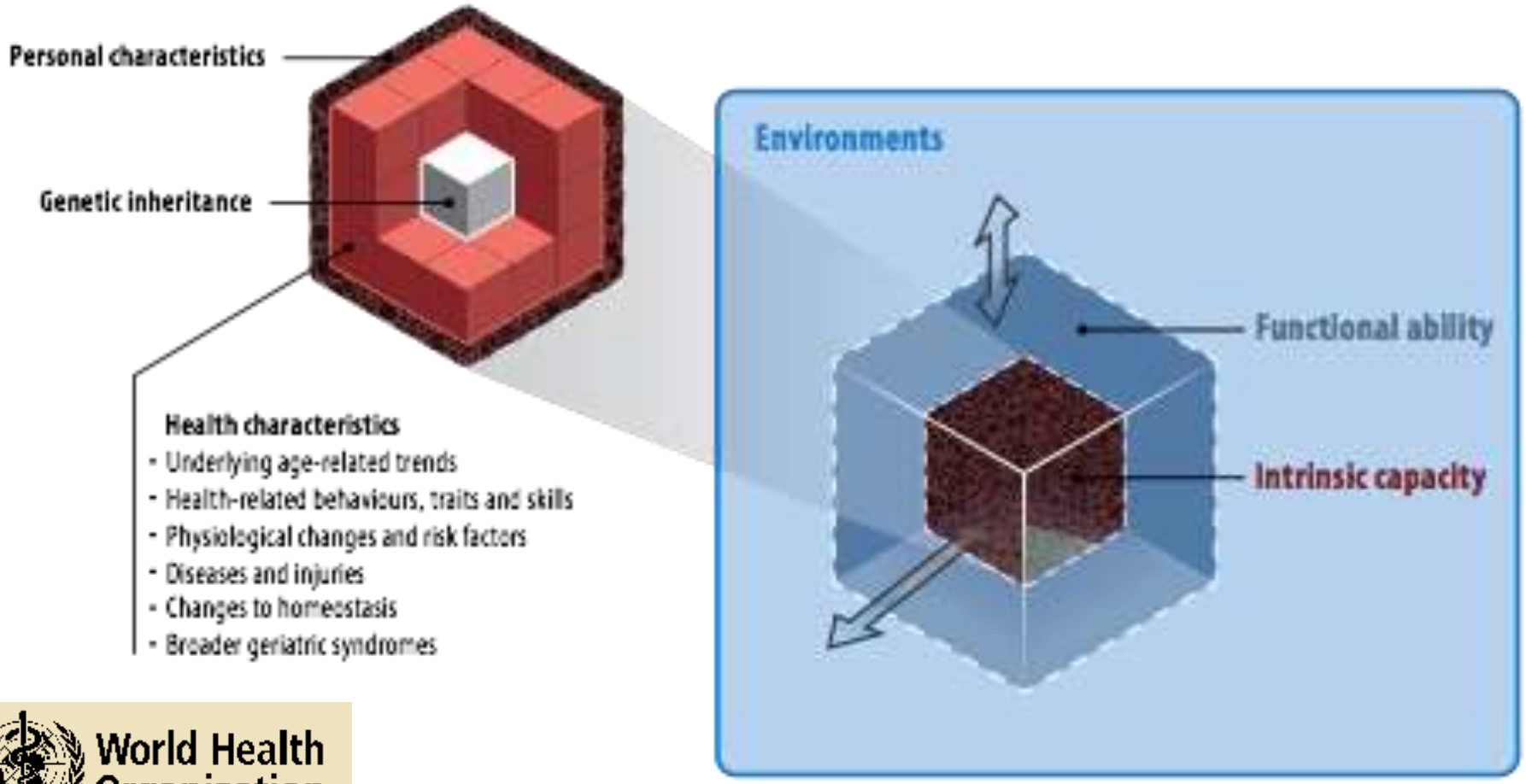
Celebrating Aging Research at Illinois:

Cognition, Lifespan Engagement, Aging, and Resilience (CLEAR)

February 19, 2016

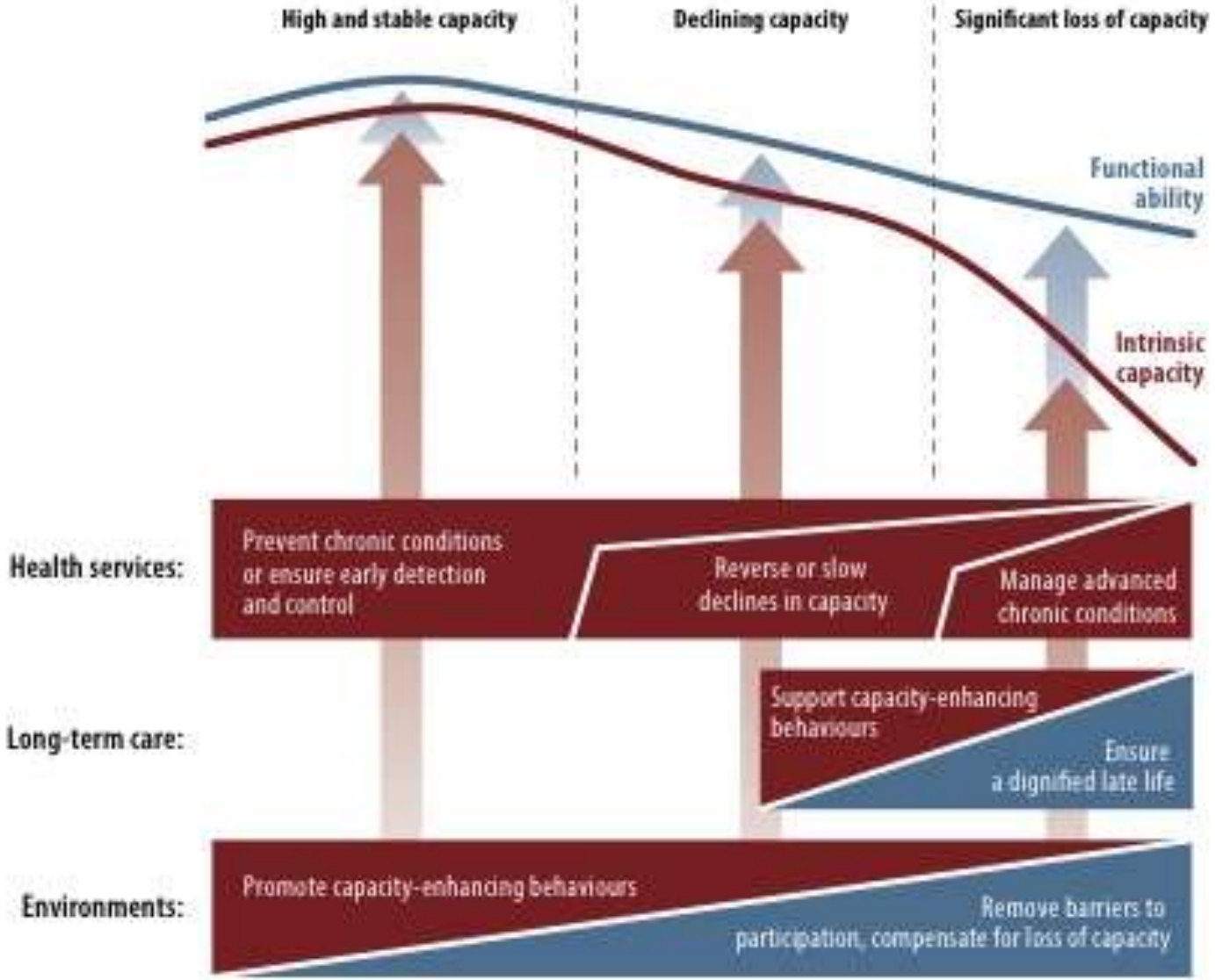
Fig. 2.1. ***Healthy Ageing***



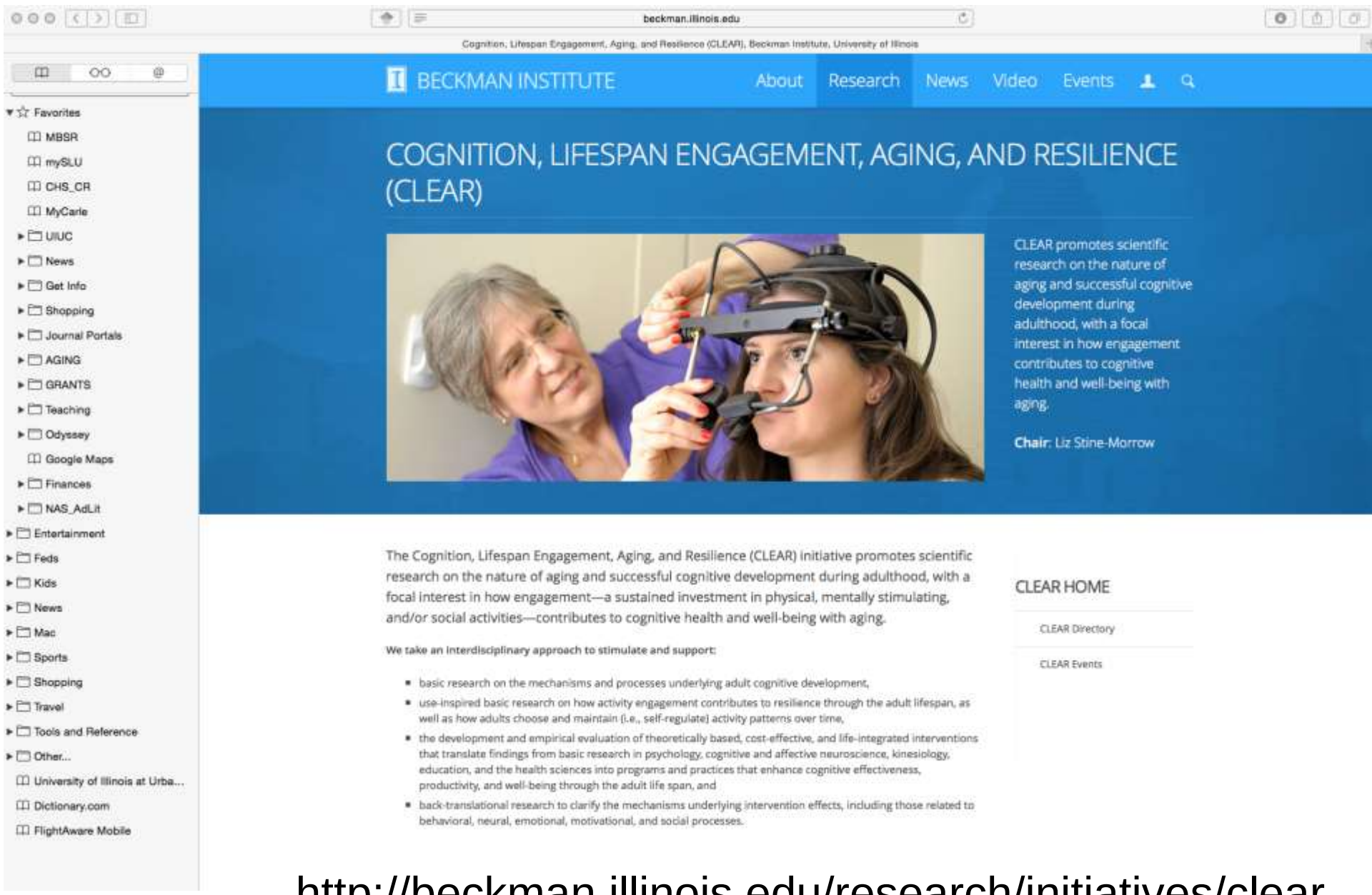
World Health Organization

World Report on Aging and Health (2015)

Fig. 2.4. **A public-health framework for *Healthy Ageing:* opportunities for public-health action across the life course**




NEUROPSYCHOLOGICAL
ELECTROMYOGRAPHY
RESEARCH
FUNCTION
INJURY
EMOTION
DECISION-MAKING
AGING_IN_PLACE
INVESTIGATIONS
SHARED
EFFORT
RESEARCHERS
STEREOTYPE_THREAT
JOINT
CONSEQUENCES
HEALTH
PRE-HYPERTENSION
POPULATIONS
BRANCHING
EYE-TRACKING
COLLABORATORS
PHENOTYPE
UNDERSTAND
MEASURES
ASSOCIATED
DIFFERENCES
KINESIOLOGY
ENGINEERING
SAMPLES
MILD
COMMUNICATION
EVERYDAY
DIGESTIVE
ALMOST
MAYO
TRAUMATIC
EXPERIENCE
PROCESSING
MEDIA
ENGAGEMENT
BRAIN
CARE
COGNITIVE
AGE-FRIENDLY
EXPERT
DESIGNS
MEASURE
BALANCE
SIMULATION
NEURAL
AFFECTIVE
INTERACTIONS
LABS
HEALTH
OLDER
LITERACY
ANIMAL
ACTIVITIES
CLARKE-LINDSEY
USING
TECHNOLOGY
INTRODUCE
LOOKING
NEEDS
JUMP
OUTREACH
SPECIAL
MOTIVATIONAL
OPTIONS
COMMUNITIES
HEALTHY
WORK
CARLE
PEORIA/UIUC
IMPAIRMENT
AGING
INTERESTS
FITNESS
AGE
USE
OSF
BIAS
ADULTS
POSSIBLY
SOCIAL
GAIT
AARP
UIUC
GROUP
POSITIVE
COMMUNITY
MCI
CLINICAL
INVESTIGATE
PROFESSIONALS
CHITTENDEN
CARE
KOGOD
INTERESTED
NONVERBAL
GENETICS
CENTER
MOBILITY
SYSTEMS
LONG-TERM
INTENSIVE
CLINIC
STUDY
SUPPORT
TESTING
READING
COGNITION
CLARITY
HYPERTENSION
EFFECTS
STRATEGIES
DEMENTIA
PRE-CLINICAL
GENERATIONAL
INCORPORATION
FACTORS
IMAGING
ROLE
VILLAGE
APPLIED
SCIENTIFIC
EXAMINE
SYMPOSIUM
ANYTHING
EXPAND
MEASUREMENTS
EXPANDING
DEVELOPMENT
DATABASE
LONGITUDINAL
DISORDERS
PHYSIOLOGY
INTERSECTION
INITIATING
SUCCESSFUL
SLEEP
NUTRITION
PSYCHOLOGY
MECHANISMS
LANGUAGE
KNOWLEDGE
EMOTIONAL
UNDERSTANDING
ELECTROPHYSIOLOGICAL
STRUCTURAL
SELF-REGULATION
CARDIOVASCULAR
FACULTY
ELDERLY
INTERVENTION
INTERVENTIONS



http://beckman.illinois.edu/research/initiatives/clear

clear@lists.illinois.edu

Jeff Woods

Director,

Center for Health Aging & Disability

Healthy Aging at Illinois

Healthyaging.illinois.edu

A collaboration between the

-Center for Health, Aging and Disability (College of AHS)

-Health Care Systems Engineering Center (College of Engineering)

for the benefit of all who do aging research on campus

Our goal is to bring campus faculty and students who do aging research together for the common good:

-new research interactions
-community connections
-connections with health care providers
-development of grant proposals
-seminar series

We have been provided campus-level support from the Provost's Office

Center on Health, Aging and Disability (CHAD)

URL: http:/chad.illinois.edu (217) 333-4965

- **Endowed Center within the College of Applied Health Sciences with 100+ members from around campus. All AHS faculty are automatically CHAD members.**

- **Mission**
  - Foster interdisciplinary research, education and outreach that promotes health and wellness, healthy aging across the lifespan, healthy communities and optimal participation of individuals with disabilities. **WE ARE THE RESEARCH SUPPORT ARM OF THE COLLEGE OF AHS FOR ALL AHS FACULTY.**

- **Who we are:**
  - Jeff Woods, Director, 244-8815 (woods1@Illinois.edu)
  - Sa Shen, Biostatistician, 300-9211 (sashen2@Illinois.edu)
  - Wendy Bartlo, Proposal Development & Community Outreach
  - Penny Nigh, Office Administrator, 333-4954 (nigh@Illinois.edu)
  - Undergrad interns
  - Work in conjunction with the Business Office for competitive grant proposal submission

- Main office located in room 1008 Khan Annex, Huff Hall

New Web page coming early 2016!

Health Care Engineering Systems Center (HCESC)

URL: http://healtheng.illinois.edu

- **Endowment through Jump ARCHES and OSF Hospital**

- **Mission**
  - The Health Care Engineering Systems Center (HCESC) provides clinical immersion to engineers and fosters collaborations between engineers and physicians. The aim is to develop new technologies and cyber-physical systems, enhance medical training and practice, and in collaboration with key partners, drive the training of medical practitioners of the future.

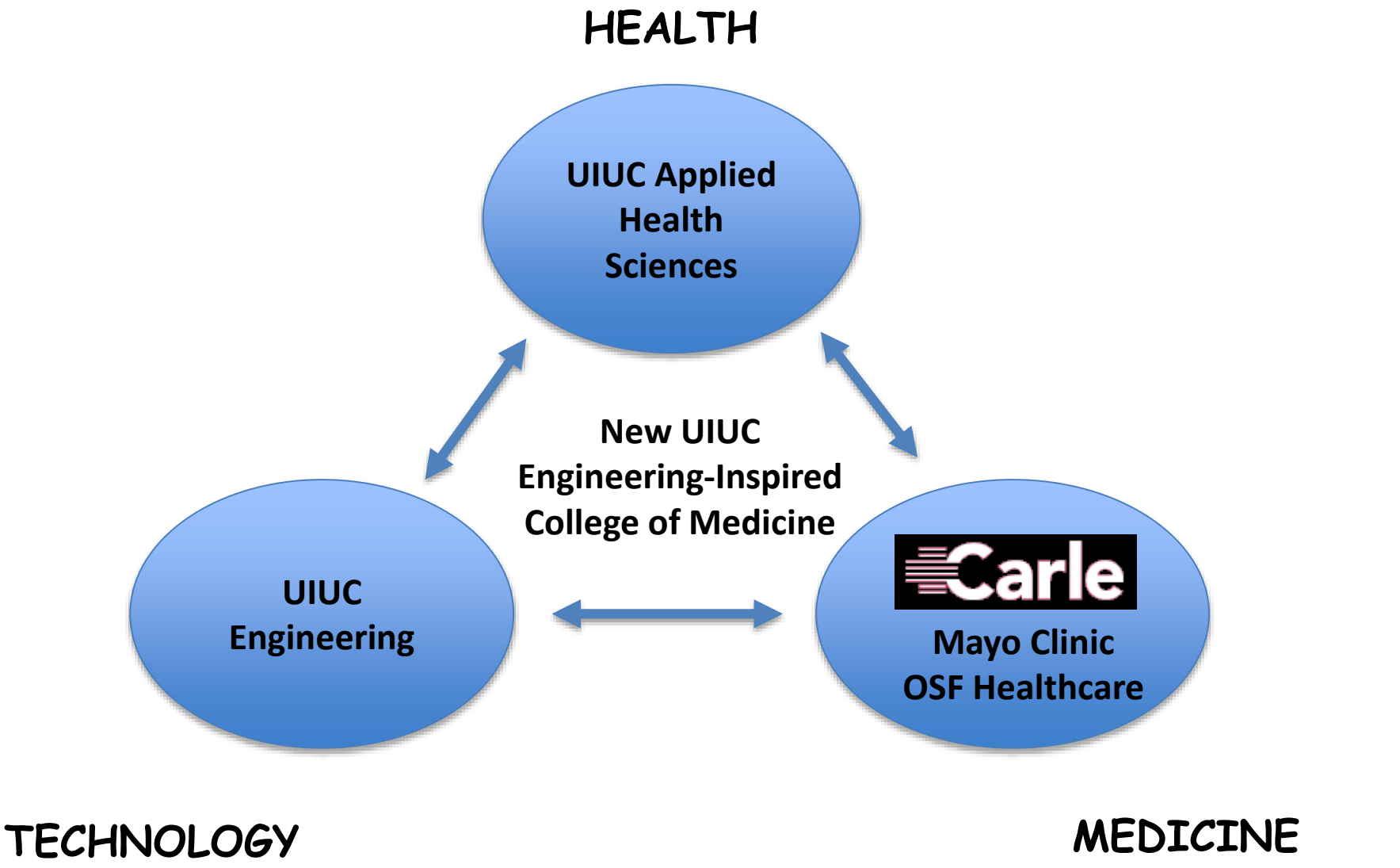
- **Who we are:**
  - Kesh Kesavadas, Director, 244-9341 (kesh@Illinois.edu)
  - Tony Michalos, Assoc. Director, 300-9211 (michalos@Illinois.edu)
  - Michelle Osborne, Office Administrator, (mosb@Illinois.edu)
  - Two Research Scientists
  - Work in conjunction with the Business Office at CSL for competitive grant proposal submission

  - Main office located in room 1206 W. Clark Ave, Urbana, IL

HCESC

Jump Sim

The timing is right for interactions between CoEng and AHS!



