

**U13 Bedside-to-Bench Conference Series
Sensory Impairment and Cognitive Decline**

October 2 – 3, 2017

Bethesda North Marriott Hotel and Conference Center

Risk factors for neurodegeneration of brain, eyes, and ears: from genetics to society

Luigi Ferrucci, MD, PhD

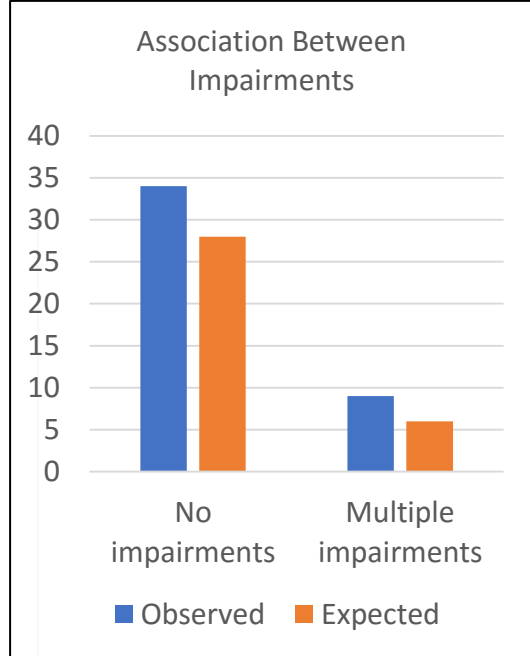
National Institute on Aging, NIH

Baltimore, MD

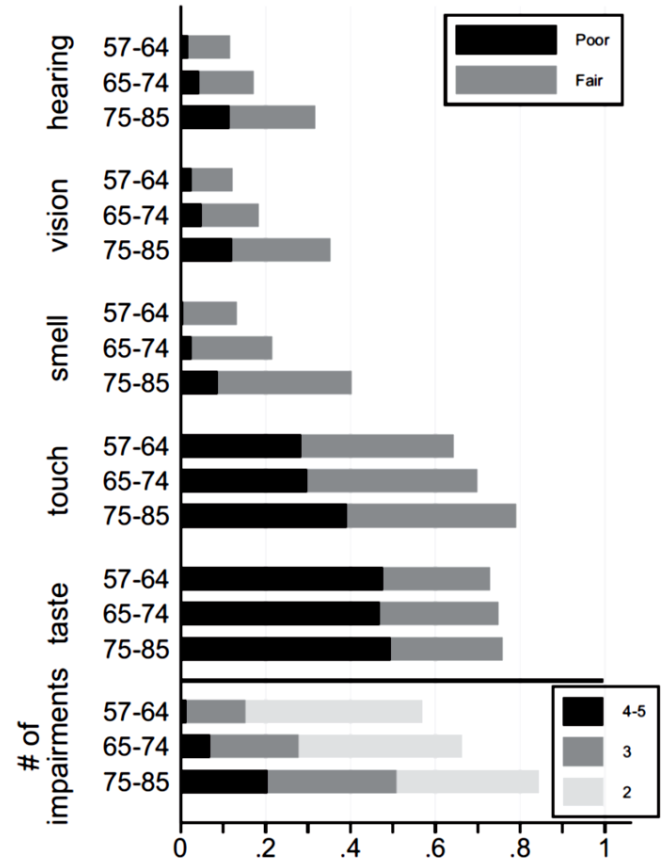


Global Sensory Impairment in Older Adults in the United States

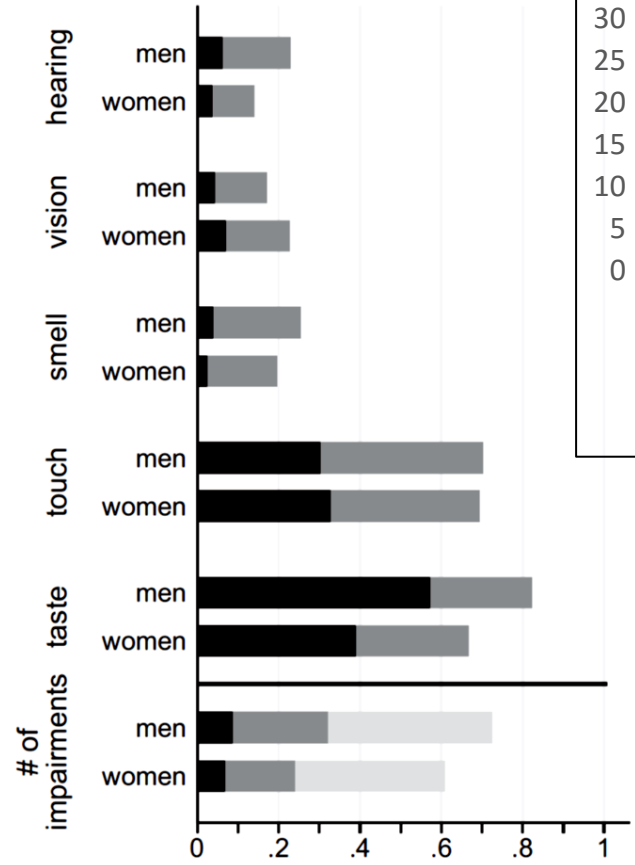
Camil Correia et al.



