4. Age variation and ageism

4. Age variation and ageism

- Growth and maturation
- Ageing and senescence

4. Age variation and ageism

- **GROWTH AND MATURATION**
  - **The increasing gap between biological maturation and social maturity in modern culture**
- **AGEING AND SENESCENCE**
  - **The increasing gap between social and biological ageing in modern culture**

Some definitions about age variation

Growth/development/maturation

- early processes in the life course that enhance the functional capacities of the individual

Ageing:

- individual ageing: chronological development over the life course
- population ageing:
  - Population dejuvenation
  - Population greying

Senescence

- age-related changes that leads to the gradual and generalised regression of the mental and physical functions ending in death

Definitions of senescence

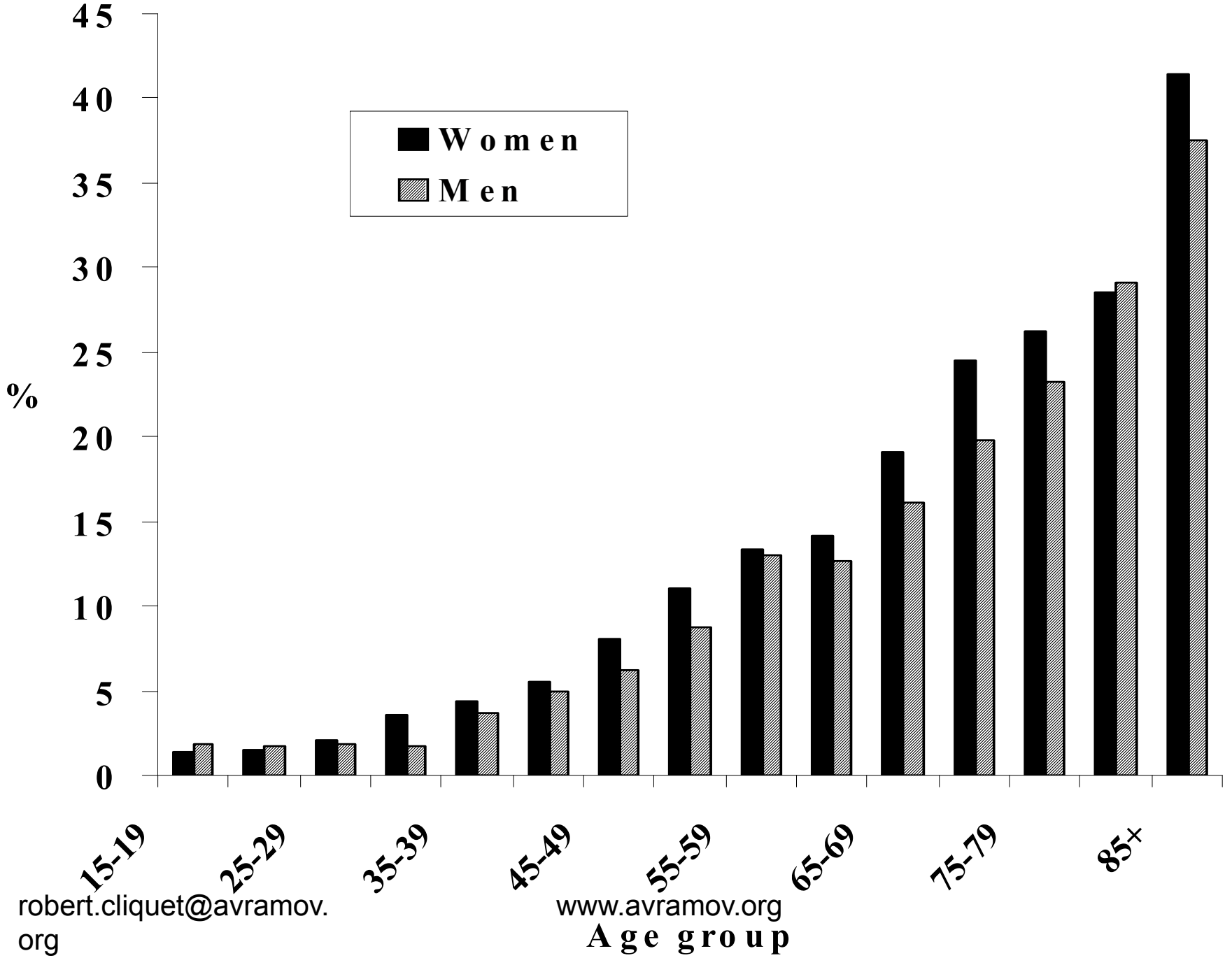
- *Gerontology (Comfort, 1956, 17):*

  "a progressive increase throughout life, or after a given stadium, in the likelihood that a given individual will die, during the next unit of time, from randomly distributed causes...“

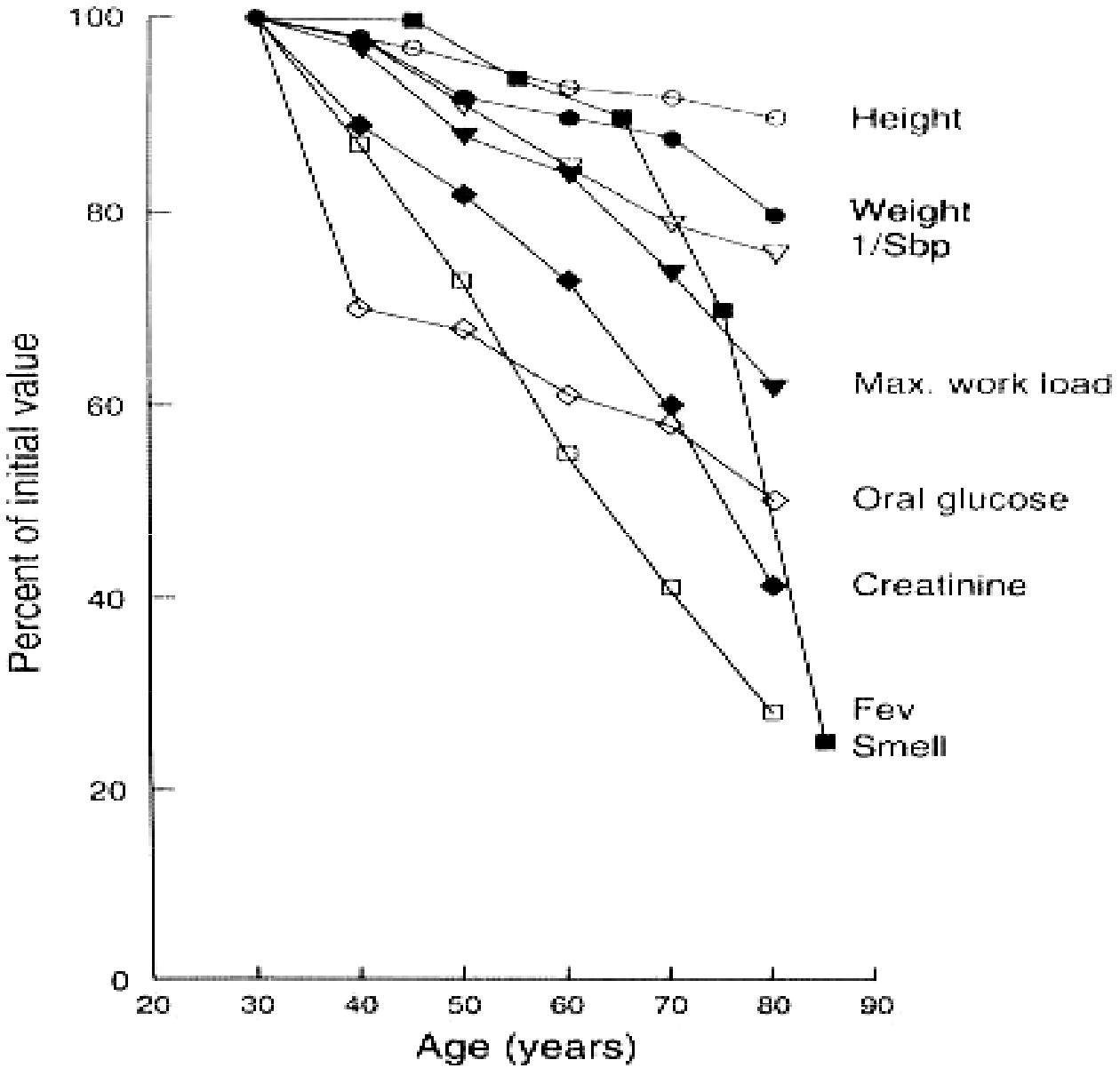
- *Evolutionary biology (Rose,1991, 20):*

  "a persistent decline in the age-specific fitness components of an organism due to internal physiological deterioration".

Women and men reporting bad or very bad health



Decrease of several physiological functions in the life course



Characteristics of senescence

- Many morphological, physiological and psychological features gradually deteriorate with increasing age in the adult;
- Substantial within-population heterogeneity: individuals age at different rates;
- Health condition of the large majority of the younger elderly is satisfactory or has even improved, especially among the better educated and is sufficient to perform most tasks in their profession or household;
- Cognitive abilities in older persons appear to decline less and later than reported in earlier studies and are largely sufficient for performing most jobs.

Population ageing

= the relative increase of the older age groups in the population age pyramid.

- Population dejuvenation: decrease of the proportion of the younger age groups in the population, e.g. as a consequence of decreasing fertility

- Population graying: the increase of the proportion of the older age groups
  - Increase of individual ageing;
  - Consequence of larger birth cohorts reaching the age categories that are conventionally considered as the elderly or seniors.

4. Age variation and ageism

- 4.1. Evolutionary background of longevity, ageing and death
- 4.2. Ageism and active ageing in modern society

Evolutionary background of longevity, ageing and death

- **Longevity**
  - ***Brain development and the evolution of the lifespan***
- **Ageing (senescence)**
  - ***The evolutionary theory of senescence***
  - ***Genetic mechanisms of the evolution of senescence***
- ***Death***
  - ***The biological meaning of death***
  - ***Senescence, morbidity and mortality***

Lifespan and brain size

Sacher (1959; 1978):

Maximal lifespan is allometrically related to

- adult brain weight and
- adult body weight.

