A Psychological Model to Age Successfully: Selective Optimization with Compensation

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Search for Theories of Psychological Aging that ...

- Combine **objective** (behavioral) with **subjective** (meaning- and reality-making) features of aging
- Permit at the same time **universal** and **individualized** manifestations
- Consider aging as a **lifelong** process
- Are **integrative** and focus on the person and context as a **whole**
- Specify ways to generate „**optimal functioning** and **adaptive mastery**“ over the life course
- Permit the joint consideration of **gains** and **losses** and their **shifting proportions with aging**
- SOC is advanced to be such an integrative, universal theory and tested whether it is. **It is in the making** ....

Orchestration of Selection, Optimization, and Compensation (SOC): A Metatheory of Development

Current Investigators at MPI (2005)

Baltes, P. B.

Lindenberger, U.

Chow, S.-M.

Ebner, N.

Li, S.-C.

Riediger, M.

Schäfer, S.

Former Co-Investigators

Baltes, M. M. (†, Free U Berlin)

Freund, A. M. (U of Zurich)

Krampe, R. T. (U Leuven)

Lang, F. R. (U Halle)

Li, K. Z. H. (Concordia U)

Marsiske, M. (U Florida)

Rapp, Michael (Mount Sinai, New York)

Wiese, B. (U Landau)

SOC-Related Psychological Models of Proactive (Adaptive) Aging

e.g.,

- **Carstensen** Theory of Socio-Emotional Selectivity
- **Brandtstädter** Theory of Assimilative-Accommodative Mastery
- **Heckhausen** Theory of Primary-Secondary Control
- **Hobfoll** Theory of Resource Development and Conservation

- **In comparison, SOC attempts to be wholistic and integrative and considers these related approaches as important, but more specific building components. For the most part, these efforts are not contradictory, but collaborative**

Three General „Foundational“ Perspectives:

- Lifespan Psychology
- Biocultural Co-Constructivism
- Adaptive (Successful) Aging

Lifespan Psychology:

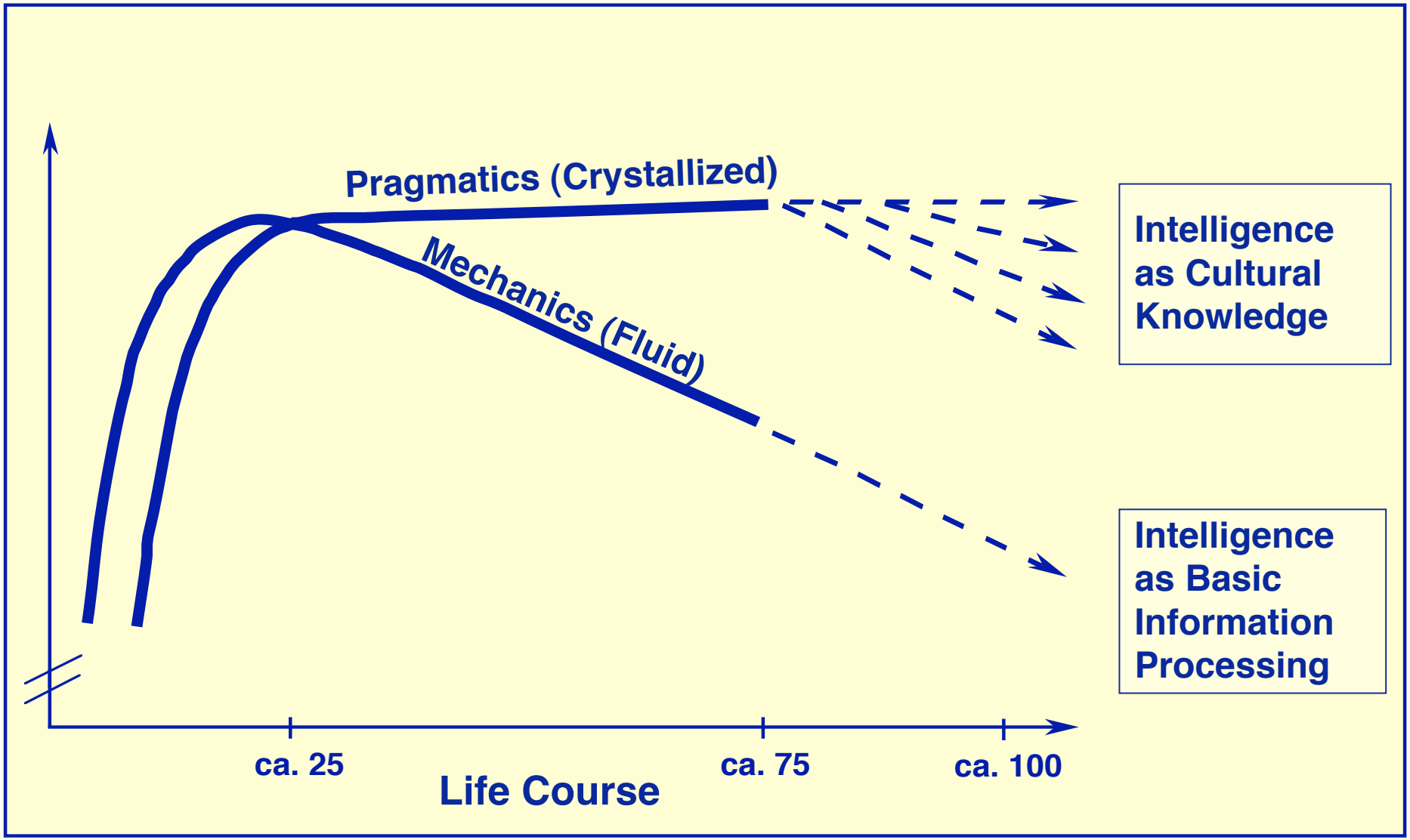
Overview of Basic Framework

Summary of Propositions of Lifespan Psychology

Development	**is a lifelong process. Aging begins at conception/birth**
Diversity/Variation	**Variation and individualization are hallmarks of aging**
Development as Gain/Loss	**Development always consists of the joint occurrence of gain (growth) and loss (decline): objective and subjective**
Plasticity/ Constraints	**The key scientific agenda is the search for the range of age-related plasticity (basic potential), its constraints and optimization**
Shifting Balance	**With aging, the balance between gains and losses becomes less positive. There is an increasing loss in plasticity**
Proactive Aging	**Involves individual (personal) and societal (collective) responsibilities of prioritization including serious questions of choice because of limited resources**