Age



Gender

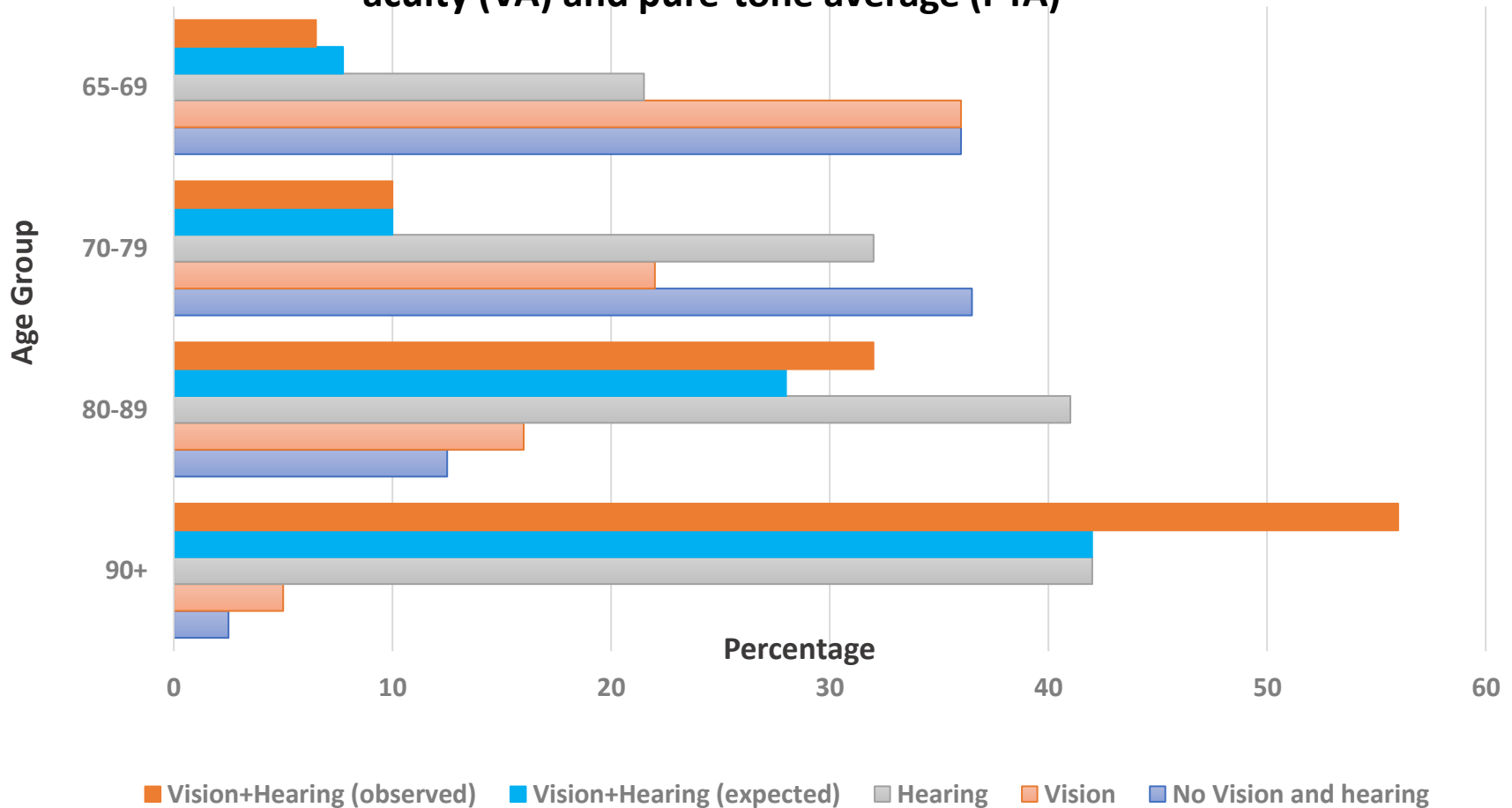


Estimated Prevalence Among Older U.S. Adults

Prevalence of vision, hearing, and combined vision and hearing impairments in patients with hip fractures

Else Vengnes Grue, Marit Kirkevold and Anette Hylen Ranhoff

Severe visual and hearing impairments assessed by visual acuity (VA) and pure-tone average (PTA)



332 patients with hip fractures from October 2004–July 2006

Comorbidity

hypertension and cardiovascular disease,
cerebrovascular disease, smoking, diabetes,
autoimmune