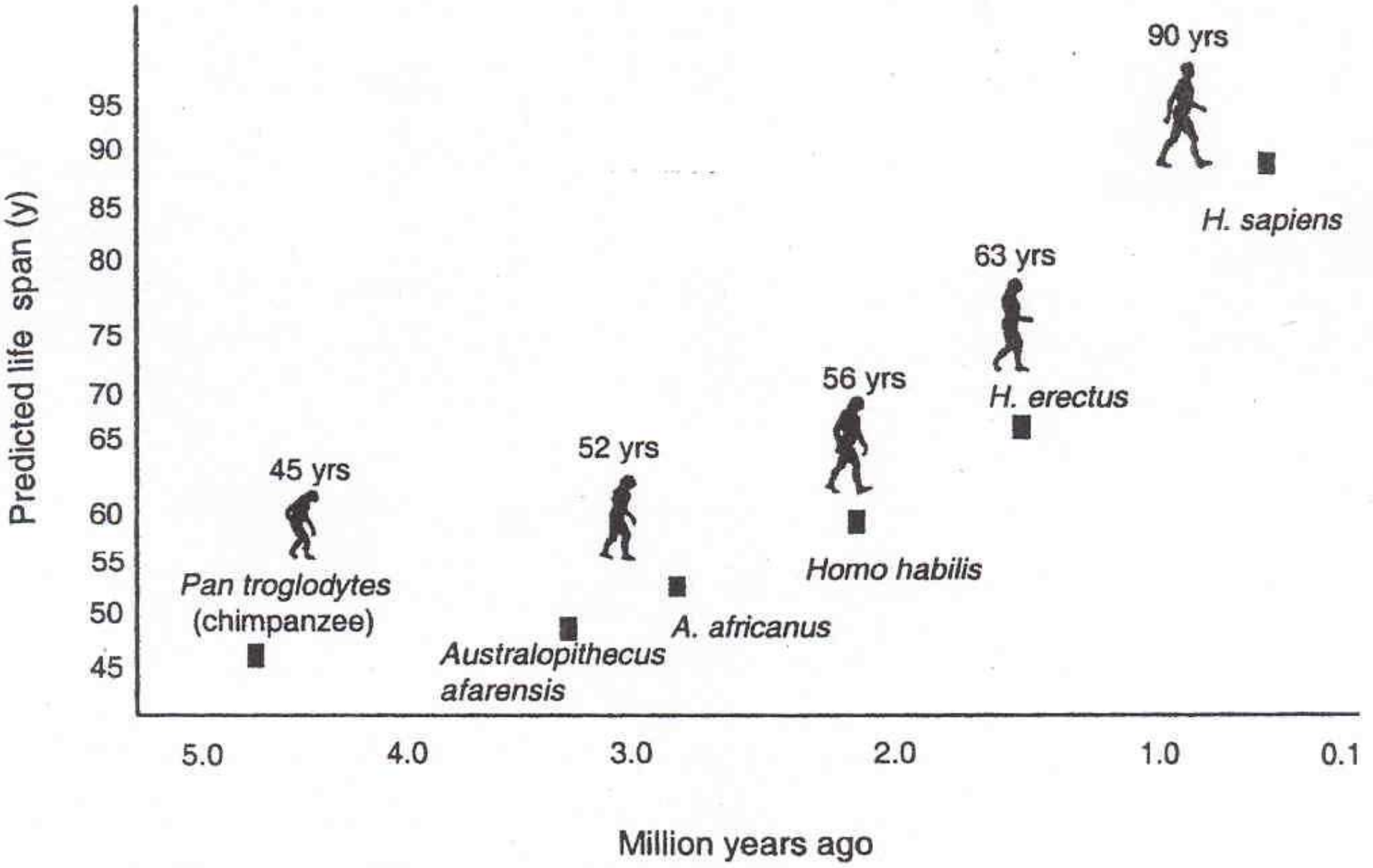
Causal chain of the allometric relation between brain development and lifespan

- Larger brain → better control of environment
- Larger brain → longer maturation time
- Longer maturation time → changed reproduction
  - → larger birth interval;
  - → shift from multi- to monoparity;
  - → lower age-specific fertility;
- Changed fertility → longer lifespan;
    - → longer parental care
    - → total fertility guaranteeing generational replacement
- Longer life span → higher somatic investment;
- Higher somatic investment → lower senescence

Hominization and the evolution of the lifespan

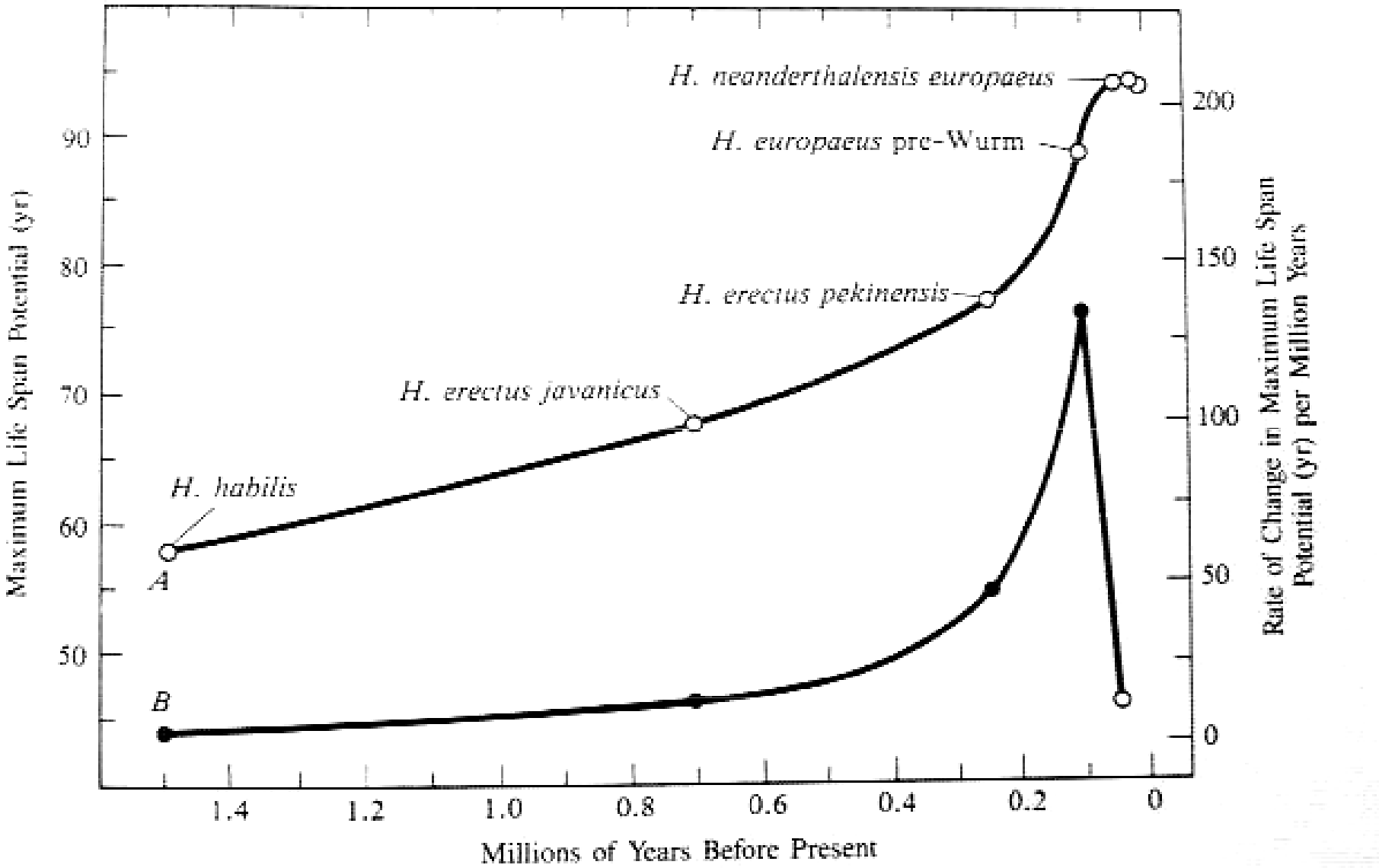
- The human lifespan has substantially increased over its last few million years of evolution.
- Evolutionary theory can explain this increase in terms of decreased ecological vulnerability resulting from increased brain size.

Hominization and the evolution of the lifespan

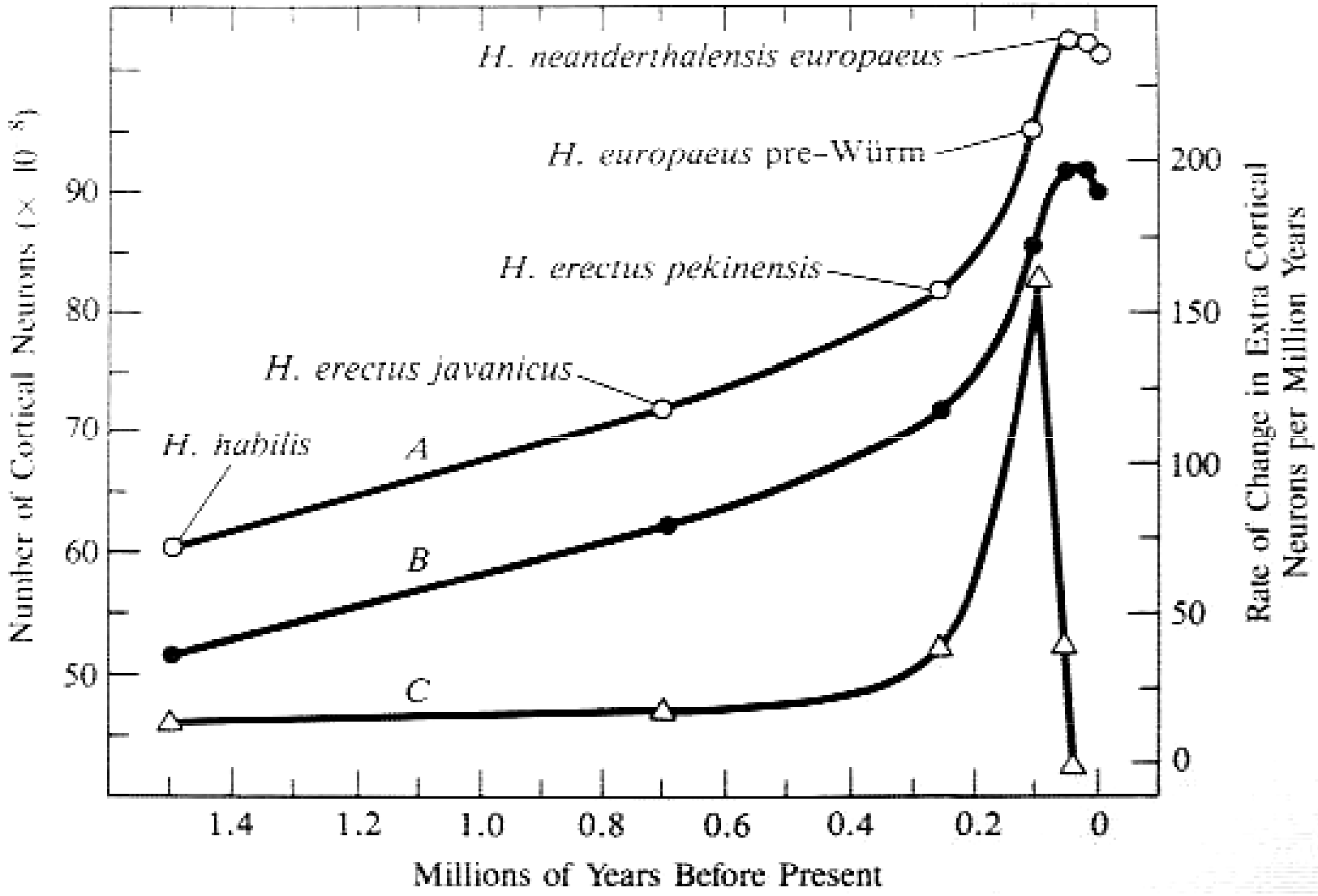


org

Increase of the maximal life span during hominization



Lifespan and neurological capacity during hominization



The evolutionary theory of senescence

The basic idea of the evolutionary theory of aging is that ageing is caused by a fall in the force of natural selection with increasing age (Medawar, 1952)

Decreasing force of natural selection in the life course

- Natural selection strongly eliminates deleterious mutations that have an effect early in life;

  The force of natural selection decreases later in life, especially after the reproductive period;

- Deleterious mutations spread in the population, through the generations, producing the appearance of ageing in the species.