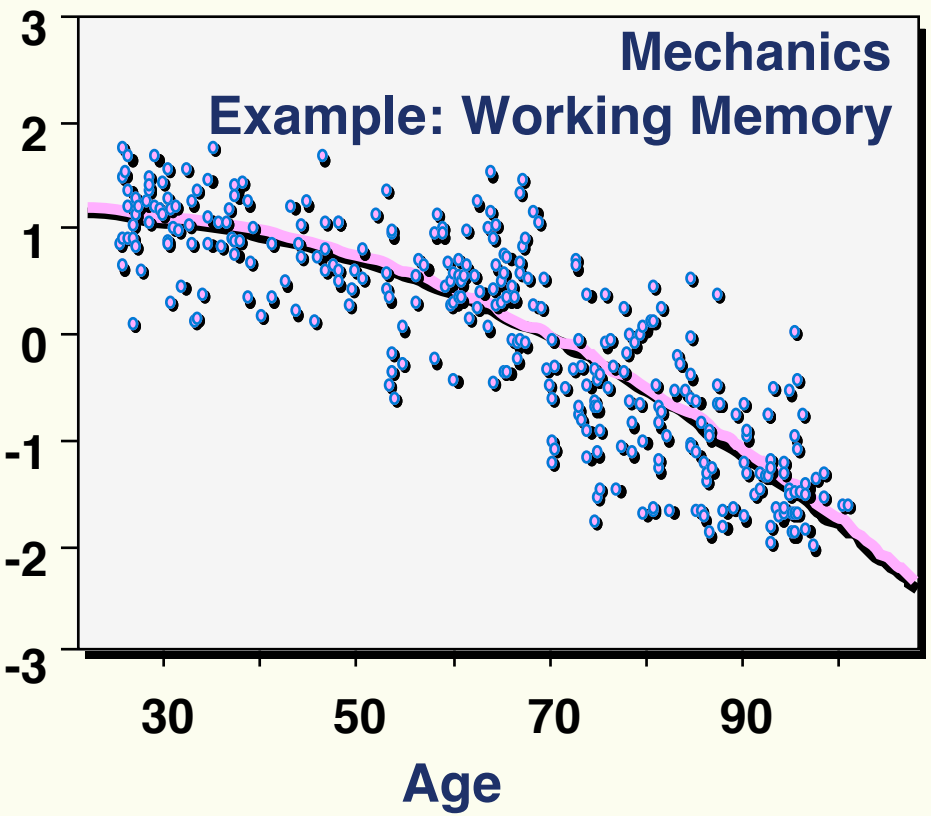
After Baltes (1987); Baltes, Staudinger, & Lindenberger (1999)

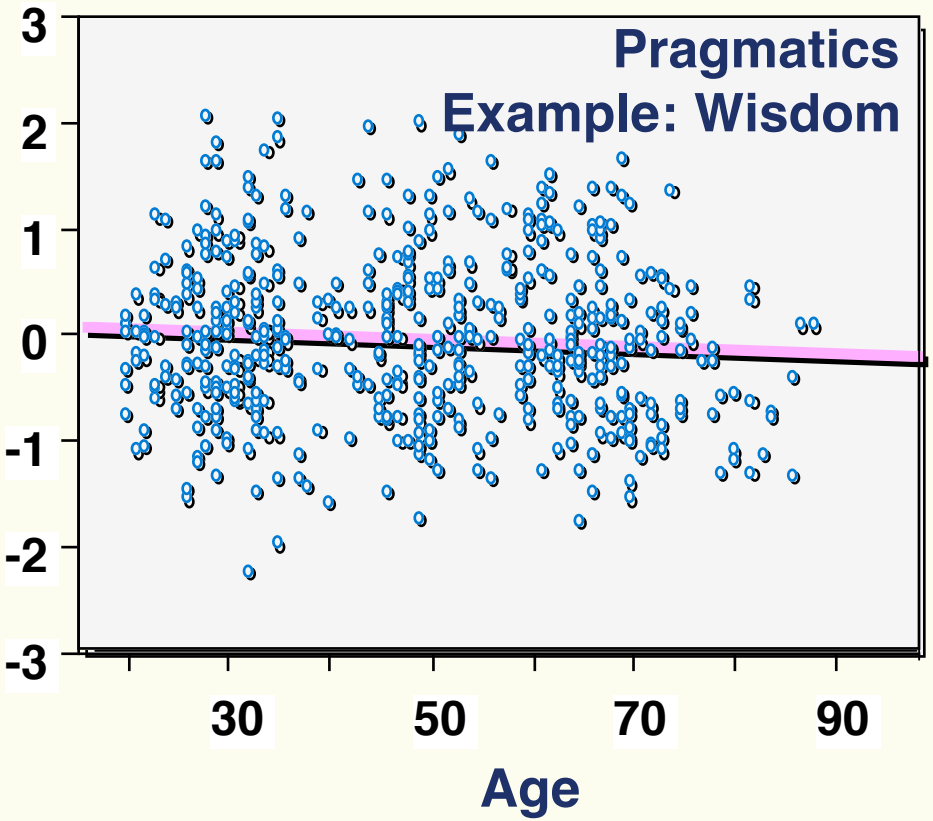
Multidirectionality: Example Two Domains of the Mind



Baltes (2000)

Adult Age Gradients for Measures of Intelligence: Cognitive Mechanics Versus Cognitive Pragmatics





Baltes, Staudinger, & Lindenberger (1998)