Genetic and
Epigenetic

Information
Processing

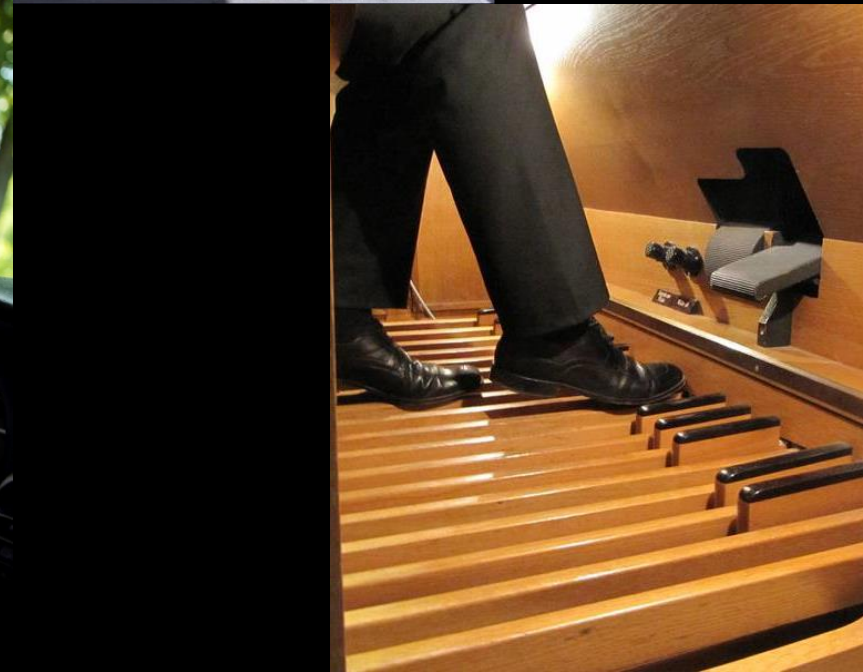
Neurodegenerative
diseases

Plasticity

Environmental
exposure

