

# 2023 ANNUAL REVIEW

#### WHAT'S INSIDE:

**Research** reports from the seven CVL labs

Highlights from CVL events

THE UNIVERSITY OF TEXAS AT DALLAS



### CENTER FOR VITAL LONGEVITY The Center for Vital Longevity is dedicated to

The Center for Vital Longevity is dedicated to pursuing research that will lead to cognitive health for life. Our research focuses on understanding how and why cognitive abilities change with age, and how these changes relate to changes in the brain's structure and function. We aim to identify, as early in life as possible, brain markers that predict who is most likely to maintain cognitive health as they grow older and who is most at risk of falling victim to Alzheimer's disease or other causes of age-related cognitive impairment. With this knowledge, we hope to develop behavioral and cognitive interventions that can prevent, slow or even reverse age-related cognitive decline.

FREEMAN

#### Welcome to our Annual Review.

I am excited for you to see the continuing progress of the CVL in this year's review. I'm happy to report that the future of the center is bright as we expand in many areas in the coming years. Most notably, we will be adding two more faculty in 2024, increasing the number of research labs housed in the center to nine, and continuing our outreach efforts in pursuit of our mission of cognitive health for life.

Among the highlights in this year's review, you will find a tremendously successful Dallas Aging and Cognition Conference where more than 200 scientists from all over the world attended to hear an outstanding line-up of speakers. You will also find reports of our annual public events including the Jean and Bill Boozitos Distinguished Lecture series with Duke University's Dr. R. Alison Adcock in October 2022 followed by our 2nd annual spring public lecture, organized in partnership with the Texas Instruments Alumni Association, held in April 2023 with Florida State University's Dr. Walter Boot.

We could not continue this work without your generous support. I greatly appreciate those of you who continue to champion the mission of the center and its research.

On behalf of all at the Center for Vital Longevity, thank you.



Michael Kug

Dr. Michael Rugg Director, Center for Vital Longevity Distinguished University Chair in Behavioral and Brain Sciences

#### What an exciting time it is to be part of the CVL!

Our labs continue to make impressive strides pursuing research that will lead to cognitive health for life, and I am thrilled that we will be gaining two more labs in 2024 in addition to the seven we already have that will add to this vital work.

Amongst this year's new grants, awards, findings and publications, you'll find Dr. Kendra Seaman's lab is doing incredible work in understanding trust and increasing racial representation among minority groups in the research community.

Dr. Chandramallika Basak's lab is celebrating a huge victory after winning UT Dallas' Big Idea Competition with a series of brain training games designed to enhance brain and cognition across the lifespan. Dr. Michael Rugg's lab published a resounding paper recently demonstrating that different mechanisms are responsible for regulating the thickness of the cerebral cortex in early and late life.

Dr. Kristen Kennedy's lab teamed up with a UT Dallas geographer to investigate whether frequent use of the spatial navigation region of the brain might help fend off the onset of Alzheimer's disease. Dr. Gagan Wig's lab received funding from the National Institutes of Health to develop animal models of the social factors that are believed to affect aging humans' susceptibility to neurological diseases. Dr. Karen Rodrigue's lab continues to make great progress on their NIH-funded project examining the effects of iron and beta-amyloid on brain structure, function, and cognition in MCI and cognitively normally aging individuals.

And my lab, the Aging Mind lab, completed the third and last wave of the Dallas Lifespan Brain Study. We have collected a massive amount of data over 12 years to see how the brain changes over this period at every age.

It was more than a decade ago that I established the center to expand the scope of work on aging and the mind. I was confident that the CVL's research could not only solve problems but unlock opportunities aging represents for our society. I am continually proud of and inspired by the ongoing growth and research at the CVL that will drive us into a bright future. Thank you for your continued support of our work!



#### **Dr. Denise Park**

Director of Research, CVL UT Regents' Research Scholar Distinguished University Chair in Behavioral and Brain Sciences Welcome to the Center for Vital Longevity's 2023 annual review! Big things are happening at the center that I am thrilled for you to learn more about in the following pages. As chair of the CVL's Advisory Council, I'm excited for you to see the remarkable progress being made at the center. Over the past year, this team of dedicated researchers and scientists have worked tirelessly towards achieving the center's mission of cognitive health for life. From novel insights into enhancing our brain and cognition throughout our lifetime to teaming up with geographers to investigate roadblocks against Alzheimer's disease. This type of work puts Dallas at the forefront of some of the most significant research in the cognitive aging field. I would like to extend my heartfelt appreciation for your continued support and confidence in these research endeavors.