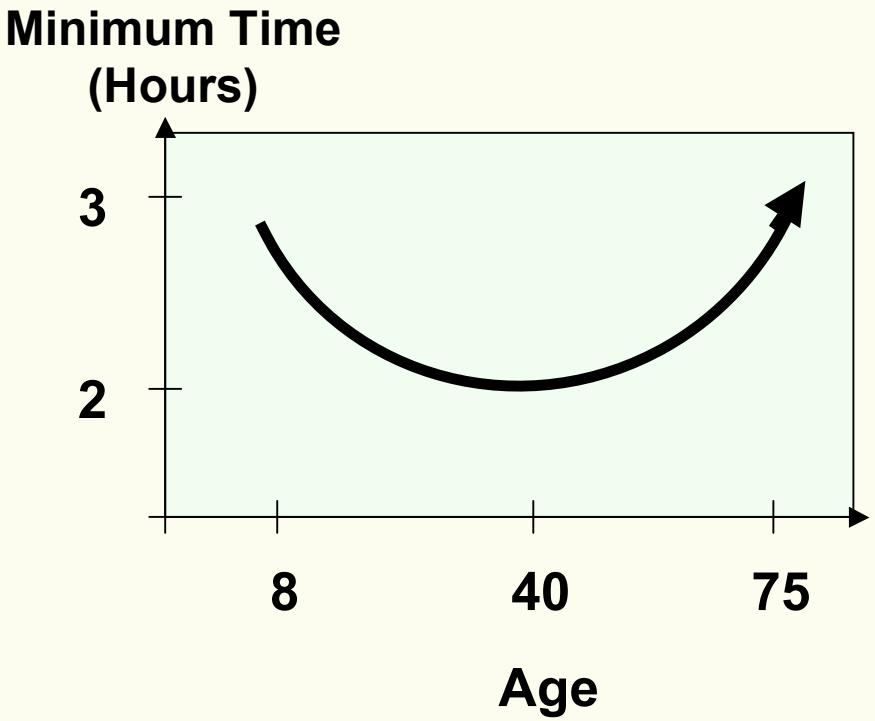
Why Basic Researchers in the Behavioral Science of Aging Spend so Much Time and Efforts on Interindividual Variability and Intraindividual Plasticity?

VARIABILITY AND PLASTICITY ARE THE FOUNDATION OF:

(1) WHAT IS POSSIBLE IN PRINCIPLE

(2) THE KEY TOWARDS FINDING THE FACTORS AND MECHANISMS THAT UNDERLIE ANY MANIFESTATION OF AGING (BASIC POTENTIALS)

Large Variability and Plasticity Across Ages
Example: Age-World Record in Marathon



The age-world record at ***70 plus*** (years) is 3 hours.

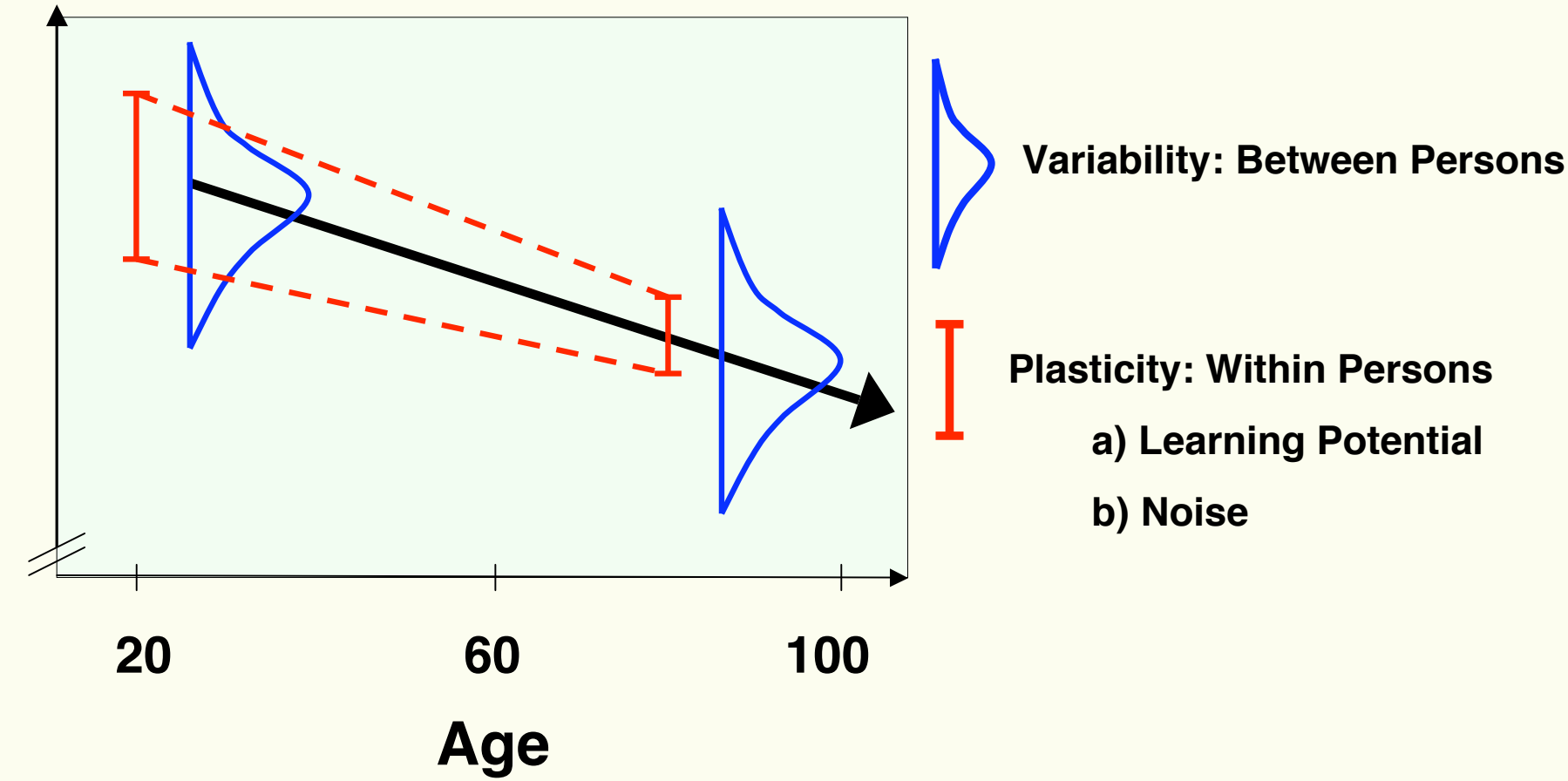
4% of 28000 completed the 2004 Berlin Marathon in less than 3 hours

70 plus world record holder would have been at position 1000 of 28000 competitors.