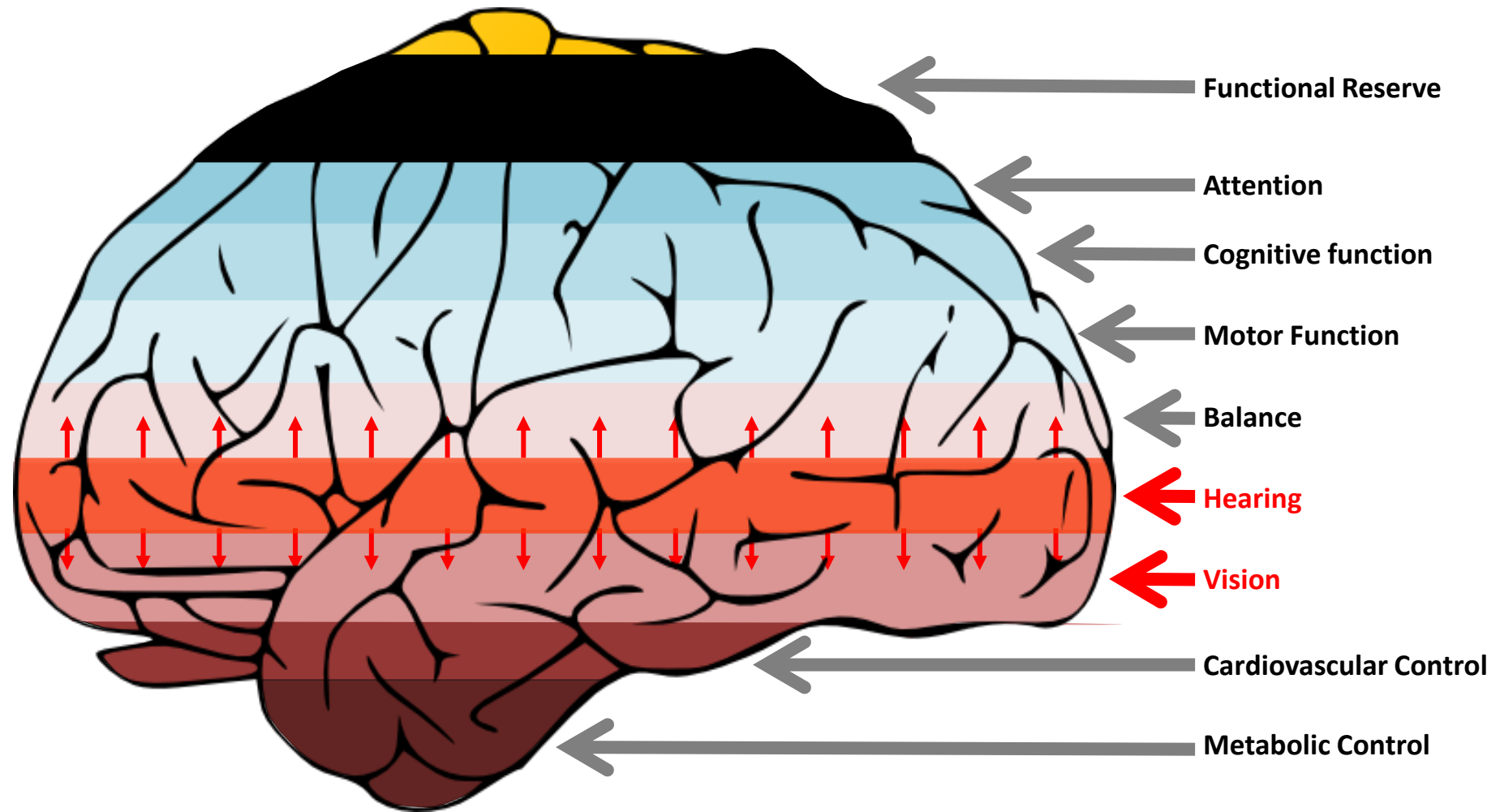


PROCEDURE FOR SIMULTANEOUSLY
WALKING & CHEWING GUM
Sheet 1 of 4 : No model Patent No. 2,876,310,746,521



