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The Challenge of Aging – Sensory, Cognitive, Socio-Emotional and Health Changes in Old Age



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life is on

Defining 'old age'

- Counted years of age
 - W. James (1890): Nothing changes after 30
- Physiological age, e.g. fitness, wrinkles, grey hair, pit stops per night, menopause
- Life events, e.g. retirement (WHO definition), new job, widowed, grand-parenthood, late parenthood
- Functional age: Go-gos, Slow-gos, No-gos: Age of attitude, moral, lifestyle
- Intellectual, cognitive age, e.g. wisdom, flexibility...
- Speaking about the old days
- Subjective age



Defining 'old age'

Subjective Age



NOTE: The solid line represents the convergence of actual chronological age and subjective age (that is, for example, a 25-year-old feels 25 years old). The dotted lines represent Montepare and Lachman's findings in regard to the relationship between actual age and subjective age. Their research suggests that, except in the mid-20s, there is a discrepancy between an individual's chronological age and subjective age.

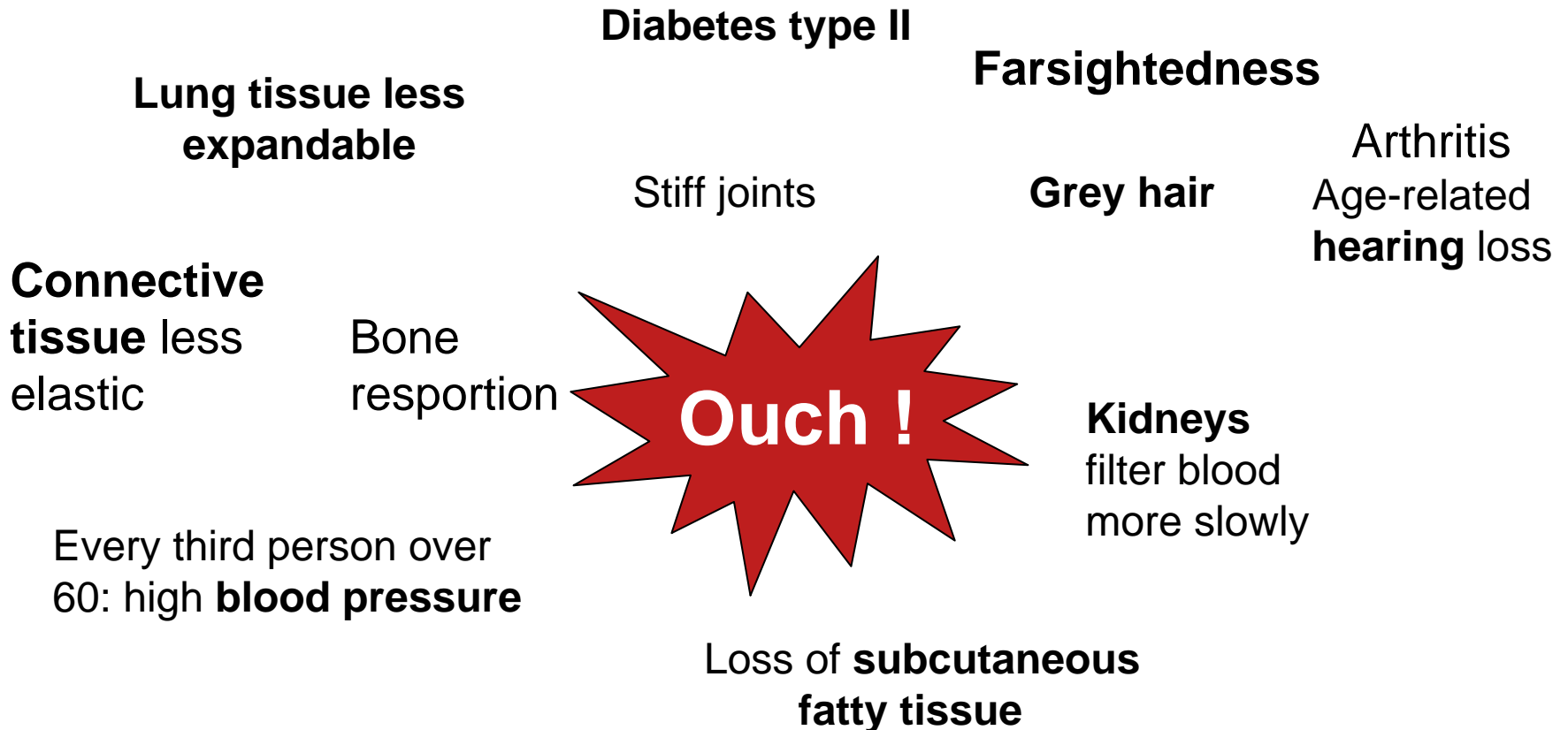
Agenda

The Challenge of Aging – An Overview:

- ❖ Ability or functional changes in old age
- ❖ Contextual changes in old age
- ❖ Compensating in old age