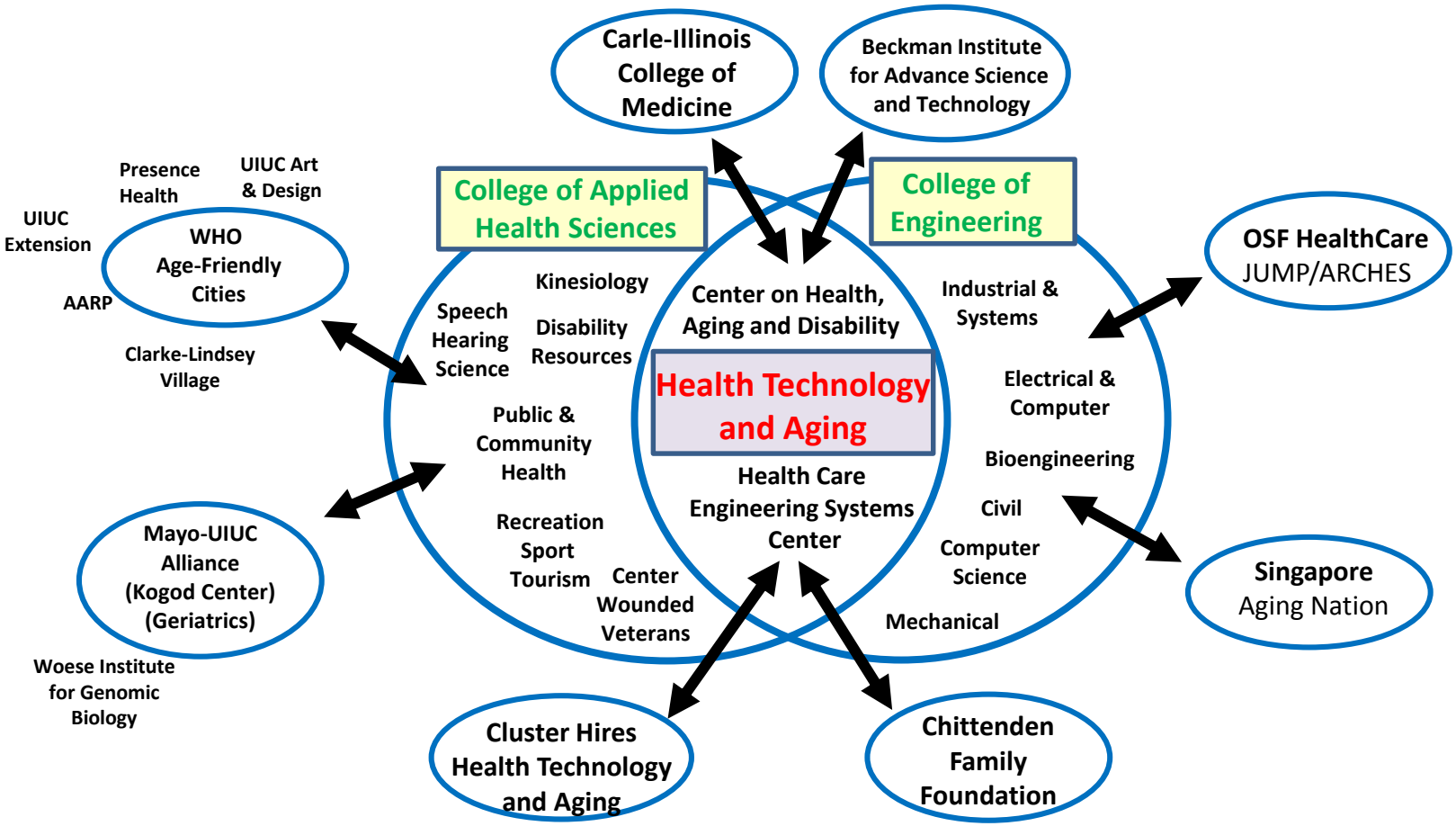
POSITION ANNOUNCEMENT
PROFESSOR in HEALTH TECHNOLOGY AND AGING
University of Illinois at Urbana-Champaign

Description: The University of Illinois at Urbana-Champaign (http://illinois.edu/) and the College of Applied Health Sciences (http://ahs.illinois.edu) is searching for a senior scholar at the Full or senior Associate Professor level to fill a campus-level Strategic Excellence Hiring position focusing on Human Health and Wellness with an emphasis on *health, technology and aging*. We are seeking a preeminent scholar whose approach to studying healthy aging bridges technology (e.g. mobile health, sensors, smart devices, rehabilitation and assistive technologies) and the biological, behavioral and/or social sciences. We are especially interested in a visionary leader whose research agenda will contribute to our campus excellence in *healthy aging* and the role technology can play in prevention and treatment of deteriorating health and disability and independent living among older adults.

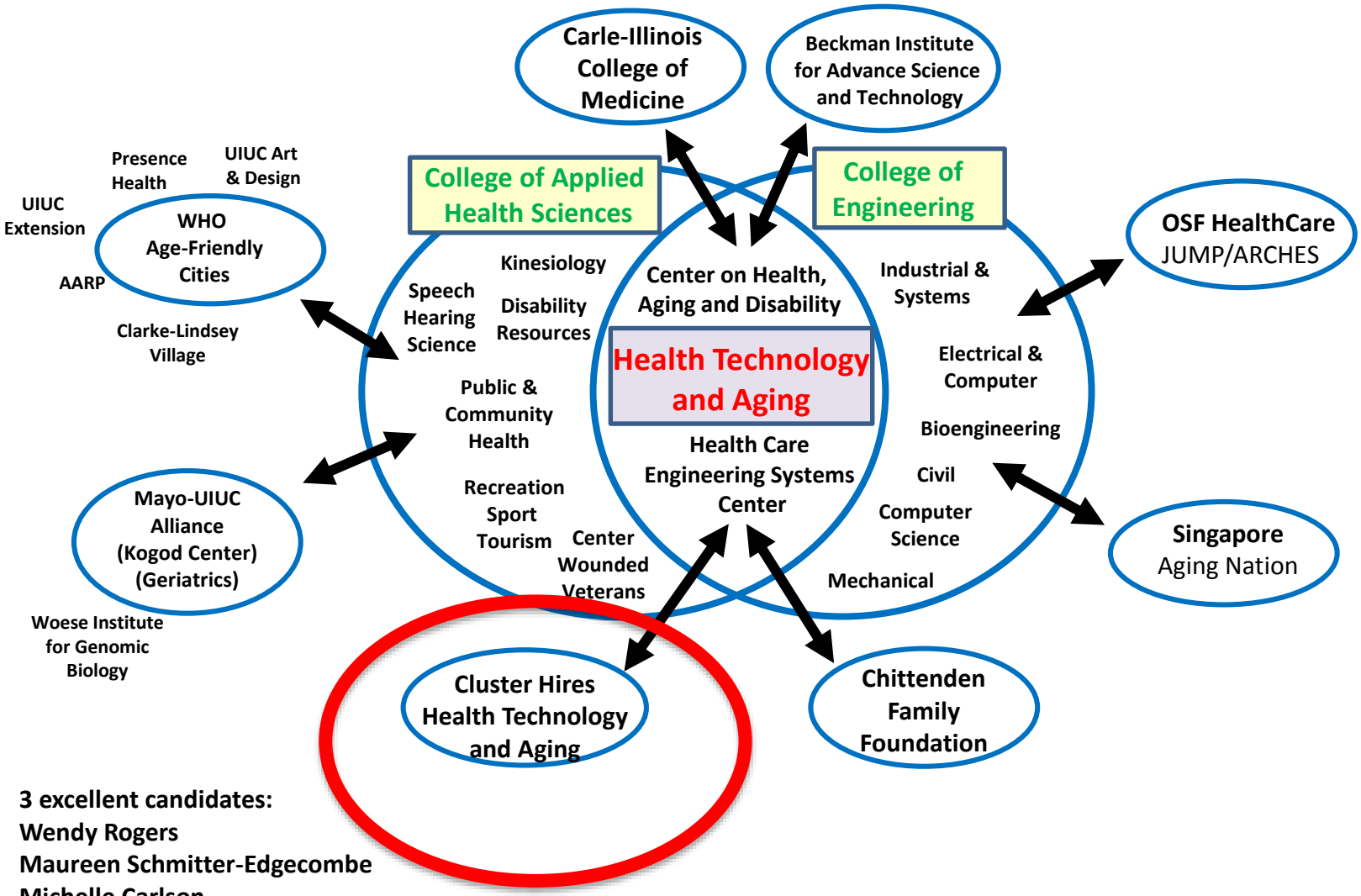
Qualifications: Successful candidates must have an earned doctorate in the health or medical sciences. A record of academic scholarship and teaching that meets qualifications for the rank of full professor at the University of Illinois at Urbana-Champaign is required. Candidates must possess a commitment to interdisciplinary research and collaborations with faculty from a variety of disciplines including engineering. Desired qualifications include: expertise in the integration of health technology and the biological, social and/or behavioral sciences; a recognized national and international scholarly reputation; visionary leadership and the ability to advance and lead interdisciplinary research and teaching initiatives; and a record of successful funding from public or private sources.

A similar position is being offered in Engineering

Pieces of the Puzzle: Health Technology and Aging at UIUC



Pieces of the Puzzle: Health Technology and Aging at UIUC



3 excellent candidates:
Wendy Rogers
Maureen Schmitter-Edgecombe
Michelle Carlson

The College of Applied Health Sciences
at the University of Illinois at Urbana-Champaign presents

Health Technology and Aging

Senior Excellence Position Lectures

MAUREEN SCHMITTER-EDGECOMBE, PhD

Professor, Department of Psychology
Washington State University

Maureen Schmitter-Edgecombe is a Meyer Distinguished Professor in the Department of Psychology at Washington State University and a licensed clinical psychologist. She has authored or co-authored more than 100 peer-reviewed publications investigating cognitive deficits, everyday functioning and rehabilitation issues with aging, neurodegenerative diseases and traumatic brain injury populations. She has mentored 24 graduate students in the field of clinical neuropsychology and worked extensively with aging and cognitively impaired populations.

The long-term objective of her multidisciplinary research is to extend the everyday functional independence of the aging population by developing smart environments and technologies that promote proactive health care and real-time intervention. Dr. Schmitter-Edgecombe and her colleagues are opening the door to new avenues of health and science research in gerontechnology by training a new breed of students in complementary disciplines (e.g., computer science, engineering, psychology and health care). Her research has been funded by over $10 million in grants from multiple NIH institutes, NSF, the Alzheimer's Association and by the Life Sciences Discovery Fund and Attorney General's Office of Washington State. She currently serves on the Editorial board for four neuropsychology journals and is chair of the Clinical Research Grants Committee for the National Academy of Neuropsychology.

Promoting Aging-in-Place Using Smart Environment Technologies for Health Assessment and Intervention

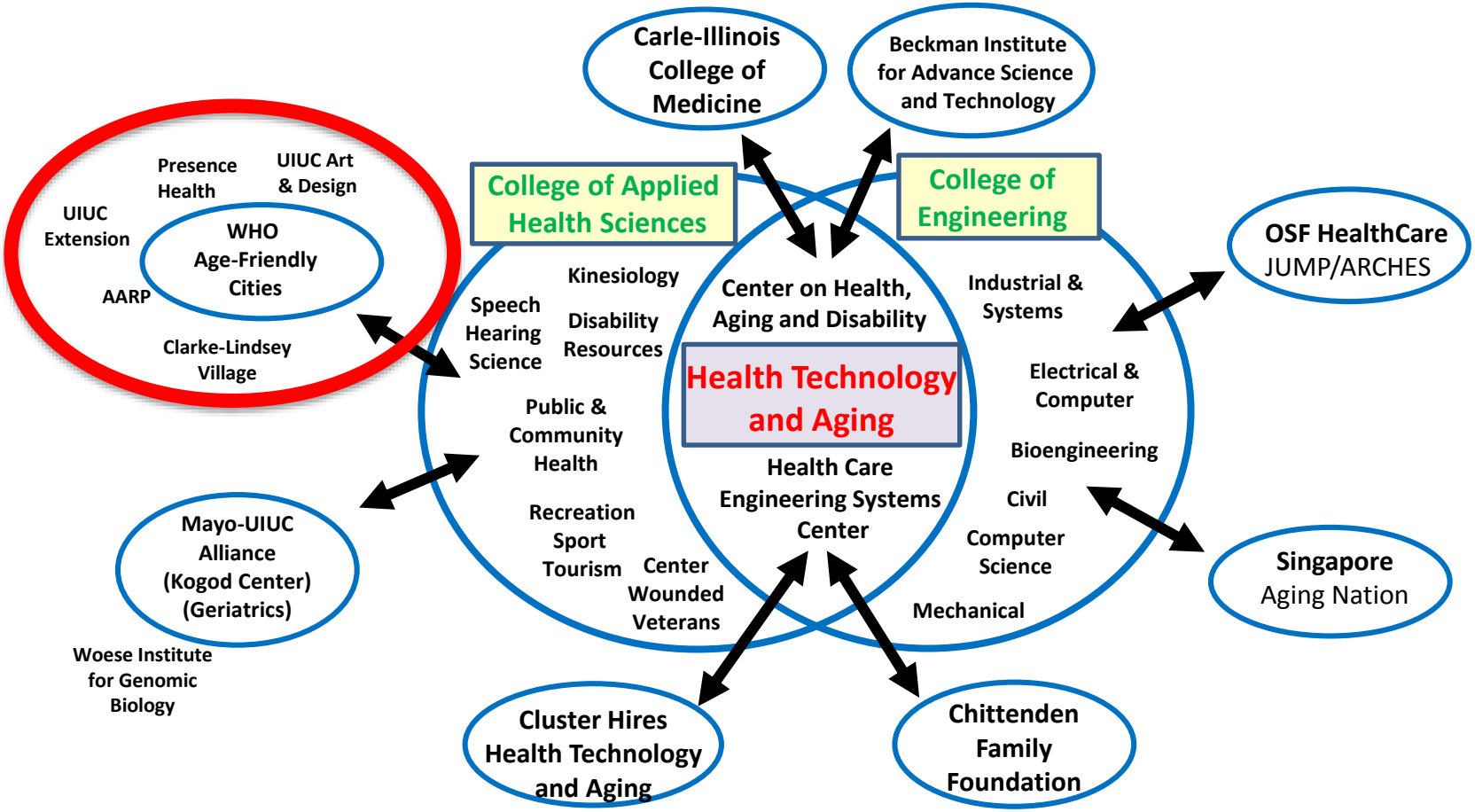
Thursday, February 25, 2016
9 a.m. – 10 a.m.
NCSA Auditorium (NCSA 1122)
1205 W. Clark St., Urbana

Health Technology and Aging: A Vision for Improving Quality of Life and Standard of Care

Friday, February 26, 2016
9 a.m. – 10 a.m.
AHS Auditorium (112 Huff Hall)
1206 S. Fourth St., Champaign

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Pieces of the Puzzle: Health Technology and Aging at UIUC



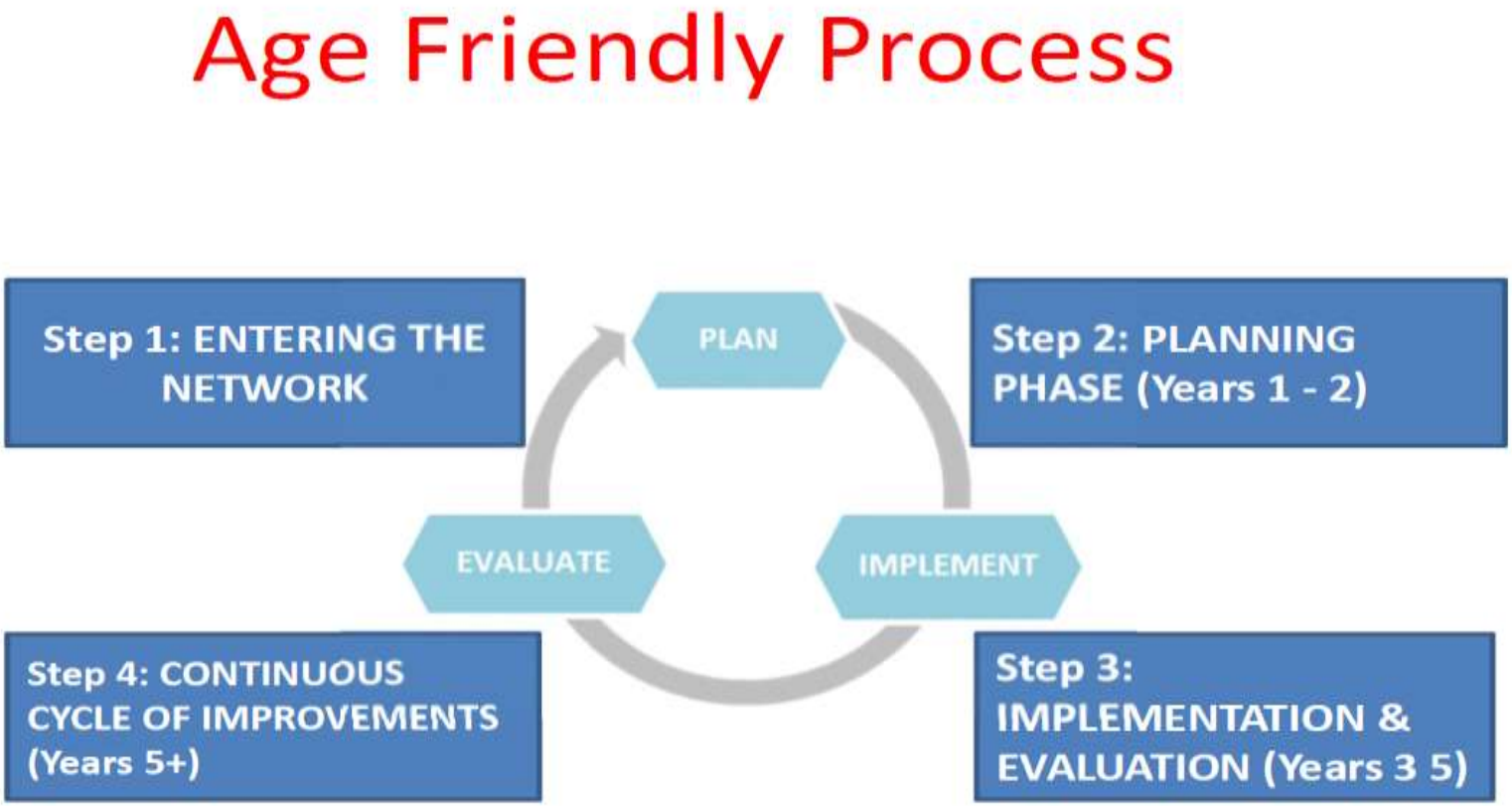
Community Outreach for an Age-Friendly Champaign-Urbana

What are our goals?

