics of swimming. Paper presented at the American Swimming Coaches Association World Clinic, San Francisco, CA, September 1988.
14. Luedtke, D.L., Schleihauf, R.E., Higgins, J.R., **Hinrichs, R.N.**, Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. Biomechanics of swimming. Paper presented at the U.S. Swimming Elite Coaches College, Colorado Springs, CO, September 1988.
15. **Hinrichs, R.N.**, Schleihauf, R.E., Higgins, J.R., Luedtke, D.L., Maglischo, C.W., Maglischo, E.W., & Thayer, A.L. Biomechanics of swimming propulsion. Four papers (one on each stroke) presented at the Annual Meeting of the Missouri Interscholastic Swimming Coaches Association, St. Louis, MO, October 1988.
16. **Hinrichs, R.N.** Application of biomechanical principles to improve performance. Paper presented at the 15th Annual Sports Medicine Symposium of the Arizona Medical Association, Phoenix, AZ, January 1989.
17. **Hinrichs, R.N.** Introduction to biomechanics. Paper presented at the 15th Annual Sports Medicine Symposium of the Arizona Medical Association, Phoenix, AZ, January 1989.
18. **Hinrichs, R.N.** Biomechanics of swimming. *Eight* papers presented to the Cairo Zone of the Egyptian Swimming Federation, Cairo, Egypt, March 1990.
19. **Hinrichs, R.N.** Biomechanics of springboard and platform diving. *Six* papers presented to the Cairo Zone of the Egyptian Swimming Federation, Cairo, Egypt, March 1990.
20. **Hinrichs, R.N.** Repetitive strain injuries (RSI): Quantifying contributing factors through research. Paper presented at the Advanced Ergonomics Systems RSI workshop, Phoenix, AZ, June 1992.
21. **Hinrichs, R.N.** Gender differences in the biomechanics of throwing. Paper presented at the 11th Annual Injuries in Baseball Course, American Sports Medicine Institute, Birmingham, AL, January 1993.
22. **Hinrichs, R.N.** Consequences of technology: Carpal Tunnel Syndrome. Paper presented at the "ASU Investigates the Information Superhighway" conference, Arizona State University, October 1994.
23. **Hinrichs, R.N.** & DeWitt, J. Physics and biomechanics of soccer. Invited 30-minute lecture for middle school students nationwide, presented over live national educational cable television, Educational Management Group, Scottsdale, AZ, October 1994.
24. **Hinrichs, R.N.** & Martin, P.E. Physics and biomechanics of golf. Invited 30-minute lecture for middle school students nationwide, presented over live national educational cable television, Educational Management Group, Scottsdale, AZ, November 1994.
25. **Hinrichs, R.N.** & Vint, P.F. Physics and biomechanics of volleyball. Invited 30-minute lecture for middle school students nationwide, presented over live national educational cable television, Educational Management Group, Scottsdale, AZ, December 1994.
26. **Hinrichs, R.N.** Physics and biomechanics of wrestling. Invited 30-minute lecture for middle school students nationwide, presented over live national educational cable television, Educational Management Group, Scottsdale, AZ, February 1995.
27. **Hinrichs, R.N.** & Vint, P.F. Physics and biomechanics of baseball. Invited 30-minute lecture for middle school students nationwide, presented over live national educational cable television, Educational Management Group, Scottsdale, AZ, April 1995.
28. **Hinrichs, R.N.** & Vint, P.F. Science of movement and dance. Invited 30-minute lecture for elementary school students nationwide, presented over live national educational cable television, Educational Management Group, Scottsdale, AZ, May 1995.
29. **Hinrichs, R.N.** Effect of low impact vehicular collisions on the human body. Paper presented at the Injury Analysis Seminar, BTI Consultants, Tempe, AZ, May 1995.
30. **Hinrichs, R.N.** Proper use of child safety restraints in motor vehicles. Paper presented at the Injury Analysis Seminar, Tempe, AZ, BTI Consultants, May 1995.