Thank you for your invaluable support!



**Lindsey Kluempers Sanders** Chair, CVL Advisory Council





## **Basak Lab Wins Big with \$40,000 Research Innovation Award for Brain Training Games**



Dr. Chandramallika Basak's Lifespan Neuroscience and Cognition Lab is celebrating a big win after receiving first place at the University of Texas at Dallas' Big Idea Competition hosted by the Institute for Innovation and Entrepreneurship. This award will provide Dr. Basak funding for her start-up company, Opti-MIND which will combine technology-based solutions for optimizing the brain and mind. Dr. Basak was also selected to participate in the CometX Accelerator program at UT Dallas which pulls the most innovative student and faculty businesses on campus to learn all the necessary tools and tactics to be go-tomarket ready.

The lab is moving into the next phase of its current clinical trial where they are evaluating the sustained benefits of computer-based cognitive training in older adults as well as the impact of the training on bloodbased Alzheimer's disease biomarkers, such as p-tau and beta-amyloid. This research is funded by a \$2.76 million grant from the National Institute on Aging, and is a collaborative effort with the University of

Iowa and the Posit Science Corporation in an effort to develop evidence-backed applications for the prevention of Alzheimer's disease.

The AWARE fund of The Dallas Foundation awarded the lab a grant this year which will allow them to buy an fNRIS system to collect neuroimaging data on a group of older adults who otherwise cannot participate in neuroimaging studies, including those with preclinical Alzheimer's disease.

"By increasing research engagement in a more diverse group of older adults in ecologically valid settings, we can ensure the implementation of best practices in aging research," says Dr. Basak.

The lab also published five peer-reviewed papers this year, including a recent paper on physical fitness and brain activations engaged during cognitive control in aging, and a meta-analysis on cognitive benefits from video game training.

Additionally, Dr. Basak is working as a mentor on two federally funded grants while also acting as a faculty mentor and co-PI for a grant submission with a first-year student in the lab, Micaela Andreo, who has been selected as one of three finalists for the Friends of BrainHealth grant that supports early career researchers.

Dr. Basak is also excited to have cross-cultural exchanges in her teaching as her course on Adult Development and Aging will be a basis for collaboration between Kansai University in Japan and the University of Olso Medical School in Norway. This project is sponsored by the Norwegian government to foster international cooperation in research and higher education.

Dr. Basak also helmed the chair of the University Core Curriculum Committee and has been nominated to serve on the board of the Psychonomic Society, an international organization of psychological researchers. 💷









### Jean & Bill Booziotis **Distinguished Lecture Series**

Dr. R. Alison Adcock joined the Booziotis Distinguished Lecture series in the Fall of 2022. Dr. Adcock is an Associate Professor of Psychiatry at Duke University and Director of the Duke Center for Cognitive Neuroscience. Her lab works to understand brain states conducive to learning and how to engage them, offering new tools for individual and societal flourishing.

Her presentation Treasure Maps & Memories: Tuning Your Brain Chemistry for Adaptive Learning was held on Thursday, October 27, 2022, at the **Communities Foundation of Texas** in Dallas. 💴



#### **ABOUT THE SERIES**

This lecture series is made possible by the late Bill Booziotis and his wife, Jean. Former president of Booziotis and Company Architects, Bill Booziotis served as a member of the CVL Advisory Council. This series was established to allow members of the Dallas area community to hear firsthand from leading scientists working in the fields of cognitive neuroscience and aging.













### Kennedy Lab Receives AWARE Grant to Further Alzheimer's Disease Study



**Dr. Kristen Kennedy's Neuroimaging of Aging and** Cognition Lab is making great progress on their National Institutes of Health funded longitudinal study of brain and cognitive aging. They recently

finalized the third wave of data collection while continuing to publish seven new papers and present more than 20 presentations at conferences this past year. The lab also was awarded a grant from the AWARE foundation to support brain aging work on brain energetics.