The Domains of Brain Resources

Total Capacity, Resource Allocation, Plasticity, Functional Reserve

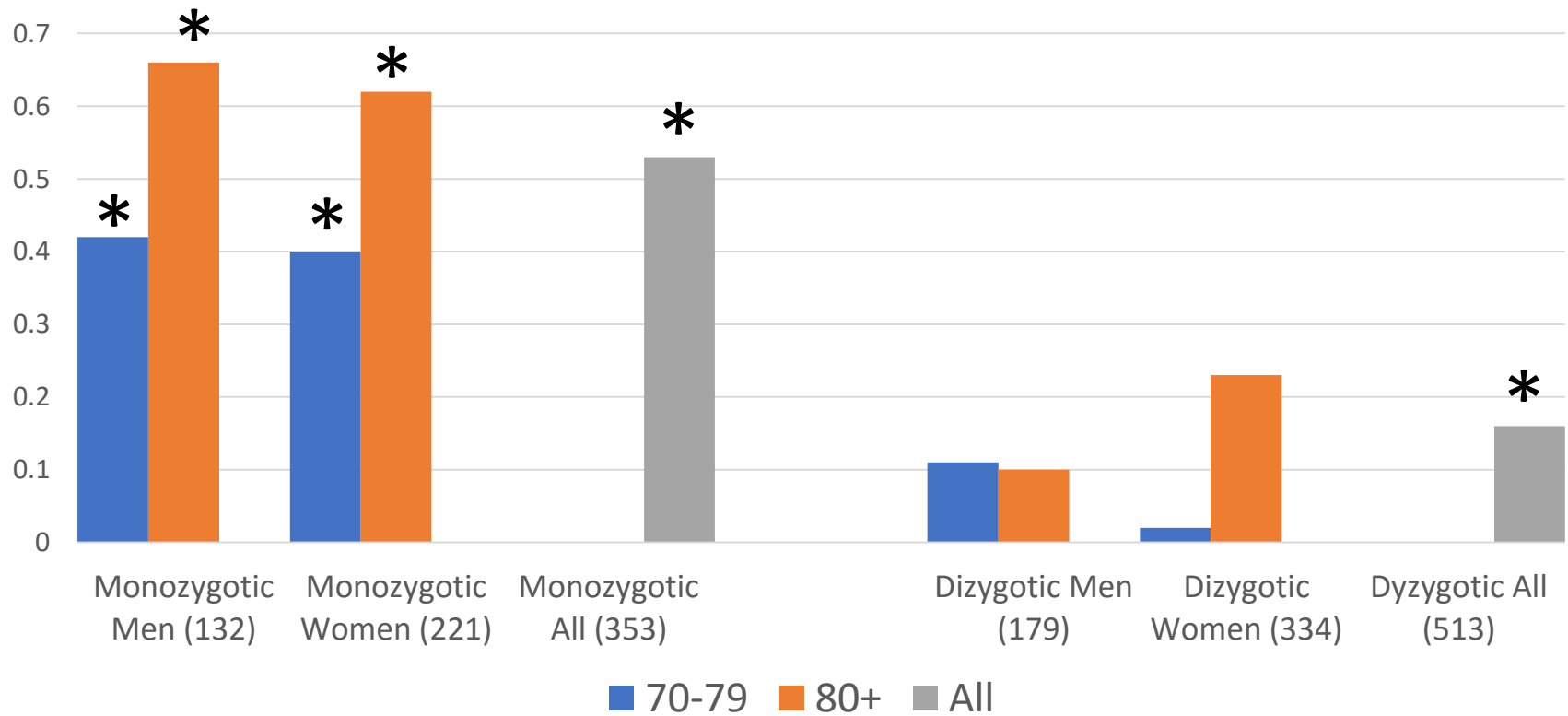


- Dual Task creates competition for brain resources
- In young and healthy individuals, additional resources can be pulled from reserve (plasticity)
- In older individuals functional resources and plasticity are constrained, leading to dysfunction

Genetic and Environmental Influences on Self-Reported Reduced Hearing in the Old and Oldest Old.

Kaare Christensen et al. J Am Geriatr Soc 49:1512–1517, 2001.