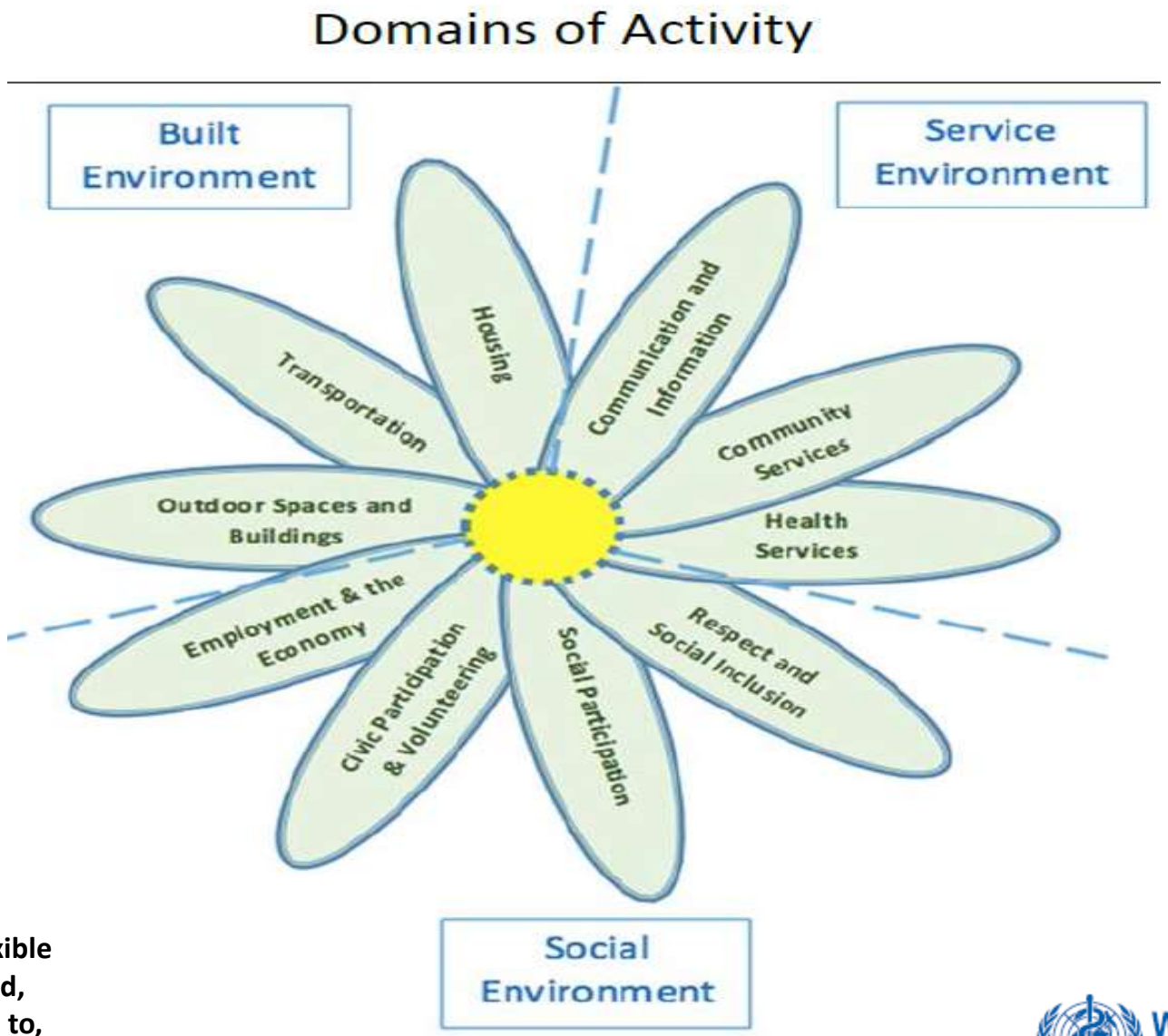
-to make Champaign-Urbana a more 'age-friendly', livable community
-to achieve status as an 'age-friendly' city in the eyes of the World Health Organization (WHO) and AARP

-obviously important to older adults (and all) who live in our community, but why is the University of Illinois and specifically the Center on Health, Aging and Disability interested in this and why should you be?…….

World Health Organization (WHO) – Age-Friendly Cities Program: Steps



World Health Organization (WHO) – Age-Friendly Cities Program: Topic Areas



These topics are flexible and can be combined, separated, or added to, dependent on the community

World Health Organization

Why is UIUC's, Center on Health, Aging and Disability Wanting to Lead Such an Effort?

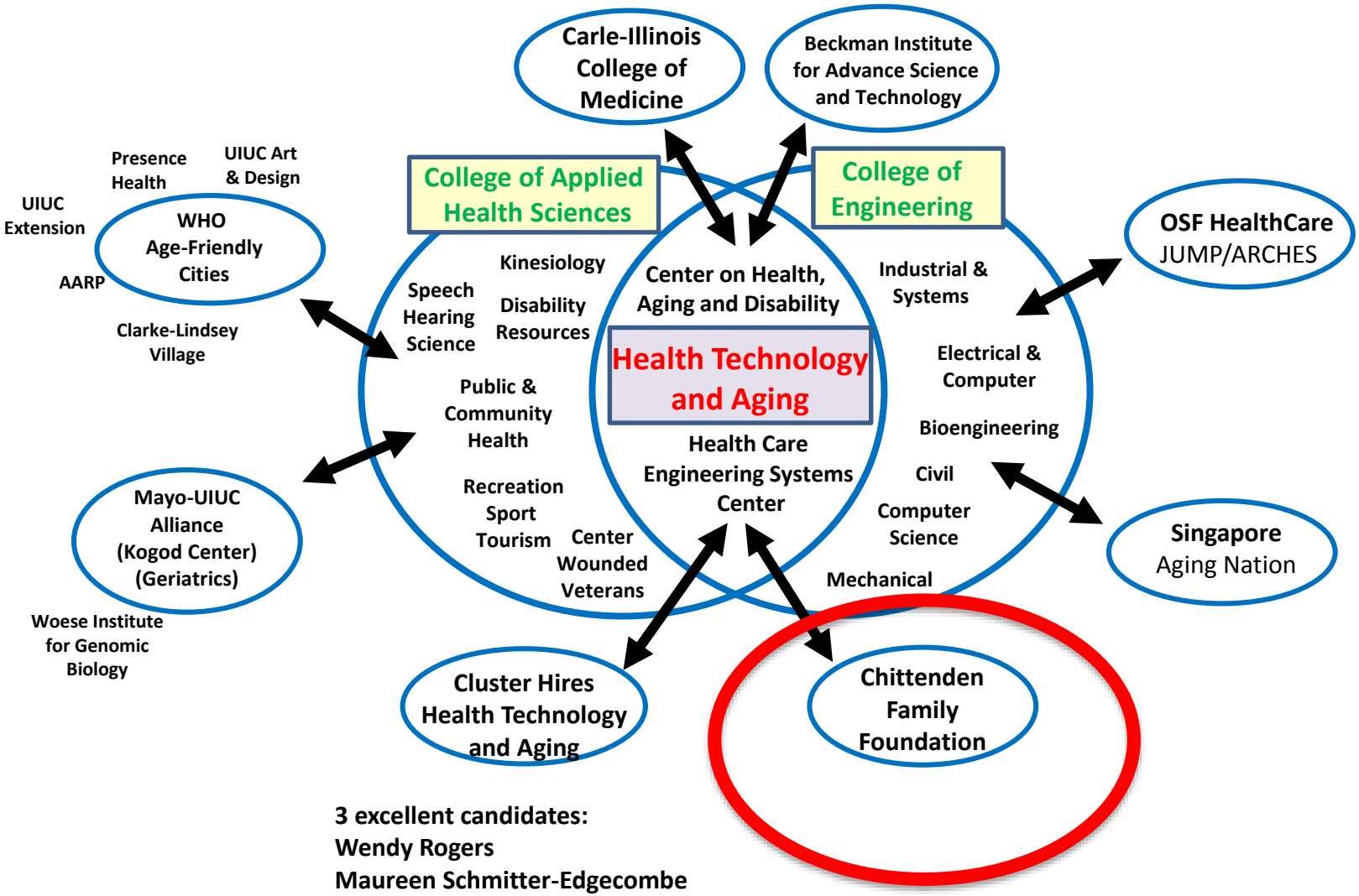
- -Land grant mission 'service is in our DNA'
- -Demonstrate to state government our local impact
- -Attract high quality faculty, keep them in the community after retirement
- -Learn from our older generation (ExperienceCorps volunteers)

I want to leverage this for the benefit of our faculty and students:

- -Potential to address research questions (technology, health and the new College of Medicine – a living laboratory?)
- -Opportunities for our students (undergrad and grad)
- -Potential to interact with stakeholders (e.g. Clarke-Lindsey, Presence, local governments, park districts, YMCA, OLLI, health support groups, Health Alliance, area agencies on aging, Faith-in-Action)
- -Potential to attract non-traditional funding support for research and services

CHAD has the capacity to coordinate and communicate to all stakeholders. We have experience accessing resources (e.g. grants). We have topical expertise in the domains. Every effort needs a 'leader'!

Pieces of the Puzzle: Health Technology and Aging at UIUC



3 excellent candidates:
Wendy Rogers
Maureen Schmitter-Edgecombe
Michelle Carlson

SAVE-THE-DATE

The Chittenden Symposium

Sponsored by
The Departments of Kinesiology and Community Health and
Industrial and Enterprise Systems Engineering

April 26, 2016
8:30 AM - 5:30 PM
iHotel and Conference Center

Registration: 8:30 AM

§

Research Program: 9:00 AM - 12 NOON

"Health, Technology & Aging"

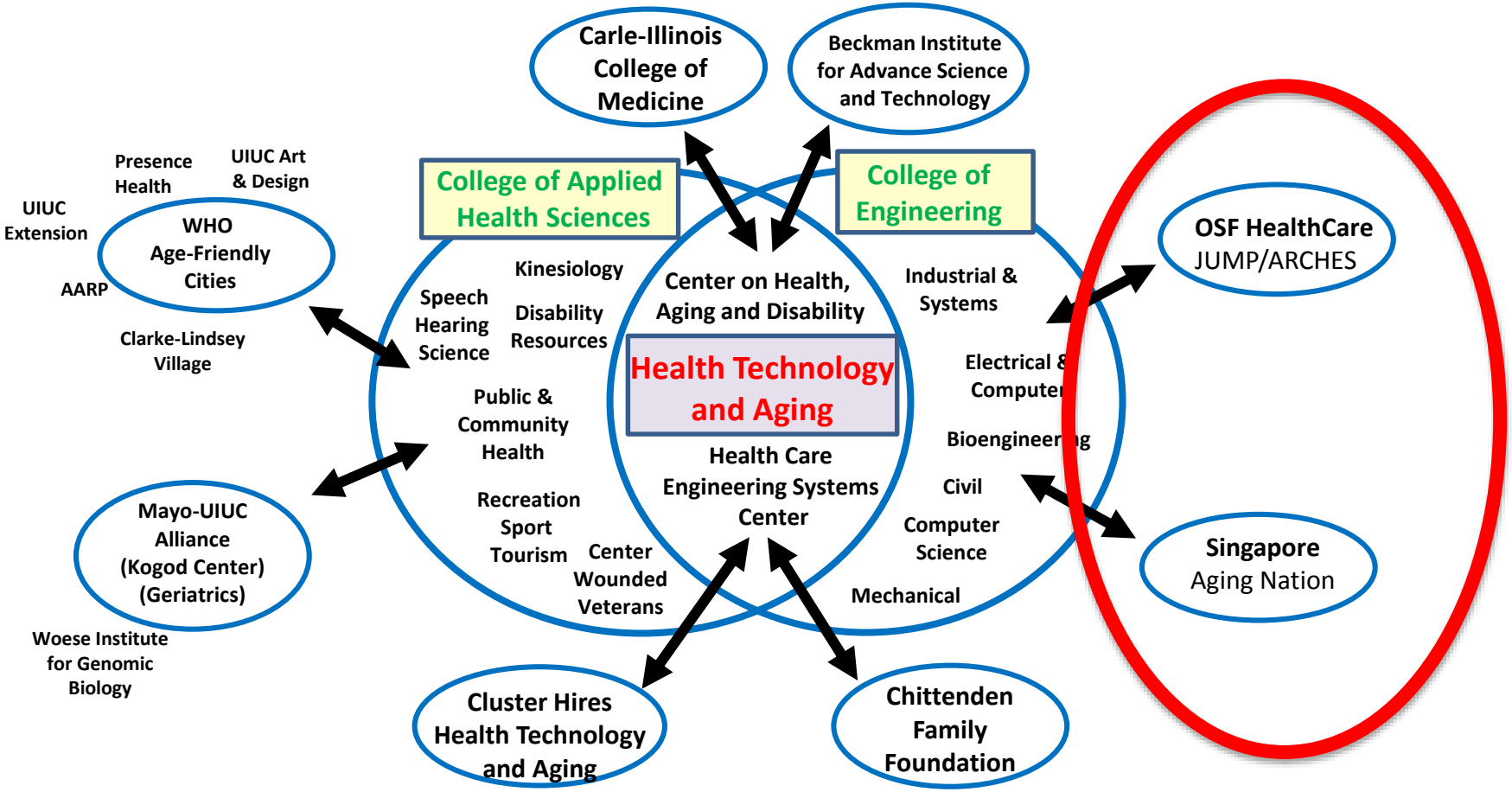
§

Community Outreach Program: 1:15 PM - 4:30 PM

"Age-Friendly Champaign-Urbana"

Reception/Poster Presentation Following

Pieces of the Puzzle: Health Technology and Aging at UIUC



3 excellent candidates:
Wendy Rogers
Maureen Schmitter-Edgecombe
Michelle Carlson

JUMP ARCHES

- 25 million dollar gift from Jump Trading
- 25 millions dollar endowment from OSF
- 12 million inkind support from COE at UIUC
- Collaboration between OSF Healthcare, UI CoM Peoria and UIUC Engineering
- JUMP Simulation Centers at Peoria and Urbana
- **A**pplied **R**esearch for **C**ommunity **H**ealth through **E**ngineering and **S**imulation
- Grant proposals of ~50K annually
- Following NIH R21 format
- Research team including OSF clinicians and UIUC engineers
- Goal to fund research in sensing devices, materials and mechanics, health information technologies, simulation, human factors/ergonomics and design

http://www.jumpsimulation.org/research/applied/arches/index.html

Singapore Interactions

- A modern city-state, ¼ the size of Champaign County (5 million residents)
- A vertical living arrangement, greenspaces
- One-party rule, top-down rule = rapid advancements, can do research faster
- Great respect for elderly
- No 'nursing homes'; children try to care for parents = a challenge
- Opportunity for 'aging in place' research
- High tech society
- Brand and ranking conscious society; only will deal with 'players'; like to do business with friends
- Engineering has a relationship with Singapore that could be leveraged
- Singapore National Research Foundation deciding on whether to provide a research thrust in 'healthy and active aging'
- Need to partner with national institution (NUH, SUTD, NUS)
- CHAD has sent the UIUC Singapore office a white paper focusing on mobility, communication and cognition (which fits our college focus)

Questions?/Discussion?

In our opinion, it makes sense to partner with CLEAR to promote age-related research on campus:

- **-pool resources**
- **-avoid confusion of multiple similar efforts**
- **-CLEAR focuses on cognition**
- **-Healthy Aging at Illinois has a broader focus**

Mayo-Illinois Alliance (for technology-based healthcare)

- Started in 2009; initial focus on computation and genomics
- Focus on individualize medicine – using genomic and other characteristics to personalize treatments
- Educational components: SURF's and grad fellowships
- Occasional funding opportunities – none at present
- Focus so far has been in cancer, microbiome, GI disease, data visualization,epigenomics/genomics, pharmacogenomics, and point of care diagnostics
- Opportunity to develop new relationships with geriatrics (# 1 adult Geriatrics unit in the country, Kogod Center on Aging) and perhaps other relevant clinical units like neurology, biostatistics etc.

OLLI at ILLINOIS

Christine Catanzarite, Director
catanzar@Illinois.edu

OLLI at ILLINOIS is

- A dynamic lifelong learning institute that offers non-credit courses, participatory study groups, lectures, educational travel, and other engagement opportunities
- Membership-based
- Open to participants over the age of 50
- A university unit located within the Office of the Provost

OLLI launched in 2007 with the support of the University of Illinois and the Bernard Osher Foundation

OLLI is also supported by membership and enrollment fees and gifts from individual donors.

M2 Building – Downtown Champaign

OLLI Member Snapshot

1,300+ members

Youngest: 50

Oldest: 104

Typical: 67-77 – 60% women, 40% men

Evenly split between campus and community affiliations

OLLI has experienced dramatic growth:

Year 1 (2007-2008)

- 297 members
- 11 courses per semester
  - Typical enrollment: 20-30
- 45 program offerings

Year 9 (2015-2016)

- 1,303 members (and counting)
- 42 courses per semester
  - Typical enrollment: 65-100
- 255 program offerings

OLLI is a laboratory for the potentials of remaining intellectually and physically active across the lifespan.

Citizen Scientist Program
Beckman – IGB - OLLI


OSHER
LIFELONG
LEARNING
INSTITUTE

Building Bridges

- Courses – 8 weeks, 4 weeks, team-taught
- Lecture
- Citizen Scientist Program
- OLLI members as research subjects
- OLLI as database for study of healthy aging
- Other partnerships and collaborations?

THE BLITZ!

Jeffrey (Jeff) A. Woods, PhD

Affiliations

- Department of Kinesiology and Community Health
- Director, Center on Health, Aging and Disability
- Associate Dean for Research, College of Applied Health Sciences
- Division of Nutritional Sciences
- Center for Nutrition, Learning and Memory
- Department of Pathology, College of Medicine

Substantive Interests in Aging Research

- If and how exercise and diet affect the aging immune system
- Effects and mechanisms behind anti-inflammatory effects of exercise
- Effects of exercise on the gut microbiome and gut-brain axis

Other Research Interests

- Diet and exercise synergy on age-related cognitive loss
- Molecular transducers of the effects of physical activity/exercise

Tools and Methods

- In vitro, ex vivo and in vivo immune function assays
- Flow cytometry
- Gene expression
- Protein expression
- 16S rRNA analysis of microbiome
- Clinical interventions in older adults
- Pre-clinical animal experiments (including in aged mice)

Integrated I&B Immunology and Behavior
University of Illinois Urbana-Champaign

T.K. Cureton Physical Fitness Research Lab

Jeffrey (Jeff) A. Woods, PhD

Campus Collaborators

- Ed McAuley (KCH)
- Art Kramer (Beckman)
- Bryan White (IGB)
- Hannah Holscher (FSHN)
- Rod Johnson (AnSci/DNS)
- Justin Rhodes (Beckman/Psych)
- Kelly Swanson (AnSci)
- George Fahey (AnSci)
- Marni Boppart (KCH/Beckman)
- Nick Burd (KCH)
- Mike DeLisio (KCH)
- Rex Gaskins (IGB)
- Greg Freund (AnSci/CoM)
- Drew Steelman (AnSci)

External Partners

- Abbott Nutrition
- Mayo Clinic (Vandana Nehra, John Fryer)
- UIC (Brown, Haus, Phillips, Arena)

Jeffrey (Jeff) A. Woods, PhD

- **New Collaborations You Would Like to Develop to Support Research Interests in Aging**
  - **AARP**
  - **Mayo Clinic Kogod Center on Aging (Nathan LaBrasseur)**
  - **Clarke-Lindsey Village (Deb Reardanz)**
  - **Communities of Champaign and Urbana (my Center initiating an 'age-friendly' community outreach effort; Chittenden Symposium April 26, 2016 "Health Technology and Aging"/"Age-Friendly Champaign-Urbana")**
  - **Anything health, technology and aging**
  - **Carle Clinic Digestive Health Group (emerging)**

Burning Questions

1. Does exercise affect the gut microbiota and its metabolites?
2. Are exercise-induced effects on the brain and behavior mediated through the gut-brain axis?
3. Does exercise affect barrier function (gut, brain)?
4. What are the molecular transducers of the beneficial effects of exercise?
5. Can dietary supplements synergize with exercise in improving cognition in the aged?
6. How does regular exercise act as an anti-inflammatory?

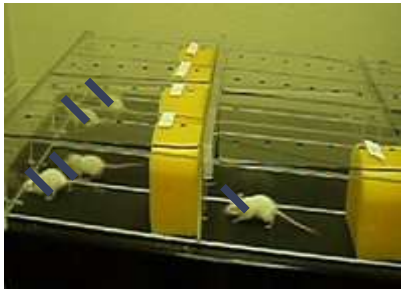
Inappropriate Inflammation: A common thread to pathology

Excessive or Chronic
Local and/or Systemic
Inflammation

Obesity
Infection
Aging
Cancer and Treatment
Gut Damage
Brain Injury

Metabolic Dysregulation
Morbidity and Mortality
Impaired Wound Healing
Tumor Growth
Altered Behavior (fatigue)
Learning and Memory
Poor Immune Responses
Poor Nutritional Status
Inflammatory Bowel Disease

Can Regular Exercise Alter Inappropriate Inflammation and Improve Its Consequences?