"I am honored that the AWARE group has put their trust in me again to be a good steward of their hardearned funds. It is these types of funds that allow us to go after high-risk, high-yield projects such as this one, that will not only discover important information about the molecular function of the aging brain but also enable the pursuit of large-scale federally funded projects," said Dr. Kennedy.

The lab is also making great strides with another NIH funded study examining the role of environmental factors (such as neighborhood quality and complexity) and the development of Alzheimer's disease. Using machine learning methods, they published a paper demonstrating that environmental complexity accurately discriminates among groups of individuals who are either cognitively normal, have mild cognitive impairment, or have Alzheimer's disease. Further findings in this study demonstrated that cortical thickness in brain regions that support wayfinding and allocentric spatial navigation mediate this environmental relationship to Alzheimer's disease diagnoses.

Dr. Kennedy was invited to present at Grand Rounds this year at the University of Chicago, Washington University in St. Louis, and UT Southwestern medical schools. She also participated in a special symposium at the Cognitive Neuroscience Society meeting in San Francisco as well as serving on their diversity, equity, and inclusion panel. Dr. Kennedy heads the Cognitive Neuroscience Doctoral Program at UT Dallas and serves as Founding and Senior Editor for the new journal *Imaging Neuroscience*.

The lab is also celebrating its members, David Hoagey and Giuseppe Miranda, who successfully defended their PhD dissertations. David was awarded Best Dissertation Award from the School of Brain and Behavioral Sciences at UT Dallas.



#### IN THE NEWS

Dr. Kennedy was interviewed by Inside Higher Ed and The Nation to discuss the mass resignation from an influential brain imaging journal in protest of unfair publishing industry profit margins, and the establishment of a new notfor-profit brain imaging journal as an alternative means of scientific publishing. Tweets of this announcement hit 1.5 million views in 24 hours!

### Park Lab Finds Age-Related Shift to Bilaterality in Dallas Lifespan Brain Study



**Dr. Denise Park's Aging Mind Lab is** celebrating completing the third and last wave of the Dallas Lifespan Brain Study with some exciting findings!

"We have collected a massive amount of data over 12 years to see how the brain changes over this period of time at every age and we have exciting, new findings to share over the coming months and years," said Dr. Park.

The most recent findings show that the best performing middle-aged adults had activity primarily in the left hemisphere of their brain on a word judgement task, much like younger adults showed. In contrast, the highest performing older adults showed activation in both the left and right hemispheres. This demonstrated an age-related shift to bilaterality. Anot that 90 y grey chan brain of gr losse gray Fir work cons but o to its to ar finar Dr. F on h



Another major finding in the study was that participants at every age, from 20 to 90 years old, had declines in their brain's grey matter volume closely mapped onto changes in cognition. We know that as the brain ages it shrinks, largely due to loss of grey matter. These latest findings show losses in cognition tracked with losses in gray matter.

Finally, the lab has completed a lot of work around personality traits, finding that conscientiousness is high in young adults but dips down during middle age. It returns to its higher levels in older age, likely due to an increased vigilance over health and financial matters. In the coming months, Dr. Park plans to release other new findings on how amyloid (the protein associated with Alzheimer's disease) affects the brain.

### Spring Lecture

The CVL partnered with the Texas Instruments Alumni Association to bring Dr. Walter Boot to Dallas in the spring of 2023. Dr. Boot is a Professor of Psychology at Florida State University. He is one of five principal investigators of the multi-disciplinary Center for Research and Education on Aging and Technology Enhancement (CREATE). Dr. Boot is also Co-Director of the ENHANCE (Enhancing Neurocognitive Health, Abilities, Networks, & Community Engagement) Center, funded by the National Institute on Disability, Independent Living, and Rehabilitation Research, with a focus on how technology can support older adults living with cognitive impairment. His presentation on The Role of Emerging Technologies in Supporting the Health, Well-Being, Independence, and Quality of Life of Older People was held on April 19, 2023, at the Davidson-Gundy Alumni Center on The University of Texas at Dallas' campus.

















### Science Luncheon Series

The Science Luncheon Series is a brown bag science talk that provides an opportunity for scientists to share their work with colleagues and students and is offered in-person and streamed online to attendees, which exponentially increases the amount of people who can join the presentations. This year, eight speakers from seven different institutions including Harvard University, Columbia University, and Washington University joined the series.







