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

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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

Old age...when you start feeling younger than you actually are?!

*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.
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!

- Lung tissue less expandable
- Connective tissue less elastic
- Every third person over 60: high blood pressure
- Diabetes type II
- Farsightedness
- Stiff joints
- Grey hair
- Arthritis
- Age-related hearing loss
- Bone resorption
- Kidneys filter blood more slowly
- Loss of subcutaneous fatty tissue
- Ouch!
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, Schneck, 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
What’s more to hearing?
From Hearing to *Listening, Comprehending, Communicating*

**Auditory sensory input**
- 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

**Visual input**
- (lips, mimic, gesture…)

Kiessling et al 2003, IJA
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:

Episodic Memory !!!
Semantic Memory
Procedural Memory
Implicit Memory

Very few differences between Young and Old!
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 
  - Social functioning (Cacciatore et al. 1999, Mulrow et al. 1990, Ringdahl & Grimby 2000)

Effects are different in different age groups!
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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

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**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

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Contextual changes in old age

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
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

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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
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!