J.A.Woods, Integrative Immunology & Behavior

Titles of Some of Our Published Work

Cardiovascular Exercise Training Extends Influenza Vaccine Seroprotection in Sedentary Older Adults: The Immune Function Intervention Trial

Exercise training increases size of hippocampus and improves memory

Exercise delays allogeneic tumor growth and reduces intratumoral inflammation and vascularization

Sex differences in the relationship between obesity, C-reactive protein, physical activity, depression, sleep quality and fatigue in older adults

Exercise training increases the naïve to memory T cell ratio in old mice

Forced treadmill exercise training exacerbates inflammation and causes mortality while voluntary wheel training is protective in a mouse model of colitis

Exercise Speeds Cutaneous Wound Healing in High-Fat Diet-Induced Obese Mice

Exercise accelerates cutaneous wound healing and decreases wound inflammation in aged mice

Reduction in trunk fat predicts cardiovascular exercise training-related reductions in C-reactive protein

Effects of exercise and low-fat diet on adipose tissue inflammation and metabolic complications in obese mice

Moderate Exercise Early After Influenza Virus Infection Reduces the Th1 Inflammatory Response in Lungs of Mice

Voluntary Wheel Running Does Not Affect Lipopolysaccharide-Induced Depressive-Like Behavior in Young Adult and Aged Mice

Effects of voluntary wheel running on LPS-induced sickness behavior in aged mice

Exercise, Inflammation, and Innate Immunity

Recent Published Papers on Exercise and the Gut

Brain, Behavior, and Immunity 33 (2013) 46–56

Contents lists available at SciVerse ScienceDirect

Brain, Behavior, and Immunity

journal homepage: www.elsevier.com/locate/ybrbi

Forced treadmill exercise training exacerbates inflammation and causes mortality while voluntary wheel training is protective in a mouse model of colitis

Marc D. Cook[a,b], Stephen A. Martin[a,b], Collette Williams[a], Keith Whitlock[a], Matthew A. Wallig[c], Brandt D. Pence[a,b], Jeffrey A. Woods[a,b,*]

[a] Departments of Kinesiology and Community Health, University of Illinois, Urbana-Champaign, IL, United States
[b] Integrative Immunology and Behavior Group, University of Illinois, Urbana-Champaign, IL, United States
[c] Veterinary Pathobiology, University of Illinois, Urbana-Champaign, IL, United States

J Appl Physiol 118: 1059–1066, 2015.
First published February 12, 2015; doi:10.1152/japplphysiol.01077.2014.

Voluntary and forced exercise differentially alters the gut microbiome in C57BL/6J mice

Jacob M. Allen,[1,2] Margret E. Berg Miller,[4,5] Brandt D. Pence,[1,2] Keith Whitlock,[1] Vandana Nehra,[3] H. Rex Gaskins,[4,5,6] Bryan A. White,[4,5] John D. Fryer,[7] and Jeffrey A. Woods[1,2,6]

[1]*Department of Kinesiology and Community Health, Mayo Clinic, Rochester, Minnesota;* [2]*Integrative Immunology and Behavior Program, Mayo Clinic, Rochester, Minnesota;* [3]*Department of Gastroenterology, Mayo Clinic, Rochester, Minnesota;* [4]*Department of Animal Sciences, University of Illinois at Urbana-Champaign, Urbana, Illinois;* [5]*Institute for Genomic Biology, University of Illinois at Urbana-Champaign, Urbana, Illinois;* [6]*Division of Nutritional Sciences, University of Illinois at Urbana-Champaign, Urbana, Illinois;* [7]*Department of Neuroscience, Mayo Clinic, Jacksonville, Florida*

Submitted 5 December 2014; accepted in final form 8 February 2015

Kang et al. Molecular Neurodegeneration 2014, 9:36
http://www.moleculameurodegeneration.com/content/9/1/36

MOLECULAR NEURODEGENERATION

RESEARCH ARTICLE Open Access

Diet and exercise orthogonally alter the gut microbiome and reveal independent associations with anxiety and cognition

Silvia S Kang[1], Patricio R Jeraldo[2], Aishe Kurti[1], Margret E Berg Miller[3,4], Marc D Cook[3,4], Keith Whitlock[3,4], Nigel Goldenfeld[5,6], Jeffrey A Woods[3,4], Bryan A White[5], Nicholas Chia[2*] and John D Fryer[1,7,8*]

Immunology and Cell Biology (2015), 1–6

www.nature.com/icb

Exercise and gut immune function: evidence of alterations in colon immune cell homeostasis and microbiome characteristics with exercise training

Marc D Cook[1], Jacob M Allen[2,3], Brandt D Pence[2,3], Matthew A Wallig[4,5], H Rex Gaskins[6,7,8], Bryan A White[6,7] and Jeffrey A Woods[2,3,8]

Some Current Projects

-"Understanding predictors of success in a comprehensive lifestyle treatment program for obesity: The fecal microbiome" (in conjunction with Mayo Clinic)

-"Running your microbiome to improve GI health: Can exercise-induced gut microbial changes attenuate the effects of ulcerative colitis" (experiment in gnotobiotic mice)

-"Can exercise and dietary fiber synergize to improve learning and memory in aging" (preclinical study)

-NIH RFA PAR-13-293 "Gut microbiota-derived factors in the integrated physiology and pathophysiology of diseases within NIDDK's mission"

From An Exercise Physiology Standpoint: Where are the 'Next Frontiers'?

- stem cells and growth factors
- autophagy (tissue turnover)
- microbiota-host interactions
- epigenetics
- mechanisms in the brain
- individualized 'exercise is medicine'

Kevin Wise

Advertising

Interactive Media Use…

Increasingly physical

Increasingly mobile

Increasingly Embodied

Embodied Media Psychology

1. What physical cue is experienced during media use?

1. What related mental concept might be activated by this physical cue?

1. How might the activation of this mental concept affect the psychological outcomes of media use?

Question: What role do interactive/embodied media experiences play in CLEAR-related phenomena?

Kevin Wise
krwise@illinois.edu

Liz Stine-Morrow

Educational Psychology

The Adult Learning Lab (TALL)

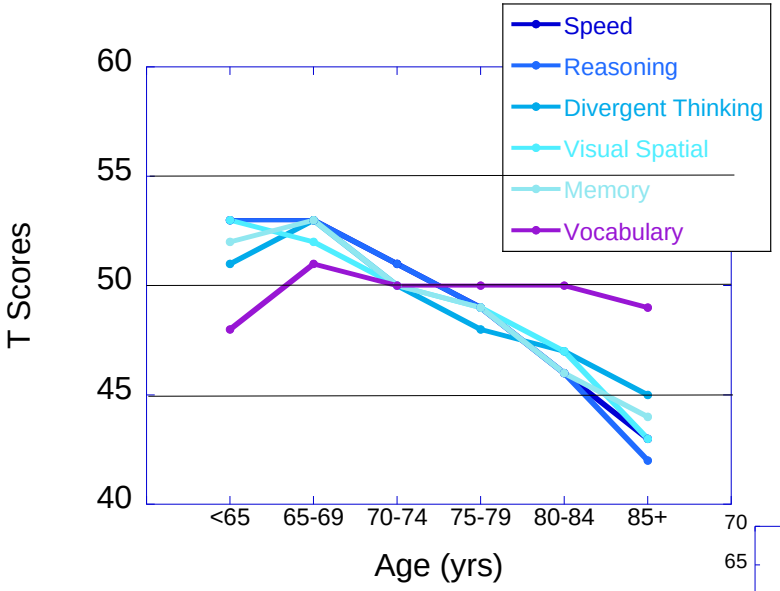
Adult development of learning and language processing

National Institute on Aging

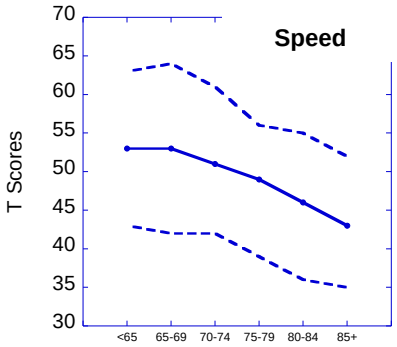
National Science Foundation
WHERE DISCOVERIES BEGIN

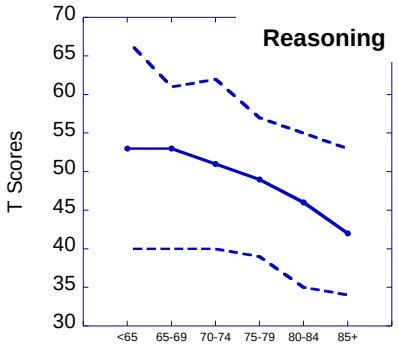
INSTITUTE OF EDUCATION SCIENCES

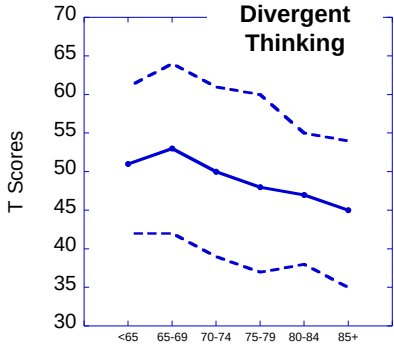
- Language Processing
  - Sentences → Discourse
  - Age-related change in mechanisms
  - Self-regulation of attention
  - Effects of literacy experience
- Pathways to Cognitive Resilience
  - Strategy Instruction
  - Activity Engagement
  - Cognitive Training



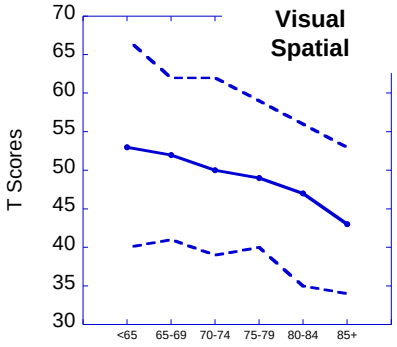
10th and 90th percentiles

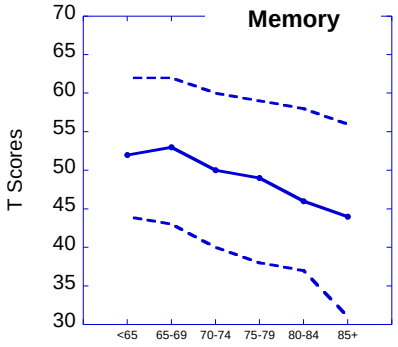


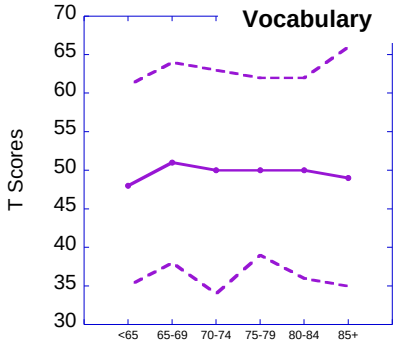




N=458
(59-93 yrs old)



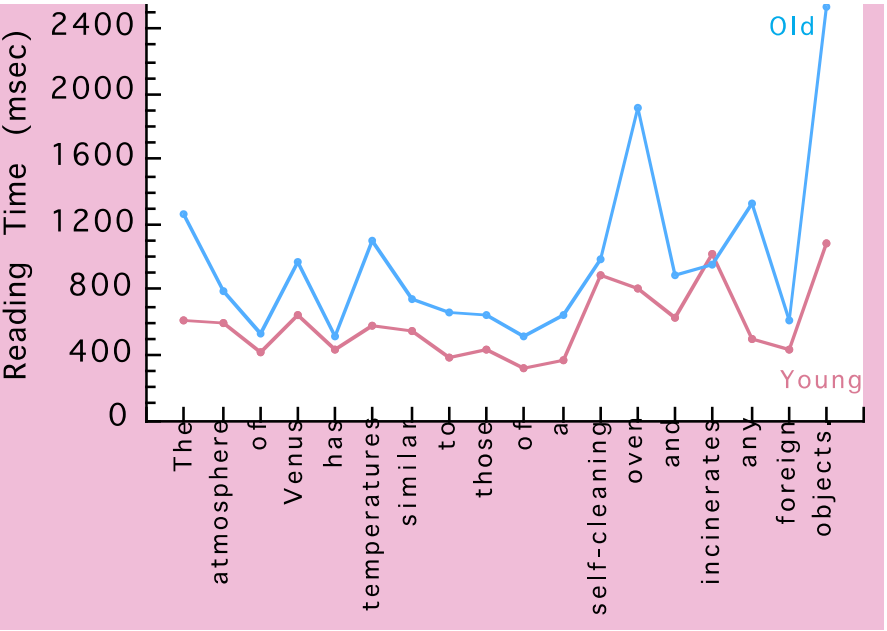


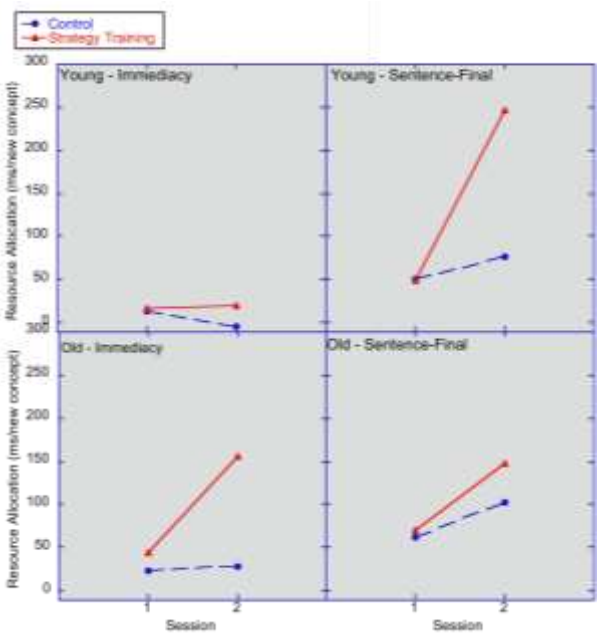


Data from Stine-Morrow et al. (2014, *Psych and Aging*)

Conceptual Integration Training

- Sentence comprehension depends on using the syntactic cues to bind information together.
  - e.g., *The alderman the mayor opposed did not support the veto of the bill that banned smoking in restaurants.*





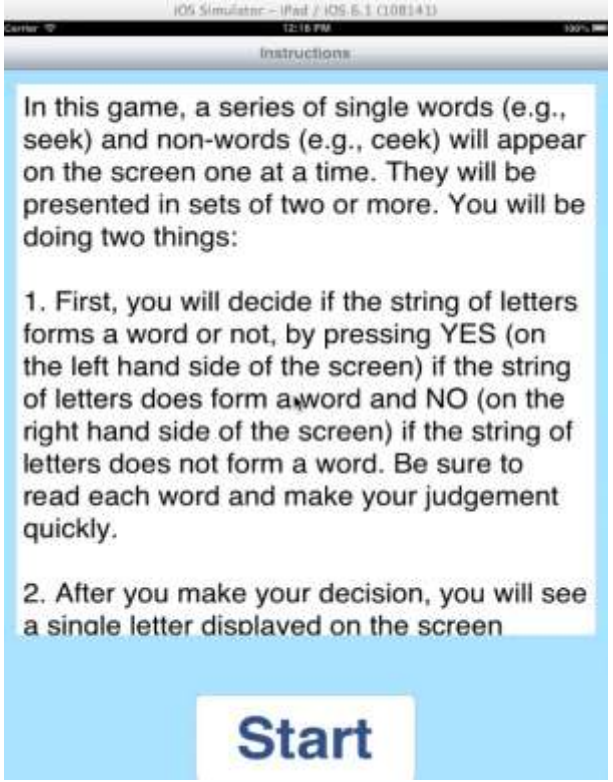
r(ΔCI, ΔRecall)

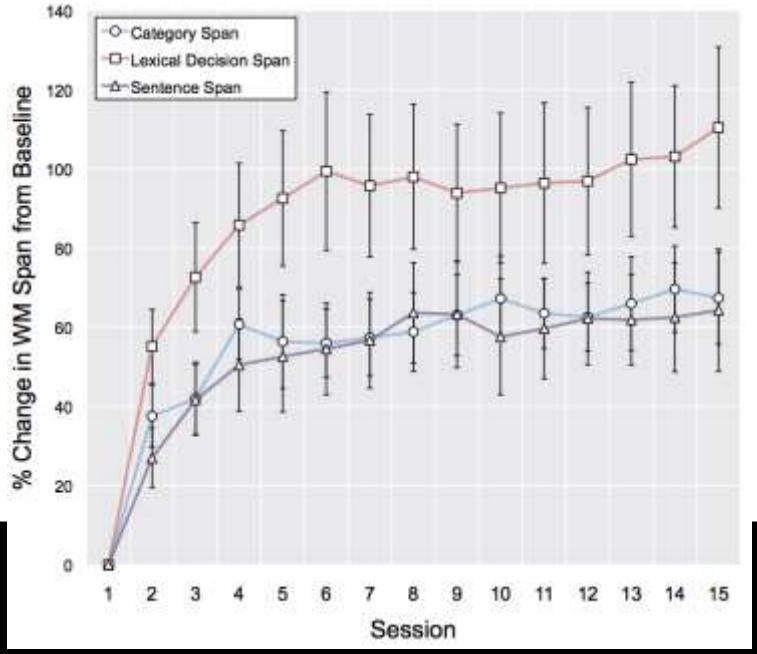
	Young		Older		All	
Immediacy	0.39	*	0.70	**	0.54	**
Sentences	0.37		0.64	**	0.50	**

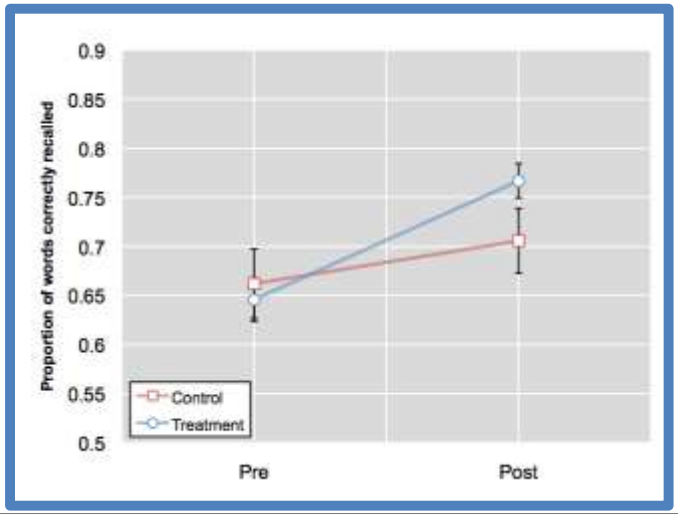
(Stine-Morrow et al., *PandA*, 2001; QJEP, 2010)

Home-Based Working Memory Training

- Age-related declines in working memory impact
  - Language comprehension
  - Discourse memory
  - Reasoning performance
- Training on 3 span tasks x 10/day x 15 days



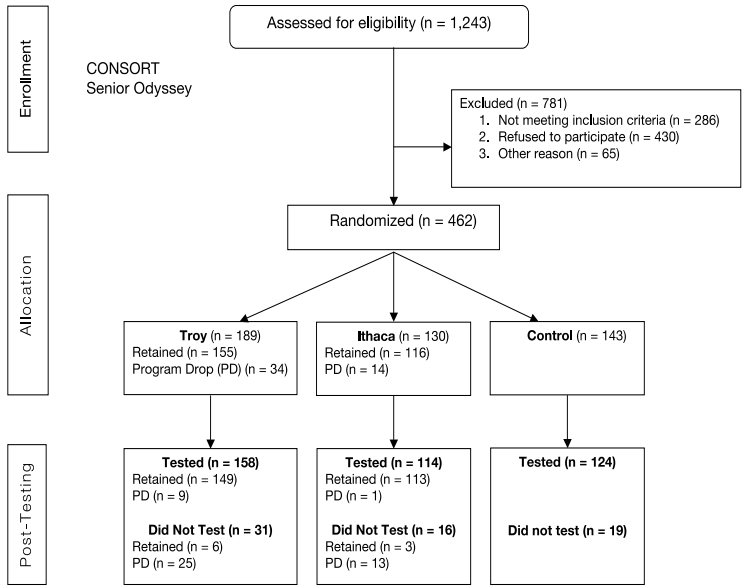


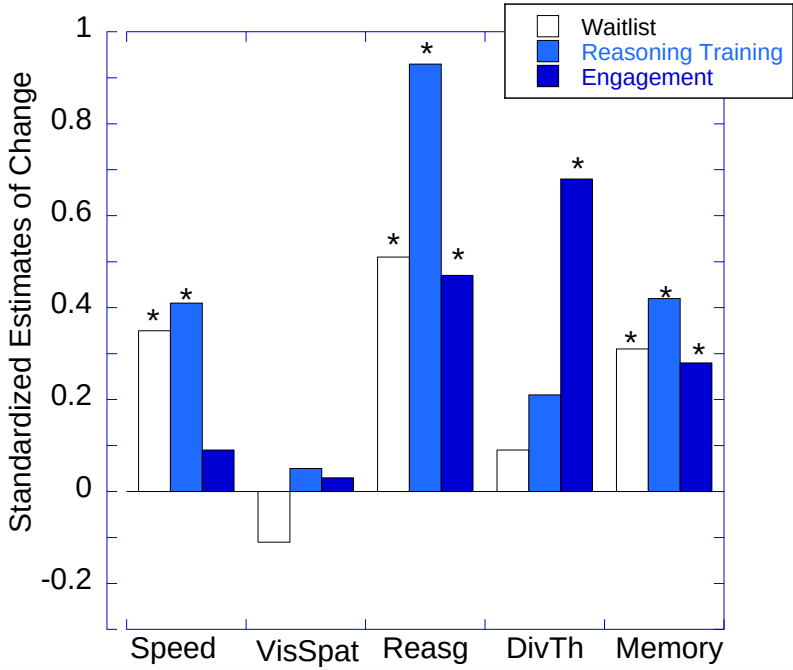


(Payne & Stine-Morrow, in preparation)

Lifestyle Intervention

SENIOR ODYSSEY





BECKMAN INSTITUTE

(Stine-Morrow, Payne, Gao, Roberts, Kramer, Morrow, Payne, Hill, Noh, Janke, & Parisi, *PandA*, 2014)

Help Wanted

- Effects of sustained literacy on late-life cognitive development?
  - Cognitive? Neural? Dispositional?
- Emotion-cognition interactions in literacy engagement?
  - Electromyography?
  - Imaging?
- What is the promise of VR for narrative embedding? Cognitive benefits?