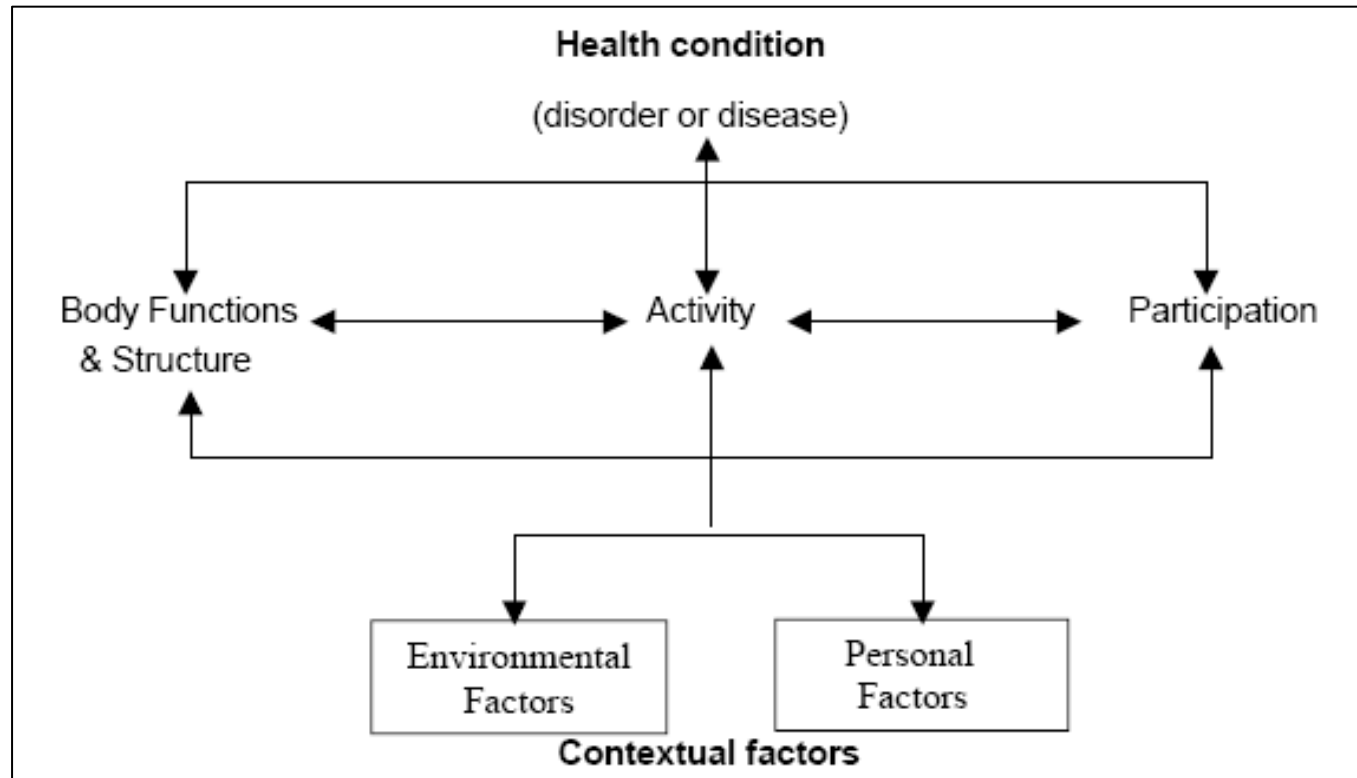
Aging affects many organs and body systems

With age: increasing numbers of chronic conditions and comorbidities!



The impact of functional change

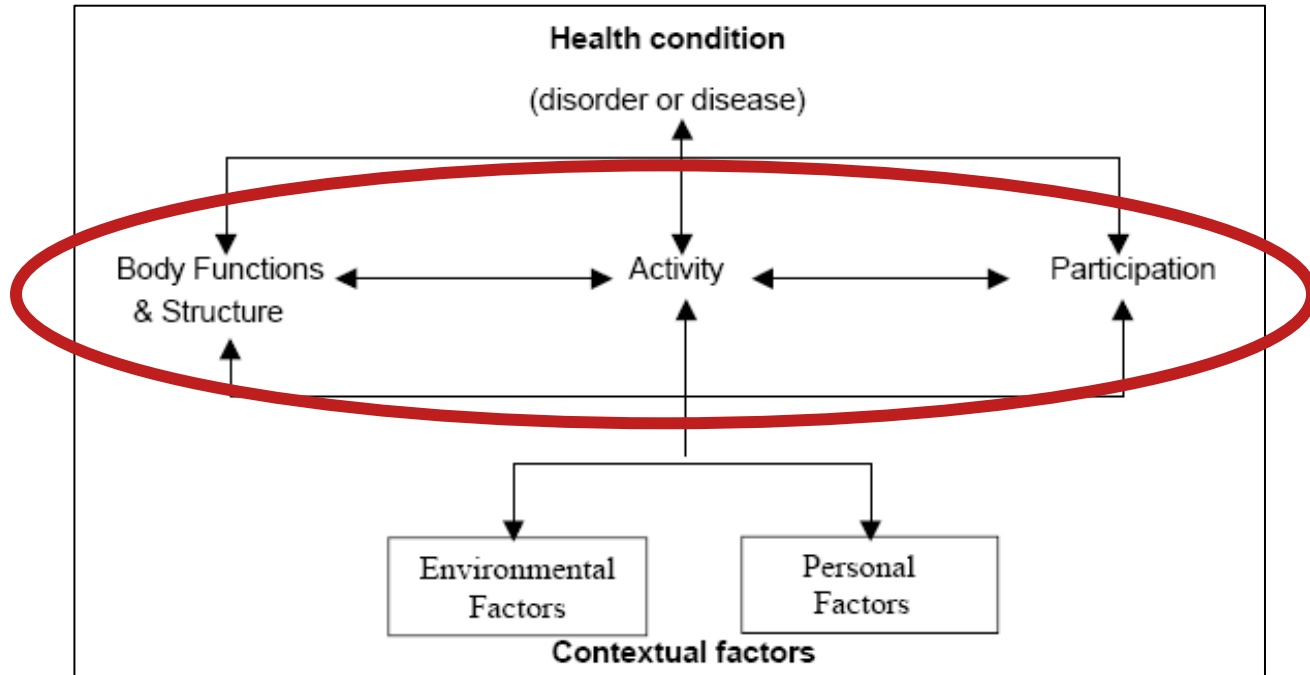
International Classification of Functioning, Disability and Health (ICF, WHO 2001)



In ICF disability and functioning are viewed as outcomes of ***interactions between health conditions*** (diseases, disorders and injuries) ***and contextual factors***.

The impact of functional change

International Classification of Functioning, Disability and Health (ICF, WHO 2001)



Three levels of human functioning:

- level of body or body part
- the whole person, and
- the whole person in a social context



Three levels of functional changes:

- **impairments**, e.g. hearing loss
- **activity limitations**, e.g. using the telephone
- **participation restrictions**, e.g. contact friends

