

## DUDLEY S. CHILDRRESS: ENGINEERING SOLUTIONS FOR HUMAN ENABLEMENT

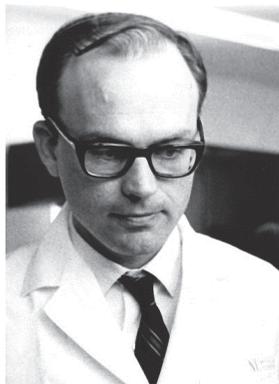
Dudley S. Childress, PhD (September 1934–August 2014), died at 79 after a long battle with Parkinson disease. This editorial represents a brief synopsis of Childress' life and accomplishments, which have significantly improved and will continue to improve the lives of Veterans and others with physical disabilities.

### In Memoriam

Childress, born the eldest of three children in Archie, Missouri, identified with the values of Missouri farmlands and small towns, which emphasized hard work, fair play, personal responsibility, and compassion. Growing up, Childress spent time with his maternal and paternal grandparents who lived on farms near Harrisonville, Missouri. Every summer he helped his maternal grandparents work their farm where he rode behind a team of cherished draft horses. Eventually, he saw farm work transition from horsepower to tractors. His paternal grandfather relished showing him how the farm machinery worked, sparking his interest in engineering and mechanical systems.

Childress was an outstanding athlete. In high school, he lettered in football, basketball, and track. During his senior year, he was a small, but fast and smart, quarterback who led his team to finish undefeated in its conference. Childress accepted a full scholarship to play football at the University of Missouri, where he majored in Electrical Engineering. Childress was the first football player at "Mizzou" to major in engineering. He earned his BS (1957) and MS (1958) degrees in Electrical Engineering from the University of Missouri. Childress served in the U.S. Army Reserve on Active Duty (1958–1959) and on Active Reserve (1959–1964).

Dudley Childress and Nancy Smith were married in 1959, and until 1963, they lived in Columbia, Missouri, where he taught

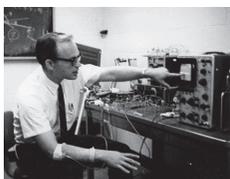


1967: Dudley Childress, intent scientist.

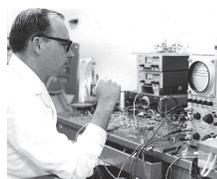
Electrical Engineering at the University of Missouri and she taught first grade in the public schools. In 1967, Childress completed a PhD in Electrical Engineering with a minor in Biomedical Engineering at Northwestern University. He built his career at Northwestern University, rising to become a tenured professor in the Departments of Biomedical Engineering and Physical Medicine and Rehabilitation. From 1972 until his retirement in 2005, Childress directed the Northwestern University Prosthetics Research Laboratory and Rehabilitation Engineering Research Program.

Throughout his career, Childress conducted research and development in the field of rehabilitation engineering and became world-renowned for his work in the field of prosthetics and rehabilitation. Childress and his laboratory developed many important rehabilitation technologies, including the first self-contained electromyography-controlled prosthetic arm, the sip-and-puff wheelchair controller, and the synergetic prehensor. Childress also published more than 130 publications that helped to broaden the knowledge base in the areas of prosthetics, orthotics, assistive technology, and human walking. Employing a basic science approach, Childress conducted applied research and development, successfully broadening the knowledge base for use by other scientists. He actively involved persons with disabilities, fully integrating them into research and development projects by hiring them as students and staff members. Childress also valued the opinions of clinicians and actively involved them in his research endeavors.

Among recognition and awards for his many career achievements, Childress



Circa 1967: Dudley Childress interpreting electric signals related to myoelectric control.



1960s: Dudley Childress.



1968: Dudley Childress (left) demonstrating myoelectric arm to colleague.

received honorary membership in the American Academy of Orthotists and Prosthetists (1993), was elected to the Institute of Medicine of the National Academy of Sciences (1995), received the Paul B. Magnuson Award from the Department of Veterans Affairs Rehabilitation Research and Development Service (2002), and received the da Vinci Lifetime Achievement Award (2005).