Jacob Sosnoff

Kinesiology & Community Health

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Tele-rehabilitation system for fall risk assessment

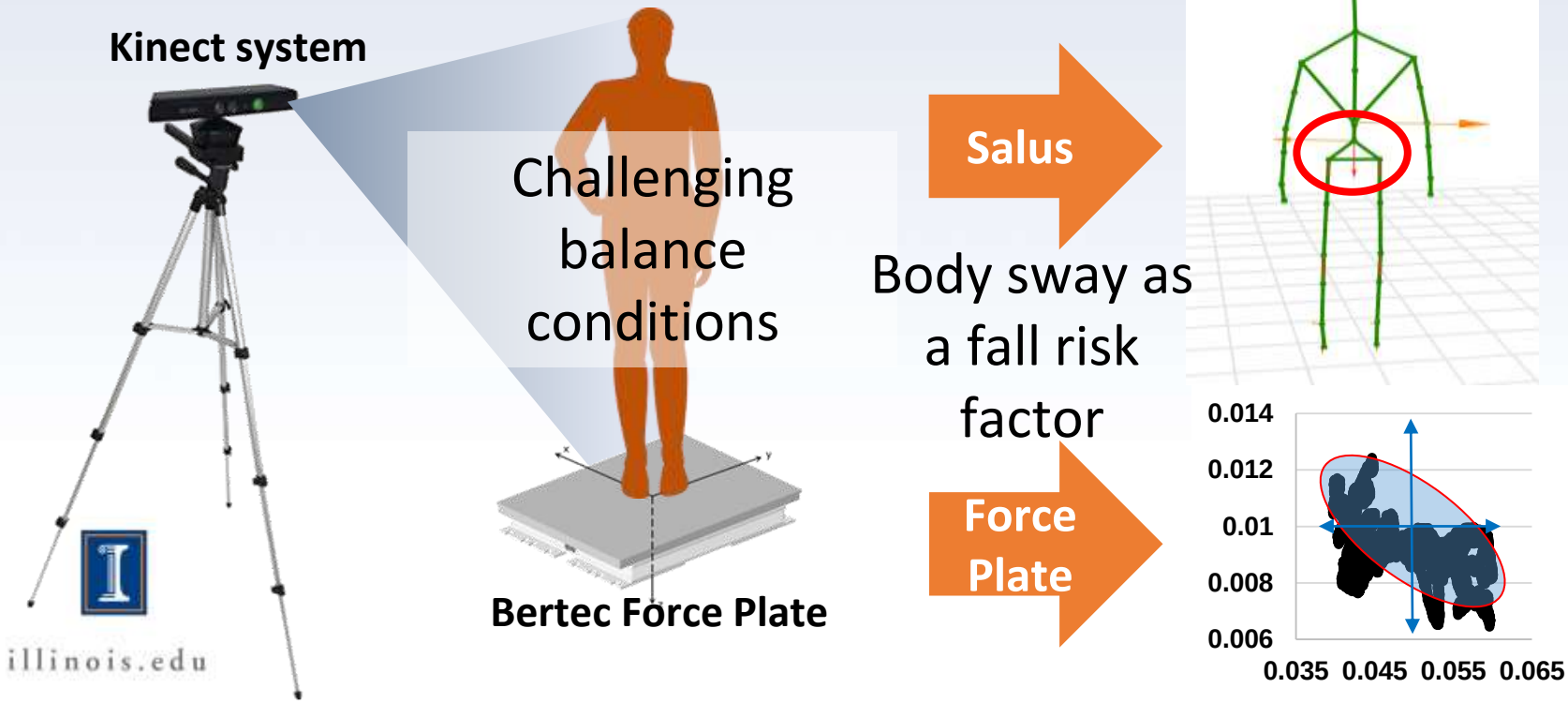
Kathleen L Roeing[1], Yaejin Moon[1], Rama Ratnam[2], Jacob J. Sosnoff[1]

[1] Kinesiology and Community Health
[2] Coordinated Science Lab

illinois.edu

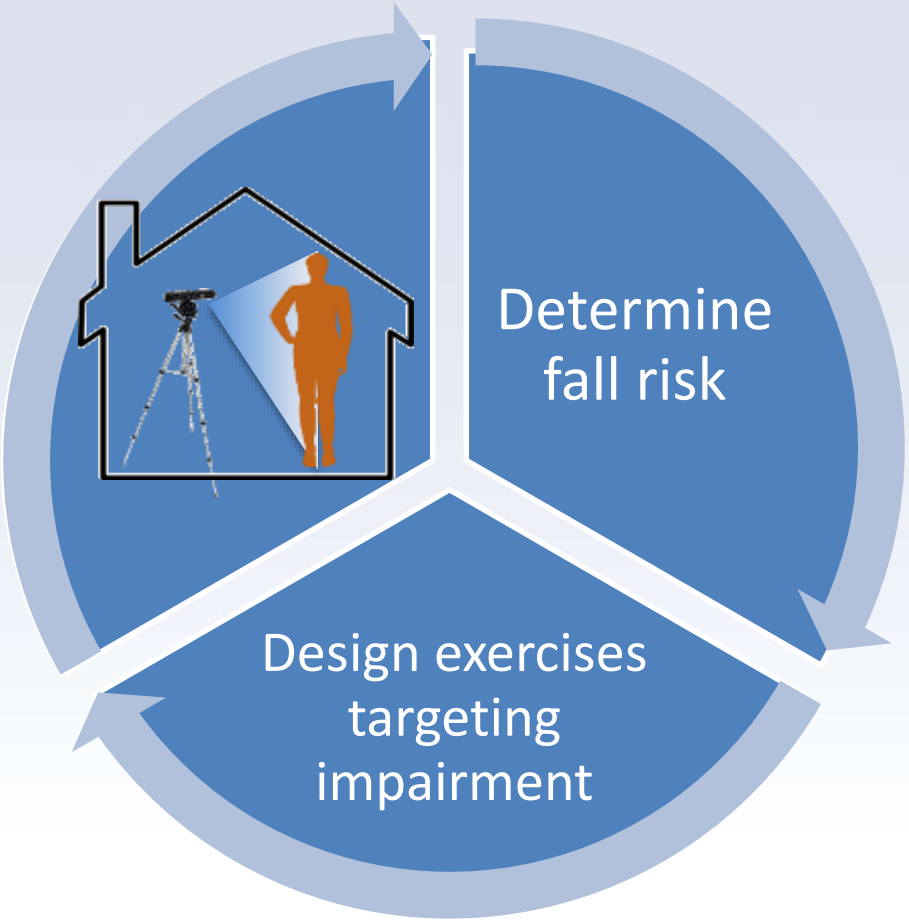
Falls: Aging and Disability

- 1 in 3 people aged 65+ will fall once a year and 10-20% of these result in injury, hospitalization, and/or death (Rubenstein, 2006)
- Falls are also major concern in the multiple sclerosis (MS) population with an incidence rate of over 50% (Finlayson, Peterson, & Cho, 2006)
- Developing home-based fall risk identification is necessary to reduce health care costs and improve quality of life.



Results and Capabilities

- Participants: 15 young adults (18-30), 15 older adults (65+), 6 individuals with MS
- Moderate to strong correlations for postural sway between Kinetic camera and force plate in all conditions
- Future applications



Brent Roberts

Psychology

Roberts Lab

Things we do

- Personality assessment
- Personality development
- Longitudinal methods

Current predilections

- Measuring and assessing non-cognitive factors that predict human capital for OECD and World Bank
- Showing that vocational interests are more important than traits and abilities in shaping the life course
- Interventions to change personality traits

Future possibilities in the area of aging

- Genomics of personality and cognitive decline with Bennett and Briley
- Longitudinal studies linking stress to personality change
- Personality and end of life planning

Sean Mullen

Kinesiology & Community Health

Exercise, Technology, & Cognition Lab

exercisetechlab.com

Sean Mullen, PhD

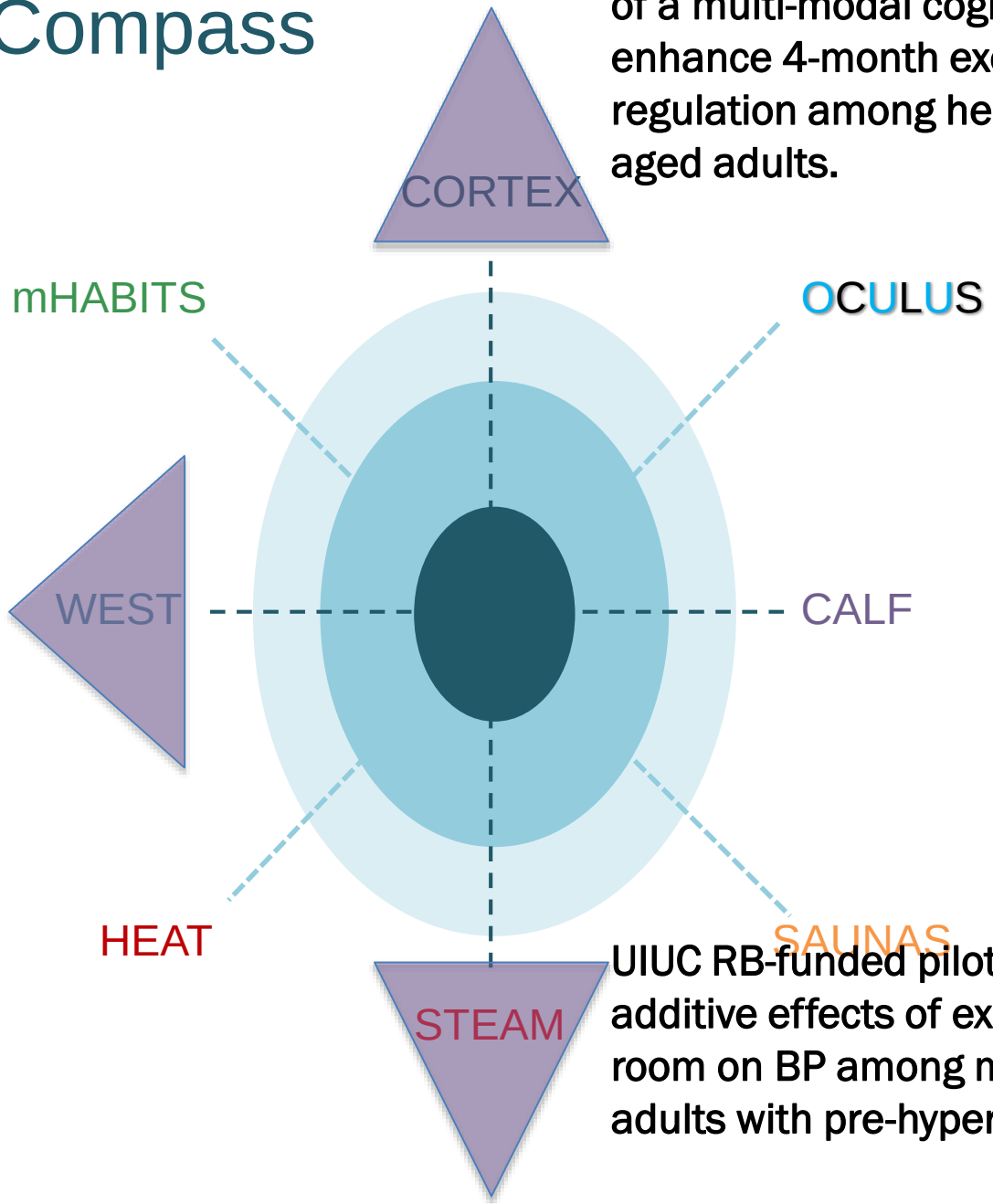
Research Focus

1. What are the best ways to increase exercise self-regulation? (outside the lab)
2. What technologies are most effective at increasing exercise?
3. What types of adjuvant therapies combined with exercise will increase brain function and heart health?

Research Compass

NHLBI-funded RCT to test the efficacy of a multi-modal cognitive training to enhance 4-month exercise self-regulation among healthy middle-aged adults.

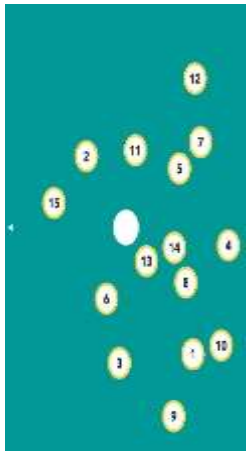
CHAD-funded pilot RCT to test the effects of a 10-month iPad-enhanced exergaming intervention on spatial memory & wayfinding self-efficacy among adults with probable MCI.

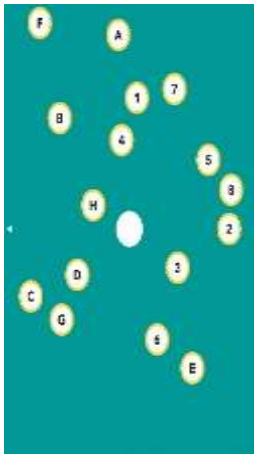


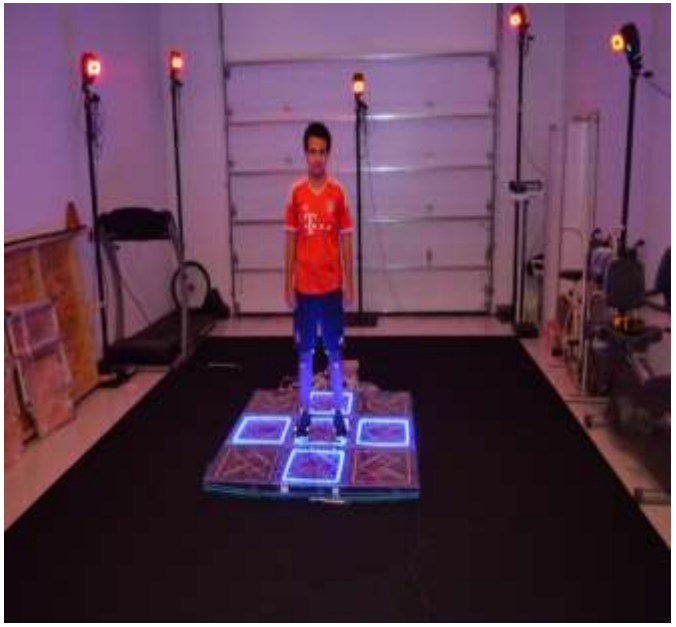
UIUC RB-funded pilot trial to test the additive effects of exercise & steam-room on BP among middle-aged adults with pre-hypertension.

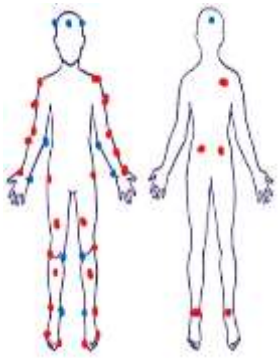
Sean Mullen, PhD
exercisetechlab.com

ETC Lab Toys









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Dan Morrow

Educational Psychology

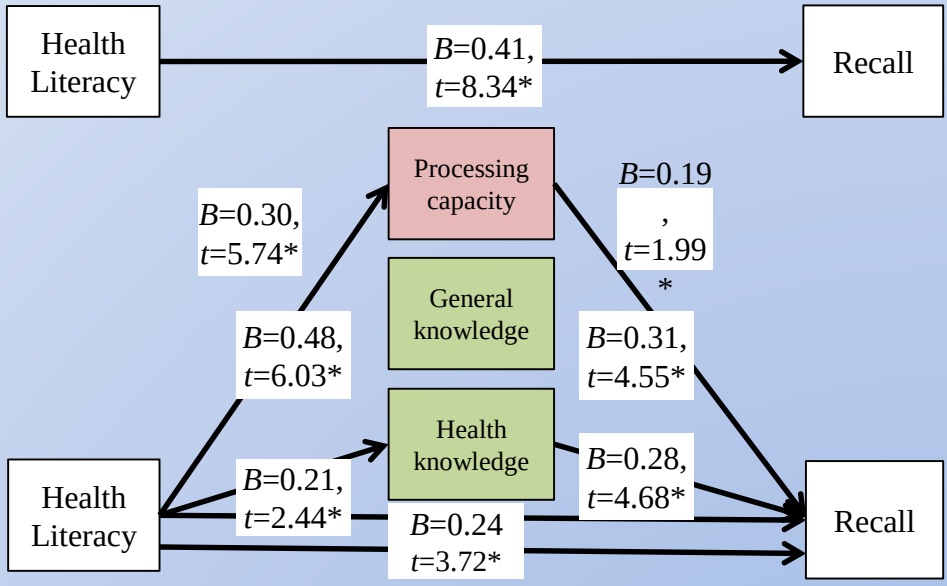
Dan Morrow Lab

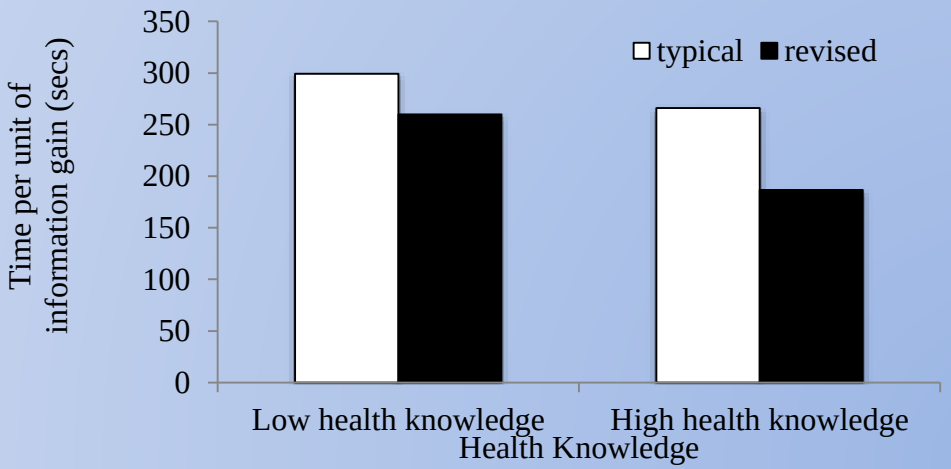
- Self-care is a critical challenge for older adults, who are more likely to have chronic illness but less likely to have the cognitive resources needed for self-care
- Theory-guided interventions to improve self-care among older adults with chronic illness.
  - Leverage age-related cognitive strengths (e.g., knowledge) and minimize demands on age-vulnerable cognitive resources (e.g., processing capacity) to support comprehension and decision making

Health Literacy Resources for Self-Care

With Elizabeth Stine-Morrow (Beckman)
Mick Murray (Purdue), Jim Graumlich (UIC-Peoria)

- Process-knowledge model explains health literacy in terms of the interplay between declining processing capacity and sustained general and health knowledge.
- In support of this model, association of health literacy and recall of self-care information is mediated by health knowledge and processing capacity.
- Guided by the P-K model, we redesigned information about self-care from credible websites and improved memory for this information among older adults with varying levels of knowledge about hypertension.