31. **Hinrichs, R.N.** How elite swimmers swim faster: Mechanisms of propulsion in swimming. Symposium presentation at the Annual Meeting of the Southwest Chapter of the American College of Sports Medicine, San Diego, CA, November 1995.
32. **Hinrichs, R.N.** The Sargent vertical jump test is bogus and unfair. Colloquium presentation at the Annual Meeting of the American College of Sports Medicine, Cincinnati, OH, May 1996.
33. **Hinrichs, R.N.** On the mechanisms of propulsion in swimming: Is it lift, drag, or something else? Paper presented at the 1996 Seoul International Sport Science Congress, Seoul, Korea, June 1996.
34. **Hinrichs, R.N.** Biomechanical determinants of human performance: Application to vertical jumping. Paper presented at the Korean Sport Science Institute, Seoul, Korea, June 1996.
35. **Hinrichs, R.N.** Misconceptions in sport: How biomechanics can help dispel common coaching and teaching myths. Paper presented at the Korean Sport Science Institute, Seoul, Korea, June 1996.
36. **Hinrichs, R.N.** Accident reconstruction and biomechanics of low impact vehicular collisions. Seminar presented to Arizona personal injury attorneys, BTI Consultants, Tempe, AZ, July 1996.
37. **Hinrichs, R.N.** On the mechanisms of propulsion in swimming: Is it lift, drag, or something else? Paper presented at the Exercise Science Symposium, University of North Carolina at Greensboro, Greensboro, NC, April 1997.
38. **Hinrichs, R.N.** Introduction to Carpal Tunnel Syndrome and other repetitive strain injuries: Application to needlework. Paper presented to the Local Chapter of the Embroidery Guild of America, Tempe, AZ, May 1998.
39. **Hinrichs, R.N.** Searching for a non-surgical approach to preventing or treating Carpal Tunnel Syndrome. Paper presented to the graduate seminar at Midwestern University, Arizona College of Osteopathic Medicine, September 1998.
40. **Hinrichs, R.N.** Qualitative analysis in sport biomechanics. Paper presented at the Southwest District AAHPERD / Arizona AHPERD Annual Meeting, Tucson, AZ, February 1999.
41. **Hinrichs, R.N.** Ergonomics and Carpal Tunnel Syndrome: What's the connection? Paper presented to the Chandler Rotary Club, Chandler, AZ, May 1999.
42. **Hinrichs, R.N.** & Morrison, B. An analysis of the new "high tech" swimming suits worn at the 2000 Olympic games. Paper presented at the Nevada AHPERD Convention, Las Vegas, NV, November 2000.
43. **Hinrichs, R.N.** Carpal Tunnel Syndrome and other musculoskeletal problems in court reporting: What's the solution? Paper presented at the 2001 Student Seminar of the Arizona Court Reporters Association, Phoenix, AZ, June 2001.
44. **Hinrichs, R.N.** Carpal Tunnel in court reporting. Paper presented at the annual convention of the Arizona Court Reporters Association, Phoenix, AZ, September 2001.
45. **Hinrichs, R.N.** On the mechanisms of propulsion in swimming: Is it lift, drag, or something else? Paper presented as the Southwest District AAHPERD Scholar Lecture, San Diego, CA, April 2002.
46. **Hinrichs, R.N.** Ergonomic recommendations for improving computer workstations. Paper presented at the American Express Safety Fair, Phoenix, AZ, June 2002.
47. **Hinrichs, R.N.**, Morrison, B.J., & McLean, S.P. A comparison of buoyant forces and center of buoyancy in competitive swimmers wearing conventional and full body swimsuits. Paper presented at the 2003 American Swimming Coaches Association World Clinic, San Diego, CA, September 2003.
48. **Hinrichs, R.N.** & Sucher, B.M. Carpal tunnel syndrome & osteopathic manipulative medicine. Paper presented at the 2003 American Osteopathic Association Convention and Scientific Seminar, New Orleans, LA, October 2003.
49. **Hinrichs, R.N.**, Wilson, B.D., Dapena, J., & Kippenhan, B.C. A perfectionist looks at sports techniques: A tribute to Jim Hay. Symposium presented at the 27th Annual Meeting of the American Society of Biomechanics, Toledo, OH, September 2003. (I led the symposium and presented the introduction.)
50. **Hinrichs, R.N.** Hay's deterministic models and their use in sport biomechanics. Paper presented (as part of the Jim Hay Symposium) at the 27th Annual Meeting of the American Society of Biomechanics, Toledo, OH, September 2003.
51. **Hinrichs, R.N.** Healthy bodies, healthy selves: Hands, wrists, and arms after 50. Two papers presented at monthly meetings of OASIS (Older Adult Service and Information Systems), Phoenix and Scottsdale, AZ, November 2003.
52. **Hinrichs, R.N.** Stretching the transverse carpal ligament as an alternative to surgery in the treatment of Carpal Tunnel Syndrome. Paper presented at the monthly meeting of Dr. Gladys T. McGarey Research Foundation's Physician Discussion Group, Scottsdale, AZ November 2004.

