My road to and through gerontechnology: An autobiography

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J.L. Fozard. My road to and through gerontechnology: An autobiography. Gerontechnology 2010; 9(3):368-379; doi:10.4017/gt.2010.09.03.002.00 This autobiography describes how: (a) family and education shaped my career; (b) gerontology and gerontechnology became the main focus; (c) I adapted to a career in gerontology after ten years of university teaching and psychological research, and (d) 20+ years of gerontological research combined with my experience in human factors enabled my contributions to the development of gerontechnology. My attitudes were shaped by my early experiences and my love for music. My formal training in experimental psychology and human factors engineering provided the academic basis for my career in gerontology and gerontechnology. However, my career was not a direct result of my training; it started by chance. I could not have written this text if my supervisors had required formal training in aging, human development or human factors engineering. This article is a remake and ten-year update of my previously published autobiography.

Keywords: music, psychology, human factors, gerontology, gerontechnology

Ten years ago I wrote my autobiography from the viewpoint of geropsychology[1]. In the last decade my research focus moved from geropsychology to gerontechnology, resulting in a new view of my career and my hopes for an improved quality of life for current and future generations of aging people.

Youth and my parents' retirement

I was born James Leonard Fozard in Detroit, Michigan (USA) on August 23, 1930 as the younger brother of Jane (*Figure 1*). My parents were James L. Fozard, BSc, from Angel's Camp, California, and E. Marion Fozard, RN, née Harden from Heightstown, New Jersey (*Figure 1*). After serving as a nurse in World War I, my mother moved from New York City to LaTouche, Alaska where she was the head nurse in a clinic for a copper mine run by my father. When I was 12, my father died at the age of 63, two years before the mandatory retirement age as the general manager of the Mammoth St. Anthony Mine in Tiger, Arizona. Anticipating retirement, he had been in the process of purchasing a cattle ranch,

*Figure 1. 5-Year old Jimmie Fozard (*1930) with his older sister Jane (*1925) in front of the family home, Roseland, New Jersey*

"large enough so I won't be bored," as he put it. My mother and her siblings continued work into their 80s and in one case 90s. This background strongly influenced my sister and me; she continues to manage a nursery and greenhouse in Monroe, Connecticut.

During three of my grammar school years, I attended one-room schools in Idaho and Arizona. Students came to school on horseback (*Figure 2*). In high school, I attended a large suburban school in Fairfield, Connecticut, a profound change in physical and social environment. My skills in horseback riding and animal care were irrelevant to the team sports and many social activities of my teenage peers. Except for my father, who earned a degree in electrical engineering at the University of California at Berkeley, I was the only one in my family to attend college.

From music to psychology

Music is an important part of my life. I studied piano and trombone in high school, majored in music for two years in college (*Figure 3*), and at the same time received conservatory level musical performance training at the Music Academy of the West. I have performed in and directed amateur and semi-professional musical shows and instrumental groups throughout my adult life. One of the most enjoyable was the Starvation Army Band, a New Orleans jazz and swing music group I started in 1988 that still performs at Maryland-area concerts, weddings, retirement homes, and even funerals.

At the University of California at Santa Barbara I changed majors from music to psychology in my junior year. Robert Gottsdanker had the most influence on my decision to study psychology in graduate school. After taking his courses in statistics and experimental psychology I became his student teaching assistant.

I had full parental support in my first two years in college and limited help thereafter. I supported myself working part time in a supermarket and as a bass trombonist in local musical groups. Dr. Gottsdanker's recommendation helped me get admitted to the master's degree program at San Diego State College with a research assistantship. I abstracted hundreds of research articles for an annotated bibliography for human factors engineering,[2] during which time I observed how pioneers

Figure 2. Jimmie Fozard, his elder sister Jane Fozard, and their father Jim L. Fozard (1880-1943) on horseback, as was the normal means of travel in the roadless wintertime environment at the Lincoln Mine near Pearl, Idaho (USA) at that time; The spare horse is the one of his mother E. Marion Fozard née Harden (1894-1984) who took the photograph

Figure 3. 19 Year old college boy Jimmie Fozard before his mother's new home and office in Phoenix, Arizona; for the non-native speakers of English: An electrologist permanently removes unwanted hair from the face and body by a process called electrolysis

Arnold Small and Alphonse Chapanis organized the then new multidisciplinary field of human factors engineering and ergonomics.