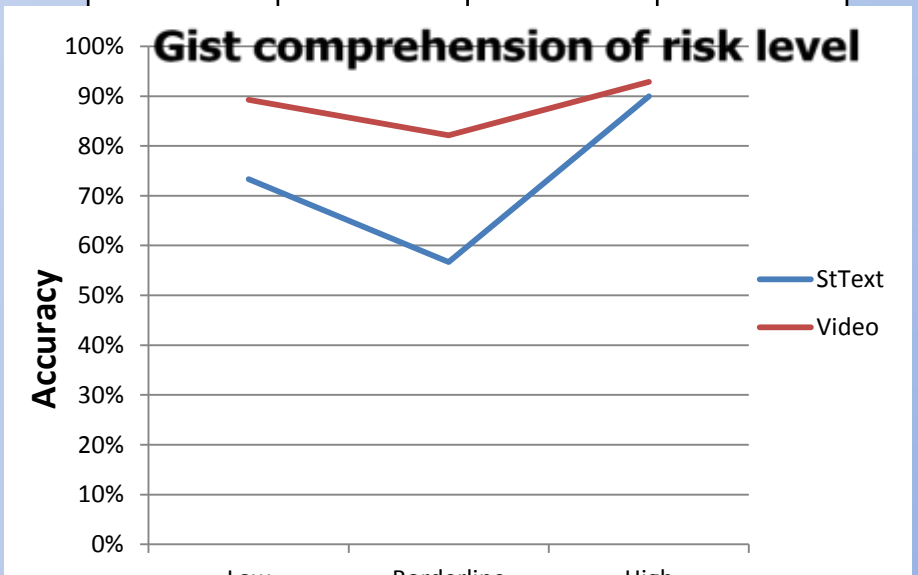
Collaborative Patient Portals

With Mark Hasegawa-Johnson & Tom Huang (Beckman), William Schuh (Carle), Rocio Garcia-Retamero (Univ Granada)

- Self-care information is often provided through patient portals to Electronic Health Records. Older adults are less likely to use portals and may not understand portal-based numeric information (e.g., test results).
- Our goal: improve comprehension of test results among older adults varying in health literacy by providing context in form of graphics and video recorded physician.
- Current study finds that enhanced formats improve gist comprehension compared to standard format.
- Now developing Computer Agent (CA) based on the video to evaluate whether the portal-based CA improves patient comprehension and collaboration with providers.

Standard Portal Format

Component	Your Value	Standard Range	Units
Total Cholesterol	184	< 200 -	mg/dl
Triglycerides	42	< 150 -	mg/dl
HDL Cholesterol	47	40 - 60	mg/dl
LDL Cholesterol	130	< 100 -	mg/dl



Fatima Husain

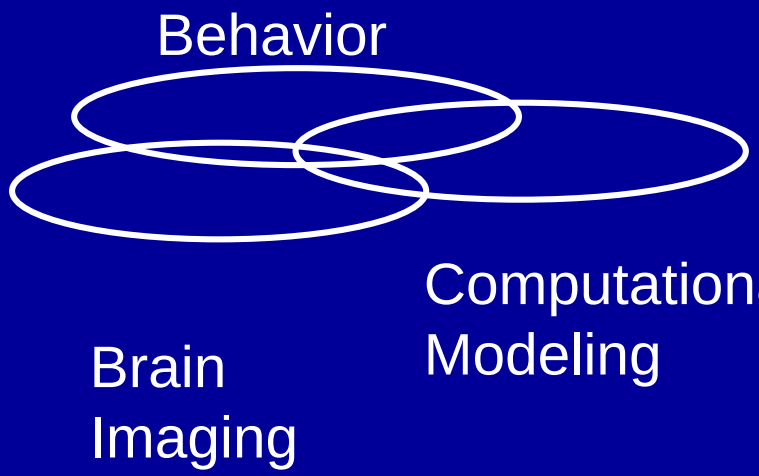
Speech and Hearing Research

Aging Research in the Auditory Cognitive Neuroscience Lab

Fatima Husain, PhD
Associate Professor, Speech and Hearing Science,
Beckman Institute for Advanced Science and Technology
& the Neuroscience Program
Affiliate, Center on Health Aging and Disability
University of Illinois at Urbana-Champaign

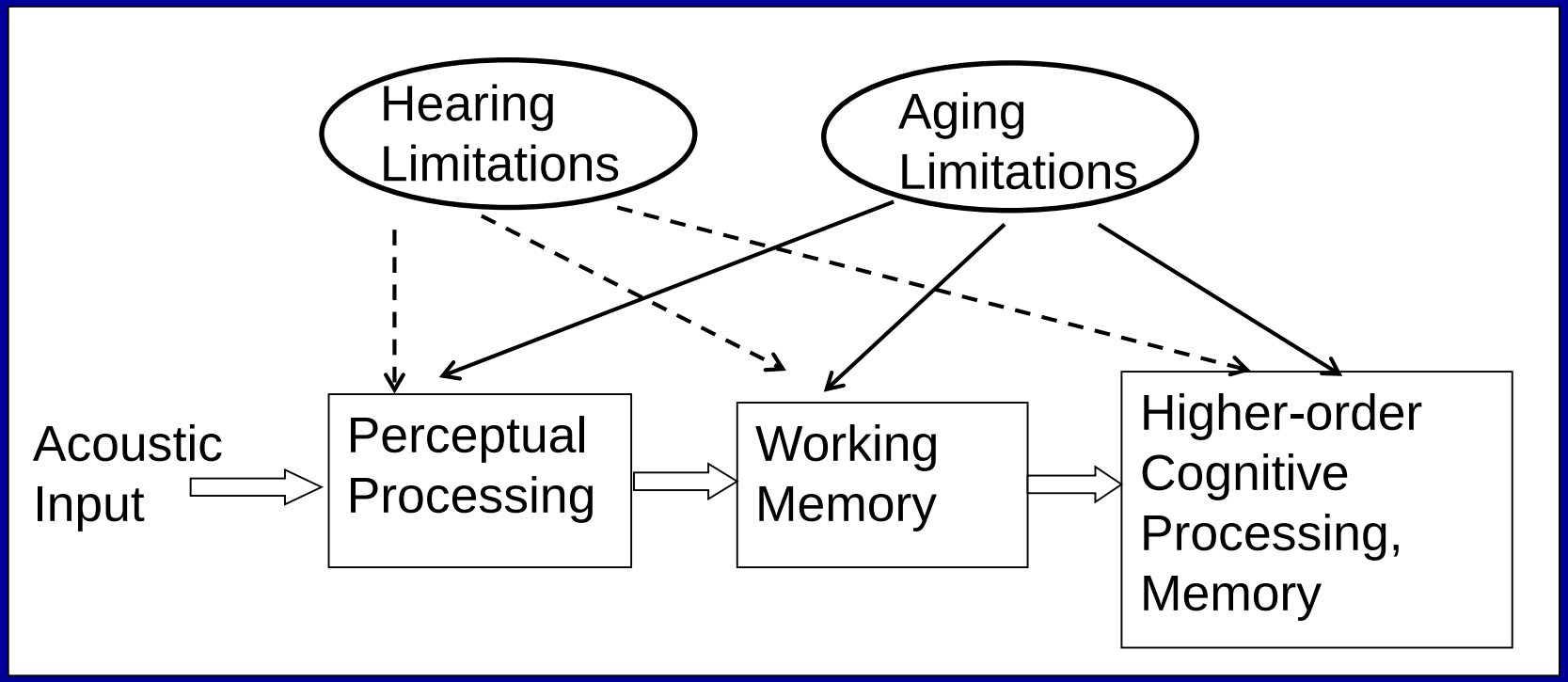
Broad Outline of my Research

TOOLS



QUESTIONS

Aging, Hearing & Tinnitus

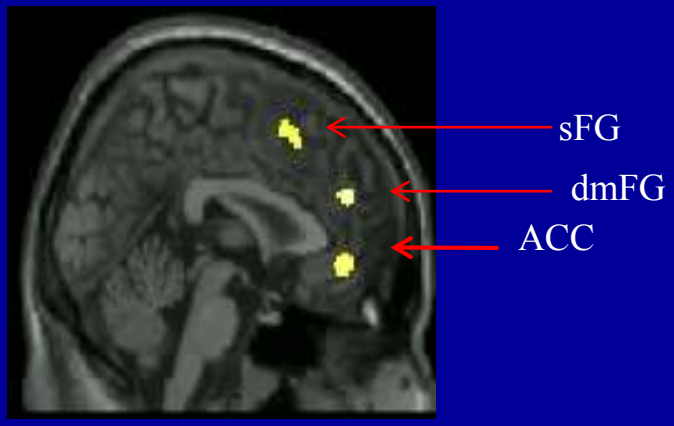


Both hearing limitations (hearing acuity, tinnitus, listening environment) and aging limitations may have an effect on perceptual, working memory and higher-order processing operations.

Example result: Gray matter & white matter declines due to hearing loss

- When comparing older adults with hearing loss to age-matched control group with normal hearing
  - Declines in gray matter in frontal cortex
  - Changes in orientation values of white matter tracts (indicative of poor microstructure integrity)

HL<NH



x= 2

HL<NH

Ant. thalamic rad.,
Inf. fronto-occipital fasc.
Inf. long. fasciculus

z= 15

Husain, et al., *Brain Research,* 2011

Naira Hovakimaya
Mechanical Science & Engineering
and
Alex Kirlik
Computer Science

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

ASPIRE: Automation Supporting Prolonged Independent Residence for the Elderly

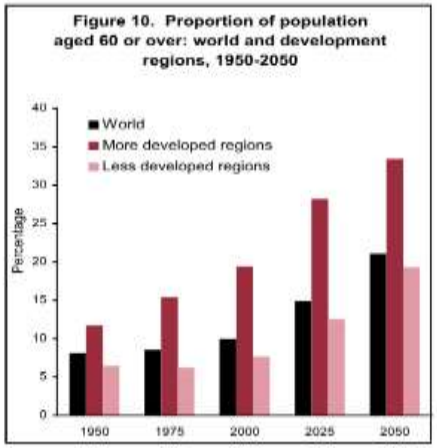
Naira Hovakimyan

in collaboration with

A. Kirlik, A. Laviers, D. Stipanovic, F. Wang, X. Wang, C. Goudeseune, and R. Carbonari

Vision & Objective

- The care giving demand for elderly and people with disabilities will grow substantially.
- Available resources (personnel, money, …) will not grow at the same pace.
- Care will need to be delivered at home as much as possible



UN Report,
Department of Economic and Social Affairs,
Population Division , 2001

- Provide a framework for **robotic assistive care** to provide independence to the elderly population.

- **Human-centered approach** to design of robust safety-critical systems.
- Merges research from control engineering, psychological sciences & computer science to create meaningful solutions to this problem.

Help is required to perform:

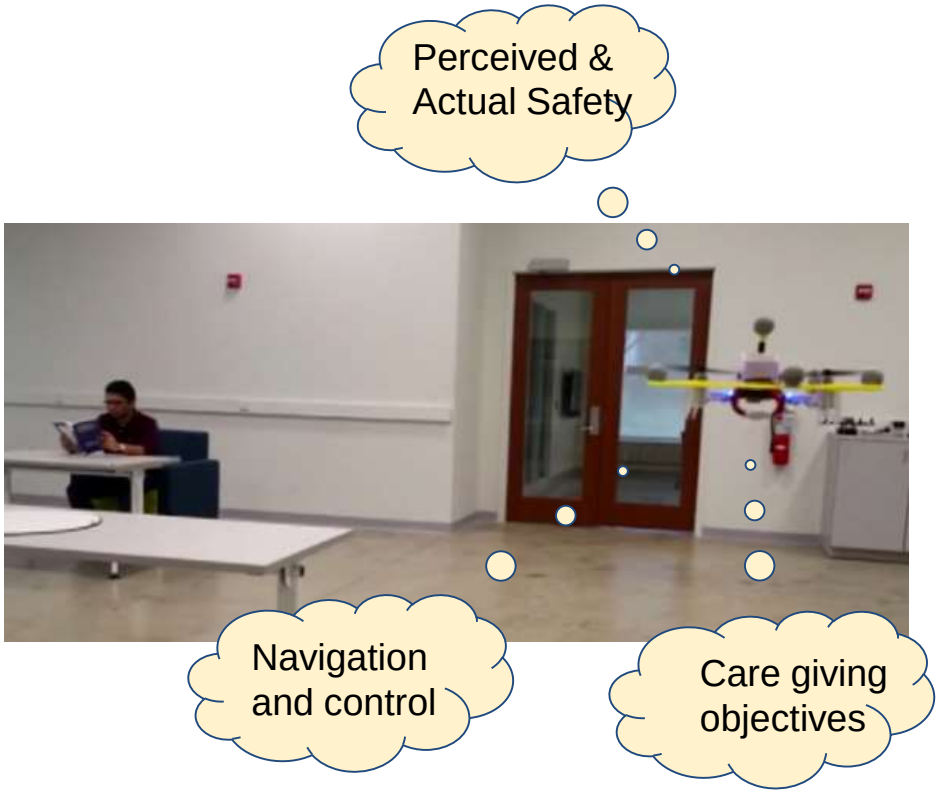
- Memory functions, health monitoring, **daily activities:**
  - *ADL – Activities of Daily Living*
  - *IADL – Instrumental Activities of Daily Living*
  - *EADL – Enhanced Activities of Daily Living*

Problem Statement

Designing robots for autonomous assistive tasks

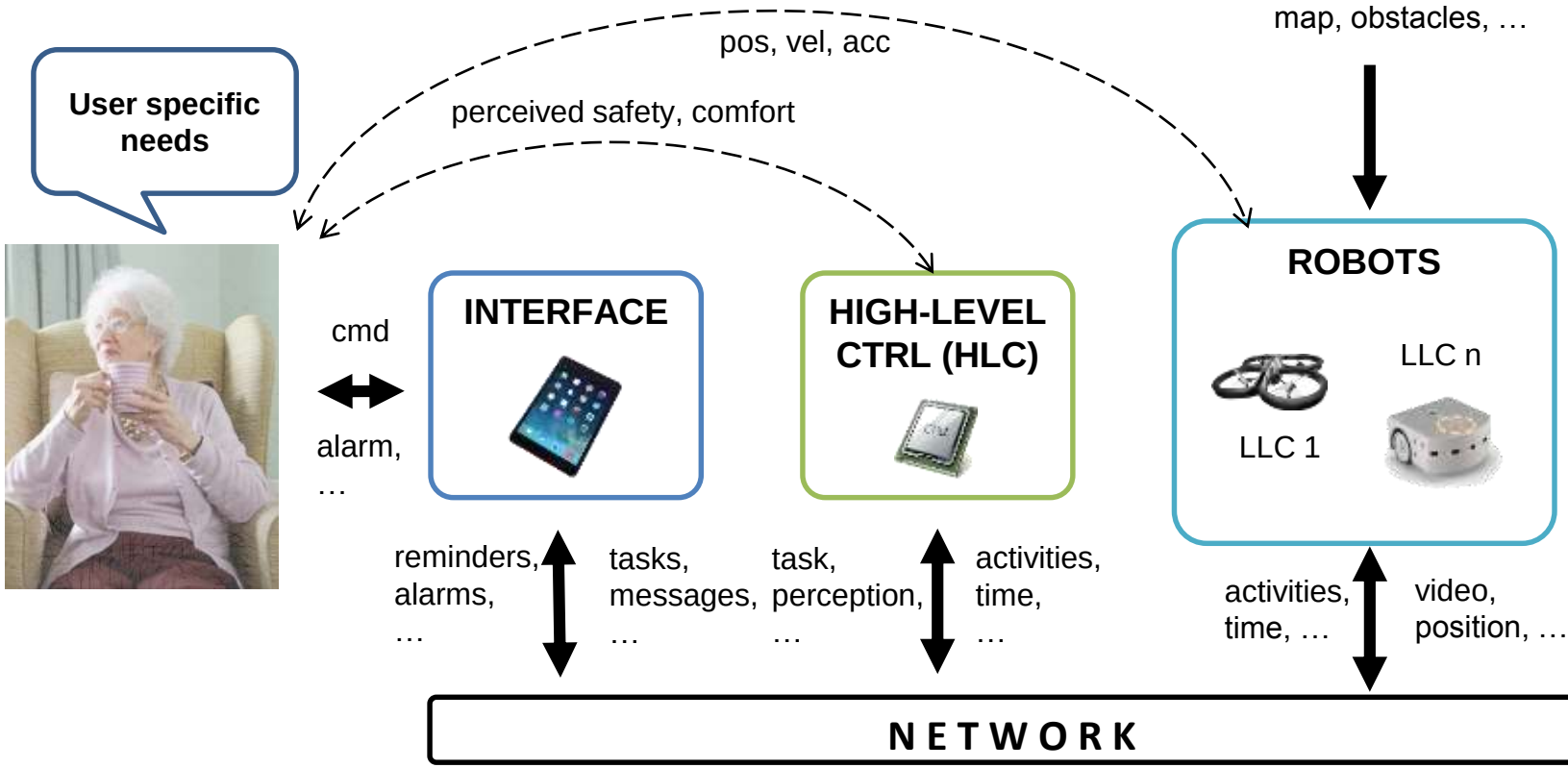
Develop a framework for the operation of autonomous vehicles to perform **care giving** tasks while also acknowledging the perceived safety and comfort of the operator.

- **Analyze how behavior and appearance models** of ground and flying robots affect senior citizens **comfort** and **perceived safety**.
- Develop friendly user interface taking into account cognitive demand.
- Design **guidance and control** algorithms for the care giving robots to **minimize human discomfort** and **increase acceptability**.



Source: Wired Magazine

Proposed Architecture



Virtual reality

Interface design

Acceptability

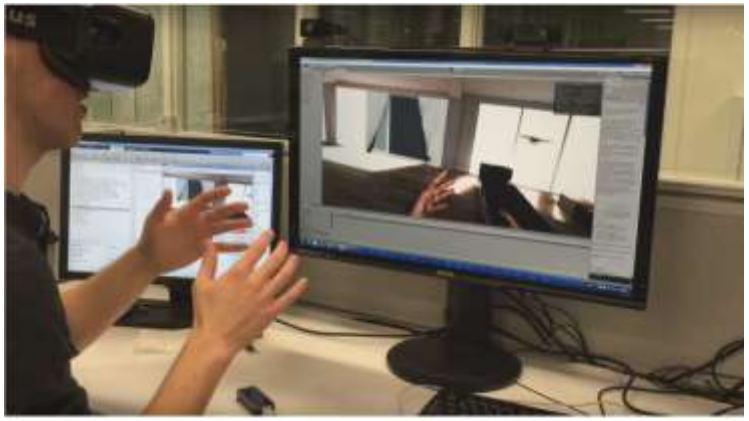
Control

Research Progress

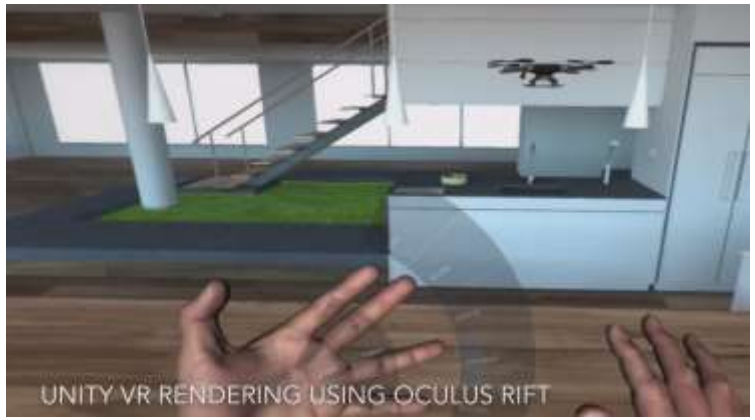
- Development of an **aerial robot simulator** in **virtual reality** for purposes of psychological experiments to study human comfort in the presence of a robot.
- The robot dynamics and control system are simulated in VR, real-time from **Simulink**.
- The robot can perform **collision-free trajectory tracking** to predefined destinations.

What's next?

- Performing psychological experiments to study the perceived safety of humans in the vicinity of robots.
- Constructing mathematical models for different robotic behaviors in the presence of humans (e.g.: collision avoidance, cooperative control)



Our graduate student interacting with a UAV in VR

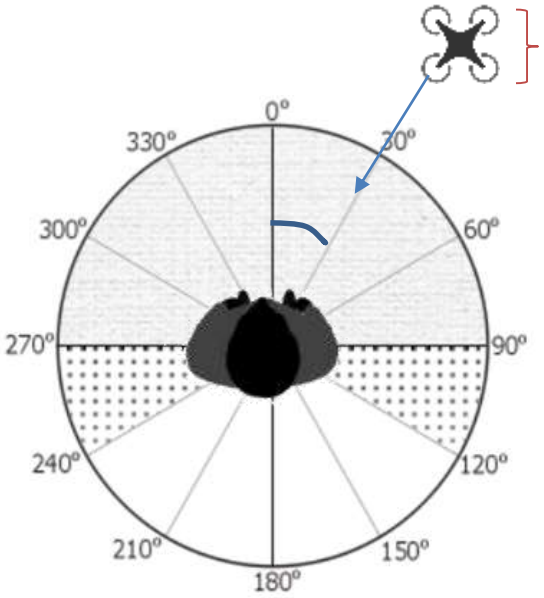


Multi-rotor in the virtual world

Psychological Experiments

- **Perceived safety** will be operationalized in terms of **judgments of relative proximity**.
- **IMU / Head tracking** data (Rift) will be recorded to assess variation in head movement: head tilt cheaply measures discomfort.
- Individual differences in **VR presence** and **simulator sickness** will be assessed with self-report questionnaires.