Sensory decline

Age-related visual impairment

Visual acuity

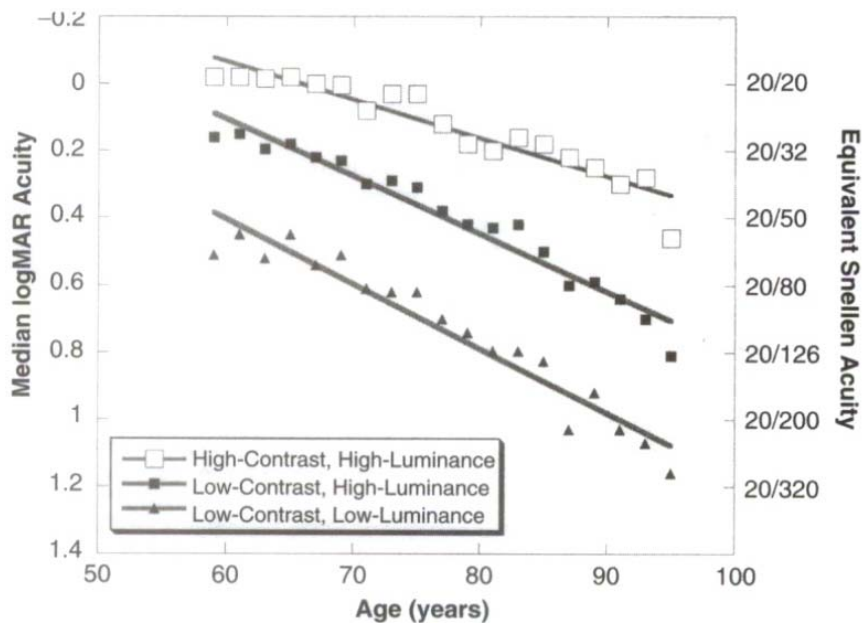


Figure 7.5 Visual acuity as a function of age and varying stimulus contrast and luminance. Source: Haegerstrom-Portnoy, Schneek, and Brabyn (1999).

Color discrimination

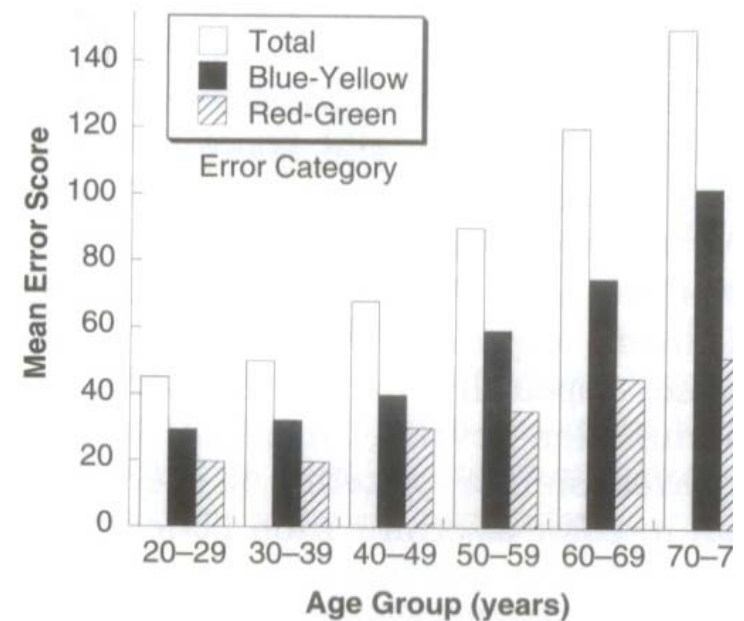


Figure 7.10 Error scores on Farnsworth–Munsell 100 hues test of color discrimination as function of age. Source: Kinnear and Sahra (2002).

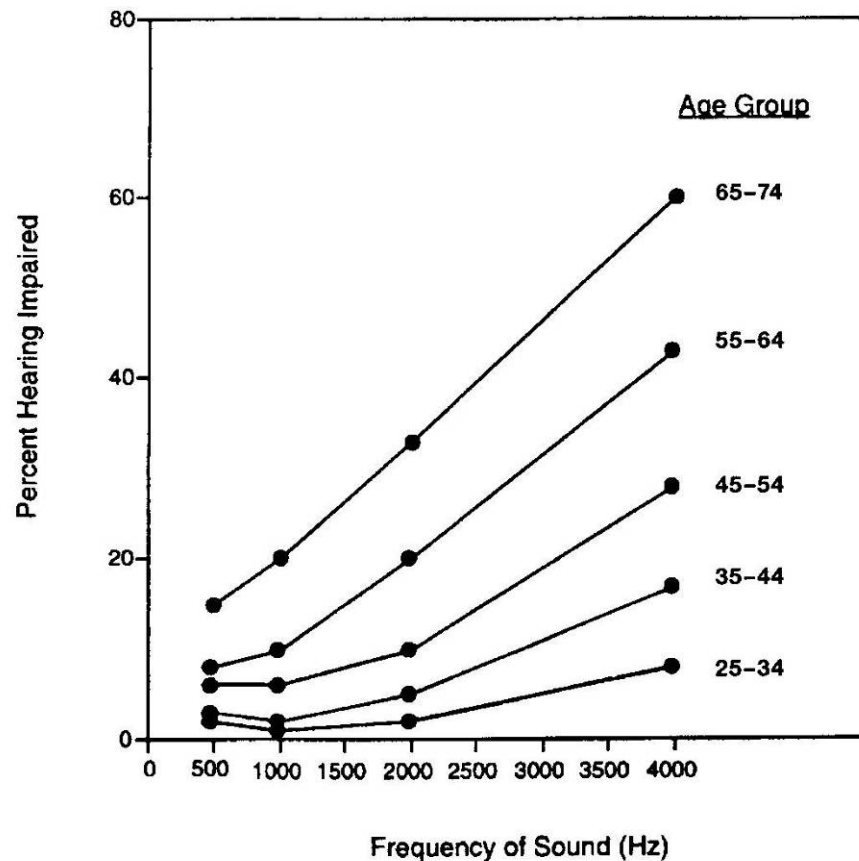
- Visual impairment often combined with dexterity problems make it difficult to handle small devices

Sensory decline

Age-related hearing impairment

- Hearing impairment is often age-related, affecting primarily high frequencies

FIG. 10.2.
The percentage of adults in five age groups showing a hearing impairment for tones presented at various sound frequencies representing the frequency range for speech. The data are taken from a large-scale study conducted by the National Center for Health Statistics (U.S. Congress, Office of Technology Assessment, 1986). Adapted with permission.



What's more to hearing? From Hearing to *Listening, Comprehending, Communicating*

Auditory sensory input

Visual input

(lips, mimic, gesture...)