- Ageing is an inescapable side effect of natural selection.

Population genetic mechanisms of the evolution of senescence

- Adaptive theories: obsolete (= 'for the good of the species')
- Non-adaptive theories:
  - mutation accumulation theory (Medawar, 1952)
  - antagonistic pleiotropy theory (Williams, 1957)
    - Disposable soma theory (Kirkwood, 1977)

Population genetic mechanisms of the evolution of senescence

- Mutation accumulation theory:
  - the weakening of the force of natural selection with increasing age *in se* leads to mutation-accumulation of age-specific deleterious genes resulting in a gradual deterioration.
- Antagonistic pleiotropy theory:
  - senescence is a side effect of the selection of other, favourable characteristics; genes that confer a reproductive advantage early in life may have harmful effects in the post-reproductive period.

Disposable soma theory

- Senescence is the result of the relative allocation of the amount of energy for physical maintenance and repair, and for reproduction.
- With a finite supply of resources, the body must compromise, and it is this compromise in allocating less energy to the repair function that causes the body gradually to deteriorate with age.

The evolutionary background of death

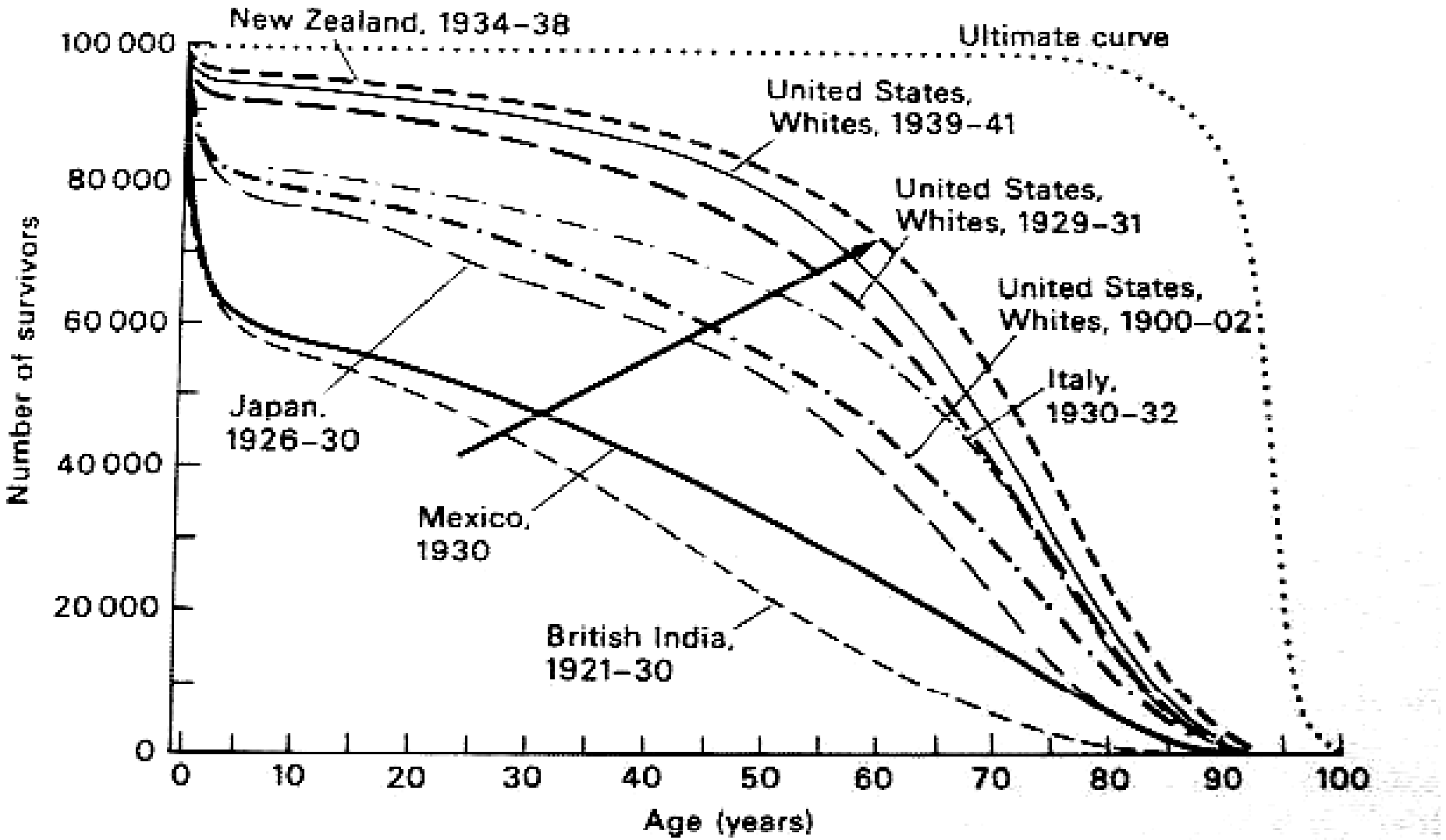
- For the individual: death = “probably the most intolerable of all absurdities”;

======

- Pre-darwinian view: “for the good of the species”;
- Present evolutionary theory (Weissmann,1883)
  - Unicellular organisms: immortable
  - Multicellular organisms:
    - ‘germ’ cells: immortable
    - ‘somatic’ cells: dispensable

Modernization:

from a concave to a convex survival curve



Increase in life expectancy

↓

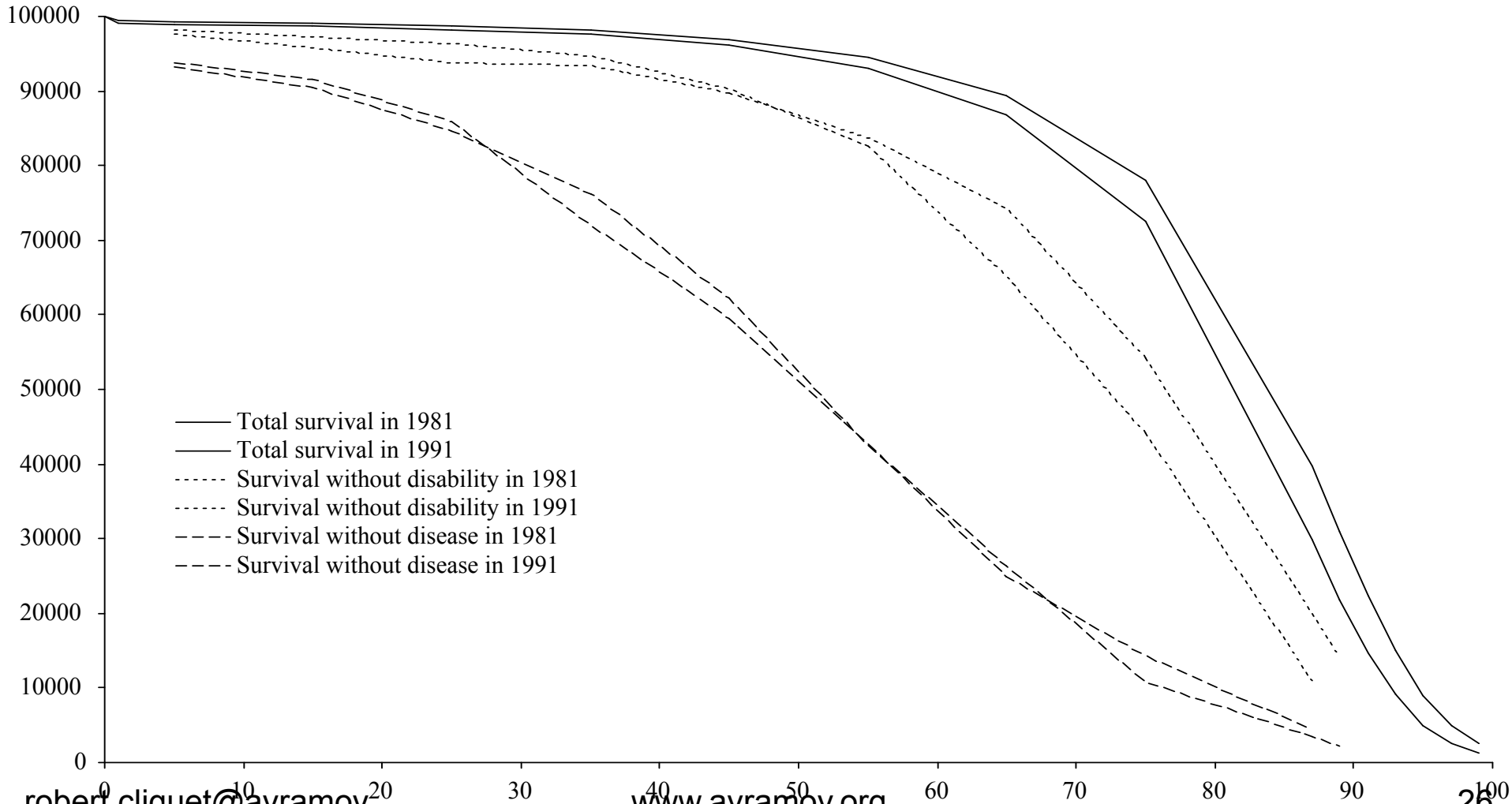
increase in years of good health?