- Aspects of robot behavior will be tested in controlled experiments using a **mixed factorial design**:
  - **Approach angle**
  - **Speed, Acceleration**
  - **Size**
- Acceleration and audio profiles of the drone are considered to be constant. Future research will explore the case of time-varying acceleration and jerk profiles, as well as audio/noise variations.



Perceived Safety

Conclusion

- The main objective of ASPIRE is to lay the foundation for the coordinated use of small aerial and ground robots in domestic environments
  - The robot design is based on a rigorous mathematical framework with provable guarantees for robustness and safety, and it takes into account the human's perception and comfort level
- Our goal is to create a prototype assistive co-robotic system to aid elder populations and people with disabilities aging in place
- Providing senior citizens with useful tools to extend periods of independent living will mitigate some of the large and rapidly growing costs associated with the graying of the U.S. population

Naira Hovakimyan

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Department of Mechanical Science and Engineering
University of Illinois at Urbana-Champaign
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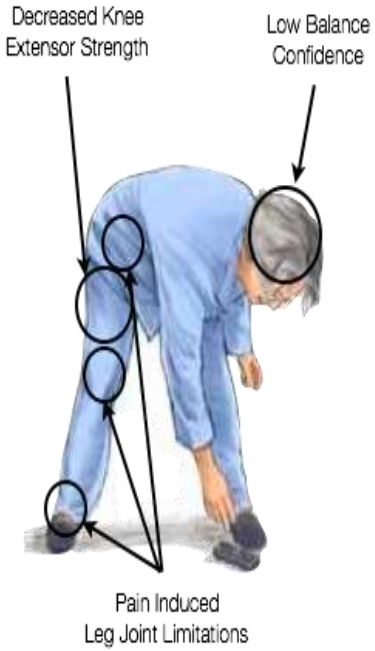
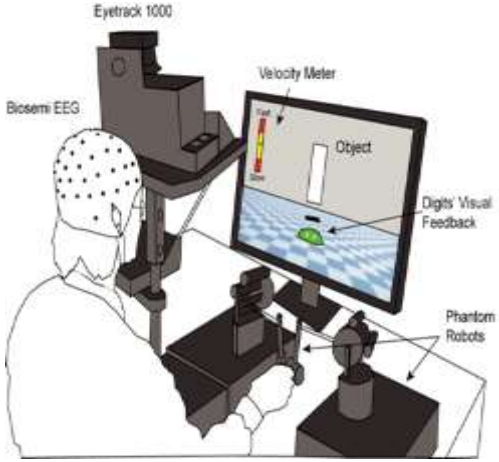
http://naira.mechse.illinois.edu

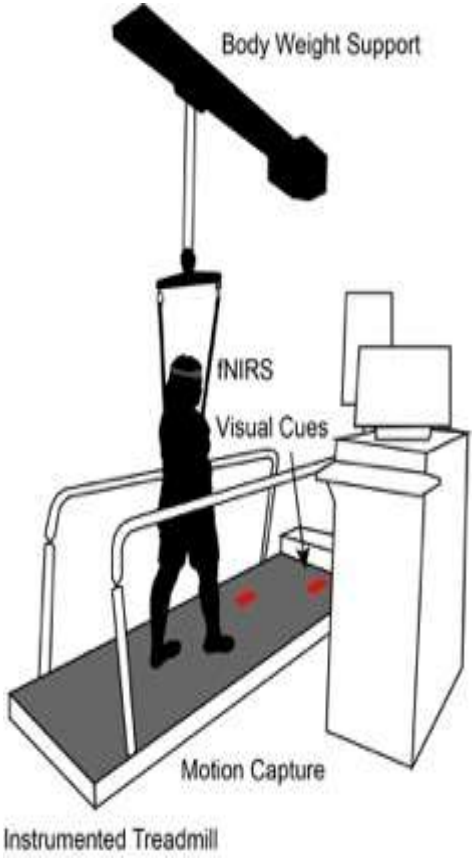
Manuel Hernandez

Kinesiology & Community Health

Research Accomplishments







(c) Zimmer, Inc.

M+FP
University of Illinois at Urbana-Champaign
Mobility and Fall Prevention Research Laboratory

Research Questions

1. Does fitness impact the ability of older adults to recruit additional attentional resources to maintain balance when navigating novel and complex environments?
2. How does the brain encode balance? and how is it altered as we age? Or due to a neurological condition?

Kara Federmeier

Psychology

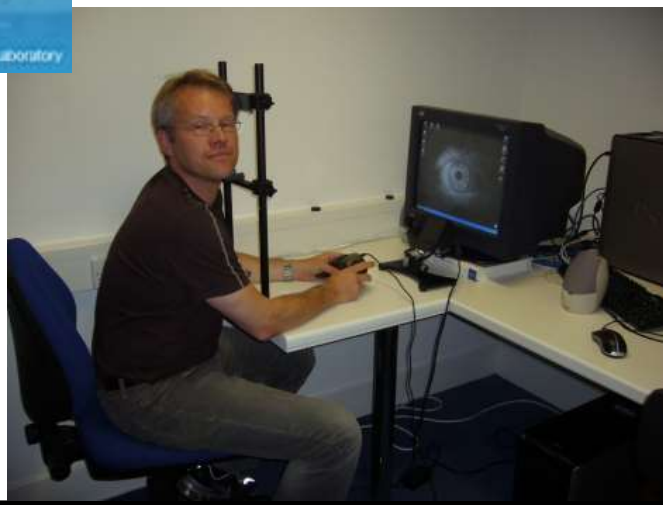
Kara Federmeier

Cognition and Brain (CAB) Lab:

Study cognitive processes using measures of electrical brain activity (ERPs: Event-Related Potentials) and eye-tracking

National Institute on Aging

James S. McDonnell Foundation



BECKMAN INSTITUTE

Language Comprehension and Aging

- Older adults tend to report little subjective loss in language comprehension abilities.
- Yet, ERPs and eye-tracking measures reveal striking changes in language comprehension with age.
- This makes language a rich domain for understanding how brain networks are flexibly and dynamically established to accomplish processing goals.

"With sixty staring me in the face, I have developed inflammation of the sentence structure and definite hardening of the paragraphs." – *James Thurber*

(New York Post, June 30, 1951)

- Older adults process language more passively. They are less likely (as a group) to …
  - predict
  - immediately resolve ambiguity (*duck*)
  - form mental images from words
- This arises from changes in the dynamics of the whole brain
  - different use of the two hemispheres
  - different tendency to activate control structures
  - different sensitivity to errors

Individual differences

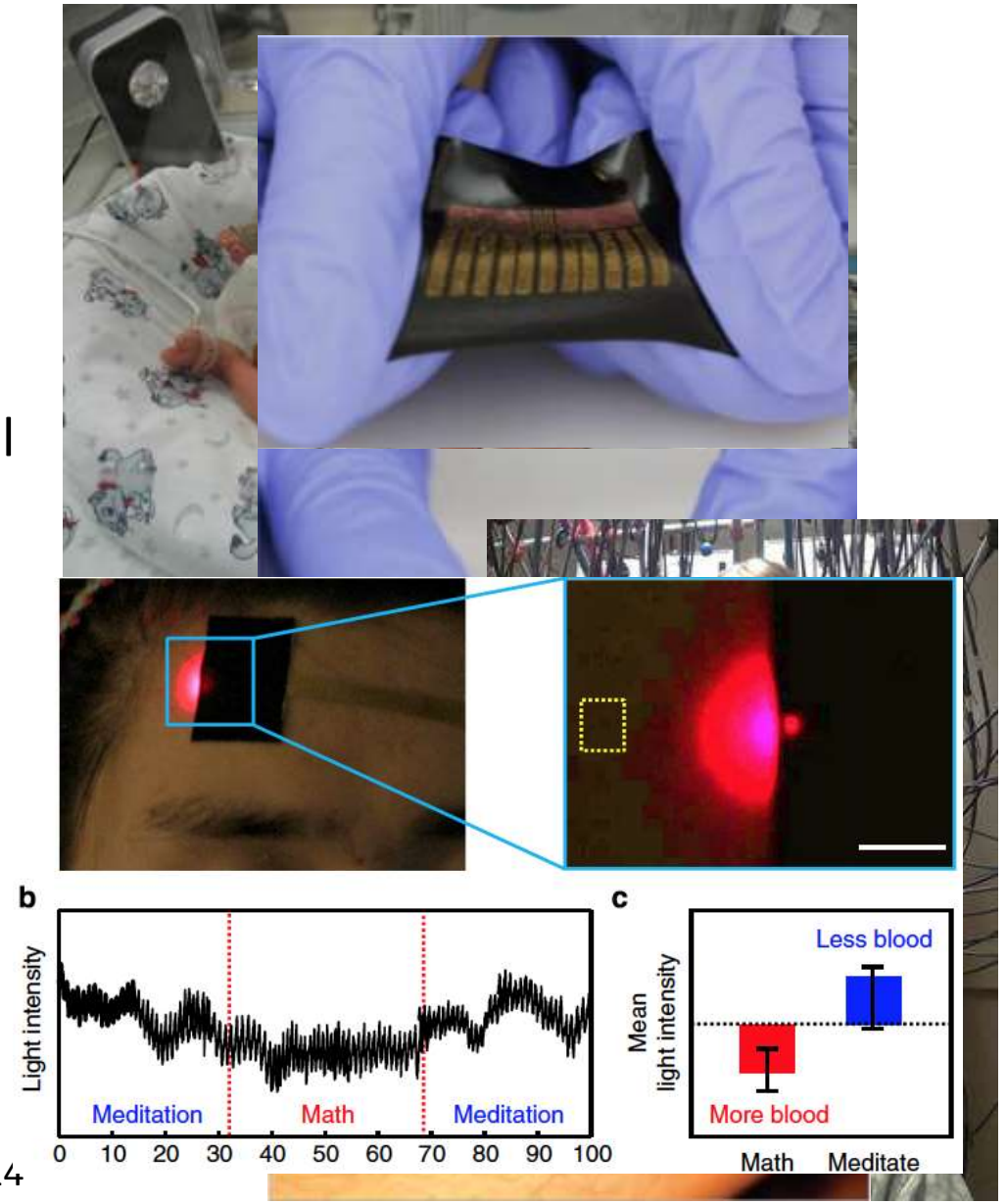
- Some individual differences (e.g., based on verbal fluency) are highly robust:
  - observed consistently, across different paradigms and measures
- These differences further reveal the malleability of the system, and provide insights into avenues for intervention.

Monica Fabiani and Gabriele Gratton

Psychology

Cognitive Neuroimaging Lab
(CNL, Gratton & Fabiani, co-directors)

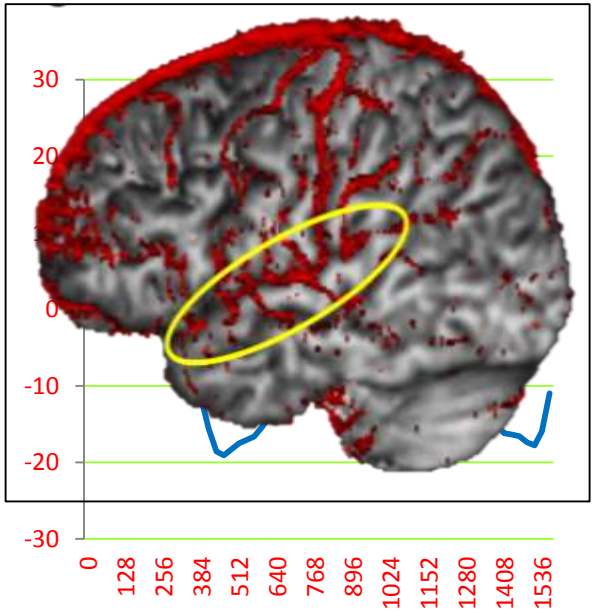
- Cognitive neuroscience research over the life span, from preterm infants to older adults
  - Working memory and attention
  - Physiological and anatomical contributions
- Enabled by methodological advances
  - Development of fast optical imaging
  - Combination/fusion of multiple imaging methods
  - Envisioning methods for the future of imaging
    - Recent collaboration with John Rogers' lab
      - Jiang et al., *Nature Com*, 2014



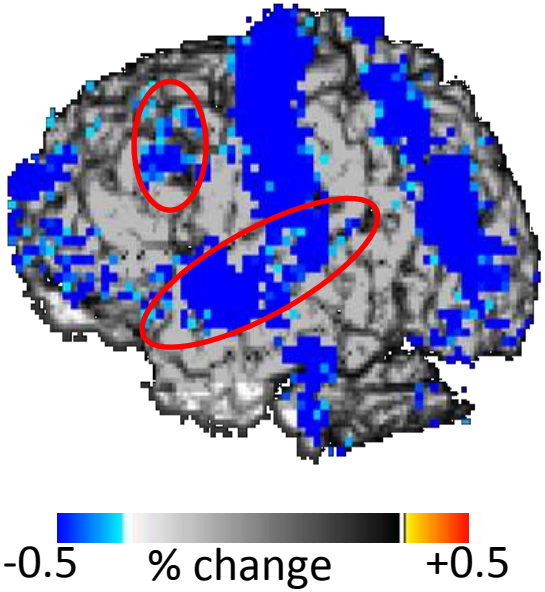
Intrinsic Optical Signals: Pulse (absorption)

Arterial pulsation leads to increased light absorption

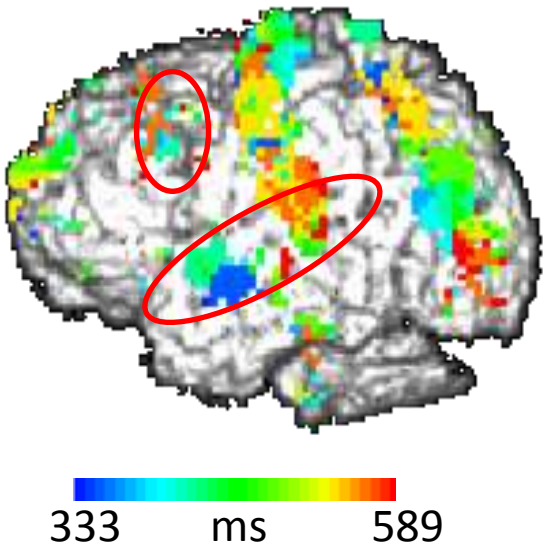
MR-based arteriogram



This is most evident over large arteries, which may be visualized



The progression of the pulse in these arteries can then be studied



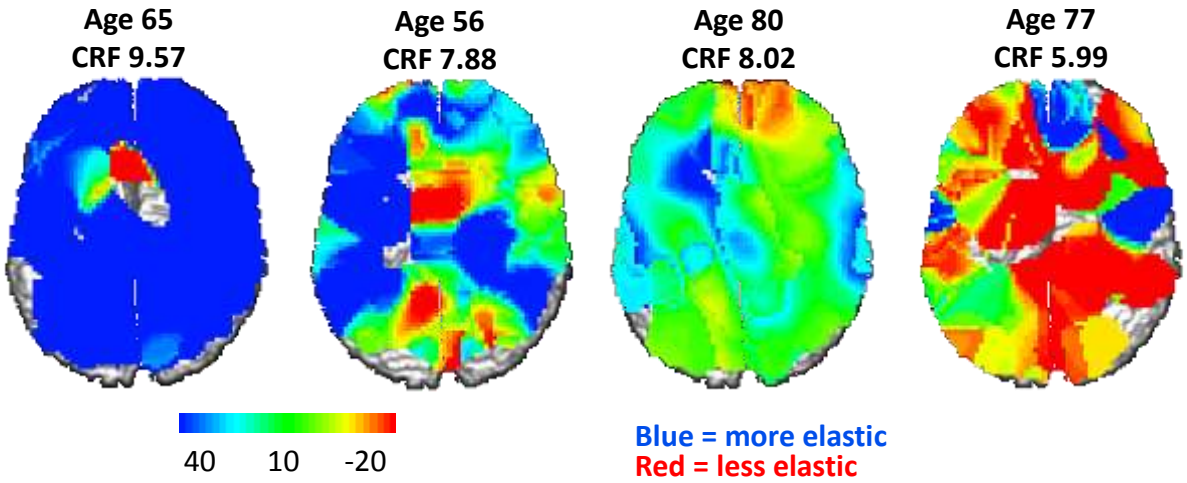
In collaboration with Dr. Sutton (U. of Illinois).
Funded by NIA (Fabiani/Gratton).
Fabiani et al. (2014, *Psychophysiology*)

Pulse and arterial elasticity

Arterial elasticity (stiffness) varies with age.
It is a major factor in dementia and strokes.
Cerebral arterial elasticity can be measured by studying parameters of the optical pulse (Fabiani et al., 2014)

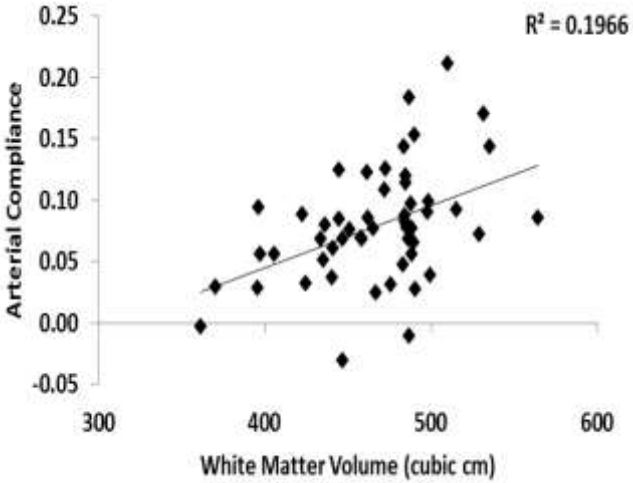
Optical pulse parameters correlate with age, fitness (CRF), and brain volumes

Compliance (arterial elasticity) maps for individual subjects

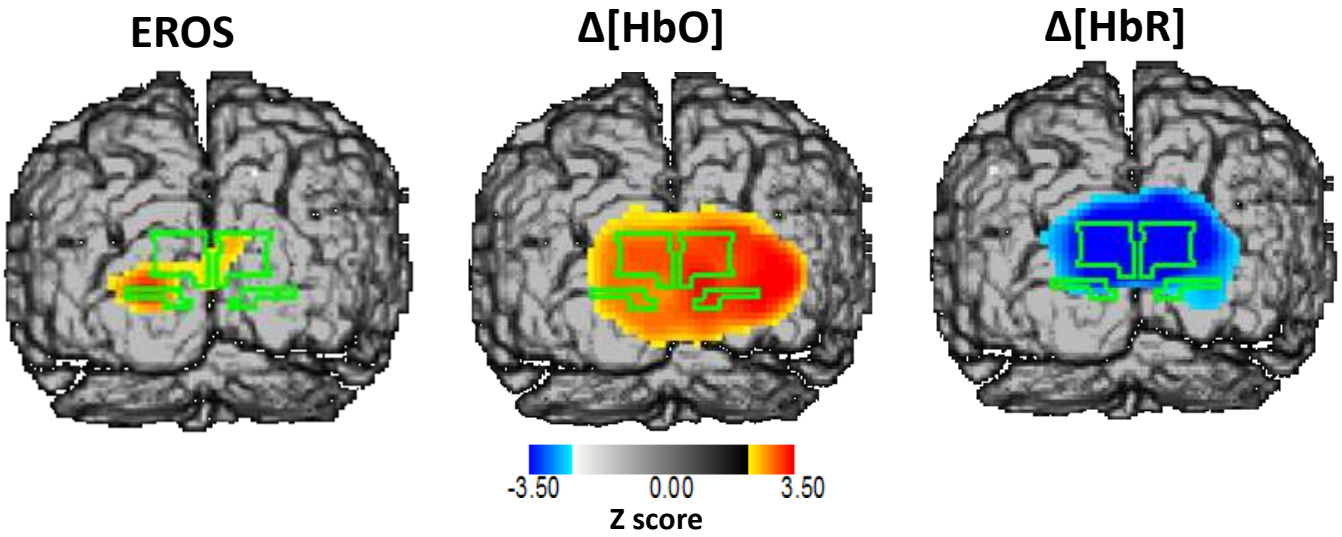


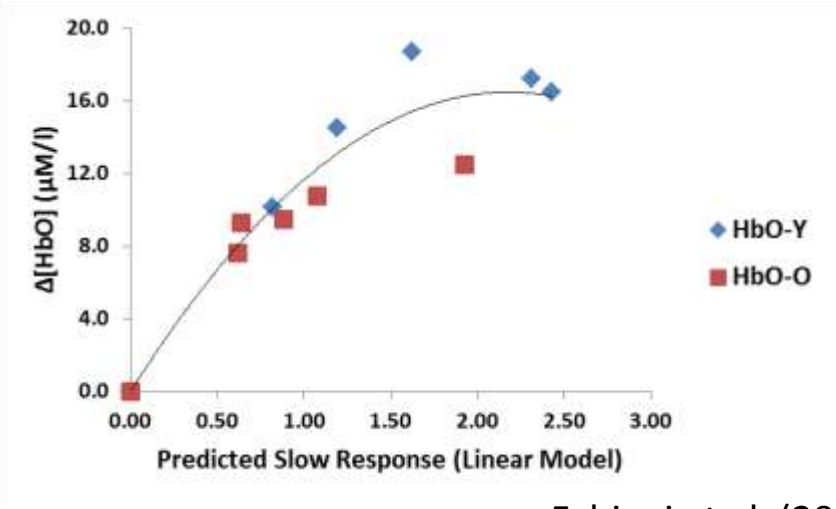
D wave amplitude (% peak)