Becoming a PhD

In 1956 I was accepted into the new experimental psychology doctoral program at Lehigh University. My formal training - conditioning, visual and auditory perception, social psychology - included being the teaching assistant for the undergraduate introductory and experimental psychology courses. For two years I was the psychologist on a team that implemented an undergraduate peer counseling program for freshmen. In order to attract and train counselors we created the Gryphon Society, which celebrated its 50th anniversary in 2007.

My major advisor was Solomon Weinstock; the research goal of my dissertation was to explain the advantage of widely vs. closely spaced training trials in operant conditioning[3]. Weinstock, a terrific teacher, taught his students how to critique research reports by example. In seminars, he would select an article at random from a recent edition of the premier 'Journal of Experimental Psychology' and examine it from hypotheses to conclusions with fiery and devastating criticism worthy of the famous lawyer, F. Lee Bailey.

After Lehigh, I spent three great years teaching at Colby College in Waterville, Maine. To increase student enthusiasm for the required courses in experimental psychology, I replaced the sequence of formal laboratory experiments then used with a format in which students conducted one or two studies from conception to reporting. Wanting more research than was possible at Colby, I planned a postdoctoral fellowship in human memory and perception, a plan that solidified during a summer spent in a National Science Foundation-supported program for young psychology faculty held at the University of Michigan. Daily seminars led by Arthur Melton collectively generated an outpouring of transformations of research ideas into meaningful experiments.

Aging research

After a year of teaching in the University of Maryland European Division in Heidelberg (Germany) where I met and married my first wife, Lyte Mitchell, a lecturer in Western Civilization, I began a two-year postdoctoral fellowship (1964-1966) with Douwe Yntema, head of the psychology group at the Massachusetts Institute of Technology (MIT), Lincoln Laboratory (*Figure 4*). My research concerned subjective judgments of the relative recency of remembered events[4]. At the Design Conference on Memory and Aging[5], Yntema used another paradigm he developed that vividly documented the vulnerability of older persons to proactive interference effects, as reported by Fozard[6].

After completing my fellowship, I took a teaching position at Southern Methodist University. The newly formed Ph.D. program justifying my position was aborted unexpectedly in its first year putting me back in the job market. Yntema introduced me to Dr. George Talland, from the Psychiatry Department at Harvard Medical School, who conducted studies in short-term memory with the Normative Aging Study (NAS), a longitudinal study operated by the Veterans Administration (VA-now The Department of Veterans Affairs). Talland recommended me

Figure 4. What a proud Jim is photographed here in April 1964. Is it because of his European car? His new appointment at MIT? Or his young fatherhood? The car was a 1963 Sunbeam Alpine that Jim purchased new in Europe. It came back to the USA with him and took him back and forth to MIT faithfully. Hip friends at the time ridiculed Jim for buying what they considered to be a second rate sports car in comparison to the MG and Triumph. The Alpine, because of its American style fin rear fenders that allowed for the novel option for storing petrol, was the only one of the three that would carry Jim's single suitcase with books and clothes in the trunk. The trunk in the others housed only the fuel tank and the soft top.

for the Research Psychologist position in the NAS, a job that, fortunately for me, required no knowledge of or prior interest in aging. One of my references, Arthur Melton, warned me that I was risking my reputation by working in such a nontraditional setting. The new position radically changed my career. Full-time research was a new experience. Teaching in medical school involved single, highly focused lectures or short, intensive courses; in 12 years at Harvard, I only taught seminars on aging in my last two years.

Learning by doing

My adaptation to research on aging included: (i) development of a research program in perception and memory; (ii) participating in interdisciplinary research; and (iii) learning pragmatics of the gerontological enterprise--politics, multidisciplinary teams, the reputation and quality of research. These experiences changed my orientation from the individual investigator-initiated approach to research in which I had been trained toward an interdisciplinary team approach, the foundation of gerontechnology.

I completed some of Dr. Talland's research following his death from cancer in March 1968. Reporting on his experiments provided me with some rapid training on the special problems of research on cognitive aging.