Kiessling et al 2003, IJA

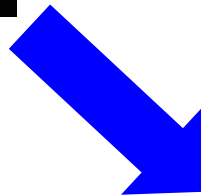
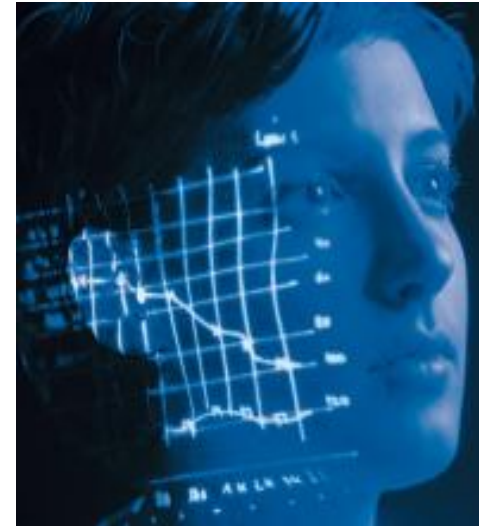
Be awake, pay attention, concentration

Hold info in short term
and working memory

Know words

meaning, grammar

Integrate information in
long term memory



Fast and parallel processing

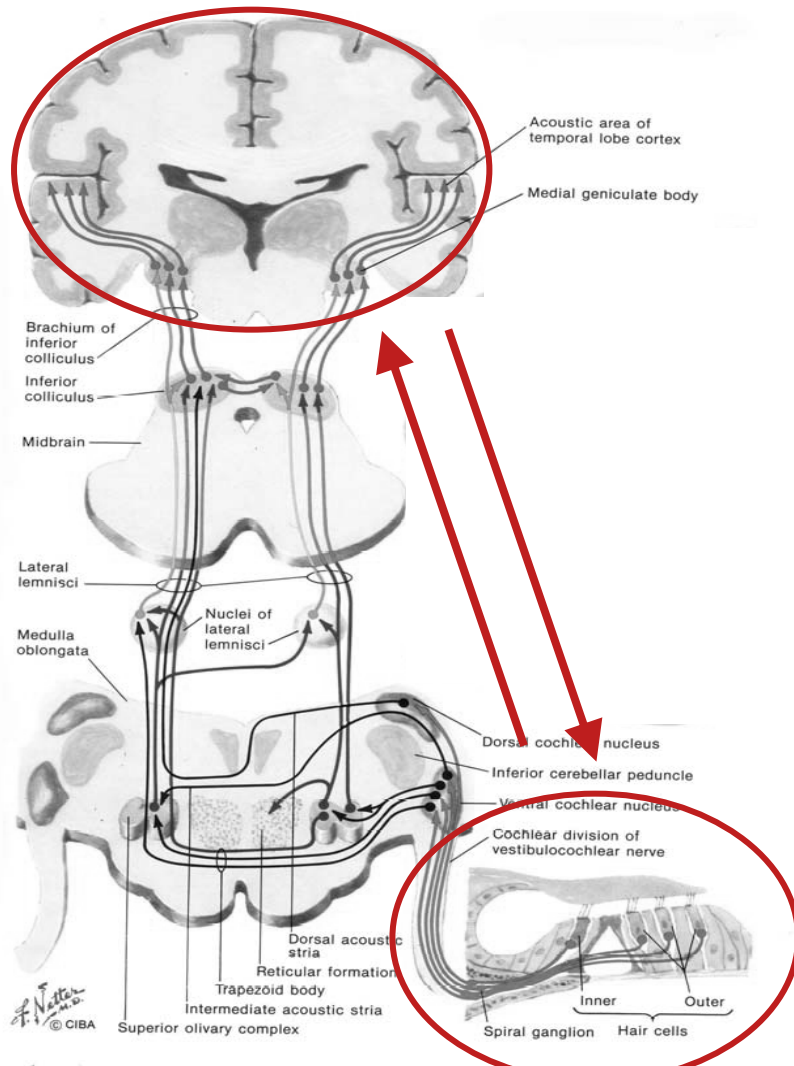
Flexibility

Social rules, context

Read between the lines



Bottom-up & Top-down processing

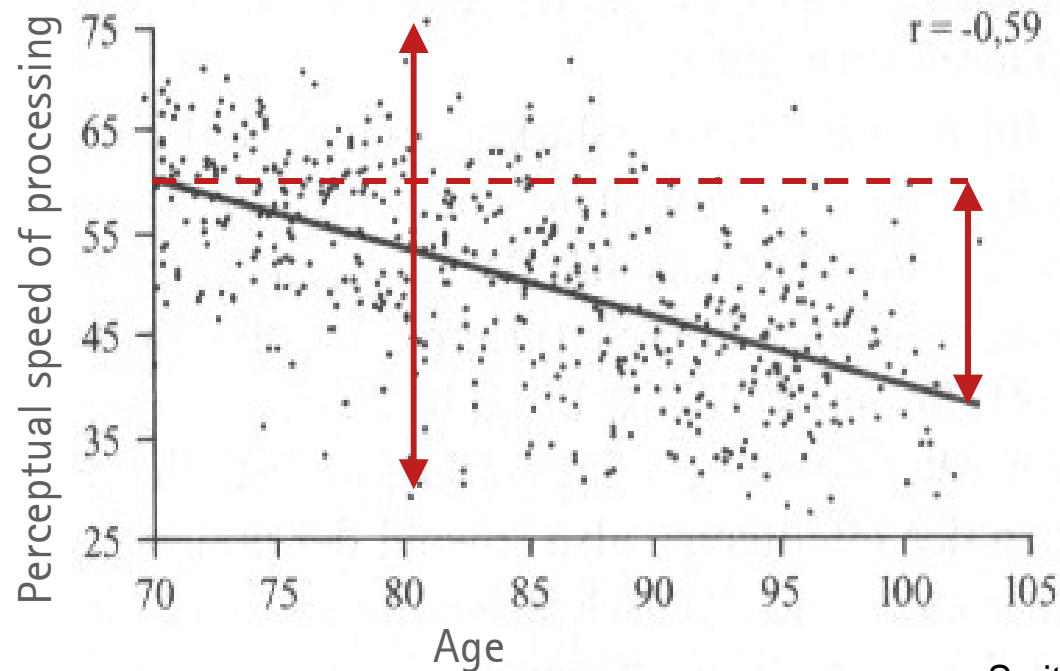


- **Bottom-up processing:** from physical signal of the acoustic input up through words, phrases, and sentences.
- **Top-down processing:** Perception of speech is facilitated by linguistic context and expectations of listeners
 - Words can be recognized in fluent speech long before their full acoustic duration has been completed or in hindsight (Marslen-Wilson, 1987)
- Speech represents a **continuous bottom-up-top-down interaction**. This is the reason why speech can be processed as rapidly as it is.