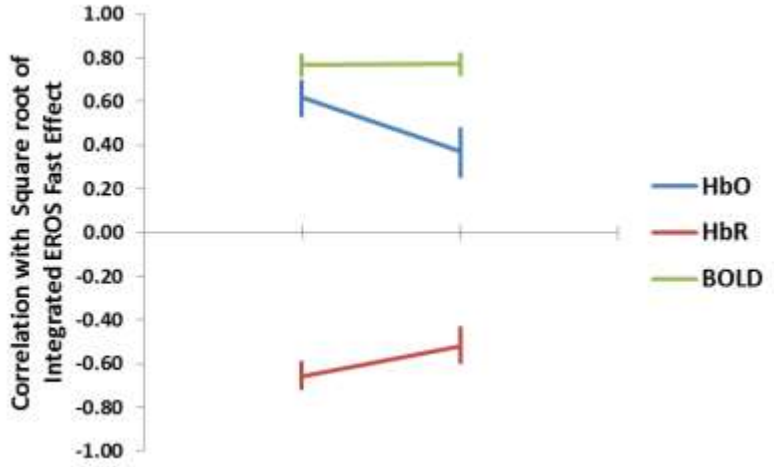
Compliance and white matter



Neurovascular coupling in young and older adults







Fabiani et al. (2014, *NeuroImage*)

Florin and Sanda Dolcos

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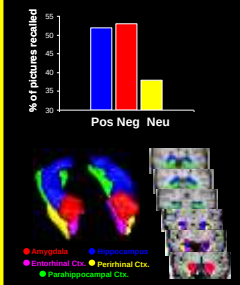

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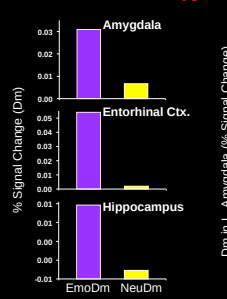

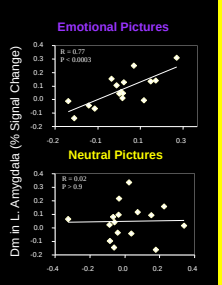

Dolcos, LaBar, & Cabeza (2004a), *Neuron*

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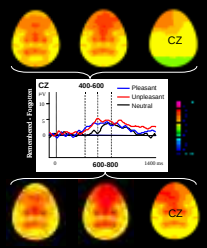

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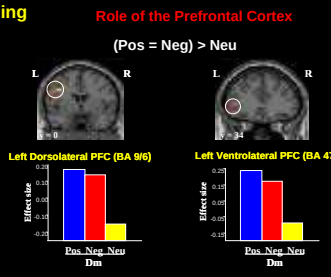

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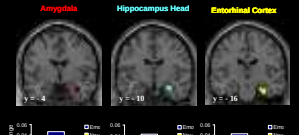

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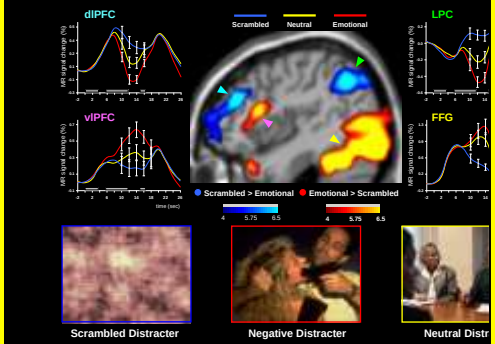

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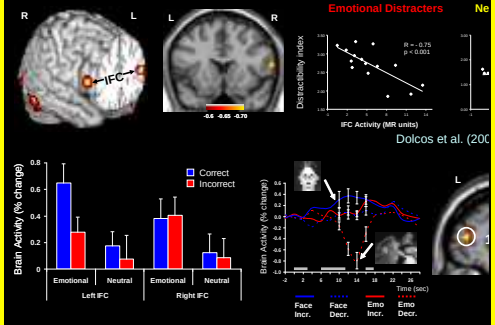

Dolcos et al. (200

Dolcos et al. (2008), *N*

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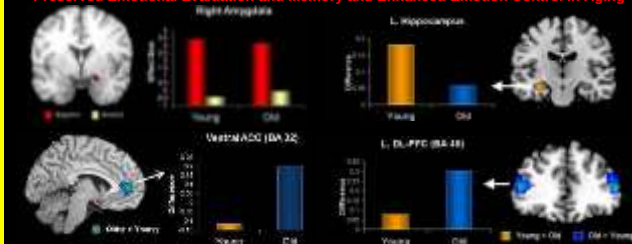

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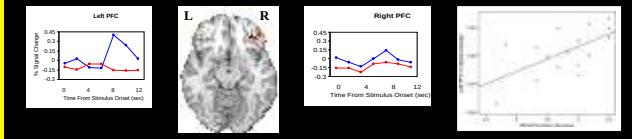

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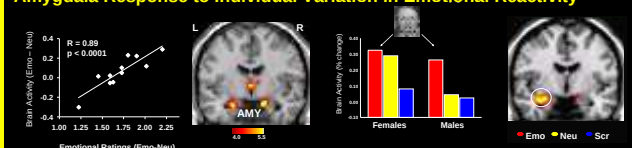

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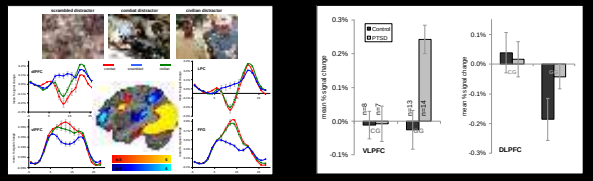

Morey, Dolcos, et al., (2009), *Journal of Psychiatry Research*

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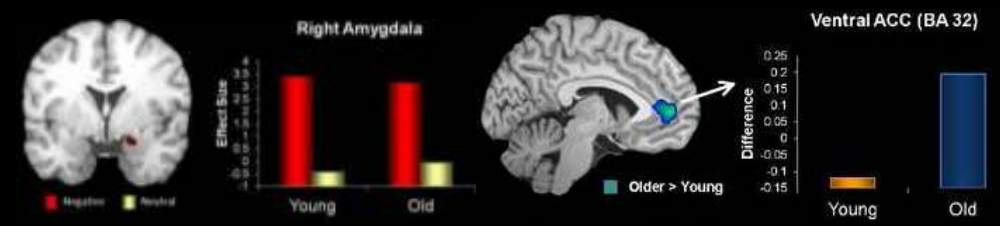

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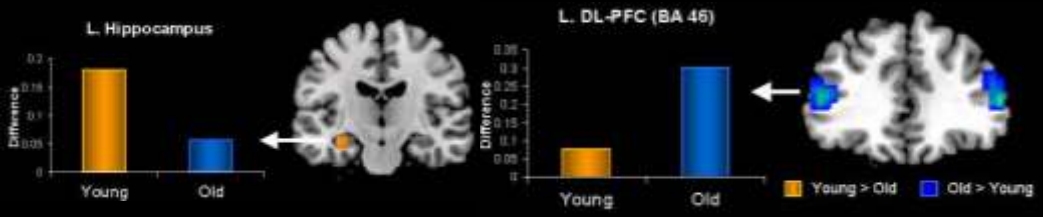

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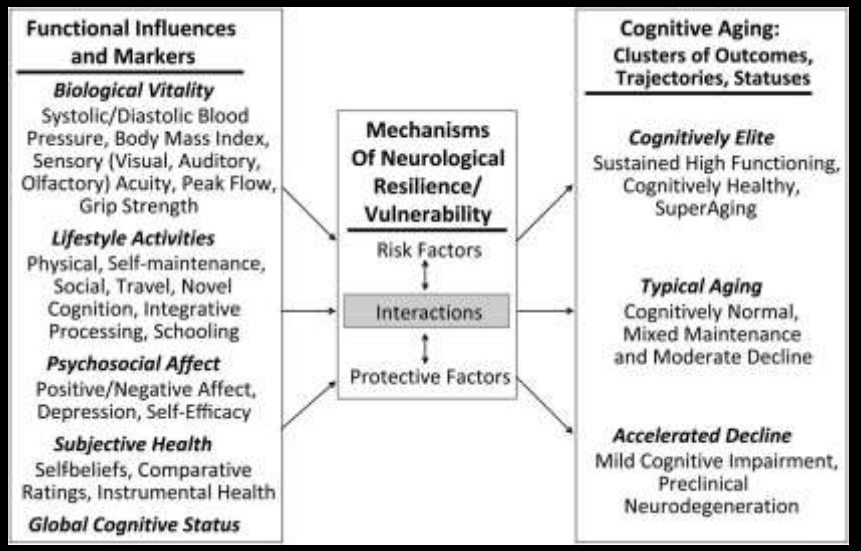

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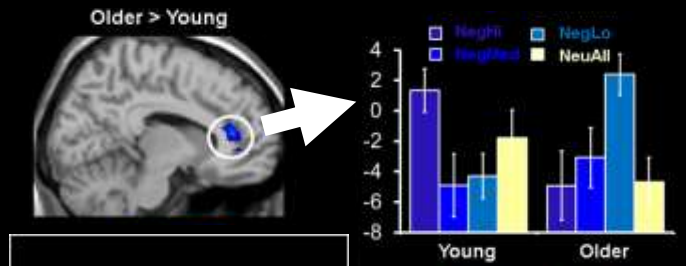

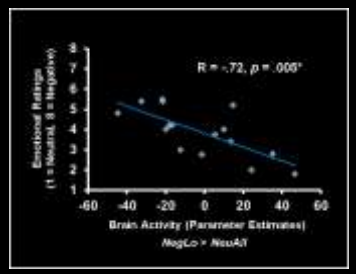

Evidence for Spontaneous Emotion Regulation in Older Adults: Increased activity in the ventral anterior cingulate cortex (vACC) correlated negatively with the behavioral ratings for low-arousing negative pictures, in older adults. NegLo, Negative Low-Arousal; NeuAll, Neutral All.

Dolcos S. et al. (2014), *Frontiers in Psychology*

Derived Ongoing Research & Future Directions:

- Factors influencing the positive affective bias in healthy aging.
- Age-related differences in social cognition and decision-making.
- Generational differences in non-verbal communication.
- Stereotype threat in aging: mechanisms and interventions.
- Incorporation of eye-tracking and ERP recordings.

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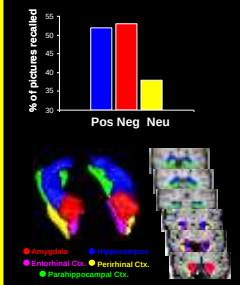

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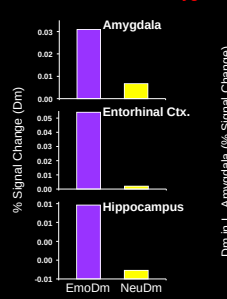

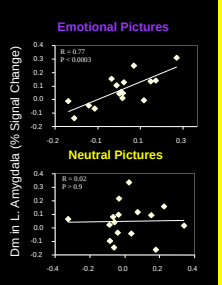

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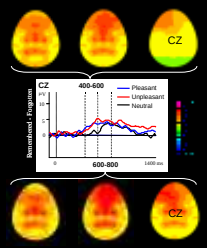

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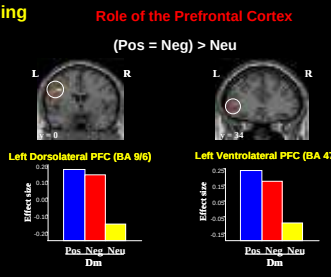

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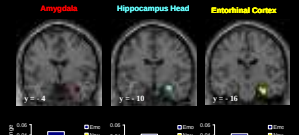

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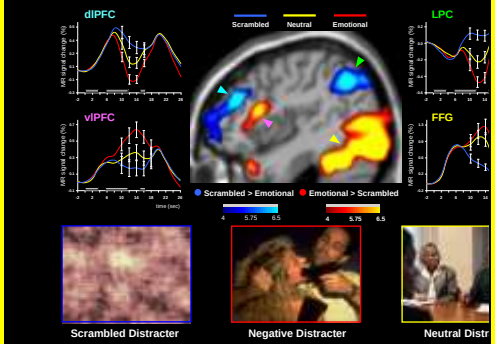

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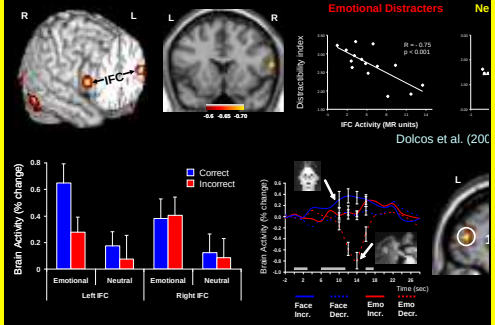

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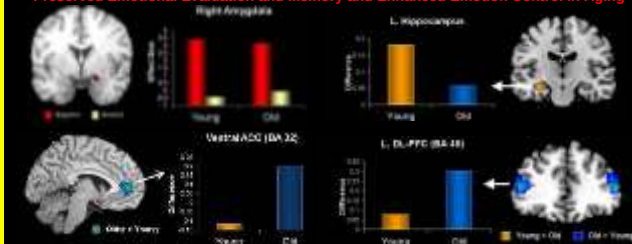

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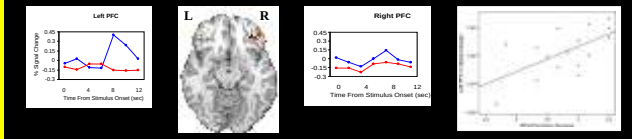

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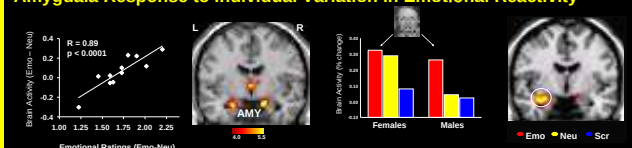

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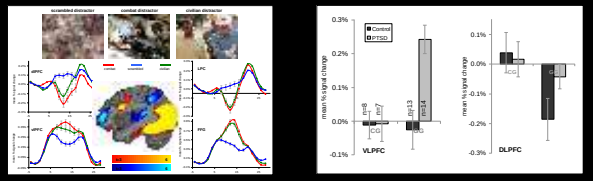

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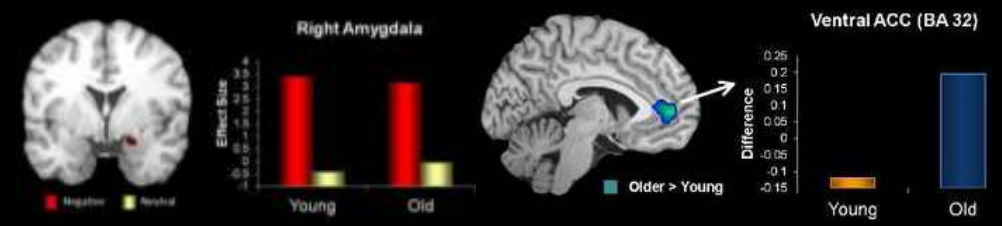

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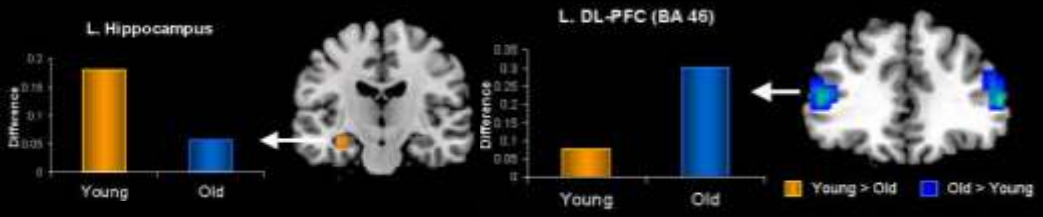

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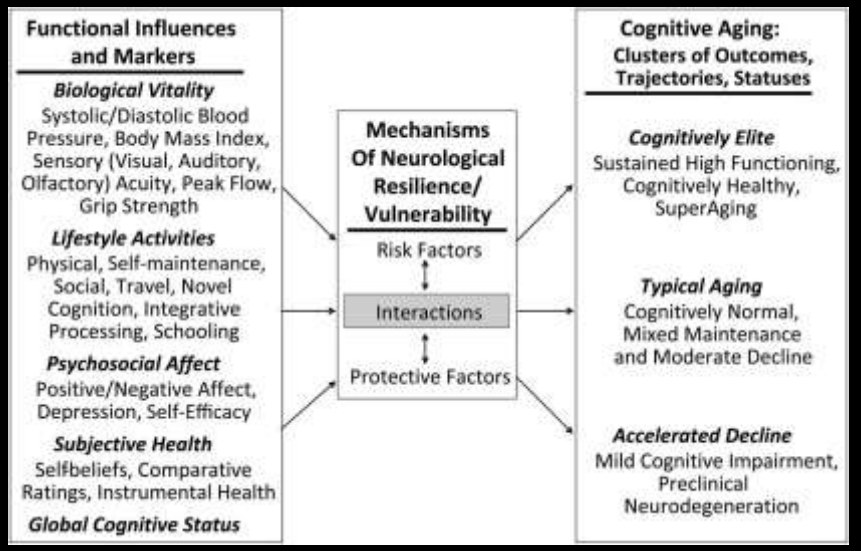
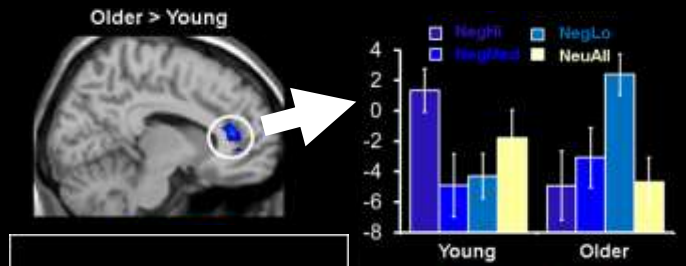
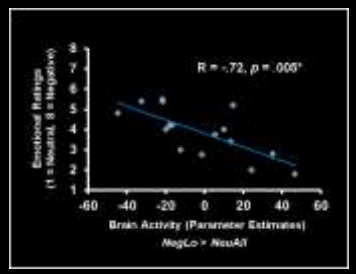


Dolcos S. et al. (2012), *Neuropsychology*





Evidence for Spontaneous Emotion Regulation in Older Adults: Increased activity in the ventral anterior cingulate cortex (vACC) correlated negatively with the behavioral ratings for low-arousing negative pictures, in older adults. NegLo, Negative Low-Arousal; NeuAll, Neutral All.

Dolcos S. et al. (2014), *Frontiers in Psychology*

Derived Ongoing Research & Future Directions:

- Factors influencing the positive affective bias in healthy aging.
- Age-related differences in social cognition and decision-making.
- Generational differences in non-verbal communication.
- Stereotype threat in aging: mechanisms and interventions.
- Incorporation of eye-tracking and ERP recordings.

DISCUSSION?

NEXT:
Posters
Beckman Atrium

Happy Hour
5:30-