Funded Research Grants

External Grants

1. Rivers, D.B., Lunceford, E.M. Jr., & **Hinrichs, R.N.** (1982). Dynamic distribution of plantar foot forces. National Institutes of Health, \$71,376. [approved but not funded.]
2. **Hinrichs, R.N.** (January 1988 – December 1989). Upper extremity function in sprint running. United States Olympic Committee Basic Research Grant, \$12,950.
3. Martin, P.E. & **Hinrichs, R.N.** (October 1988 – August 1989). Interrelationships among mechanical power, energy transfers, and running economy. NIKE, Inc., \$3,900.
4. **Hinrichs, R.N.** (January 1989 – December 1990). Upper extremity function in race walking. The Athletics Congress of the U.S.A. Basic Research Grant, \$7,300.
5. **Hinrichs, R.N.**, Sucher, B.M., Heath, D.M., & Andrews, S. (July 1991 – December 1992). Kinematic, electromyographic, and osteopathic investigation of repetitive strain syndrome in computer keyboard operators. DeRoy Testamentary Foundation, \$16,986.

6. **Hinrichs, R.N.** & McLean, S.P. (July 1992 – June 1993). Gender differences in the center of buoyancy location of competitive swimmers. National Collegiate Athletic Association, \$19,998.
7. **Hinrichs, R.N.** (September 1992 – December 1992). Repetitive strain injuries in utility industry field employees: A review of literature. Salt River Project, \$5,697.
8. **Hinrichs, R.N.** & Sucher, B.M. (August 1998 – June 2000). Non-surgical release of the transverse carpal ligament: A cadaver study using external devices and osteopathic manipulation, American Osteopathic Association, \$25,616.
9. Vint, P.F. & **Hinrichs, R.N.** (July 1999 – December 2000). Identification of factors related to the development of ball speeds and one-legged landings in the volleyball attack. United States Olympic Committee Sports Science and Technology Grant, \$23,573.
10. Wiesel, A., **Hinrichs, R.N.**, Jackson, N. & Weber, S.L. (August 2000 – June 2003). Skill-driven optimization of construction operations. National Science Foundation, Award # 0080278, \$149,970 (+ \$50,000 ASU matching funds).
12. **Hinrichs, R.N.**, Morrison, B.J. & McLean, S.P. (April 2001 – December 2002). A comparison of body density and center of buoyancy in competitive swimmers wearing conventional and full-body swimsuits. USA Swimming, Inc., \$18,579.
13. **Hinrichs, R.N.** & Morrison, B.J. (March 2004 – February 2005). The effect of age on the stroke rate, stroke length relationship in freestyle swimming. United States Masters Swimming Endowment Fund, \$4,750.
14. Morrison, B.J. & **Hinrichs, R.N.** (March 2004 – February 2005). Age effects on the stroke rate-stroke length relationship in sprint freestyle. International Society of Biomechanics Matching Dissertation Grant, \$2,000.
15. **Hinrichs, R.N.**, Conci, S.J., Welcher, R.L., McLean, S.P., & Vint, P.F. (January 2005 – December 2005). Asymmetrical force production during swimming starts. USA Swimming, Inc., \$15,000.
16. Amazeen, P.G. & **Hinrichs, R.N.** (June 2005 – May 2008). Dynamics of motor-respiratory coupling. National Science Foundation, Award # BCS-0447039, \$349,988.