Cognitive changes in old age

Slowing in speed of processing

Enormous inter-individual differences between elderly people



Smith & Baltes, 1996

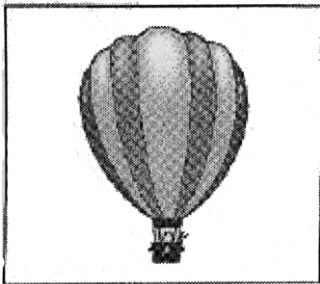
- Often differences are bigger between persons of the same age group than between persons of different age groups.

Cognitive changes in old age

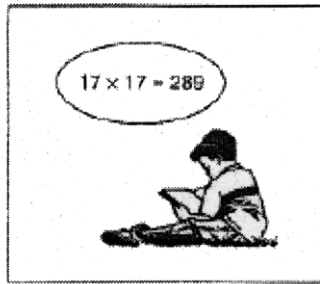
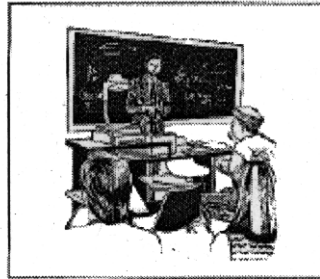
Memory problems

Different types of memory:

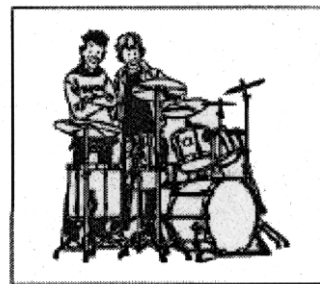
Very few differences between Young and Old !



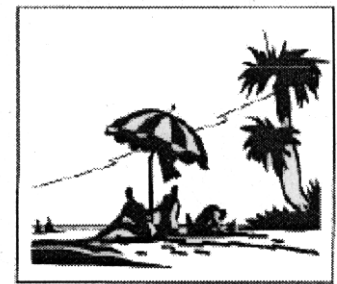
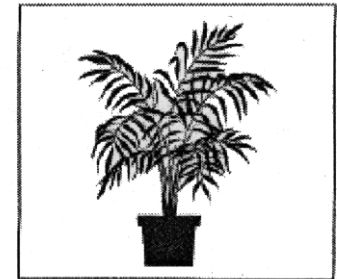
**Episodic
Memory !!!**



**Semantic
Memory**



**Procedural
Memory**



**Implicit
Memory**

Cognitive changes in old age

Working memory span

Holding and manipulating of recently received information

Example: The man who sold the car to the woman had red hair

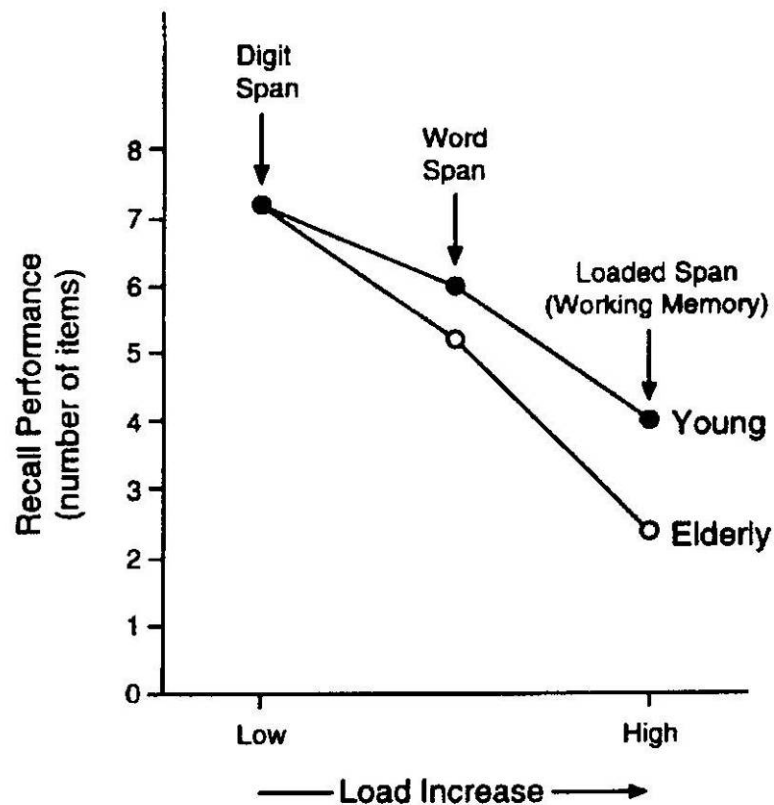
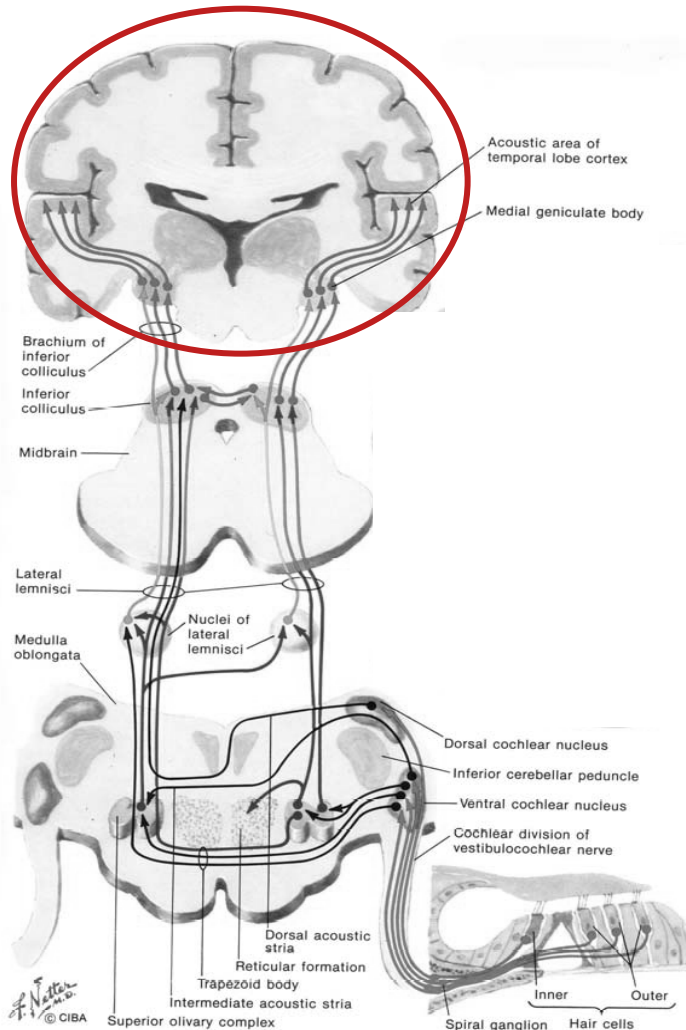