Tetrachoric Correlation for Reduced Hearing in Danish Twins
Age 70 and Older

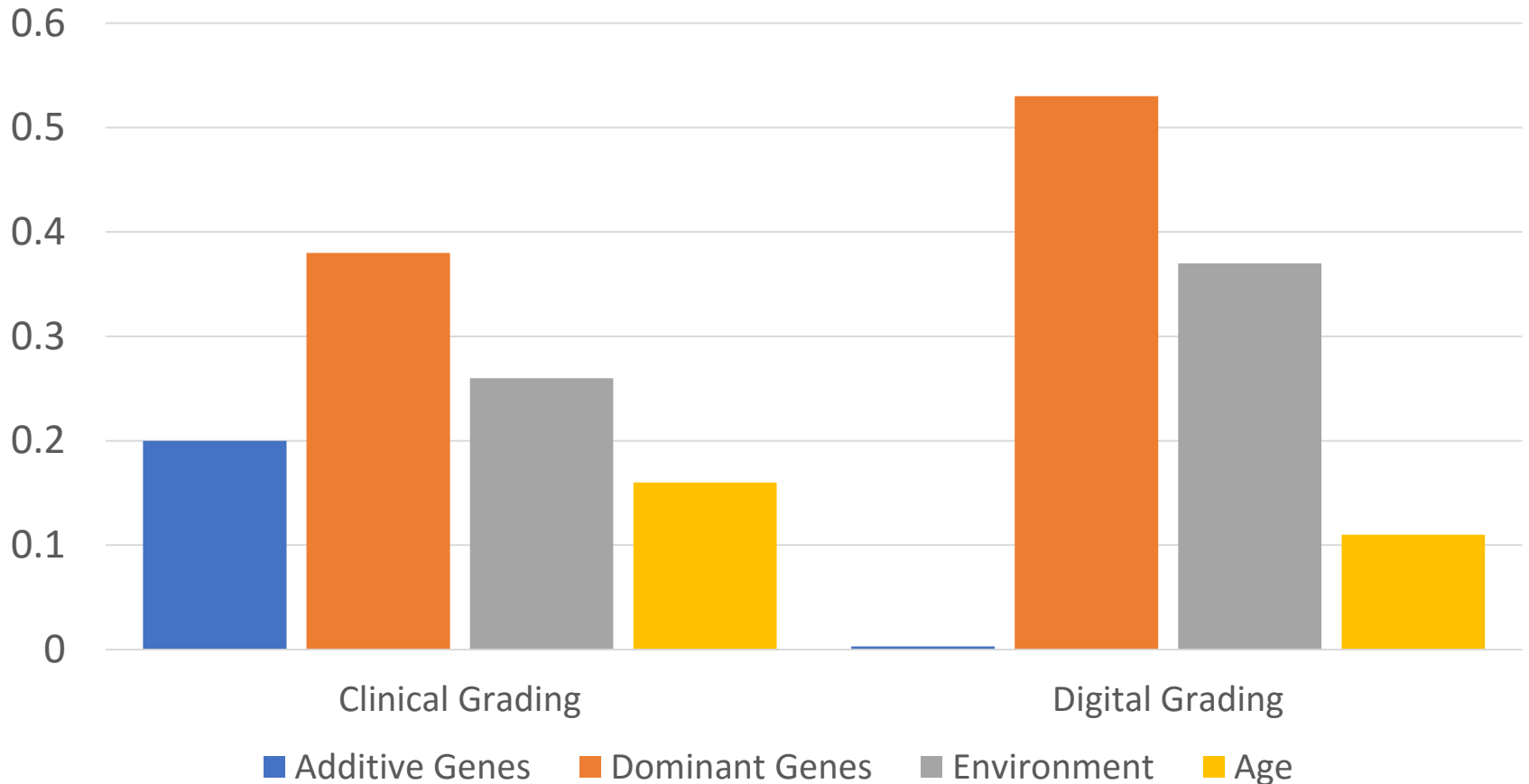


* p<.05

The Heritability of Age-Related Cortical Cataract: The Twin Eye Study

Christopher J. Hammond et al. (Invest Ophthalmol Vis Sci. 2001;42:601–605)

Standardized Parameter Estimates of the Best-Fitting Models of Cortical Cataract for Clinical and Digital Grading Systems