Internal Grants

1. Werner, P.H, Rink, J., & **Hinrichs, R.N.** (January – December 1983). Effects of intervention in the teaching process on the landing patterns of second grade children. University of South Carolina Research and Productive Scholarship Grant, \$3,266.
2. **Hinrichs, R.N.** (October 1984 – September 1985). A hydrodynamic analysis of the hand propulsive forces used by U.S. Olympic swimmers. North Texas State University Faculty Research Grant, \$4,500.
3. **Hinrichs, R.N.** (October 1985 – September 1986). A three-dimensional analysis of the net forces and moments at the elbow joint in pitching. North Texas State University Faculty Research Grant, \$1,500.
4. Thomas, J.R., Thomas, K.T., **Hinrichs, R.N.**, & Martin, P.E. (January – March 1989). Gender differences in kinematics and ground reaction forces for children's throwing: biology and environment. Arizona State University College of Liberal Arts & Sciences Mini-grant, \$500.
5. **Hinrichs, R.N.**, Martin, P.E., Thomas, J.R., & Thomas, K.T. (May – June 1989). Gender differences in mechanics of children's throwing: Growth and practice contributions. Arizona State University College of Liberal Arts and Sciences Summer Research Award, \$2,800.
6. **Hinrichs, R.N.** (February 1993). Investigation of ergonomic keyboard design on typing kinematics. Arizona State University Institutional Biomedical Research Grant, \$624.
7. Martin, P.E. & **Hinrichs, R.N.** (January – December 1996). Enhancing undergraduate biomechanics lab instruction: Equipment and software needs, Arizona State University College of Liberal Arts and Sciences Grant to Advance the Quality of Undergraduate Education, \$5,615. [Teaching Grant]
8. **Hinrichs, R.N.** & Martin, P.E. (January – December 1997). Enhancing undergraduate instruction in biomechanics and kinesiology: Laboratory equipment and software needs, Arizona State University College of Liberal Arts and Sciences Grant to Advance the Quality of Undergraduate Education, \$5,421. [Teaching Grant]

Courses Taught in Biomechanics

(ug=undergraduate, g=graduate)

- Iowa: Biomechanics of Athletics (g)
- Penn State: Sport Biomechanics (ug)
- S. Carolina: Biomechanics of Sport and Physical Activity (ug/g), Mechanical Analysis of Motor Skills (g)
- N. Texas: Kinesiology (ug), Biomechanics of Human Movement (g), Basic Biomechanics of the Skeletal System (g), Qualitative Analysis of Sports Skills (g), Analytic Techniques in Biomechanics (g)
- Ariz. State: Functional Anatomy and Kinesiology (ug), Biomechanics (ug), Biomechanics of the Skeletal System (ug/g), Qualitative Analysis in Sport Biomechanics (ug/g), Electromyographic Kinesiology (ug/g), Biomechanics of Exercise and Sport (ug/g), Introduction to Biomechanics Research Methods (g), Advanced Topics in Biomechanics (g)

Service and Other Professional Activities

Offices and Committee Service — Professional/Community

1. Treasurer of the Phi Epsilon Kappa Fraternity, Iota Chapter, August 1977 to August 1978.
2. President of the Columbia Masters Swim Club, Columbia, SC, January 1983 to June 1984.

3. South Carolina State Chairman for Masters Sports, Amateur Athletic Union, August 1983 to June 1984.
4. Member of the Sports Medicine Committee and the Biomechanics Research Team, United States Swimming, October 1983 to December 1988.
5. Member of the Program Committee for the 14th Annual Meeting of the American Society of Biomechanics, January to November 1990.
6. Member of the Meeting Site Committee for the 15th Annual Meeting of the American Society of Biomechanics, November 1989 to October 1991.
7. Associate Editor, *Medicine and Science in Sports and Exercise*, January 1992 to December 1994.
8. Review Panel Chair for biomechanics abstracts submitted for the 1994 AAHPERD national convention, September to October 1993.
9. Review Panel Chair for biomechanics abstracts submitted for the 1995 AAHPERD national convention, September to October 1994.
10. Member of the Nominating Committee, American Society of Biomechanics, September 1997 to August 1998 and August 2001 to August 2002.
11. Member of the Education Committee, American Society of Biomechanics, January 2000 to August 2002.
12. Editorial Board Member, *Journal of Biomechanics*, January 2003 to present.
13. Member of Board of Directors, *International Society of Biomechanics in Sports*, January 2004 to December 2006.