FIG. 10.3.

Younger and older adults were tested for their ability to recall lists of spoken digits (digit span), lists of words (word span), and the final words of sets of sentences presented for comprehension (loaded span). Adapted with permission from A. Wingfield, E. A. L. Stine, C. J. Lahar, and J. S. Aberdeen, 1988.

Typical cognitive changes in old age

Change - win and loose



- General slowing of information processing
- Difficulties in processing parallel, interfering information – divided attention, inhibition
- Reduced capacity of working memory
- Broader semantic knowledge
- Better use of context information and listening strategies

**Top down compensation
for
bottom-up sensory decline**

Hearing impairment impacts *Hearing, Listening, Comprehending and Communicating*

Problems in communicating

- No longer able to participate
- No longer able to use the phone
- Isolated, within one's own world, focused solely on oneself

A sense of insecurity in everyday life

- Disorientation: Especially in road traffic
- Warning and information sounds
- Environmental sounds

Limitations on quality of life

- Social and cultural activity
- Living without music, theatre, singing, sounds of nature
- *"It would be an awful silent world."*
(EHIMA 2007)



Significance of hearing impairment

Hearing impairment inevitably affects:

- Health-related quality of life
(Chia et al. 2007, Dalton et al. 2003, Lee et al. 1999, Ringdahl & Grimby 2000)
- Psychological, social and emotional functioning
(Carabellese et al. 1993) in a variety of psycho-social variables
 - Depression (Cacciatore et al. 1999, Kramer et al. 2002, Strawbridge et al. 2000, Nachtegaal et al. 2009)
 - Loneliness (Fellinger et al. 2007, Hawthorne 2008, Knutson & Lansing 1990, Kramer et al. 2002, Nachtegaal et al. 2009)
 - Anxiety, distress, somatization (Eriksson-Mangold & Carlsson 1991, Nachtegaal et al. 2009)
 - Social functioning (Cacciatore et al. 1999, Mulrow et al. 1990, Ringdahl & Grimby 2000)

Effects are different in different age groups !

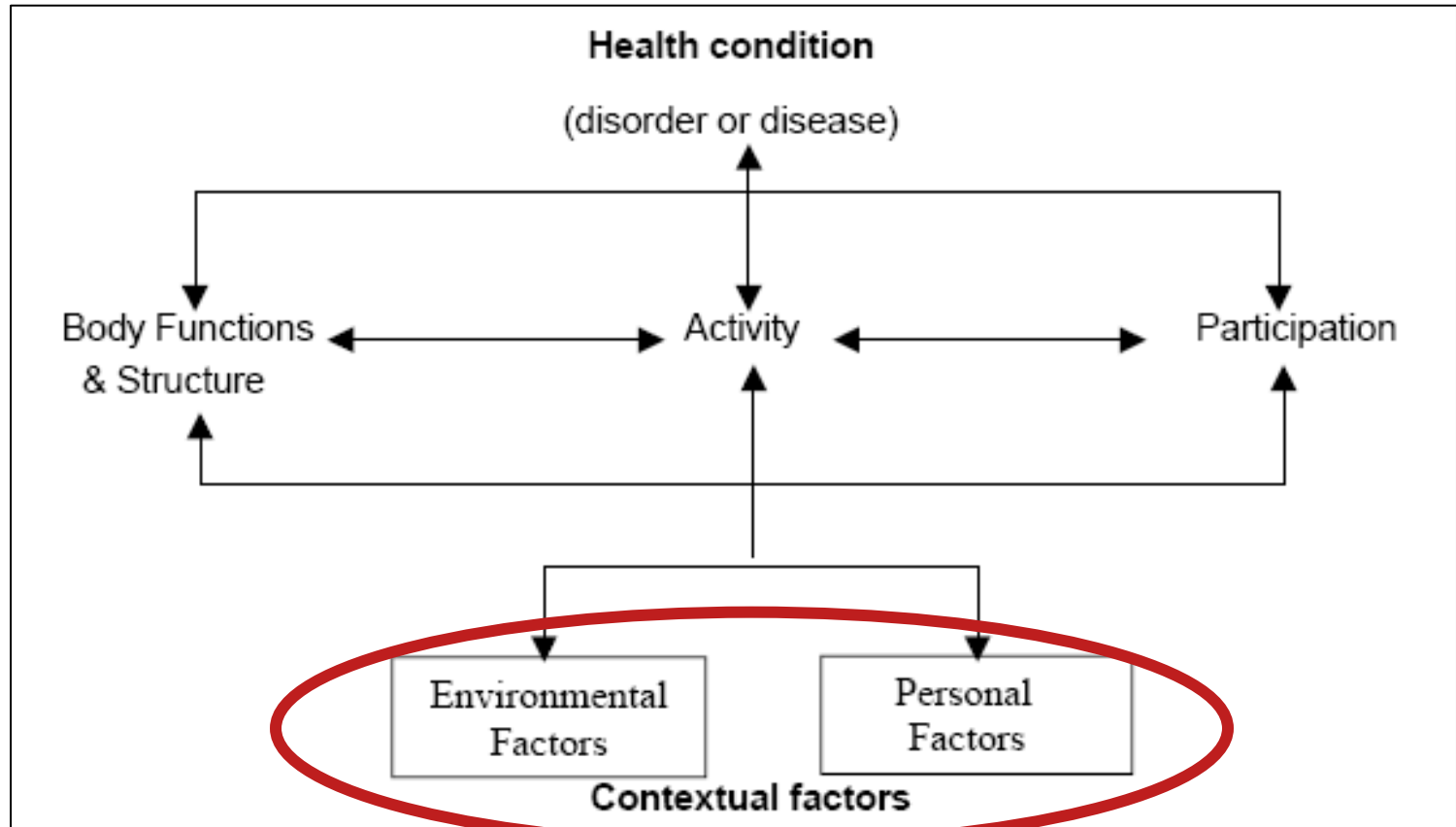
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The impact of functional change