Scientific community has different views:

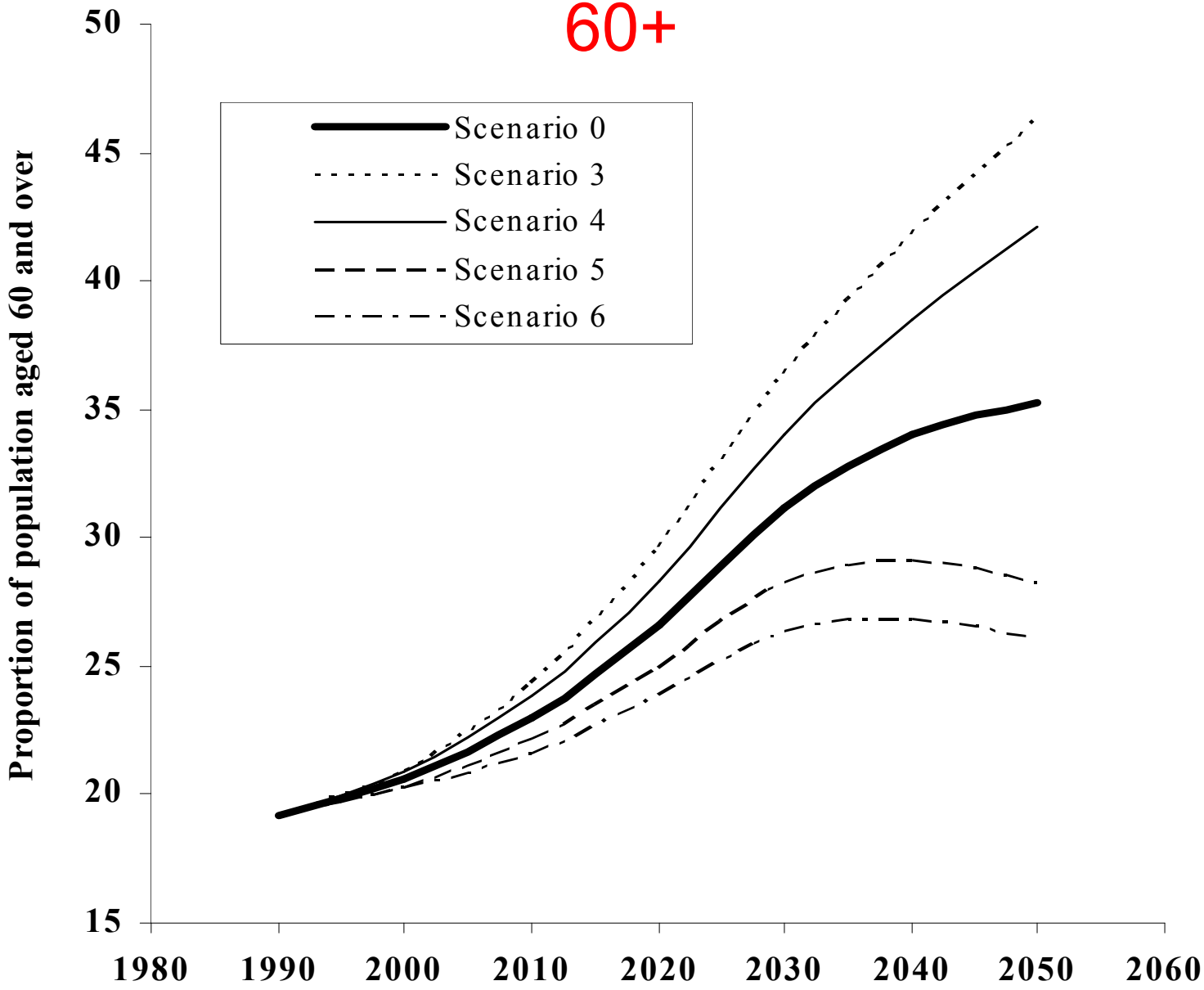
1) → increasing frailty;
2) → compressed senescent morbidity;
3) → double trend
   → younger aged: better health
   → oldest old: increasing frailty

Survival without disease and survival without disability (WHO model, 1984) France, 1981-1991, females

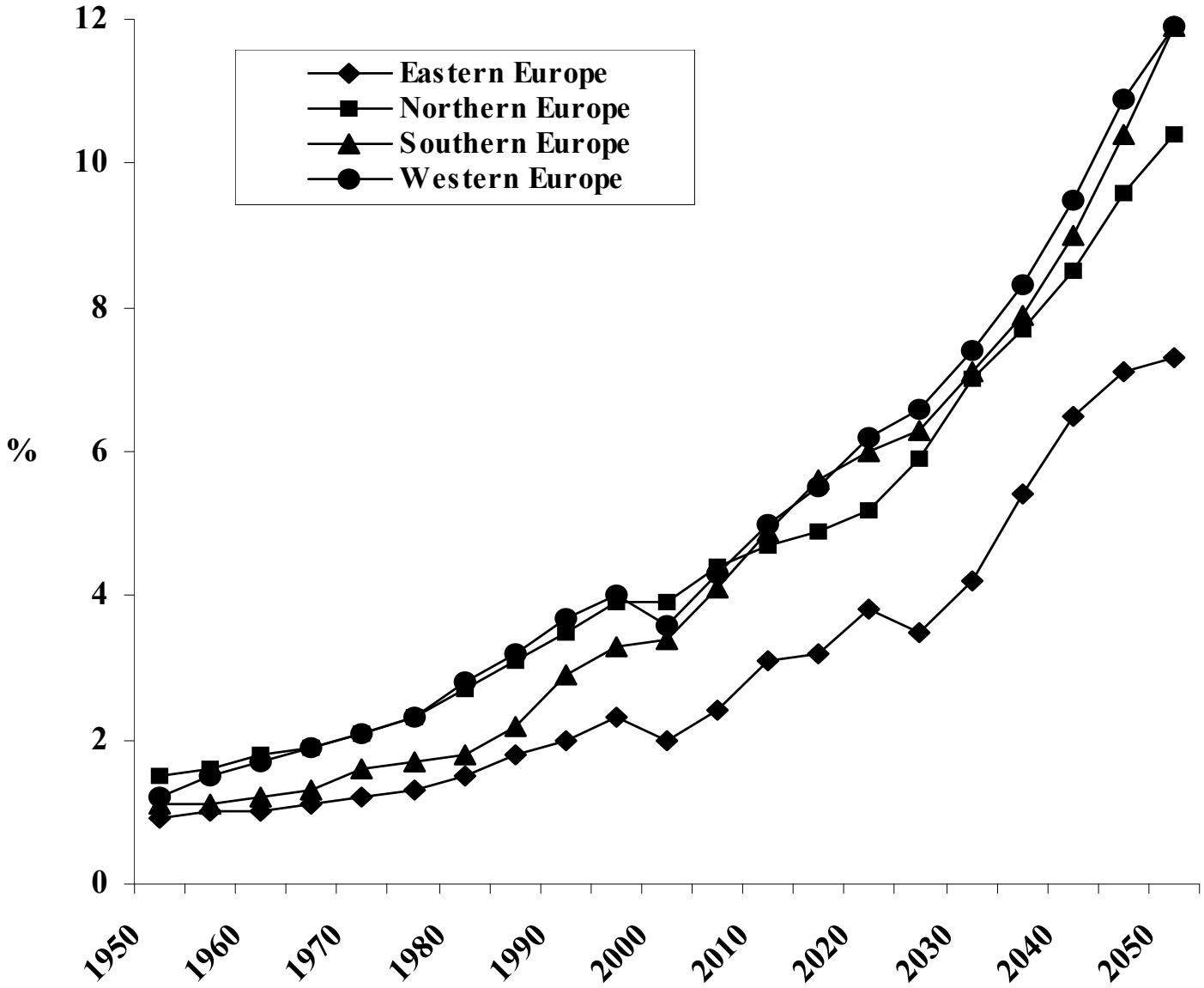
(Robine, Morniche, Cambois,1996)



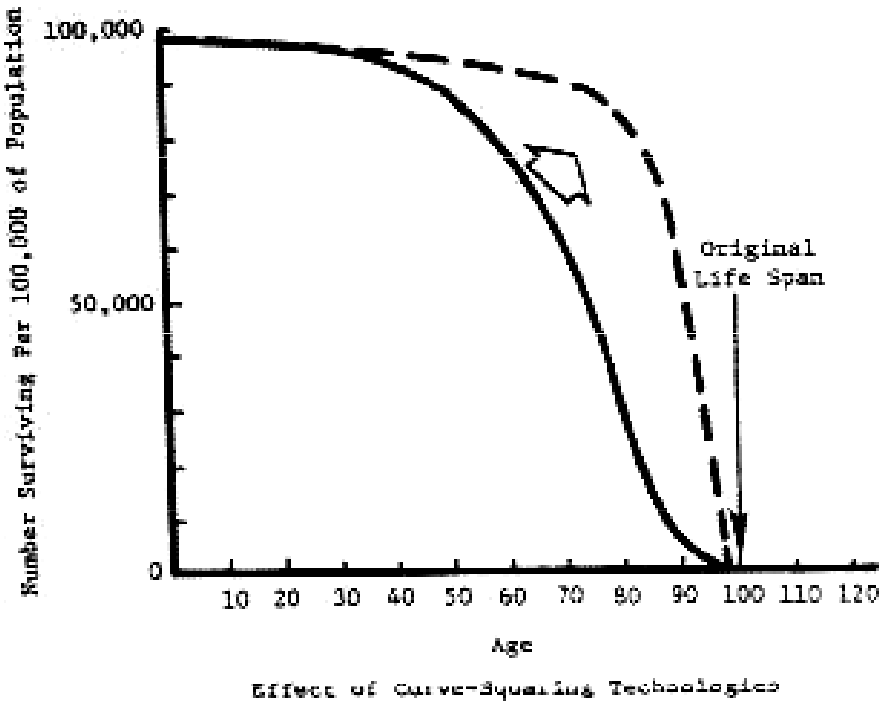
Recent and expected trends in population ageing: 60+