Committee Service — Departmental/University

1. Chair of the College of Health Computer Committee, University of South Carolina, September 1982 to August 1983.
2. Chair of the Graduate Student Recruitment & Follow-up Committee, Department of Physical Education, University of South Carolina, September 1982 to August 1983.
3. Chair of the Graduate Comprehensive Examination Committee, Department of Physical Education, University of South Carolina, September 1983 to August 1984.
4. Chair of the Ad-hoc Computer Utilization Committee, Department of Physical Education, University of South Carolina, September 1983 to August 1984.
5. Faculty advisor, P.E. Major's Club, Department of Physical Education, North Texas State University, August 1984 to August 1985.
6. Graduate Program Coordinator and Chair of the Graduate Committee, Department of Physical Education, North Texas State University, August 1985 to August 1986.
7. Chair of the search committee for a lecturer position in aquatics, Department of Physical Education, North Texas State University, January 1986 to June 1986.
8. Member of the search committee for the position of Department Chairman, Department of Physical Education, North Texas State University, April 1986 to July 1986.
9. Member of the Faculty Senate, North Texas State University, August 1986 to June 1987.
10. Member of the Faculty Senate, Arizona State University, August 1988 to May 1992.
11. Faculty advisor to the student organization "United Students in Exercise Science", Department of Exercise Science and Physical Education, Arizona State University, August 1988 to July 1991.
12. Member of the Undergraduate Curriculum Committee, Department of Exercise Science and Physical Education, Arizona State University, August 1988 to May 1990.
13. Member of the search committee for faculty position in Exercise Biochemistry, Department of Exercise Science and Physical Education, Arizona State University, February to April 1989.
14. As faculty senator, conducted faculty review of the Chair, Department of Exercise Science and Physical Education, Arizona State University, April 1989, 1990, 1991 and 1992.
15. Member of the search committee for faculty position in Motor Learning/Control, Department of Exercise Science and Physical Education, Arizona State University, January 1990.
16. Member of the search committee for two technical staff positions, Department of Exercise Science and Physical Education, Arizona State University, October 1989, and January 1990.
17. Graduate Council representative for Ph.D. oral examination, Yong-Gen Lai, Mechanical Engineering, Arizona State University, November 1990.
18. Member of the search committee for a protected class faculty position, Department of Exercise Science and Physical Education, Arizona State University, November 1990 to March 1991.
19. Member of Computer Users Committee, Department of Exercise Science and Physical Education, Arizona State University, August 1991 to August 1994.
20. Member of the CLAS Dean's Advisory Committee on Technology (CLAS-ACT), College of Liberal Arts and Sciences, Arizona State University, March 1992 to May 1997.
21. Graduate Council representative for Ph.D. oral examination, Qiang Liu, Mechanical Engineering, Arizona State University, October 1992.
22. Member of Bylaws Committee, Department of Exercise Science and Physical Education, Arizona State University, October to December 1992.
23. Member of Executive Committee, Department of Exercise Science and Physical Education, Arizona State University, August 1993 to May 1994.