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Contextual factors “represent the complete background of an individual's life and living”

Aging – individually different



Social Resources

Emotional Resources

Cultural Resources

Cognitive Resources

Health Resources

Economic Resources

Contextual changes in old age

Coping with life-events

- Health changes in personal network
- Change in daily routine, esp. retirement
- Death of significant others, family, friends
- Change of living conditions, esp. moving to retirement/nursing home

Contextual changes in old age

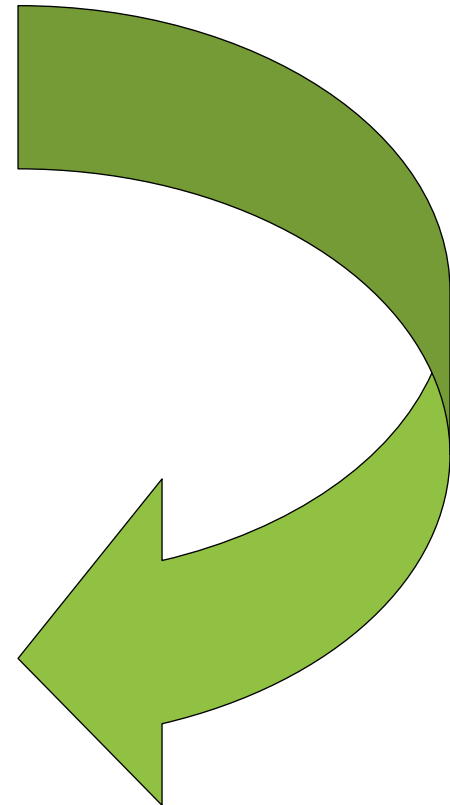
Age-specific goals, needs and values

Middle adulthood

- Capability
- Self-fulfillment
- Enjoyment
- Social involvement
- Precautions for later on

Old age

- **Health & wellbeing**
- **Safety & Security**
- **Autonomy & Mobility**
- **Social participation**



Contextual changes in old age

Environmental factors

Living, Housing

- Living arrangements, e.g. moving to smaller apartment, retirement home, nursing home
- Housing obstacles, e.g. stairs, distances, window cleaning
- Technical support, e.g. lift, door opener
- Local services, e.g. “meals on wheels”, visiting services by communities, church, support groups



Rate of nursing home residence (US, 2004)

Age 65-74:	9 per 1'000
Age 75-84:	36 per 1'000
Age 85+:	139 per 1'000

Contextual changes in old age

Environmental factors

Financials – assets, insurance

- “Money makes the world go round” – in old age too
- Sense of security, independence
- Financing of technical support, e.g. movement support, hearing instruments, glasses
- Financing of personal support, e.g. house call, nursing services, home delivery



Contextual changes in old age

Environmental factors

Technology

- People are open to the idea of using assistive technology. They want to remain independent for as long as possible into old age, and feel these products have the potential to help them.
- Older people use many technology items.
- New technologies are often not optional or difficult to avoid, e.g. voice menu systems, online accounts, ticket machines.
- 75% report experiencing difficulties in usage, e.g. seeing or comprehending text/ symbols, remembering instruction/ warning, movement control like holding/ opening a product



Contextual changes in old age

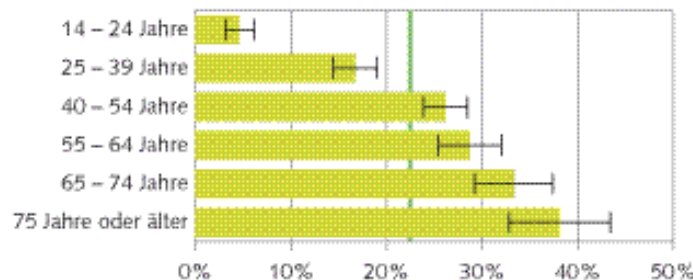
Environmental factors

Social network

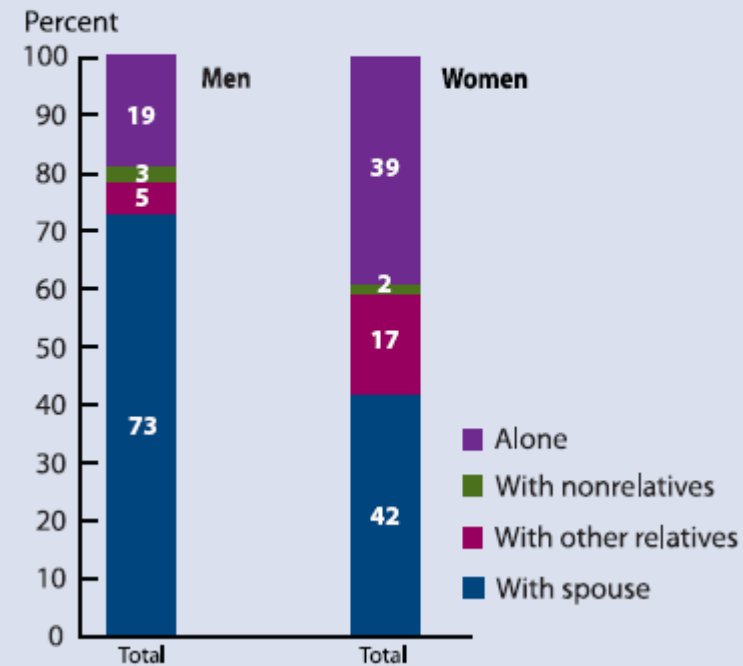
Less, but more intimate contacts in old age

High ratings of general well-being and life- satisfaction in old age

Social contacts per age group – Percentage of people, who meet with friends, relatives etc. **less than once a week**



Living arrangements of the population age 65



Agenda

The Challenge of Aging – An Overview:

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- ❖ **Compensating in old age**



Life is on, Life goes on!