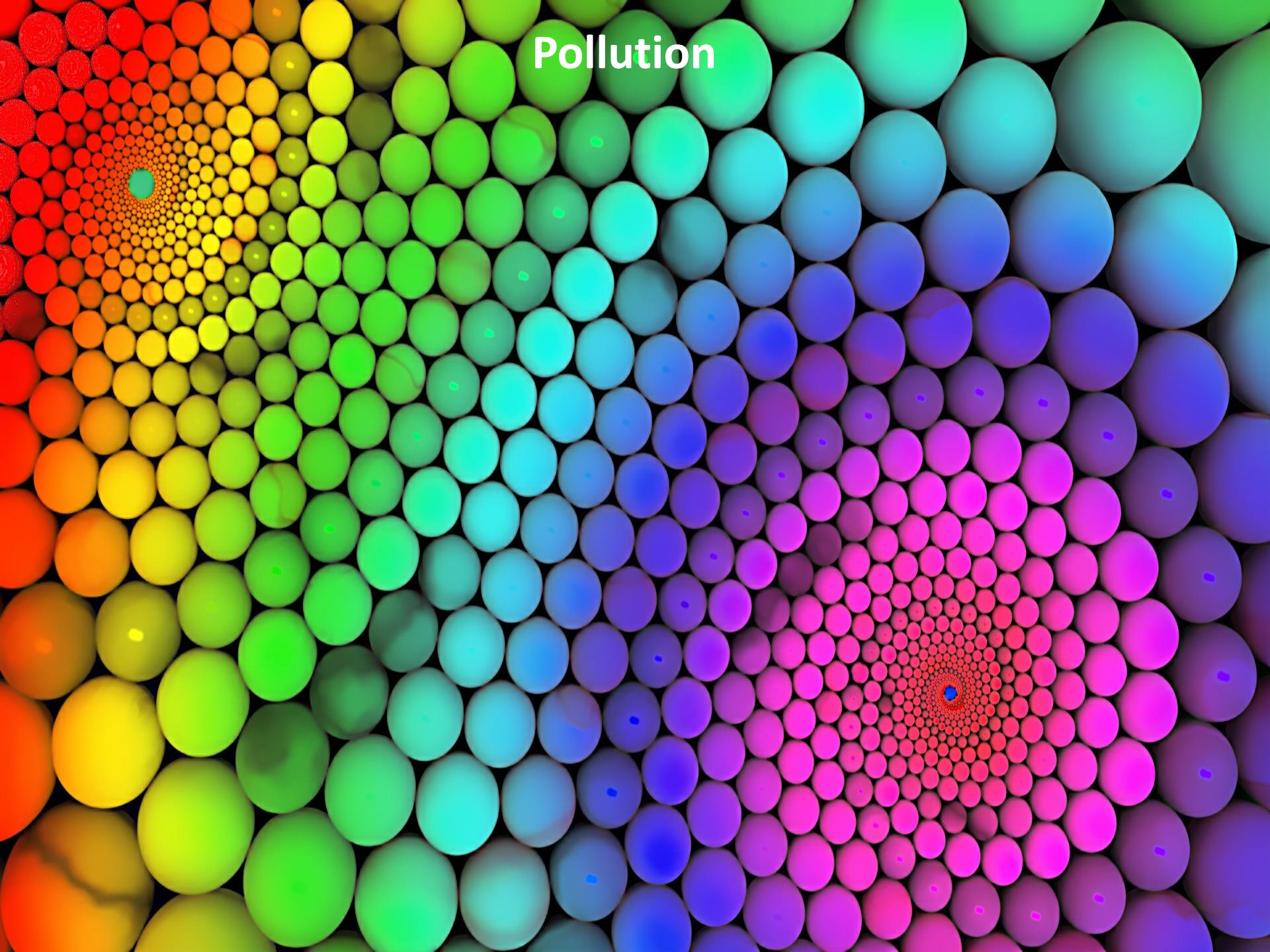
506 twin pairs, 226 monozygotic (MZ) and 280 dizygotic (DZ) (age 40-79) from the St. Thomas' United Kingdom Adult Twin Registry (UK)

Pollution

Image © Gerald Scarfe All Rights Reserved.



Pollution



Synopsis

- Performance in Vision and hearing decline with aging. Whether the rate of decline in these dimensions are longitudinally correlated is uncertain.
- Mechanisms of joined decline are not understood, likely multifactorial.
- Neurodegenerative disease often cause sensory function impairment
- Sensory problem have genetic, behavioral or environmental factors.
- Mechanisms for effect on the brain:
 - Reduction of sensory function may overload the brain circuitry by pulling excess resources to cope with the poor signal to noise.
 - Long term deafferentation may also contribute to a progressive decline of brain integrity
 - Multiple sensory impairments may be affected by the same disease
- Most literature focuses on vision and hearing, smell and taste decline are important as well and connected to diseases.
- Multiple sensory impairments should be studied from a multidisciplinary perspective, especially in older persons.



Questions?