24. Member of Personnel Committee, Department of Exercise Science and Physical Education, Arizona State University, August 1993 to May 1995.
25. Member of (University-wide) Human Subjects Institutional Review Board, Arizona State University, August 1994 to December 2002.
26. Member of (University-wide) Academic Senate, Arizona State University, August 1994 to May 1998.
27. Member of College of Liberal Arts and Sciences Academic Senate, Arizona State University, August 1994 to May 1998.
28. Member of Computer Network Team, Department of Exercise Science and Physical Education, Arizona State University, August 1994 to June 2000.
29. Member of Instructional Evaluation/Improvement Team. Department of Exercise Science and Physical Education, Arizona State University, August 1994 to May 1995.
30. As Academic Senator, conducted faculty review of the Chairman, Department of Exercise Science and Physical Education, Arizona State University, April 1995, 1996, and 1997.
31. Graduate Council representative for Ph.D. oral examination, Nevenka Dimitrova, Computer Science, Arizona State University, March 1995.
32. Member of search committee for a lecturer faculty position, Department of Exercise Science and Physical Education, Arizona State University, November 1995 to May 1996.
33. Member of the CLAS Senate Executive Committee, College of Liberal Arts and Sciences, Arizona State University, October 1995 to May 1996.
34. Webmaster, Department of Exercise Science and Physical Education, Arizona State University, January 1996 to November 1997. Responsible for maintaining department web page.
35. Member of (University-wide) Information Technology Advisory Committee (ITAC), Arizona State University, September 1996 to May 1998.
36. Member of search committee for a faculty position in biomechanics/motor control, Department of Exercise Science and Physical Education, Arizona State University, November 1996 to May 1997.
37. Member of search committee for a faculty position in lifespan motor behavior, Department of Exercise Science and Physical Education, Arizona State University, November 1997 to May 1998.
38. Member of Committee of Review, Department of Exercise Science and Physical Education, Arizona State University, August 1998 to August 2000.
39. Chair-Elect of (University-wide) Human Subjects Institutional Review Board, Arizona State University, August 1998 to August 2000.
40. Member of ad-hoc committee to recruit a "Senior Scholar," Department of Exercise Science and Physical Education, Arizona State University, May to December 1999.
41. Chair of (University-wide) Human Subjects Institutional Review Board, Arizona State University, August 2000 to December 2002.
42. Member of search committee for Chair, Department of Exercise Science and Physical Education, Arizona State University, December 2000 to February 2001.
43. Member of the (University-wide) Research Safety Oversight Committee, Arizona State University, July 2000 to December 2002.
44. Member of search committee for a faculty position in pedagogy, Department of Exercise Science and Physical Education, Arizona State University, November 2000 to March 2001.
45. Member of Committee of Review, Department of Exercise Science and Physical Education (changed to Kinesiology July 2002), Arizona State University, August 2001 to August 2003.
46. Member of search committee for two faculty positions in pedagogy, Department of Exercise Science and Physical Education, Arizona State University, November 2001 to March 2002.
47. Director, Interdisciplinary Ph.D. Program in Exercise Science, Arizona State University, July 2002-March 2004.
48. Member of search committee for a faculty position in pedagogy, Department of Kinesiology, Arizona State University, November 2002 to March 2003.
49. Member of Personnel Committee, Department of Kinesiology, Arizona State University, August 2003 to present.
50. Chair of search committee for a Ph.D. Lecturer position in biomechanics, Department of Kinesiology, Arizona State University, September 2004 to February 2005.

Committee Service — Graduate Theses and Dissertations

1. Masters Theses
 - A. Completed (NTSU): Maggie Reilly-Hagen (Biomech/**Chair**), Dan Canales (Biomech/**Chair**), Julia Nelson (Biomech), Carol Thomson (Biomech)
 - B. Completed (ASU): Todd Ellenbecker (Ex Phys/Biomech), Gary Heise (Biomech), Barry Munkasy (Biomech/**Chair**), Tim Joganich (Biomech), Cat Letton (Anthropology), Rachael Seidler (Biomech), Chris Sherwood (Biomech/**Chair**), Kris O'Connor (Biomech/**Chair**), Joan Van Dyke (Dance), John DeWitt (Biomech/**Chair**), Jeny Carden (Design), Adam Gaines (Biomech/**Chair**), Kristin Sutika, (Ex. Physiol.), Bryan St. Laurent (Biomech/**Chair**); Greg Imlay (Motor Control), Sara Novotny (Biomech/**Chair**), Susan Sultvedt (Biomech/**Chair**), Jennifer Fay (Ex Phys), Michelle Jung (Motor Dev)
 - C. In progress (ASU): Mike Lee (Biomech/**Chair**), Shannon Spangler (Biomech/**Chair**), Trampas Tenbroek (Biomech/**Chair**), Chris Colloca (Biomech/**Chair**), Sarah Conci (Biomech/**Chair**), Bethany Larsen (Biomech/**Chair**)