In the 1970s, the Veterans Administration initiated its competitive *Geriatric Research, Educational, and Clinical Center (GRECC)* program. I became co-director of the Boston division of the Boston/Bedford GRECC with Jeremiah Silbert, M.D. Our program that evaluated various outpatient medical services for the aging, proved to be an administrative challenge. Successful use of GRECC resources depended on recruiting biomedical researchers who had enough clinical responsibilities to justify paying their salaries from patient care as opposed to research funds. Our clinical and research appointments required approval by two or three different deans from medical schools of Harvard, Tufts, and Boston University.

Engineering creeps in

Both speed and quality of memory processes worsen with age. Dr. Nancy Waugh, then at Harvard Medical School, and I developed Mental Performance and Aging, a program to study age differences in speed of retrieving information from sensory, primary, secondary, and long-term or tertiary memory using procedures that controlled for differences in the quality of memory. The age effects proved to differ for the memory stores.

As described in her obituary[7], Waugh, starting with our research, made outstanding contributions to research on cognitive aging.

The project supported young scientist managers, Dr. John C. Thomas, and Dr. Leonard Poon, and a systems programmer, Dr. John Cerella, all of whom wrote several papers with us[8] and developed significant careers related to aging. Papers that Terry Anders, a postdoctoral fellow with Nancy Waugh, wrote with me at the NAS are some of the most widely cited in the gerontological literature[9].

Databases, reviewing, gerontechnology

Responsibilities as the NAS psychologist included analyses of NAS data on standardized tests of abilities and personality. I began with the GATB (General Aptitude Test Battery) that Dr. Ronald Nuttall and I factor analyzed in relation to age and socioeconomic status (SES); we identified the now familiar pattern of an education related, an age related and a mixed spatial abilities factor[10]. We replicated our findings using the original standardization data of the GATB, thereby raising several practical issues concerning the applications of the test to matching people of various ages with jobs, the main use of the GATB at the time[11]. Concurrently, I helped create the comprehensive NAS database from which customized data files could be created easily. For over a year, I dealt with problems of reliability, documentation, standardization, formats, and other practical issues.

I learned much about gerontology and multidisciplinary research serving as a site reviewer for the National Institutes of Health (NIH) and the VA Medical Research Service, as the associate editor of the Journal of Gerontology (1972-1976), Gerontechnology (2004-) and guest editor of the first special issue on aging of Human Factors (1980). My first three NIH reviewing assignments were for multidisciplinary gerontology training programs proposed by James Birren, Jack Botwinick, and Ewald Busse and Carl Eisdorfer. These experiences made me appreciate how much our contemporary educational programs in gerontology and geriatrics owe to these pioneers.

Dr. Arnold Small arranged for me to give an invited address at the 1975 meeting of the American Psychological Association (APA), from which I made my initial proposals for interventions in the environment and with people related to the challenges of aging[12]. The paper acknowledged my intellectual debt to Powell Lawton[13]. I was the first chair of the Technical Group on Aging (created by Small) of the Human Factors and Ergonomics Society. As interest in aging grew in human factors circles, I helped plan the National Institute on Aging (NIA) program allocating extramural funds to stimulate human factors research. Most important for me, my activities led to my participation, starting in 1990, in the development of a new multidisciplinary discipline - gerontechnology - research and development of technology on behalf of aging and aged people.

A single parent

In 1976 my 12-year marriage ended. Several months after our separation, my wife required medical treatment lasting more than a year. I moved back to our Boston home to rear our three children, Marcelle (1964-), Andre (1970-), and Colette (1970-), a responsibility that became permanent. This change in parenting roles resulted in a major

Figure 5. James L. Fozard, now director of Patient Treatment Service in the Office of Geriatrics and Extended Care at the Veteran Administration Central Office, Washington DC USA, visiting a statue of a forefather in May 1980, at Bushgardens, Virginia

Figure 6. Jim on the occasion of receiving the Distinguished Contribution Award from the APA division on adult development and aging from Dr. Leonard Poon, president of the division, August 8, 1984

career change; I could not do a good job of raising a family, supporting a large-scale research operation run on soft grant money, and carry out my new duties with the GRECC at the same time.

In 1978 I became the director of Patient Treatment Service in the Office of Geriatrics and Extended Care at the VA Central Office (*Figure 5*). In contrast to the open-ended work schedules of research, my responsibilities as a member of a hierarchical management team - although very demanding of effort - allowed me to put a boundary around my work day.