### **Rodrigue Lab Receives International Invitations** to Present Ongoing Memory Disorder Research



Dr. Karen Rodrigue's Cognitive Neuroscience of Aging Lab published five peer-reviewed articles in the last year and gave ten

presentations at local and international conferences. Members of the lab traveled to Glasgow, Scotland last year to present their current research, including findings on beta-amyloid's effects on brain function. They also traveled to San Francisco to present lab research findings at the Cognitive Neuroscience Society annual meeting.

Dr. Rodrigue was invited to present at the Grand Rounds at the Rotman Institute at the University of Toronto.

The lab continues to make great progress on their NIH-funded project examining the effects of iron and beta-amyloid on brain structure, function, and cognition in MCI and cognitively normally aging individuals, with data collection underway for amyloid-PET and MRI scanning and neuropsychological assessment.

Lab member, Marci Skotnicki, successfully defended her dissertation and received her PhD from the School of Behavioral and Brain Sciences' Psychology program at The University of Texas at Dallas. Other students made progress in applying for federal grant funding with one NSF grant awarded, and two submitted receiving high scores.

Dr. Rodrigue serves as the Program Head of the Psychology Doctoral program at UT Dallas, as well as serving on the MRI safety committees at both UT Dallas and the UT Southwestern Medical Center. Dr. Rodrigue also began a four-year term serving on an NIH study section panel, reviewed student grant proposals for both the National Science Foundation and the National Institutes of Health, and continues in her role as Associate Editor for the journal Psychological Sciences. CVL

## Rugg Lab Demonstrates Different Mechanisms Responsible for Regulating Cerebral Cortex Thickness



Dr. Michael Rugg's Functional Neuroimaging of Memory Lab had a productive twelve months, publishing five peer-reviewed papers, two chapters in edited

books, and presenting posters at three international conferences. Additionally, the laboratory received new funding from the National Institute on Aging and BvB Dallas, a young professional's organization, to support its research on the effects of age on neural selectivity and the anterior shift.

Two published papers are particularly noteworthy. In one, measures of cognitive ability and brain structure – gray matter volume and thickness of the cerebral cortex – were obtained in nearly 400 healthy adults ranging in age from 18 to 76 years old. Cortical thickness demonstrated a positive relationship with cognitive ability in people aged 65 and above. Greater thickness was associated with lower ability between ages 18 – 25 years old. These findings clearly demonstrate that different mechanisms are responsible for regulating the thickness of the cerebral cortex in early and later life.

In the second paper, functional magnetic resonance imaging (fMRI) was used to examine the effects of age on brain activity associated with the encoding and subsequent retrieval from memory of word and face images. Young and older adults were scanned while they viewed word-image pairs. They then viewed a



series of words and were asked to indicate if they remembered seeing each word previously. If they had, they judged whether it had been paired with a face or a scene. Accurate face and scene memories were associated with an anterior shift in brain regions specialized for the processing of these different image categories. For both categories, the shift was larger in older than in young adults. This finding adds to prior behavioral evidence that memories retrieved by older participants are more gist-like and contain less detail. Additionally, and regardless of age, people with the smallest anterior shifts had the highest ability to remember whether the test words had been paired with faces or scenes.

These findings provide the foundation for a new federally funded research project that will examine whether the anterior shift and other measures of neural selectivity predict changes in memory performance over a three-year period. The project will also examine whether age differences in the anterior shift extend to auditory items such as snippets of speech and music. Additionally, the laboratory will be continuing collaborative studies investigating the relationship between age, brain activity and function, and memory performance in schizophrenia (with Dr. Elena Ivleva from UT Southwestern Medical Center), and relationships between brain activity and memory performance in people with temporal lobe epilepsy (with Dr. Arne Ekstrom from the University of Arizona, and Dr. Brad Lega from UT Southwestern Medical Center).



### **Dallas Aging and Cognition Conference**

The 7th biennial Dallas Aging and Cognition Conference drew cognitive neuroscientists from across the world to Dallas in February 2023. More than 200 people attended the three-day conference at the HALL Arts Hotel where researchers shared the latest scientific findings on aging and cognition through a series of talks and approximately 90 scientific poster presentations.