2. Doctoral Dissertations (ASU)
 - A. Completed: Amir Seif-Naraghi (Bioengineering), Mike Mungiole (Biomech), Al Hreljac (Biomech), Scott McLean (Biomech/**Chair**), Tony Marsh (Biomech), Peter Vint (Biomech/**Chair**)
 - B. In progress: Bryan Morrison (Biomech/**Chair**), Robert Welcher (Biomech/**Chair**), Young-Kwan Kim (Biomech/**Chair**)

Reviewing Activities

1. Guest reviewer for a revised edition of an undergraduate biomechanics textbook for Prentice Hall, January 1984.
2. Consulting reviewer for *Journal of Sports Sciences*, April 1985.
3. Guest reviewer for *International Journal of Sport Biomechanics*, January 1985 to December 1992.
4. Guest reviewer for *Canadian Journal of Applied Sport Science*, September 1987.
5. Guest reviewer for *Medicine and Science in Sports and Exercise*, January 1987 to present (Associate Editor, January 1992 to December 1994).
6. Guest reviewer for *Research Quarterly for Exercise and Sport*, June 1988 to present.
7. Guest reviewer for *Journal of Biomechanics*, January 1988 to present.
8. Reviewed 108 abstracts for the 14th Annual Meeting of the American Society of Biomechanics, May 1990.
9. Guest reviewer for *Journal of Applied Biomechanics*, January 1993 to present.
10. Reviewed 18 manuscripts for an edited book on 3-D analysis of human movement for Human Kinetics Publishers, June to September 1992.
11. Reviewed proposals for the Douglas L. Conley Memorial Scholarship Fund, Arizona State University, April 1992, October 1996, November 1997, and April 2002.
12. Guest reviewer for *International Journal of Sports Medicine*, April 1993.
13. Reviewed 5 abstracts for the 1995 AAHPERD national convention, September to October 1994.
14. Reviewed 10 abstracts for the 1995 ACSM national meeting, November to December 1994.
15. Reviewed 25 abstracts for the 1996 ACSM national meeting, November to December 1995.
16. Guest reviewer for *Annals of Biomedical Engineering*, June 2000 to present.
17. Guest reviewer for *Journal of Sports Sciences*, December 2000 to present.
18. Guest reviewer for IEEE Transactions on Biomedical Engineering, August 2000 to present.
19. Guest reviewer for USA Sport Science Grant Proposal, March 2001.
20. Guest reviewer for student research proposal in University of Florida grant writing workshop, February 2001.
21. External reviewer for tenure and promotion to Assoc. Prof. of colleague at Willamette University, May to September 2002.
22. External reviewer for tenure and promotion to Assoc. Prof. of colleague at Iowa State University, July to October 2002.
23. Reviewed 48 student grant proposals for the International Society of Biomechanics, February to March 2003.
24. Reviewed 21 student grant proposals for the International Society of Biomechanics, February to March 2004.
25. External reviewer for promotion to Full Professor of colleague at University of California at Davis, July to September 2004.
26. Reviewed 25 student grant proposals for the International Society of Biomechanics, February to March 2005.

Consulting Activities

1. Consulting as an Expert Witness (Forensic Biomechanics). Worked on more than 100 legal cases involving injury and liability ranging from slip-and-fall accidents and sports accidents, to automobile and motorcycle accidents, to murder cases. Worked for both defendants and plaintiffs, May 1977 to May 1985, and March 1993 to present. Currently working through BTI Consultants, Tempe, AZ (<http://www.btic.com/>).
2. United States Swimming, Colorado Springs, CO. Research consultant for 1984 U.S. Olympic Swim Team, October 1983 to December 1984.
3. Orthopaedic Consultants, Dallas, TX and ATI Products, Inc., Denver, CO. Biomechanics and computer consultant. In charge of hardware and software development for electrogoniometer research, gait analysis, and locomotion studies. Worked toward development of marketable product for clinical gait analysis, August 1985 to April 1989.
4. Egyptian Swimming Federation, Cairo, Egypt. Scientific consultant to the Egyptian National Swim Team, March 1990 to May 1991.
5. Dobson Association, Mesa, AZ. Aquatics consultant. Conducted a safety analysis of competitive pools and made recommendations concerning minimum depth required for performing racing dives safely. Oversaw plans and construction of new pool, September 1990 to June 1992.
6. START Sports Medicine Clinic, Tempe, AZ. Biomechanics consultant. Evaluated their video motion analysis system and checked it for accuracy. Provide advice on the proper use of their system for the analysis of golf swings and other sports applications, September 1991 to December 1992.
7. BTI Consultants, Tempe, AZ. Ergonomics consultant. Evaluated all the company staff's computer workstations (including desks, chairs, keyboards, monitors, etc.) and made written recommendations for improving ergonomics and reducing the risk of repetitive strain injury (RSI), September to December 1996.