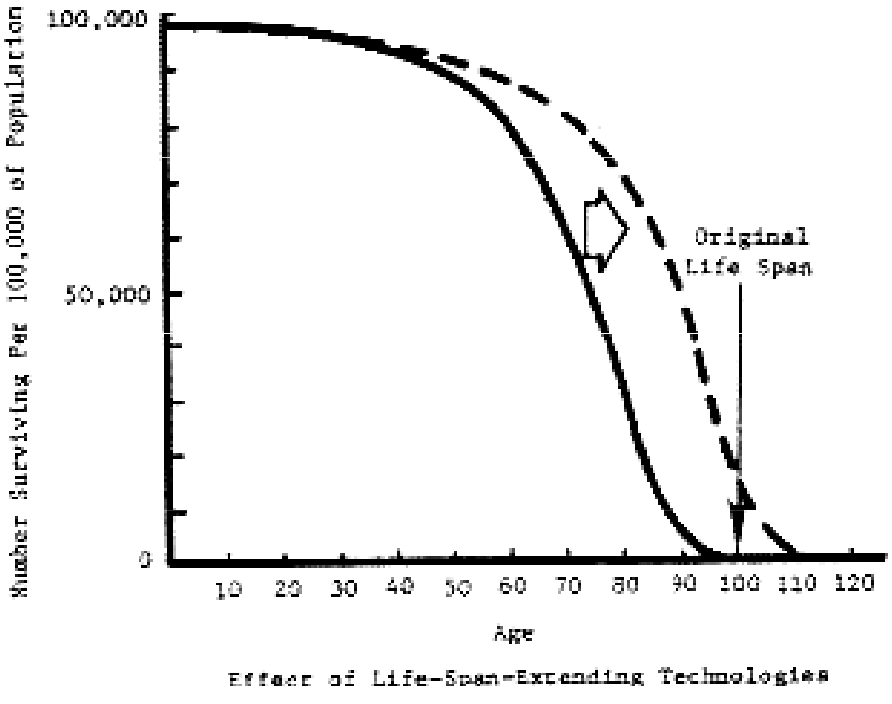
Recent and expected trends in population ageing: 80+



Curve-squaring' and 'life-extending' strategy

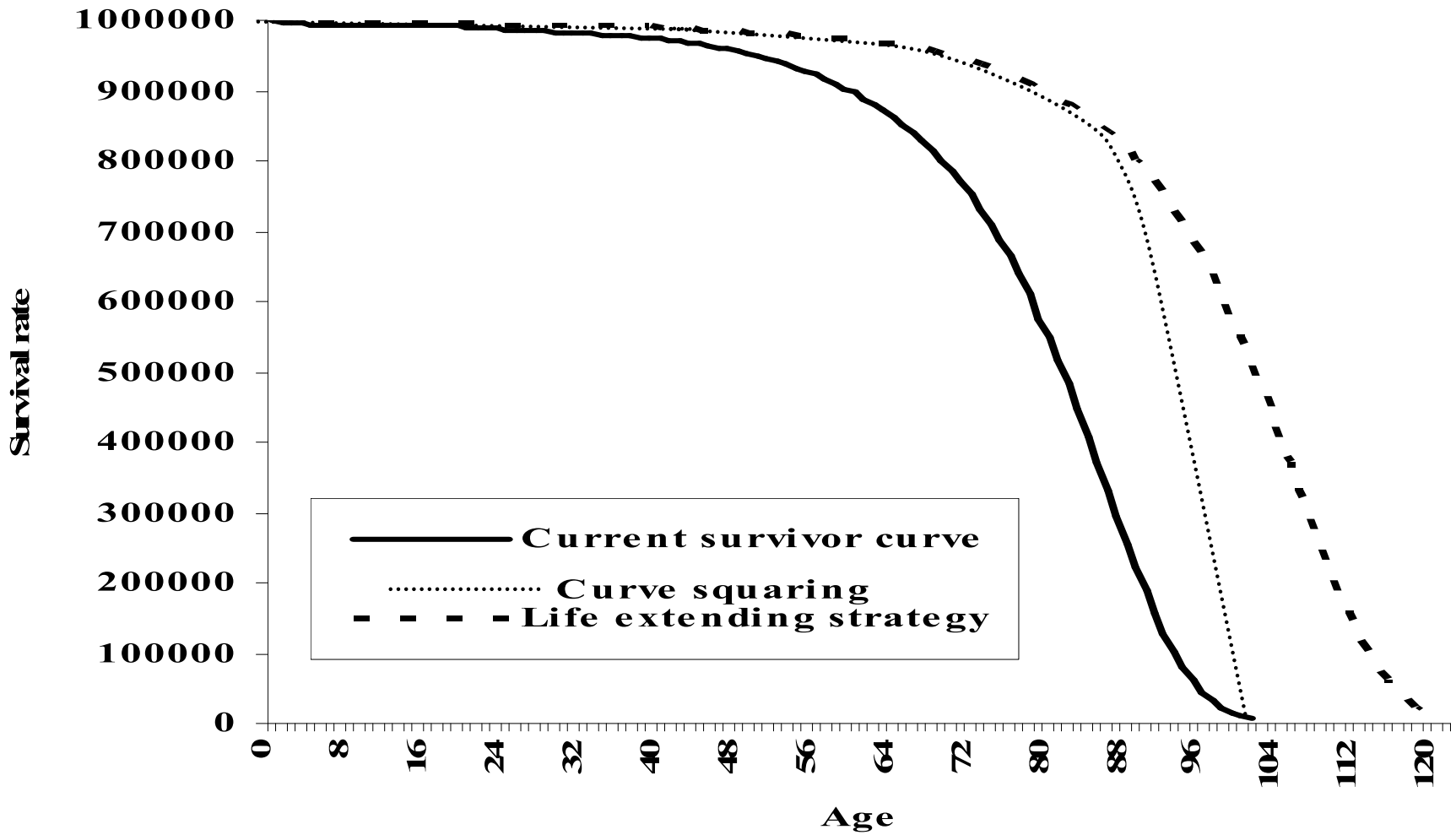


Effect of Curve-Squaring Technologies



Effect of Life-Span-Extending Technologies

Effects of curve squaring and life extending strategies on the life span



Perspectives on curve squaring strategies

Further increases in life expectancy are to be foreseen through

- Further medical progress
- Lifestyle interventions:
  - decreasing smoking
  - improving nutritional habits
  - more physical excercise
- Limiting caloric intake
- Pharmacological interventions

Perspectives on life extending strategies

- So far, modernization mainly succeeded in rectangularising or curve-squaring the survival curve (more people reach the biological potential lifespan)
- Not much progress has been made in the field of life extending technologies, which could move the current species-specific lifespan to a higher age.
- Future: bio-medical inventions may enable the extension of longevity beyond the present species-specific lifespan.

Meaningfulness of life extending strategy (LES)?

- Individual aspirations: eternal life
  (cf. beliefs in hereafter in many religions)
- Evolutionary perspective: LES inadaptive
  (present human species-specific lifespan = adaptation to long maturation time of human brain!)
- Future: LES technologies will be applied, unless or until social norms and rules might develop to limit or prohibit such practices.

Probability of life extending technology?

- Genetic engineering:

  Changing directly DNA, in order to correct or prevent deleterious mutations producing senescent degeneration;

- Euphenic engineering:
  - Correct indirectly phenotypic effects of deleterious mutants through curative medical interventions

- Evolutionary eugenic engineering:
  - Intensify natural selection for increased lifespan

The prolongation of the dying process

Medical technologies:

- → increase longevity
- → prolong the dying process.
  - Increased suffering for the individual, because of loss of human specificity or dignity;
  - Increased suffering and/or financial costs for the family;
  - Increased costs for society at large, economically and ethically.

Implications of ageing

Attitudinal ambiguities:

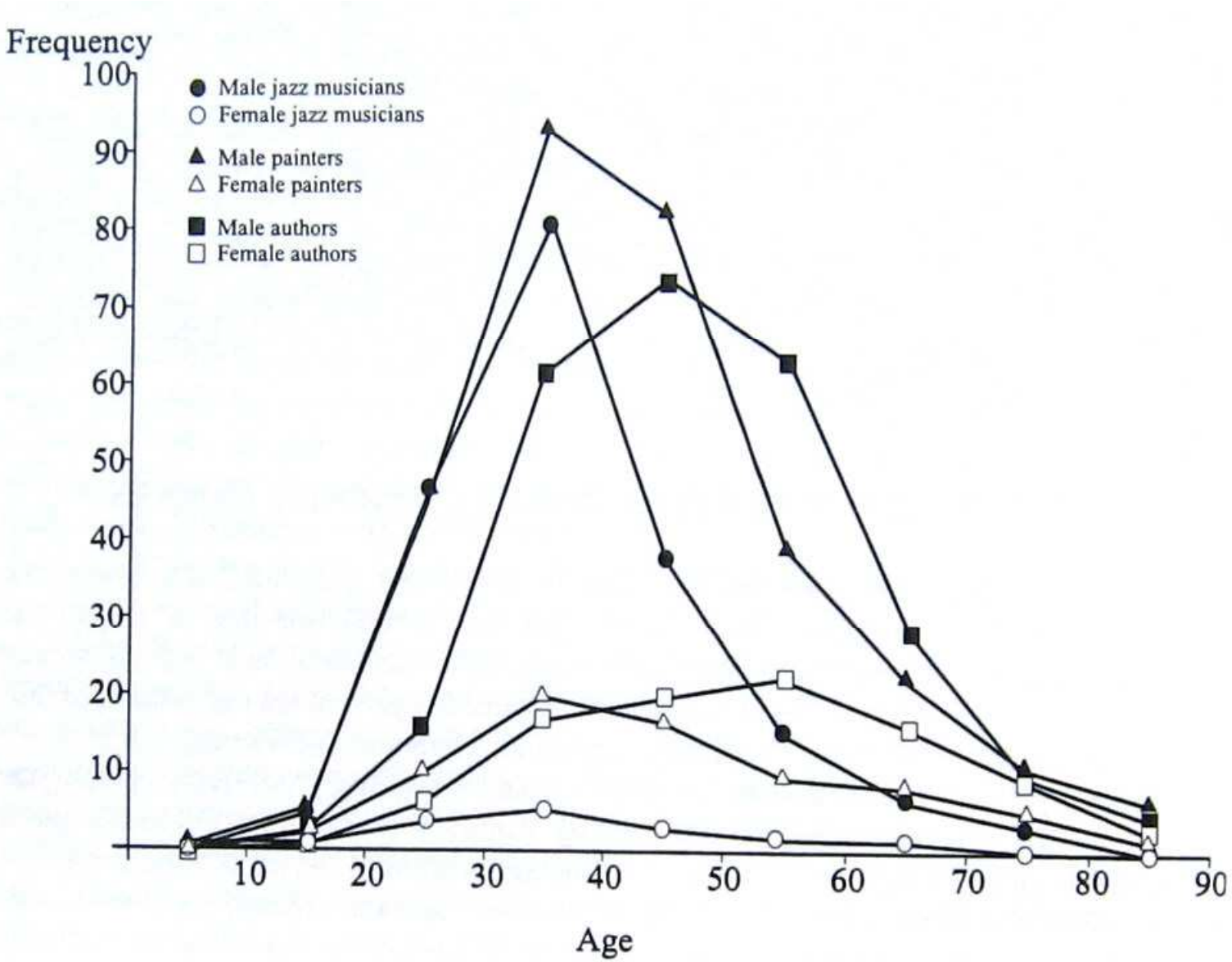
- *Sauvy: « de vieilles gens qui ruminent de vieilles idées dans de vieilles chaumières »*
- *Notestein: « "Viewed as a whole the problem of ageing is no problem at all. It is only the pessimistic way of looking at a great triumph of civilisation."*

Implications of ageing

- Individual level
  - Longevity as ideal
  - Not without quality of life at high age?
- Family level
  - Care for elderly
  - Less caretakers
- Societal level
  - Costs (pensions, health and welfare care)
  - Labour shortage
  - Decreasing creativity and dynamism?