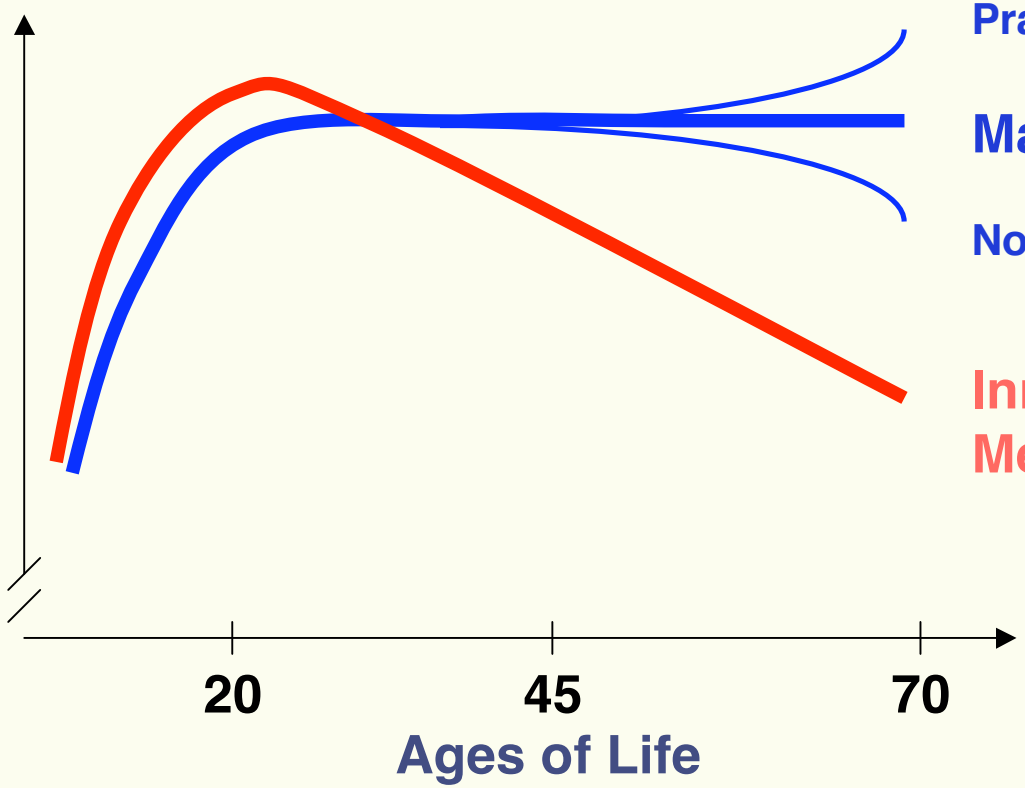
There is a **child younger than 10** years who completed the marathon in less than 3 hours

Conclusion: To hold the age world record with a time of 3 hours, one has to be younger than 10 or older than 70 years!

Variability and Plasticity of Aging



Theoretical Lifespan Gradients for Mechanics and Pragmatics: Role of Amount of Practice



Individualized–Practiced Pragmatics: Focus on Knowledge

Maintained Pragmatics

Non-Practiced Pragmatics

Innovative-New Learning Mechanics

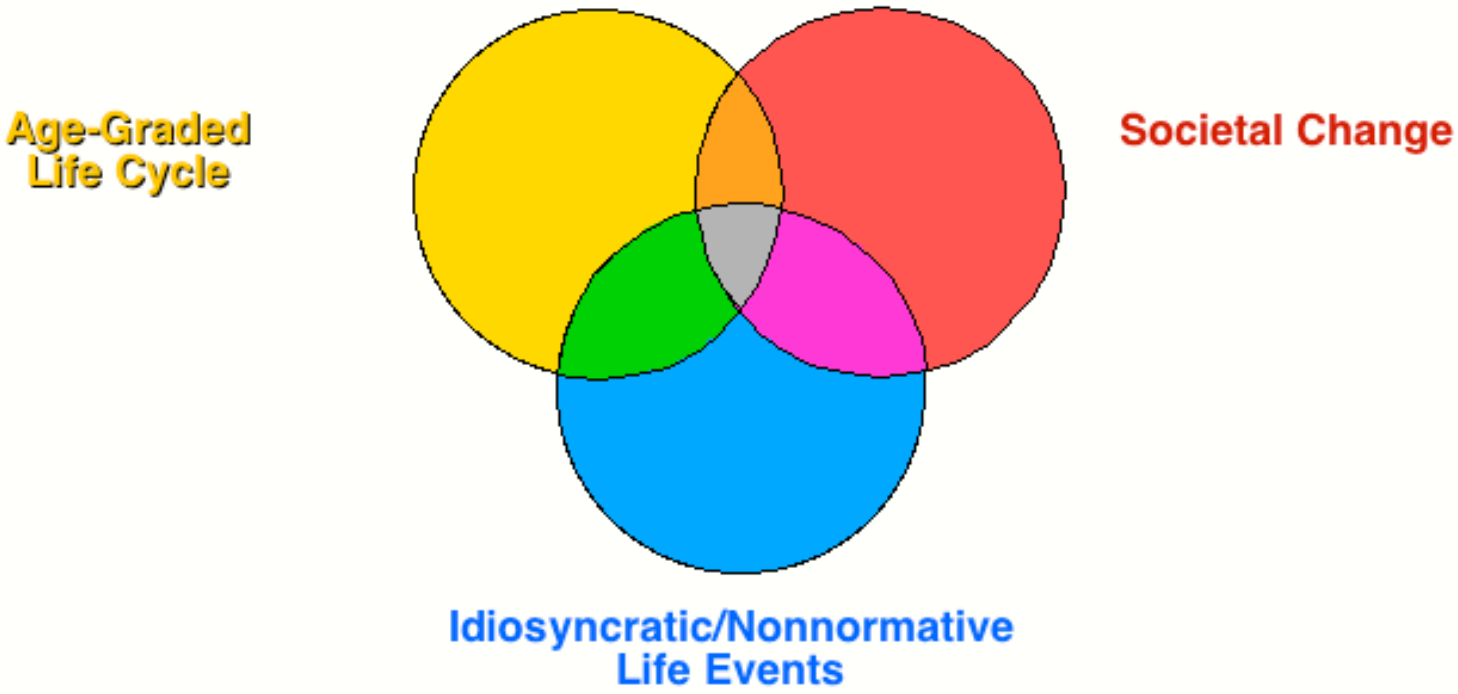
Innovatives Lernen (Mechanik der Intelligenz)
Bewahrendes Lernen (Pragmatik der Intelligenz)