During his lifetime, Childress mentored more than 50 masters and 20 doctoral students and their research projects. Many of his doctoral students are now leading rehabilitation engineering laboratories around the world. Elliot Roth, MD, noted that students and colleagues alike benefitted from Childress' tutelage and mentorship:

He was absolutely passionate about training the future generation of engineers and scientists in the specialty of rehabilitation. You could practically feel his enthusiasm for mentoring trainees, junior faculty, and fellow colleagues. As Department Chair, I deeply appreciated Dudley's consistent commitment to creating and maintaining an academic environment in which scientific inquiry and social benefit were valued.

Beyond his own research and development work, Childress served as a grant reviewer for many Government agencies, including the Department of Veterans Affairs. For many years, he also served on the Editorial Board for the *Journal of Rehabilitation Research and Development*. Childress rarely, if ever, turned down the opportunity to assist with activities related to the improvement of rehabilitation of persons with disabilities or the training of others to work in the field of rehabilitation.

Beyond his many accomplishments in the field of rehabilitation, Childress was devoted to his wife and two sons, Stephen and Malcolm. He held leadership roles in his church and community and gave generously to help others. Approximately 200 friends, colleagues, former students, and family members attended the September 20, 2014, memorial service held in honor of Childress. For colleagues and friends who were unable to attend, the transcribed tributes [1] and MP3 audio files [2] are freely available. Also available are essays written by his former students and colleagues for the Festschrift in Honor of Dudley S. Childress, PhD (2006) [3].

Childress was a contemporary Renaissance man, an athlete, and a scholar who was knowledgeable in

diverse areas including architecture, art, history, and poetry. Through his work, Childress helped to develop the field of rehabilitation. He also inspired, supported, encouraged, and nurtured innovative people who developed engineering solutions to human problems. We who knew him will miss him, but the world can celebrate Childress' many contributions and ongoing influence on rehabilitation engineering.

**R. J. Garrick, PhD;<sup>1\*</sup> Andrew H. Hansen, PhD;<sup>2</sup> Elliot J. Roth, MD;<sup>3</sup> John W. Michael, CPO/L, MEd;<sup>3</sup> Malcolm Childress, PhD<sup>4</sup>**

<sup>1</sup>Resource Unit for Information and Education Services, Northwestern University Prosthetics-Orthotics Center, Feinberg School of Medicine, Northwestern University, Chicago, IL; <sup>2</sup>Rehabilitation Engineering Research Program, Minneapolis Department of Veterans Affairs Health Care System, Minneapolis, MN; <sup>3</sup>Department of Physical Medicine and Rehabilitation, Feinberg School of Medicine, Northwestern University, Chicago, IL; <sup>4</sup>Land Alliance Inc, Washington, DC

\*Email: [r-garrick@northwestern.edu](mailto:r-garrick@northwestern.edu)

ORCID: Andrew H. Hansen, PhD: 0000-0002-2599-6436; John W. Michael, CPO/L, MEd: 0000-0003-4516-196X

<http://dx.doi.org/10.1682/JRRD.2015.01.0004>

## REFERENCES

1. Childress Memorial Service [Internet]. Chicago (IL): Northwestern University; 2014 Sep 22. Available from: <https://northwestern.app.box.com/s/skxzub0gpejp82zbbze4>
2. Childress Memorial Service [Internet]. Chicago (IL): Northwestern University; 2014 Sep 23. Available from: <https://northwestern.app.box.com/s/skxzub0gpejp82zbbze4/1/2483882777>
3. Childress Festschrift—2006 [Internet]. Chicago (IL): Northwestern University; 2014 Aug 19. Available from: <https://northwestern.app.box.com/s/uj72x6cgnfnb a9bfbn9b>





1968: Dudley Childress (left) with Hector Kay at a meeting in Banff, Canada.



1980s: Dudley Childress.



1980s: Dudley Childress.



1997: Dudley Childress and Andrew Hansen working at NUPRL.



1972: Dudley Childress.



1980s: Dudley Childress.