Creativity in the life course

(Kanazawa, 2003)



Implications of the prolongation of the dying process

- Emergence of death control practices:
  - Palliative care
  - Euthanasia
- Implications:
  - Individuals
  - Families
  - Society at large

Palliative care

- Narrow: compassionate medical care for the terminal ill
- Broad: reducing the severity of disease symptoms, rather than providing a cure, to prevent and relieve suffering and to improve quality of life for people facing serious, complex illness

Euthanasia

- Broad: terminating the life of patients suffering from incurable conditions or diseases irrespective of their own will (euthanasia s.l.)
- Narrow: prescription or administration of drugs by a physician with the intention of ending the suffering of an incurably ill patient at his/her explicit request (euthanasia s.s.)

Euthanasia: attitudes and practices

- Attitudes:
  - large proportion of people approving euthanasia;
  - considerable increase in positive attitudes towards euthanasia in recent decades
  - continuous existence of within-population diversity of opinions.
- Practices:
  - Legalized: Netherlands, Belgium, Oregon, Switzerland
  - Practice in silence: euthanasia is more and more being applied in silence, because the legislation is lagging behind societal and technological developments

Palliative care versus euthanasia

- Differences:
  - Ideological motivation/justification
    (sanctity vs.quality of life);
  - Duration of intervention
- Similarities:
  - Approach:
    - importance of reducing human suffering;
    - aversion for the technical medicalization of the end of life;
    - importance of control by the patient at the end of life;
    - recognition that death is not always the worst thing that can happen;
  - Effects: ending life, be it with some difference in timing

4. Age variation and ageism

- 4.1. Evolutionary background of longevity, ageing and death

- 4.2. Ageism and active ageing in modern society

Ageism

- Definition: discrimination based on age, and especially prejudice against the elderly (Robert N. Butler,1969);
- Less acknowledged than other forms of social discrimination such as sexism and racism;
- Less researched;
- Apparently socially still more accepted.

‘Ageist’ attitudes and behaviour towards seniors

- Experience of ageism is widespread, frequent and multiple.
- Evidence of gendered ageism
- Labour market exclusion of older people
  - Less investment in older workers
  - More unemployment
  - Forced (early) retirement

Active ageing

- Definitions:
  - realization of an active life of older people in the different domains of their personal, family, social and professional life
  - prolonged economic activity ('active ageing at work')
- History:
  - First appearances: 1960s, 1970s, 1980s;
  - WHO: late 1990s
  - UN: International Plan of Action on Ageing 2002
  - Counter-ageing (Cagiano de Azevedo & Cassani, 2005

Contents of active ageing

- continuous labour market participation;
- active contribution to domestic tasks;
- active participation in community life;
- enjoyment of active leisure activities.

Active ageing in WHO, UN, EU

- The World Health Organisation (2002):

  "the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age"

- The UN International Plan of Action on Ageing 2002 (§ 27):

  "Older persons should be enabled to continue with income generating work for as long as they want and for as long as they are able to do so productively."

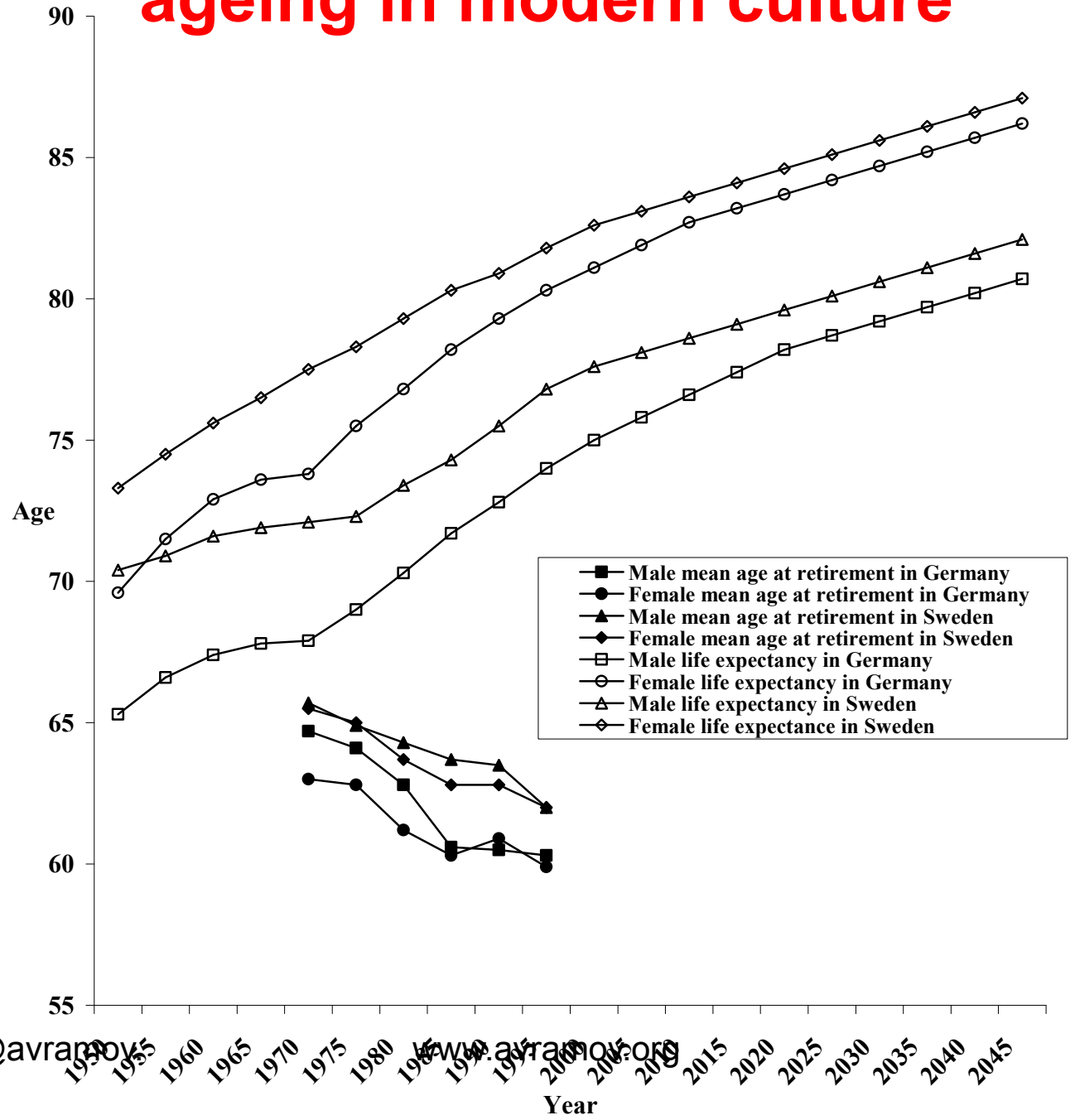
- European Commission (1999; 2002; 2006):

  prolonged economic activity to be achieved by working longer years, retiring later in life, and engaging in socially productive activities such as voluntary work or care giving after retirement, as well as practicing healthy life styles.

Mismatch between biological and social ageing

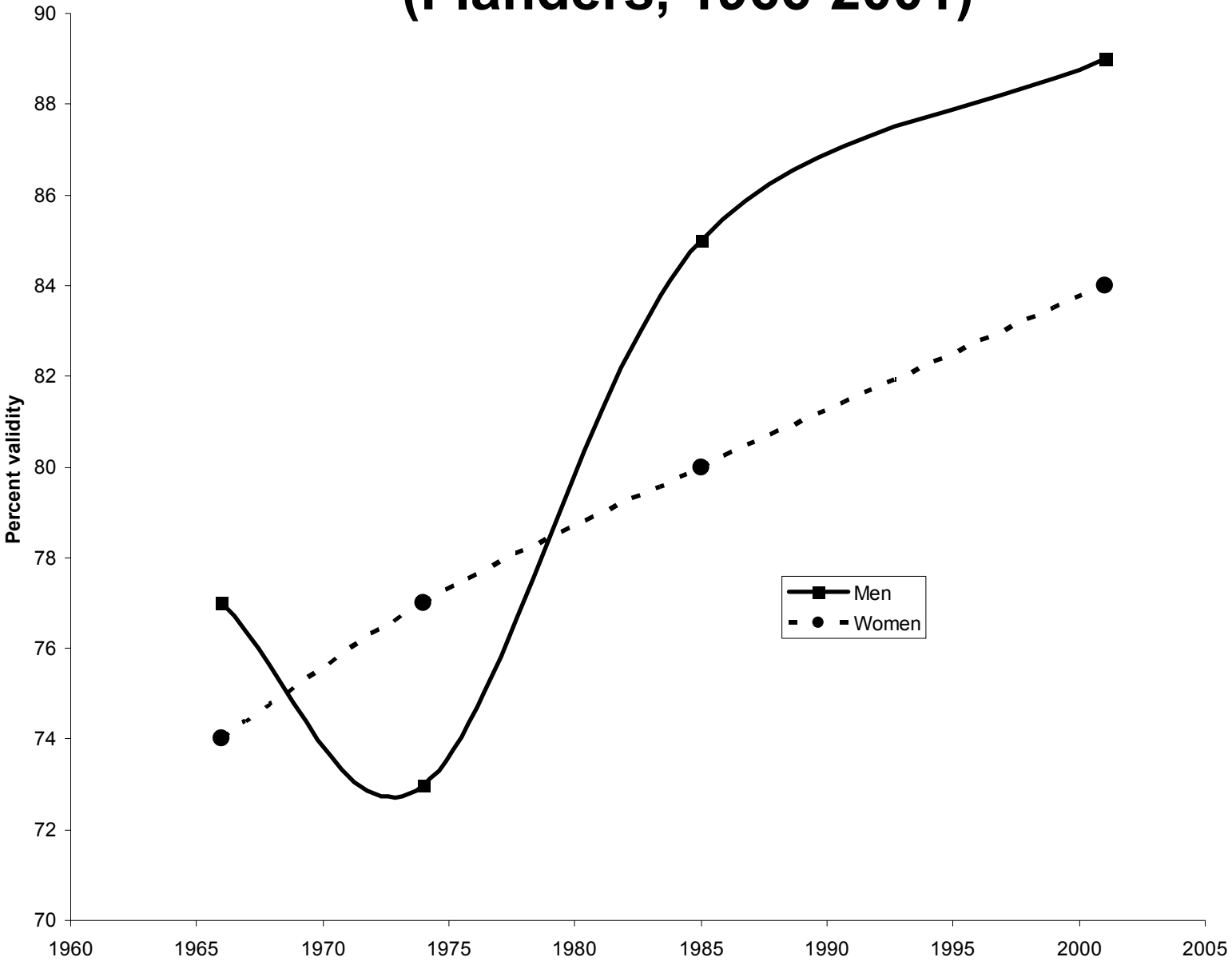
The last decades of the 20th century were marked by the mismatch between gains in longevity, improvement of the health, especially of the younger old, generational shifts towards higher educational attainment acquired in youth by the older workers and pensioners and trend towards early retirement