General Conceptual Frame:

Biocultural Co-Constructivism

Baltes, Reuter-Lorenz, & Rösler (Eds.) (in press).
***The New Brain-Behavior Perspective: Developmental Biocultural Co-Constructivism*.**
New York: Cambridge University Press

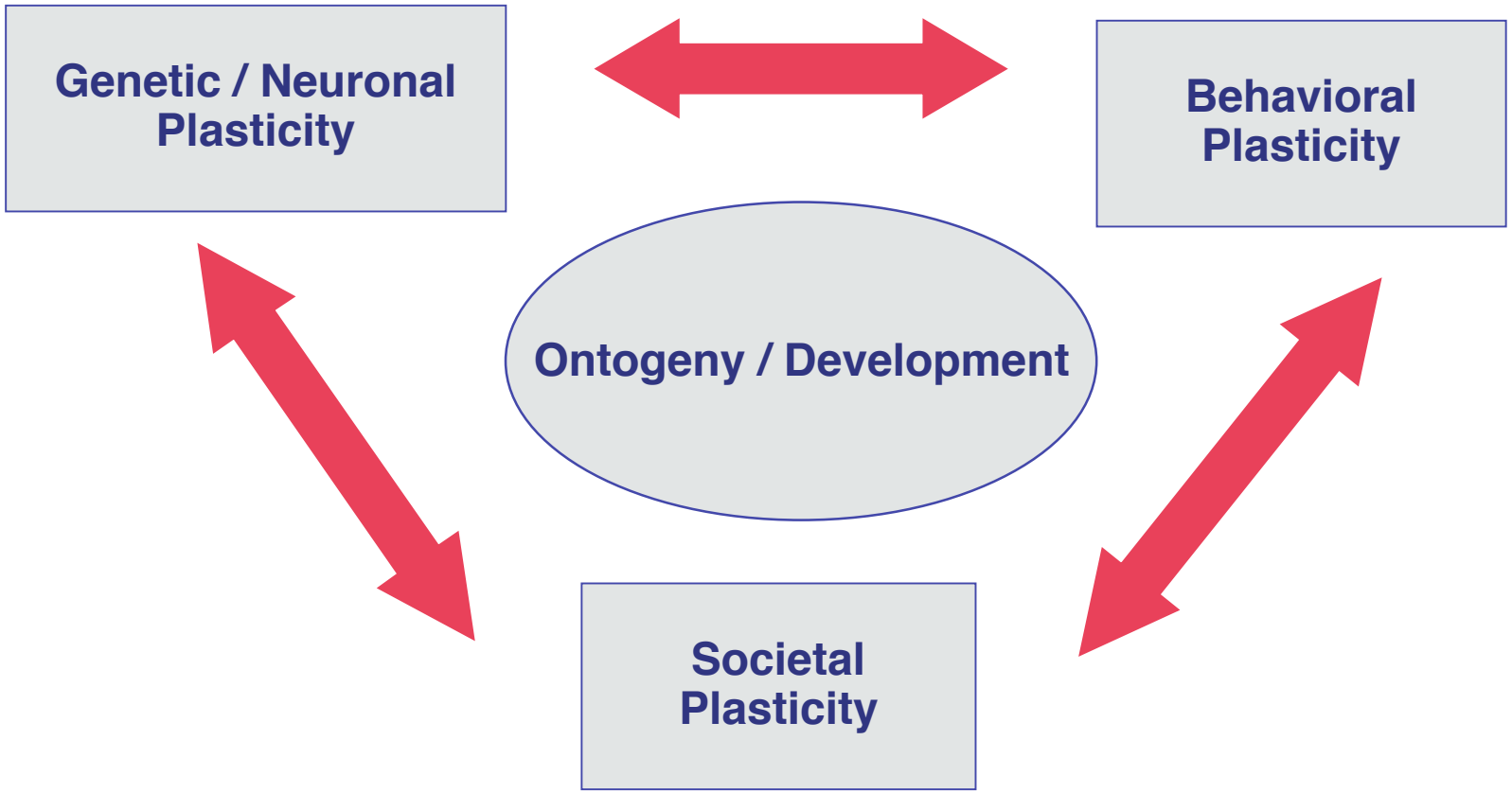
Three Systems of Interacting and Differential Influences Constitute Human Development: Each System Involves Biological-Genetic and Environmental Factors/Mechanisms



Note: Each of the systems of influence contains interindividual-difference variation (e.g., genetic, education, gender, social stratification, ethnicity)

Baltes, Cornelius, & Nesselroade (1977, 1979)

Biocultural Co-Constructivism:
Towards Completing the Unfinished Biocultural Architecture of Aging



Baltes & Lindenberger (2004); Li (2003)

HOW TO INTERCONNECT DISCIPLINE EFFORTS IN AGING RESEARCH? EXAMPLE: PLASTICITY AS AN INTEGRATIVE CONCEPT

PLASTICITY: GENERAL DEFINITION

Defined as the Potential (Modifiability, Perfectability) of an Event or Process

Zone (Range) of Possible Development

Search for Conditions and Constraints by Comparative and Interventive Methods

NEURONAL / NEUROCHEMICAL PLASTICITY

Brain Development: Anatomical Differentiation, Neurogenesis, Synaptogenesis, etc.