Photo dpa

Jane Fonda, 71 years

Receiving a prize at an award show in Berlin last week (while wearing a corset after a surgery due to back pain)

“Either you let the pain define you or you get on with your life.”

Promoting Aerobics in 1979



Photo: AP

Compensation strategy

Selection – Optimization - Compensation



Selection
Optimization
Compensation

Arthur Rubinstein, Pianist

- He compensated for weaknesses of old age by reducing the number of piano pieces in his repertoire (**Selection**),
- by practicing more often (**Optimization**) and
- by using 'tricks', e.g. playing slower before fast passages in order for them to appear faster than he could play (**Compensation**).



Compensation for sensory impairments – *Resources for compensation in listening situations*

- Better use of listening strategies
- Better use of context information
- Better use of prosody (intonation, timing, stress)
- Broad experience with wide variety of social situations
- Broad semantic, linguistic knowledge, vocabulary



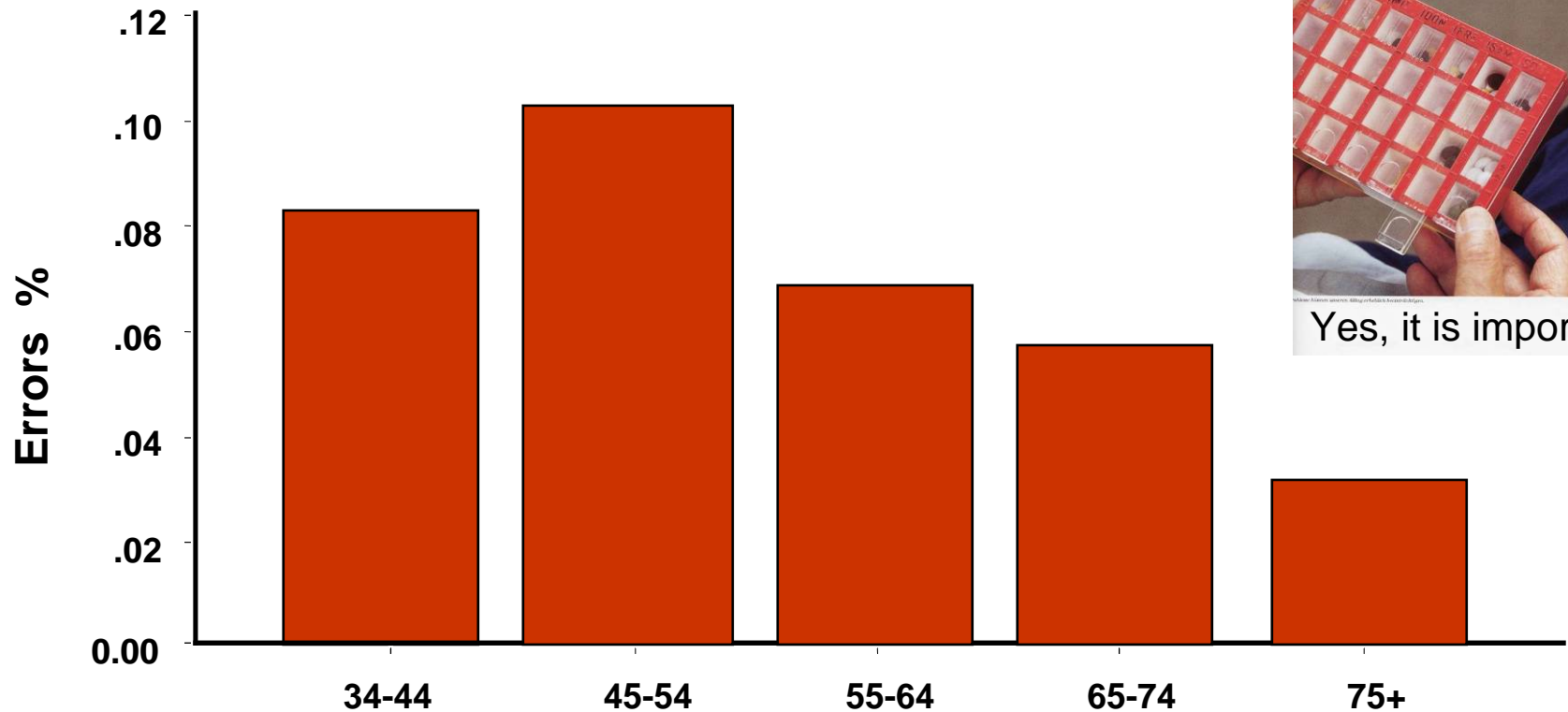
Improved sensory input, e.g. through usage of hearing systems, has the potential to reduce necessary top-down compensation and listening effort for successful comprehension.

Compensation for sensory impairments – Using aids



Compensation in everyday life – Strategy and use of aids

Error rate while taking medication:

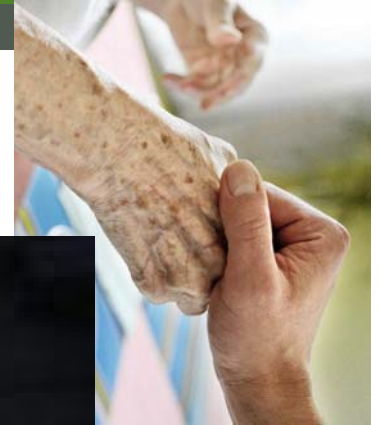


Age group (N = 121)



(Martin & Park, 2000)

Compensation in everyday life – Organizing help



Prevention starts early

All kinds of activities have the potential to shape the brain!

Start early and continue a life long!!

Use it or lose it!!!

A recipe for successful aging:

- **Physical activity**
- **Cognitive activity**
- **Social involvement**
- **Financial precautions**

Good hearing is a precondition for staying active, being involved and participating

Summary

- Aging is a multidimensional process of developmental change across the life span
- Several aspects related to aging
 - Ability/functional changes
 - Contextual changes
 - Compensation
- Multiple dimensions and multiple directions: Wins, losses, and stability. Different abilities develop differently with age
- Differentiate between age groups: Aging is different for different generations
- Aging is individually: Enormous inter-individual differences within the same age group

Thank you for your attention !