Being a single parent brought me close to all aspects of the growth and development of my children, a precious personal experience. The downside to the new job was a radical decrease in my research. A book describing 10 years of work in mental performance and aging never got completed although significant parts of it were published in invited chapters resulting from conference keynote addresses and my 'Division 20 presidential address' [6,8,12,14].

The new position required fast-paced administrative duties, and management and long range planning for nonhospital extended care. Major activities included preparation of guidelines and manuals specifying levels of care, space, staffing, and regulations for extended care programs; review of building plans for new VA-operated nursing homes and domiciliaries; preparation of budget proposals; drafts of enabling legislation for new programs; reviews of program utilization and quality; and system-wide administration and clinical training programs. In order to improve quality of care and increase top quality physician involvement in extended care programs which mostly addressed chronic medical problems, we developed an interdisciplinary team approach that we successfully adapted to both our institutional and home care programs. This approach was also the foundation for our creation of the Geriatric Evaluation and Management Units, subsequently adopted in many VA medical centers.

Routine activities included preparation of reports to Congress and correspondence to beneficiaries and members of Congress, most of which were prepared for the signature of government officials up to the level of the president according to a complex set of rules. With Alan Kennedy a professional journalist, I helped write the first and second editions of the VA guidelines on diagnosis and treatment of dementia[15], now in its third edition. I also served as the psychologist consultant to the American Medical Association Panel on Dementia for four years.

My role in developing interdisciplinary teams in the VA was described in an invited address given when I received the Distinguished Contribution Award from the APA Division on Adult Development and Aging (*Figure 6*). My chief mentor for the clinical side of these activities was my supervisor, Paul Haber, Assistant Chief Medical Director for Geriatrics and Extended Care. Haber was the founder of the VA GRECC program and certainly the most influential VA official promoting geriatrics and gerontology of his time.

By 1985 my goals for geriatrics and extended care had been largely attained, indeed the development and expansion of our programs had far exceeded my expectations. When offered a newly created position at the NIH I resigned from the VA.

New beginnings

I became Associate Scientific Director of NIA (National Institute of Aging, a part of NIH) for the Baltimore Longitudinal Study of Aging (BLSA), and Chief of the newly created Longitudinal Studies Branch (LSB). The job involved full-time administration of BLSA operations and research with the BLSA that celebrated its 50th anniversary in 2008. I successfully addressed management problems then hampering BLSA operations: (i) a rationale for the size and composition of the participant group, including minority participation; (ii) a system to track inactive participants; (iii) a quality information system for deceased participants and an autopsy program; (iv) administration of the participant waiting list; and (v) perhaps most importantly the creation of a corps of nurse practitioners and physicians' assistants supervised by a single medical officer that conducted research quality clinical evaluations designed specifically for longitudinal research.

The new position coincided with my marriage to Marian Singer, a teacher of English as a second language and a professional editor and writer whom I courted for several years. In addition to our love for one another, we shared an enjoyment of music performance and played together in several musical groups. Marian gracefully assumed the challenging role of stepmother especially as it affected her and my two teenage children who lived at home during the first years of our marriage.

Underutilized data and new programs

I was given responsibility for several ongoing programs that currently had inadequate scientific leadership; I created over a half dozen multidisciplinary research teams to oversee and report ongoing research as well as to create new initiatives. The pulmonary data and laboratory provide an example of the challenges with the ongoing studies. We made the BLSA an additional satellite in the ongoing Atherosclerosis Risk in Community Study, which had a central facility for training technicians and evaluating the quality of ongoing data collection. Historical and contemporary data were blended by tracing the old paper records with an electronic pen so that records obtained over 35 years could be machine graded using current criteria for quality. This laborious process yielded data showing that age-associated declines in pulmonary function in healthy adults follows a constant percentile[16] and that rapid changes in pulmonary function is an independent risk factor for cardiac death[17]. These studies used multilevel regression techniques adapted and developed by Dr. Larry Brant--procedures also used in our research on early detection of prostate cancer risk and on age associated hearing loss including our finding that long term elevated systolic blood pressure is a risk factor for hearing loss[18].

One new program included the renewal of the BLSA longitudinal studies of muscle strength using contemporary procedures. To investigate strength training as an intervention for age declines in muscle strength, I created a collaborative program with the University of Maryland. Its subjects were similar to but not BLSA participants. This two-pronged program has resulted in over 30 publications; the first was by Lindle and colleagues[19].