Scientists from universities in Germany, Norway, Ireland, Canada, and across the United States attended the DACC. More than 48 institutions were represented.

This year's keynote address was given by Dr. Kristine Beate Walhovd from the University of Oslo in Norway. She presented Set to Change? Lifespan Factors Influencing Brain and Cognition.















Travel awards were given to 47 graduate students and postdoctoral students to support their registration and travel to the DACC. Funds for the awards are generously provided by the Sallie P. Asche Travel Assistance Fund and the Pomberg and Hammer Family Opportunity Fund. "I'm thankful for the Sallie P. Asche travel award, and the

Research and Innovation.

"We are incredibly grateful to everyone who made the trip to Dallas to join us for this year's conference. After postponing the event for three years, it was wonderful to see mentors, friends, and colleagues together again, and it serves as a reminder of the critical role the DACC plays in the field of lifespan cognitive neuroscience. We look forward to seeing everyone again in 2025," said Dr. Michael Rugg.







opportunity to present my work on sparse PLS-CA. Texas BBQ at the park is something you won't get anywhere else!" Ju-Chi Yu, Centre for Addiction and Mental Health, Canada.

The DACC is hosted by the Center for Vital Longevity and supported by The University of Texas at Dallas' Office of the Provost, School of Behavioral and Brain Sciences, and Office of



### The Aging Well Lab Makes Strides Understanding Trust and Increasing Racial Representation



**Dr. Kendra Seaman's Aging Well Lab** received a \$6,000 UT Dallas Brain and Behavioral Science's pilot grant for a project focused on how people

learn from social feedback. The first part of this study requires the lab to create a facial image database of participants expressing certain emotions. These participants will be from minority ethnic and racial groups, which are often overlooked in the research community. The images will be made available as a resource for psychological and neuroscience research globally.

"My hope is that by providing this resource to the larger scientific community, we will increase representation of racial minorities in psychological and human neuroscientific research," said Dr. Seaman.

In June 2022, Dr. Seaman received a \$1.8 million NIH grant to fund a national scientific network that helps support multidisciplinary Scientific Research on Decision Neuroscience and Aging (SRNDNA). As of summer 2023, the network has awarded more than \$79,000 in grants and award funding to support pilot research, collaboration, and diversity encouragement. As a co-director of SRNDNA, Dr. Seaman oversaw the production of the SRNDNA '23 Conference held in April 2023.

"SRNDNA is an international group of scholars working at the cutting edge of an emerging field prioritized by the NIH for development: decision neuroscience and aging. Housing the network here at UTD exposes these researchers to UT Dallas and the amazing work we have going on in the Center for Vital Longevity," said Dr. Seman.

Additionally, Dr. Seaman published a paper in Neurobiology of Aging that was featured by UT Dallas' News Center. The study tested how younger adults and older adults learn to trust over time. It was found that older adults learn to trust differently than younger adults. Collectively, older adults did worse learning to trust than their younger counterparts. However, when compared within the group, older adults fell into two categories: those who learned and those who did not. The older adults who learned seemed to use social cues differently than older adults who did not learn.

The Aging Well Lab's post-doctoral researcher, Dr. Colleen Frank, published her first paper for the lab, covering aging and decision making in Cognitive, Affective, & Behavioral Neuroscience.

"Almost nothing in life has 100% certainty. We felt it was important to consider how older adults take uncertainty into account when they make decisions," said Dr. Frank. "Writing the review was a great way for me to delve into the decision making and aging literature by including evidence from several perspectives."

And the lab continues to grow, reaching 24 members in spring 2023!

### Wig Neuroimaging Lab Awarded Grant to Study Susceptibility to Neurological Diseases



Dr. Gagan Wig's Neuroimaging Lab received a pilot grant from the National Institutes of Health's Animal models for social dimensions of health

and aging research network to develop and study social factors in animal models that are believed to affect aging human's susceptibility to neurological diseases. This study will focus on developing a mouse model of the progression of neurological disorganization in the aging brain so that Dr. Wig and his team can later isolate specific variables that can modulate such conditions.

"With mice, we can look at exposures and outcomes in a way that you cannot in humans," he said. "You can closely examine and in some cases even alter exposures early on — socialization, diet, sleep, exercise, and stress. We can examine the impact of certain exposures at various times during their twoto three-year lifespan. By doing so, we hope we can begin to understand trajectories in a way that you can't with humans, to see what matters most and when it matters," said Dr. Wig.