Increasing gap between social and biological ageing in modern culture



Degree of validity of 65+

(Flanders, 1966-2001)



Age at retirement

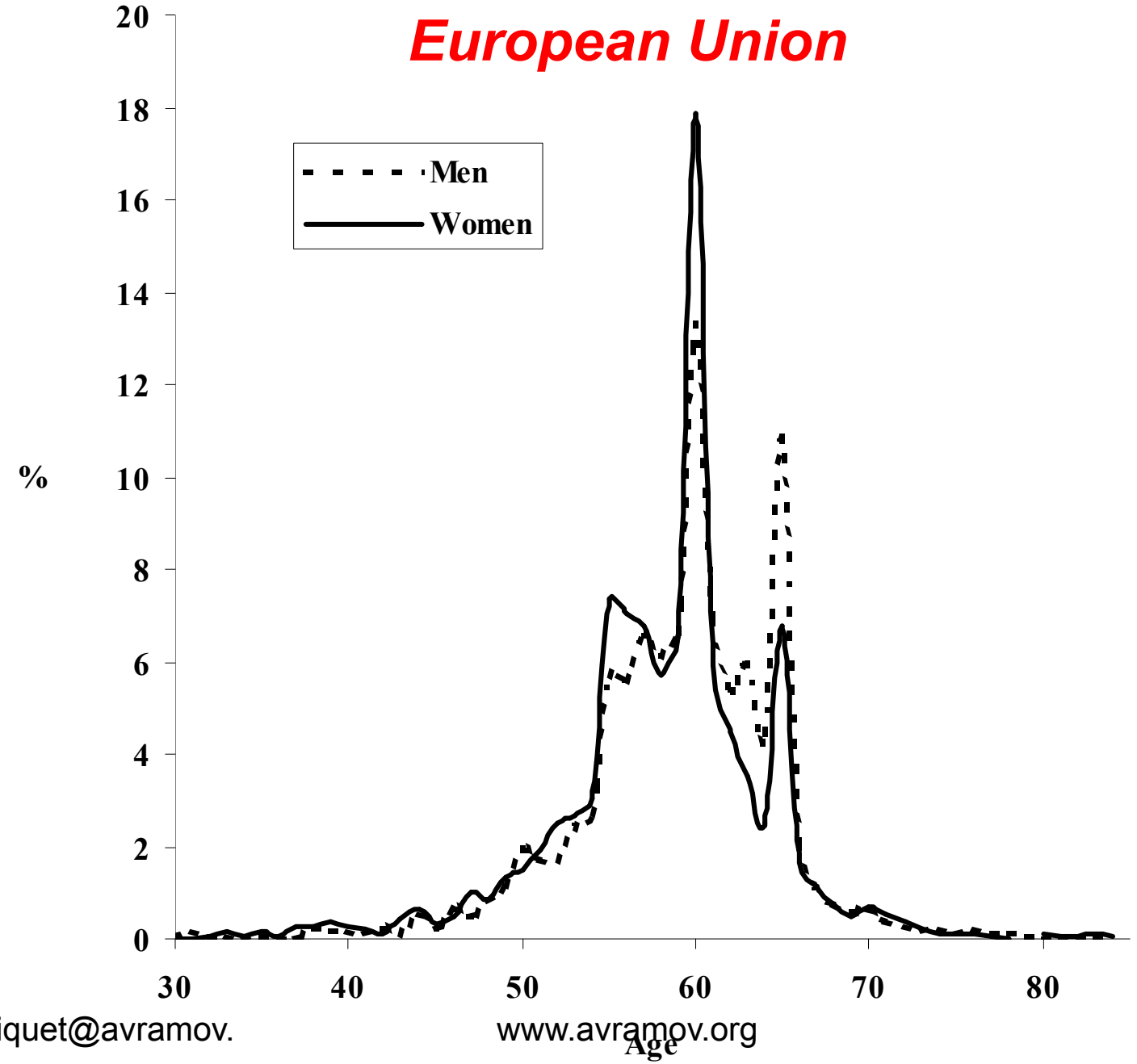
- Pre-modern society: no retirement
- Bismarckian pension scheme (1891): 70
- 1913- 1970s: 65
- 1970s – present: pre-retirement schemes
- Most recent years: some North-Western European countries: > 65

Percent of working men and women in the European Union

ECHP database (Avramov 2002)

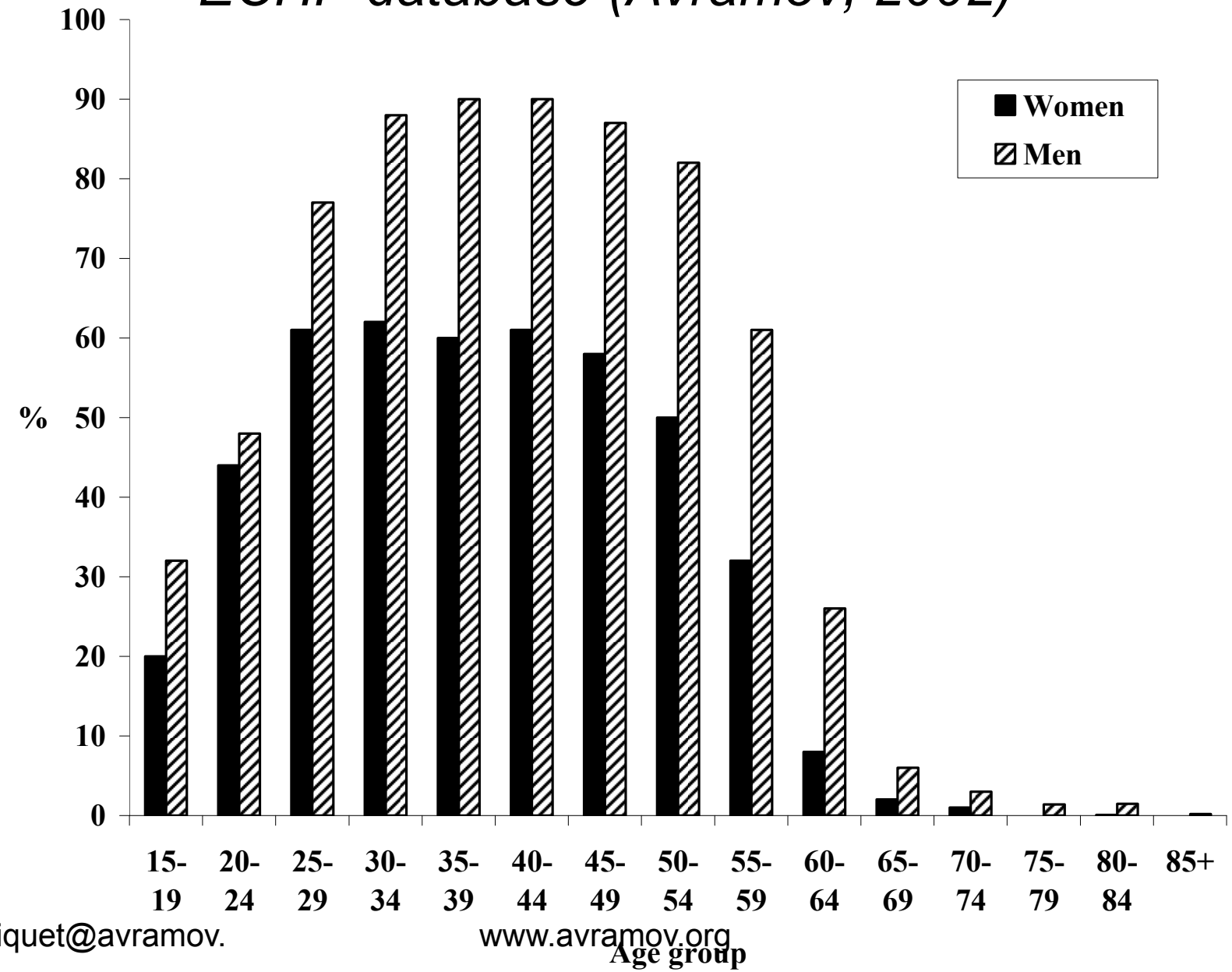
Age group	Men	Women
60-64	26.4	9.0
60+	10.1	2.8
65+	3.7	1.0