Miscellaneous Professional Activities

1. Presented a paper entitled "Kinetic analysis of U.S. Olympic butterfly swimmers" at the North Texas State University College of Education Summer Conference, Denton, TX, June 1986.
2. Participated in a panel discussion on the interdisciplinary aspects of human endurance performance at the annual meeting of the Texas Chapter of the American College of Sports Medicine, Austin, TX, November 1986.

3. Guest lectures and seminar presentations (ASU): PED 791 Exercise Science Seminar, "Biomechanics of U.S. Olympic Swimmers," Fall 1987; CHE 598 Biomechanics, "On the stability of human rotary motions: Application to diving and gymnastics," Spring 1988; ASU varsity men's and women's swim teams, "Biomechanics of swimming," Spring 1988; PED 791 Exercise Science Seminar, "A mathematical model of competitive swimming in pools with currents," April 1991; DSC 344, "Introduction to Carpal Tunnel Syndrome and other repetitive strain injuries: Implications for keyboard design," October 1997; ASU Triathlon Club, "Biomechanics of swimming propulsion: Is it lift, drag, or something else?" November 1997, PSY 437 (Mike McBeath), "Carpal Tunnel Syndrome and other Repetitive Strain Injuries: What's the Solution?" April 1999, repeated April 2001; IEE 437/547 (Rebecca Boren), "Ergonomics and Repetitive Strain Injuries: What's the Connection?" November 1999, repeated November 2000; IEE 437/547 (Rebecca Boren), "Carpal Tunnel Syndrome and Other Musculoskeletal Problems in Industry: What's the Solution?" November 2001, gave updated talks November 2002, November 2003, November 2004; KIN 791 Exercise Science Seminar, "A comparison of buoyant forces and center of buoyancy in competitive swimmers wearing conventional and full-body swimsuits," October 2003; IGERT Seminar, "Stretching the transverse carpal ligament as an alternative to surgery in the treatment of Carpal Tunnel Syndrome," December 2003.
4. Guest lectures and seminar presentations (Non-ASU): Kinesiology Conference, Department of Exercise and Sport Sciences, University of Arizona, "A mathematical model of competitive swimming in pools with currents," April 1991; American College of Sports Medicine Fitness Instructor Certification Workshop, Phoenix College, "Applied anatomy and kinesiology," August 1991; Dobson High School Swim Team, Mesa, AZ, "Biomechanics of Swimming," October 1999, October 2000; September 2002, September 2003, and October 2004; Phoenix Orthopedic Residents Program, "Biomechanics I, II" and "Biomechanics of Bone and Articular Cartilage," October 2001; OASIS (Older Adult Service and Information Systems), Phoenix, AZ, "Healthy bodies, healthy selves: Hands, wrists, and arms after 50," two seminars, November 2003.
5. Served as Chairperson of a scientific session entitled "Biomechanics of the Foot and Leg" at the Annual Meeting of the American College of Sports Medicine, May 1988.
6. Served as Chairperson of a scientific session entitled "Locomotion" at the 14th Annual Meeting of the American Society of Biomechanics, November 1990.
7. Served as Chairperson of a scientific session entitled "Movement Dynamics" at the 19th Annual Meeting of the American Society of Biomechanics, August 1995.
8. Served as Chairperson of a scientific session entitled "Sport Biomechanics" at the 20th Annual Meeting of the American Society of Biomechanics, October 1996.
9. Faculty Advisor, ASU Triathlon Club, Arizona State University, August 1996 to May 2002.
10. Served as Chairperson of a scientific session entitled "Aquatic Sports Symposium" at the 17th Congress of the International Society of Biomechanics, August 1999.