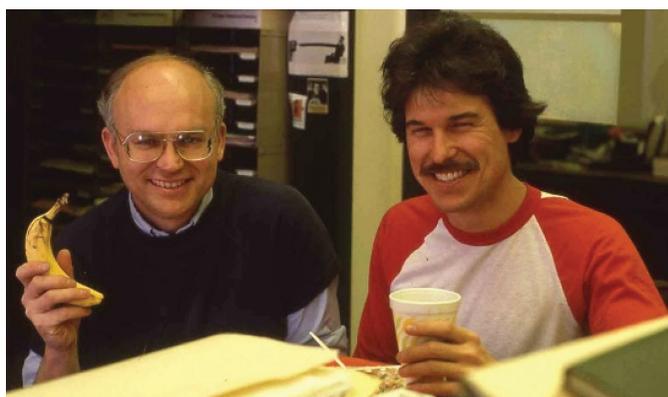
1987: Dudley Childress, Sheraton, Washington, DC.



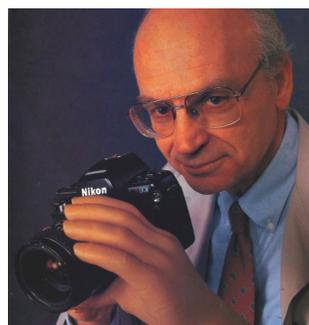
1990s: Dudley Childress.



Circa 1974–1975: Dudley Childress (arms crossed, center) with his Northwestern University Prosthetics Research Laboratory personnel. Back row (left to right): Jay Kaplan, Carol Herhold, Terry Supan, Nancy Johnson, (unidentified person), Joann Williams, John Billock, Edward Grahn, Mark Hajost. Front row (left to right): Margaret Pfrommer, Dudley Childress, Clinton Compere, Bob Thompson, Jack Lewis, John Strysik. (Photograph by Bill Dellenback.)



1980s: Dudley Childress (left), mugging with graduate student Ken Kozole.



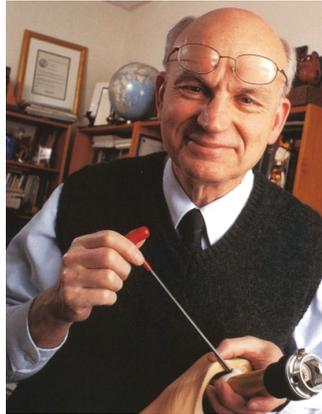
1990s: Dudley Childress, using myoelectric arm to hold camera.



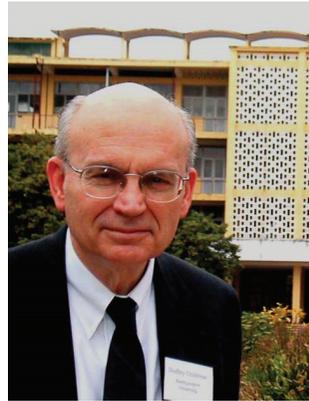
Circa 1985: Dudley Childress (center) with Colin McLaurin (right) and Ben Wilson (left).



2000s: Dudley Childress.



2005: Dudley Childress and his career were featured in Northwestern University Ward Rounds, 2006. (Photo by Jim Ziv.)



2005: Dudley Childress was an invited speaker about prosthetics at Hanoi University, Vietnam.



2005: Dudley Childress was invited to Hanoi University (Vietnam) to speak about prosthetics.



2006: Dudley Childress. (Photo by R. J. Garrick.)



October 2006: Dudley Childress welcomed guests to a Festschrift in his honor at Northwestern University. (Photo by R. J. Garrick.)



October 2006: Dudley Childress at Festschrift reception in his honor at Northwestern University. (Photo by R. J. Garrick.)



2009: Dudley Childress in the Northwestern University Prosthetics Research Laboratory machine shop. (Photo by R. J. Garrick.)



November 22, 2010: Dudley Childress greets friends and colleagues at the opening ceremony that merged and renamed Prosthetics and Orthotics research and education programs: the Northwestern University Prosthetics-Orthotics Center (NUPOC). At the NUPOC ribbon-cutting ceremony, the Research Commons was dedicated in "grateful appreciation to Dr. Dudley S. Childress for his faithful service, unwavering dedication and lifetime contributions to prosthetics and orthotics education and research". (Photo by R. J. Garrick.)