Biogenetics of Human Development

Neuronal Modelling, Animal Models

BEHAVIORAL/PSYCHOLOGICAL PLASTICITY

Learning/Practice

Acquisition of Sensorimotor Skills

Basic Cognitive and Cultural Competencies

Peak Performance (Expertise) in General and Person Specific Domains

SOCIETAL PLASTICITY

Cross-Cultural, Cross-Society, Historical Analyses

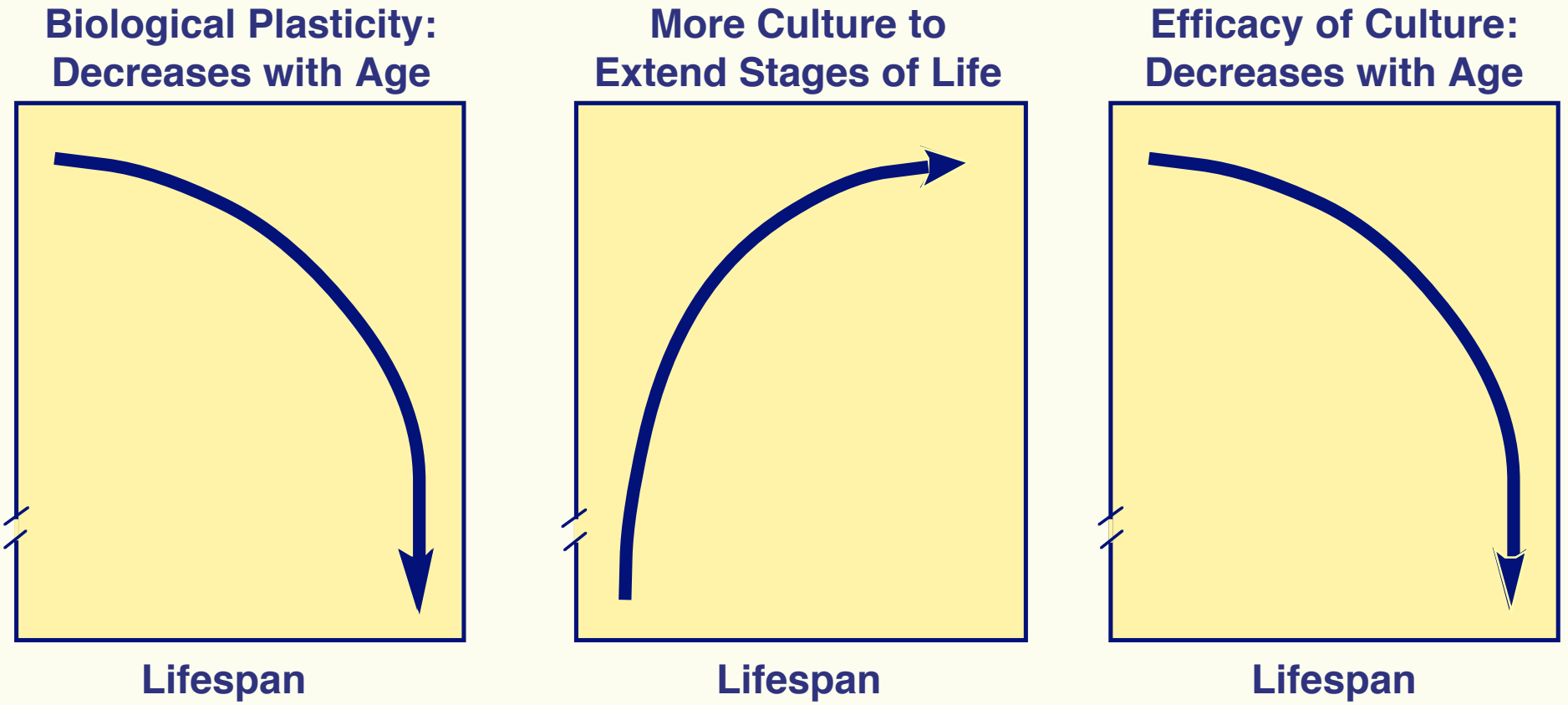
Social Differentiation: Study of Inequalities/Constraints by Age, Gender, Ethnicity, Class

Health Policy Comparison: Longevity/Morbidity

Edcuational Comparison

Age-Graded Opportunity/Constraint Structure Analysis

Three Meta-Principles Co-Regulate Human Ontogeny: On the Growing Incompleteness of the Life Course