In collaboration with Dr. Patrick Walsh, the Chair of the Urology Department at the Johns Hopkins School of Medicine, I developed a team that continues to study prostate aging and disease, including prostate growth assessed non-invasively by magnetic resonance imaging, and assessment of urinary symptoms. Using longitudinal data, long term changes in prostate specific antigen (PSA) levels leading up to the diagnosis of prostate cancer were discovered[20]. By 1998, some 25 publications were completed, some that significantly changed medical practice.

By this time Gerontechnology was initiated at the Eindhoven (Netherlands) University of Technology. I was an advisor and a keynote speaker for the first conference held in 1991 at Eindhoven, and I took a yearlong sabbatical (1993-1994) from the NIA to serve as a visiting professor at the Eindhoven University of Technology (*Figure 7*) where I participated with Dutch and other colleagues in Europe to develop the educational and research initiatives that defined the new field.

Figure 7. During his sabbatical in Eindhoven, the Netherlands (1993), Jim (and his wife) played in formal uniform in the Koninklijke Stadsharmonie Phileutonia Helmond, founded October 23, 1850[21]

After-retirement gerontechnology?

At age 68, I retired after 31 years of government service. One important reason was that I wanted to shift my attention away from observational longitudinal studies to research on environmental interventions that may alter aging, such as gerontechnology, but first I tried a more classical approach.

I accepted a position as the Director of Geriatric Research and Director of the Florida Geriatric Research Program (FGRP) operated by a community hospital system in Clearwater. The study followed some six hundred unscreened volunteers aged 65 or older with yearly assessments of cardiac function, several laboratory tests, the Mini Mental Status exam and a dietary and functional assessment questionnaire. Blood samples were obtained from all consenting volunteers, processed and frozen by the Florida Blood Services. Over my two years in the position, the twenty-five years of paper records were turned into electronic files suitable for computer-based analyses, research proposals prepared and improvements made in administration and quality control.

The study had been entirely supported with private community donations which soon after my arrival, were diverted to other purposes by the hospital administration, leaving the operation of the study to run on the interest from an endowment fund. With disappointment, I left the position after completion of my 2-year contract. The study was terminated in 2006.

Back to basics

Between 2000 and 2004, I taught several upper division psychology courses for St. Leo University on a part time basis, something I had not done for 37 years. They included research design and statistics, perception and cognition, biological psychology and a senior research seminar. It was interesting to vicariously catch up on the areas of psychology which I had not followed actively since pursuing a career in gerontology. Writing included review articles, the vision and hearing chapter (with Sandra Gordon-Salant) of the 5th edition of the Handbook of the Psychology of Aging, a series of papers on gerontechnology, and several papers from earlier work. I served on the national advisory board for CREATE, an age-oriented human factors research consortium involving Sara Czaja, University of Miami, Arthur D. Fisk and Wendy Rogers, Georgia Institute of Technology and Neil Charness, Florida State University. I also served as an advisor to the Georgia Centenarian Study, directed by Leonard Poon. In its 2008 meeting, nine centenarian studies from around the world compared findings. Collectively, these experiences provided me with several splendid examples of highly successful interdisciplinary approaches to research and practice in gerontology and gerontechnology.

Aside from teaching and writing, I found more time to pursue hobbies such as gardening and musical performance and conducting - starting in 2001, I served for eight years as the assistant conductor of the Dunedin, Florida Concert Band in which Marian and I performed.

Another life event

In 2001, Marian was diagnosed and was supposedly successfully treated for endometrial cancer. It recurred and she died from the cancer in November, 2003. Being the caregiver for my lover and friend during her year-long terminal illness was the most heartbreaking experience in my life, in no small part because of her strong-willed efforts made to continue our lives together and to pursue her expanding artistic and professional career. In keeping with her wishes, I held a memorial potluck dinner and party for about a hundred friends and family which featured lots of music, some by the woodwind quintet she co-founded, and stories told by her family, American and Dutch friends, fellow college teachers of English as a second language and fellow basket makers.