Average age at retirement of women and men in the European Union



Percent of working women and men by age

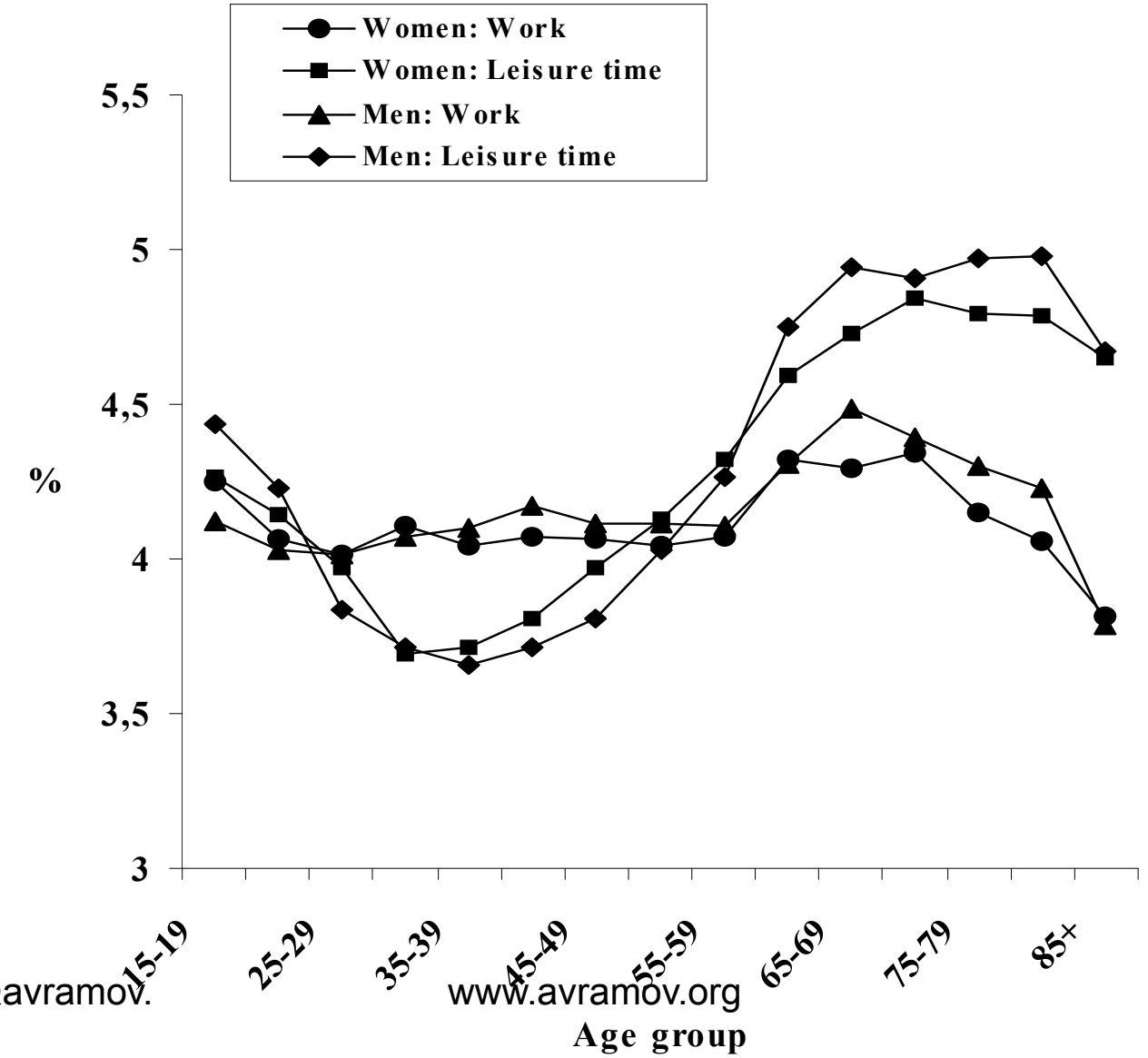
ECHP database (Avramov, 2002)



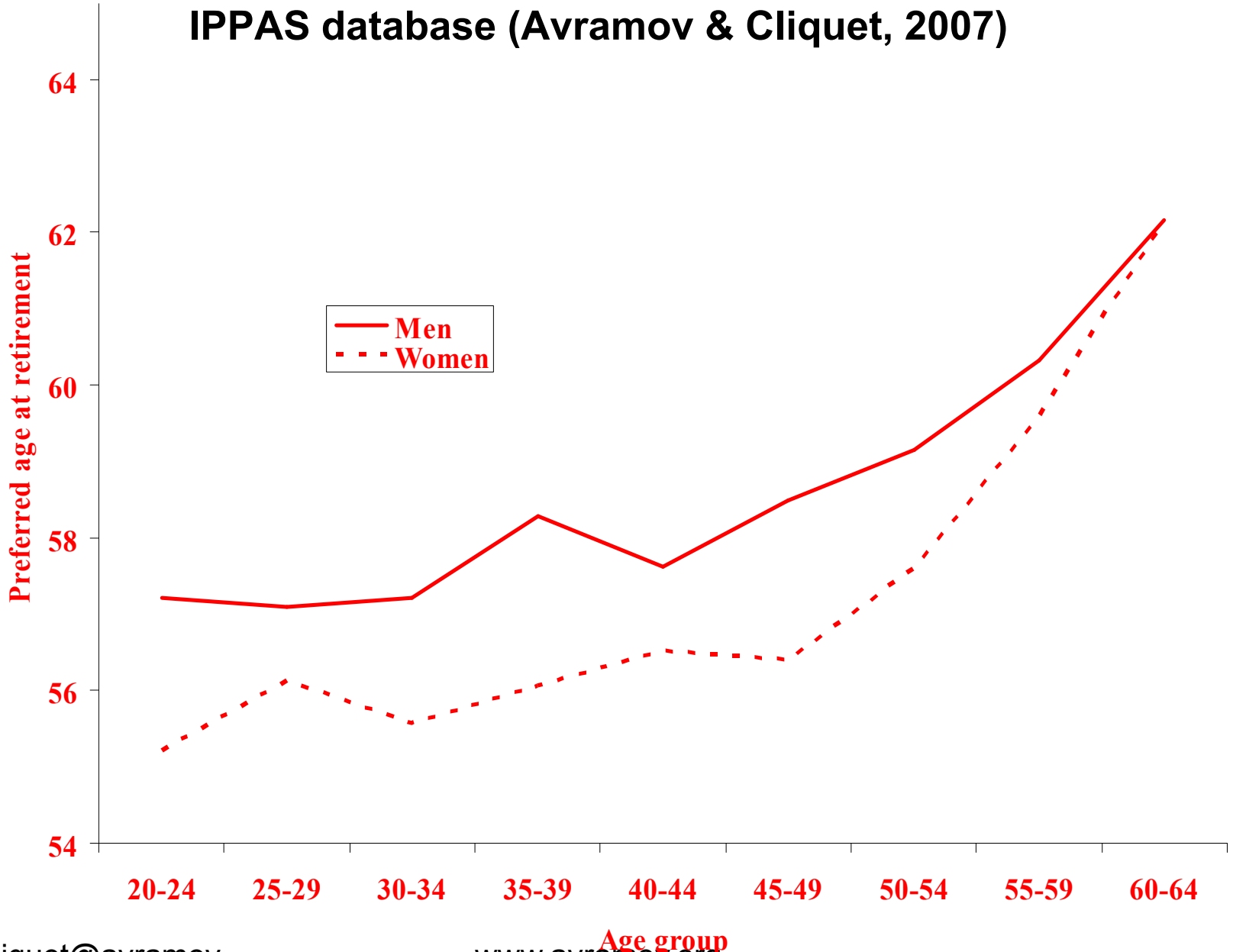
Attitudes towards early retirement

- Bad health;
- stress at work;
- more free time, leisure opportunities and family networking.

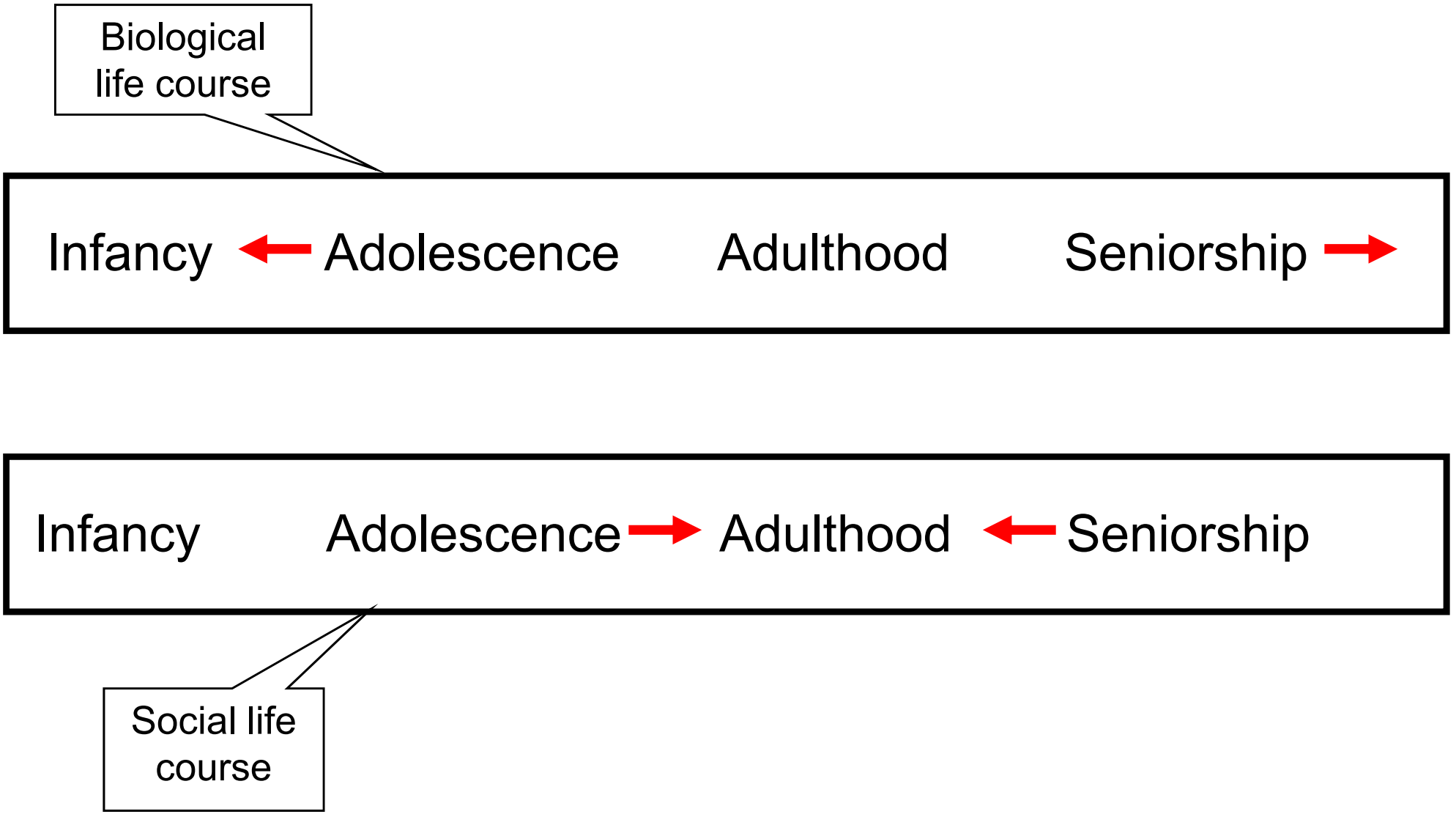
Satisfaction with work and leisure time among women and men in the EU



Preferred age at retirement among not yet retired



Changes in the biological and the social life course



Solution:
reshuffle life course stages

- Education: prolong into early adulthood
- Work: postpone into early adulthood
  prolong into late adulthood
- (Reproduction: advance in early adulthood)
- Retirement: postpone into early seniorship

Work in early seniorship

- Abolish early retirement schemes (50-65)
- Increase age at retirement (70-75)
- Provide variation in age at retirement
- Provide flexibility in number of working hours at higher (all?) ages
- Diminish stress at work

Possible changes in life course events concerning work, childbearing and retirement