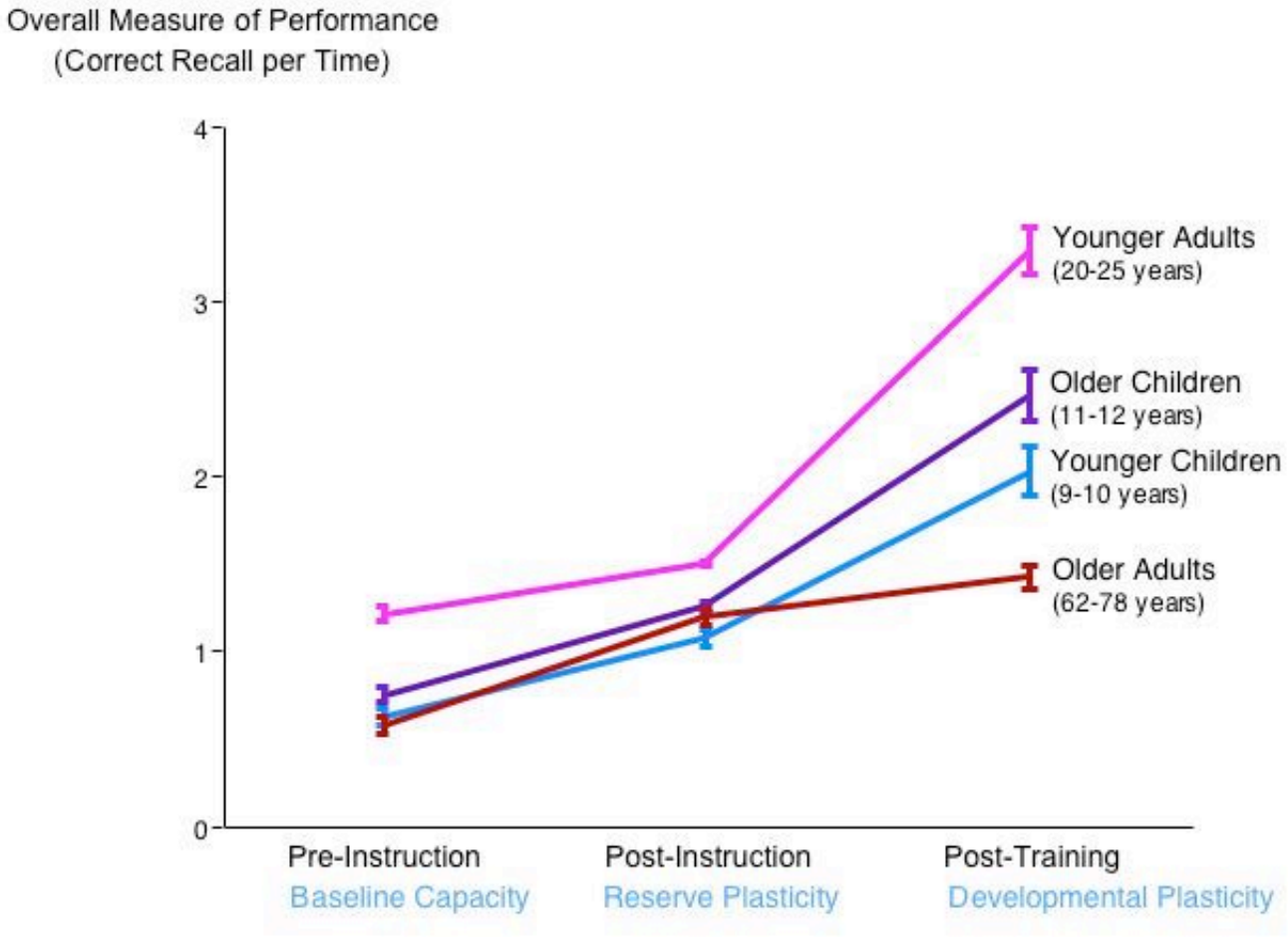
Baltes (1998)