The lab is also continuing to work on understanding the health and lifestyle contributions to disparities in brain health as part of ongoing research from a \$2.9 million grant from the National Institute of Health. This study is working to identify mediators between an individual's socioeconomic status and their brain network organization. The



team is examining brain network organization as a biomarker of cognition resilience or vulnerability under changing life conditions, as well as determining whether the genetic risk of Alzheimer's disease moderates these relationships.

In 2023, Dr. Wig was invited to speak at the Organization for Human Brain Mapping Annual Conference (Lifespan Network Neuroscience Pre-symposium; Montreal, QC), Simon Fraser University (Brain Resilience Workshop; Vancouver, BC), The University of Iowa (Neuroscience Graduate Program Seminar Series), Indiana University (Clinical and Translational Sciences Institute Retreat), The University of Pennsylvania (Institute on Aging's Visiting Scholars Series), Washington University School of Medicine (Festschrift for Dr. Steven E. Petersen), The Dallas Aging and Cognition Conference, The University of Washington's School of Medicine (Alzheimer's Disease Research Center Seminar), The Ohio State University Wexner Medical Center (Department of Neurology Grand Rounds), and the Academy of Behavioral Medicine Research's Annual Meeting.

Last, but not least, two members of laboratory successfully graduated with PhD degrees this year: Dr. Phillip Agres and Dr. Liang Han.

Dr. Agres is continuing his research training as a post-doctoral associate at the University of Chicago in the Department of Neurology, and Dr. Han is now working as a Data Scientist at JP Morgan Chase & Co. CVL

### **DIRECTOR'S RESEARCH CIRCLE**

When the late Bill Booziotis envisioned the Director's Research Circle, he pictured a community coming together to advance what we know about healthy aging, memory, and age-related dementia. Since its founding, the DRC has provided resources to support research at the CVL and bring researchers from around the world to Dallas to present and discuss their work.

As a DRC member, you gain access to interactive talks, hands-on demonstrations, and opportunities to interact with internationally recognized scientists while fueling vital research that will lead to cogni-



The late Bill Booziotis

tive health for life. We would love for you to join this circle and support our mission! Please contact the Director of Development, Michael Gute, for membership information.

### DIRECTOR OF DEVELOPMENT



#### **Michael Gute Director of Development** School of Behavioral and Brain Sciences 972-883-3915 michael.gute@utdallas.edu

### THE LEGACY SOCIETY

The Legacy Society are individuals who make a planned gift commitment to CVL.

Jean and Bill Booziotis

Madeline Christensen

Katherine L. Freiberger

David Pomberg and Jerri Hammer MS'97

E. Michelle Miller MS'05

Denise C. Park

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### **DONOR RECOGNITION**

This list recognizes donors who contribute at the Director's Research Circle level of \$1,000 or more.

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### **DONOR FEATURE**

#### Larry Warder has always held

education close to his heart. He worked full-time while earning his bachelor's and master's degrees. After a long, successful career in consulting, President George W. Bush nominated Larry to serve as the Department of Education's Chief Financial Officer. Larry is now retired and lives in Dallas with his wife Emily. They both continue to keep education at the forefront of their lives. Larry is a long-time supporter and donor of the CVL and The University of Texas at Dallas. He has served on Larry Warder and his wife, Emily the CVL's Advisory Council since 2011 and served as the Chair for six years. He and his wife Emily are both active members of the Director's Research Circle and are committed donors to the CVL's mission of cognitive health for life.

"Larry and Emily have championed the center's mission since its inception. Their support and involvement are invaluable and provide vital support to our research. We are forever grateful to them for their dedication," Dr. Michael Rugg.

### **ADVISORY COUNCIL**

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### Save the Date

## 2023 Jean and Bill Booziotis Distinguished Lecture



### Featuring

**Dr. Ralph Adolphs** California Institute of Technology

Wednesday, November 1, 2023 | 7 p.m.

<u>Location</u> Communities Foundation of Texas 5500 Caruth Haven Lane, Dallas, TX 75225

This event is free and open to the public. Visit <u>cvl.utdallas.edu</u> for more info.

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