In 2005, I was appointed as a courtesy full professor in the School of Aging Studies of the University of South Florida. I created a graduate seminar in gerontechnology called Environmental interventions to alter aging, and taught an upper level course in retirement and alternative housing arrangements for the elderly.

I also participated in the preparation of several research and training proposals for the Tampa VA Patient Safety Center and the University. Together with Professor William Kearns, now a major contributor to gerontechnology, I am participating in a VA initiated research project to evaluate visual camouflaging of exits in homes to discourage elopement of persons with dementia. It uses novel location-aware technology to record the movements of the wanderer and caregiver near the exit door. Another project uses the same technology for automatic tracking of everyday indoor movements in the common spaces of an Assisted Living Facility that successfully tested the hypothesis that greater degrees of cognitive impairment are associated with increased variability in patterns of movement in the monitored space[22,23]. We are currently using this approach to study long term changes in movement patterns that may be predictive of falls.

Environments to alter aging

Altering the physical and social environment to improve human performance and adaptability is a concept that has traction in contemporary ergonomics, industrial design and environmental psychology including its application to aging. My early efforts to link environmental interventions to aging[12] increased with my involvement in the development of gerontechnology.

If one considers the preparation time for the 1st International Conference on Gerontechnology in Eindhoven, the field has evolved for 20 years, approximately 1/3 the age of the International Society for Gerontology and Geriatrics or the Human Factors and Ergonomics Society. My contributions to the development of gerontechnology have been mostly to the formulation and articulation of its conceptual basis - described in some 53 chapters and articles mostly coauthored with Dutch colleagues. Included are 5 different lines of thinking:

(i) Aligning its goals with those of public health; first published in the Eindhoven University of Technology campus newsletter, Cursor, in 1993; This concept evolved into the current gerontechnology matrix[24];

(ii) Articulation of the concept that the dynamics of person-environment interactions

Figure 8. James Leonard Fozard, Pater familias over 3 childen and 3 grandchildren in 2004 at the wedding of Charles to Colette Fozard; From left to right: 'son-in law Stephen Marschall holding Jim's granddaughter Juliet Marschall, Marcelle Fozard with Jim's grandson, Cas Marschall, Jim, Colette and Charles, son Andre Fozard, with Jim's granddaughter, Kayla Fozard.

change depending on when and how secular changes in the technological environment occur[25], a concept derived from earlier transactional theories of person-environment interactions including the seminal analyses by Warner Schaie[26] that formal descriptions of aging should include age changes and differences in the aging of successive cohorts over time, an idea reflected in the concept of technology generations[27];

(iii) Developing and describing the links between classical ergonomics theory and gerontechnology[28];

(iv) Description of the information needed for development of gerontechnology projects, and the development of training materials for young engineers and designers through several master classes held in the Netherlands and Taiwan[29-31] and the first full course on gerontechnology taught at the Nan Kai University of Technology in Taiwan[32];

(v) Development of several literature reviews in gerontechnology including participating in a team effort led by van Bronswijk that describes how gerontechnology can support fun and creative activities in older age[33].

Epilogue

For the past 20 years I have devoted an ever increasing amount of my working life to the development of gerontechnology as a way to study and - more importantly - alter changing person-environment relationships. Research as well as my personal experience of aging makes me realize the increasing importance of the physical and social environment for a good quality of life as we age. Starting about the time of my post-doctoral fellowship at MIT, my 35-something year path to and through gerontechnology has allowed me to meet, interact and collaborate with a remarkable array of talented and dedicated scientists and clinicians, mostly named in the text and references. I am as indebted to them as to my formal teachers for the guidance, stimulation and inspiration provided to me; because of those experiences, I hope to continue my contributions to gerontechnology and science for the years that remain in my life. I am blessed to watch and cheer on the development of my children and grandchildren (*Figure 8*). Aging makes me realize daily the importance of enjoying the company of new as well as old friends; I especially appreciate the friendship of Ms. Kathryn Halter, whose retirement hobbies in music and art are a continuing inspiration for me to continue pursuing meaningful artistic activities such as playing challenging brass chamber music (*Figure 9*).

Figure 9. The Tampa Bay's premier brass quintet in 2009; from left to right: in the back Doug Ritchie, French horn, James L. Fozard, bass trombone and Gilbert Marcy, tuba; in the front: Robert (Bob) Rickel, cornet and Bob Leischner, trumpet[34]

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