The Gain-Loss Dynamic: Overall Pattern

– Age Changes in Plasticity

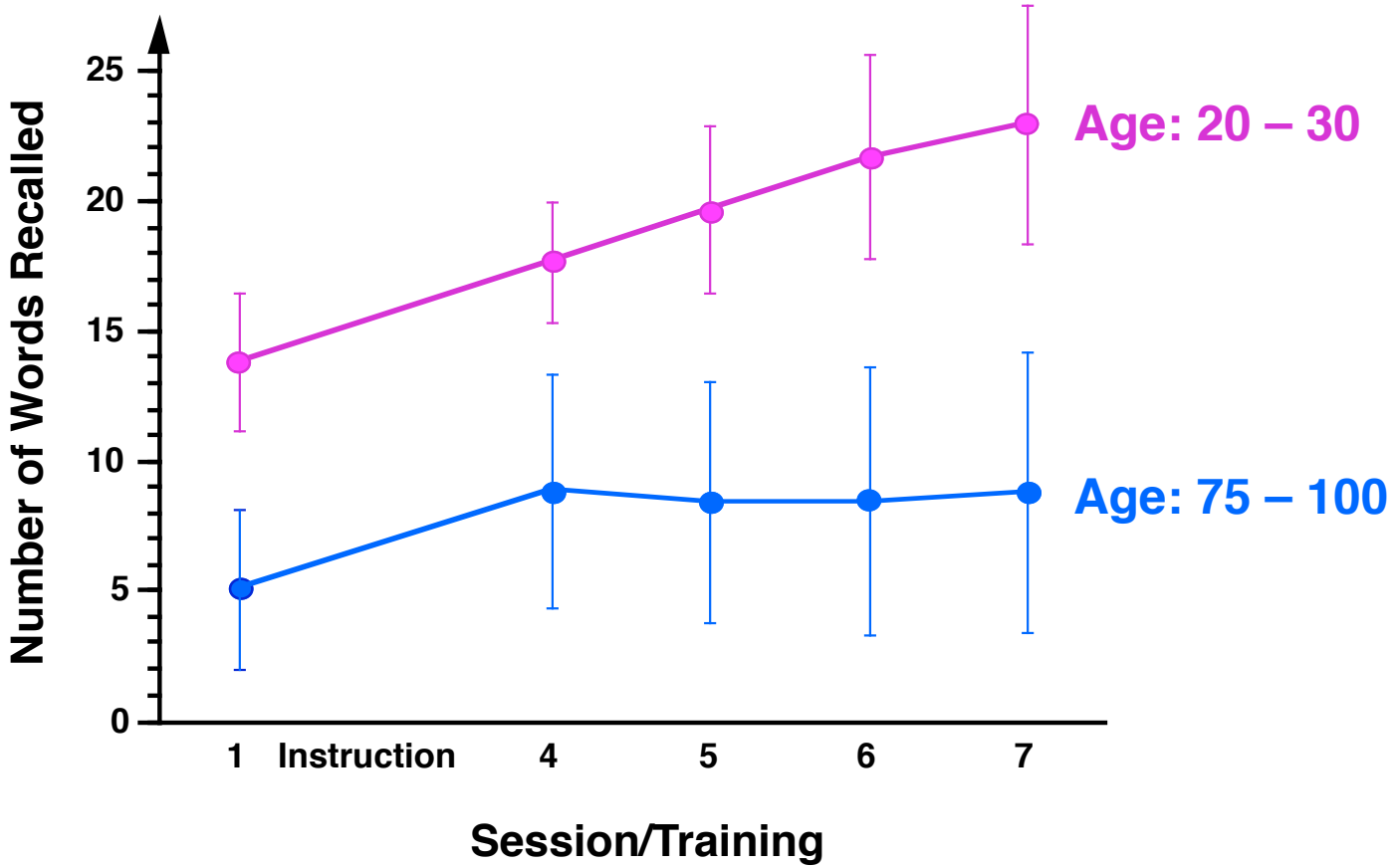
– Research on Testing Limits

Testing Limits: Lifespan Age Difference



(Y. Brehmer, dissertation; Brehmer, Li, & Lindenberger, in prep.)

Plasticity of Memory in the Fourth Age: Sizeable Age Losses in Learning Potential



Singer, Lindenberger, & Baltes (2000)

Recent Gerontology News

The Good News: The Third Age (Young-Old)

- Extension of lifespan includes older ages
- Substantial latent potential for better fitness (physical, mental)
- Historical improvement in physical and mental fitness of same-age persons
- Evidence for cognitive-emotional reserves
- More and more exceptionally successful agers
- High levels of emotional and social well-being (self plasticity)
- Effective strategies of mastery of gains and losses of life

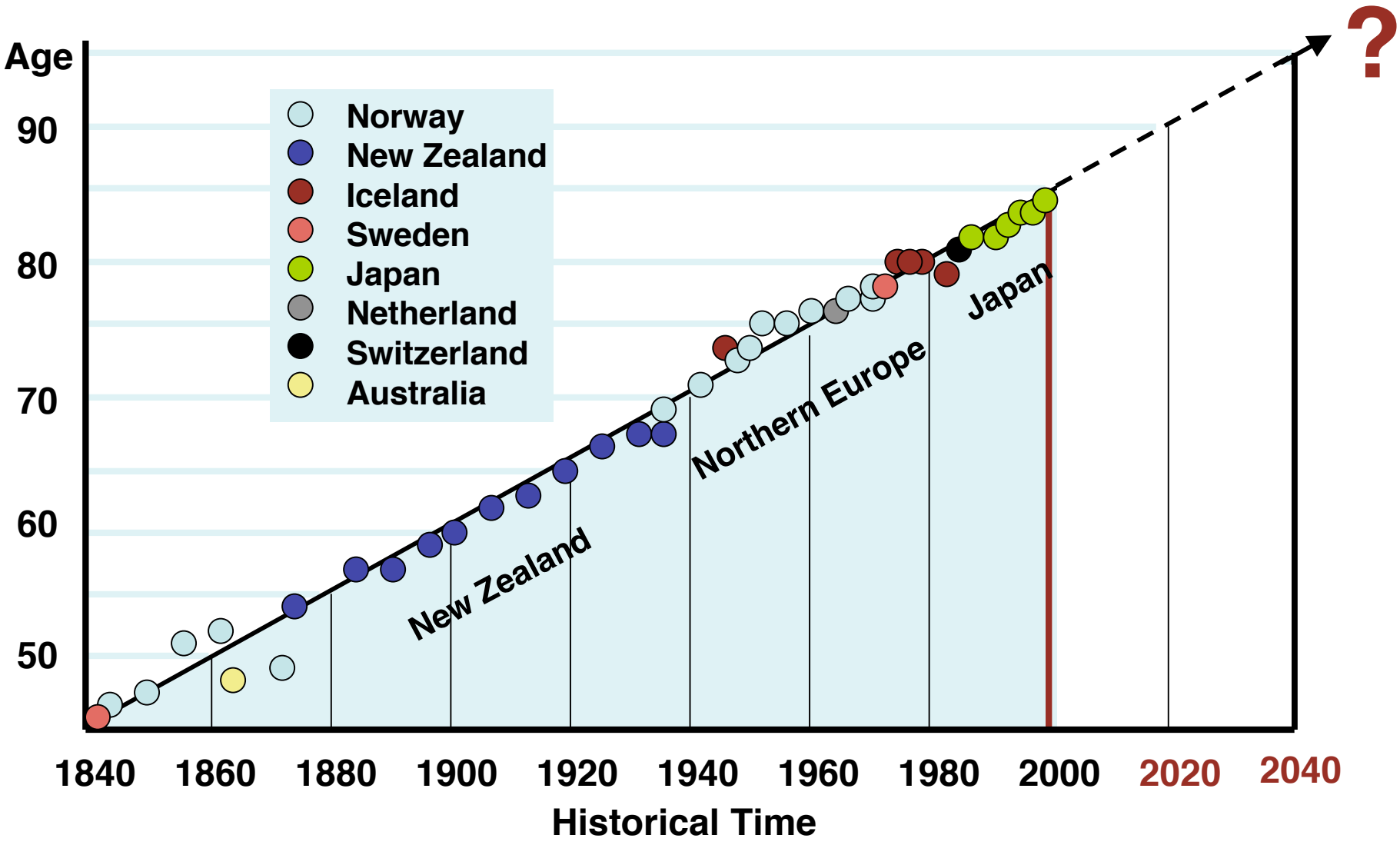
The Not so Good or Bad News: The Fourth Age (Oldest-Old)

- Sizeable losses in learning potential and cognitive plasticity
- Increases in stress syndrome in oldest-old
- Sizeable incidence/prevalence of dementia (about 50% in 90-year-olds)
- High levels of frailty and dysfunctionality in 85- to 100-year-olds
- Dying in oldest age: With human dignity?

The 21st century: The era of chronic incompleteness of mind and body?

Baltes (2002)

Example for Historical Plasticity
Average Life Expectancy: Top Countries in Recent History



Based on: Max Planck Institute for Demographic Research, Rostock 2003

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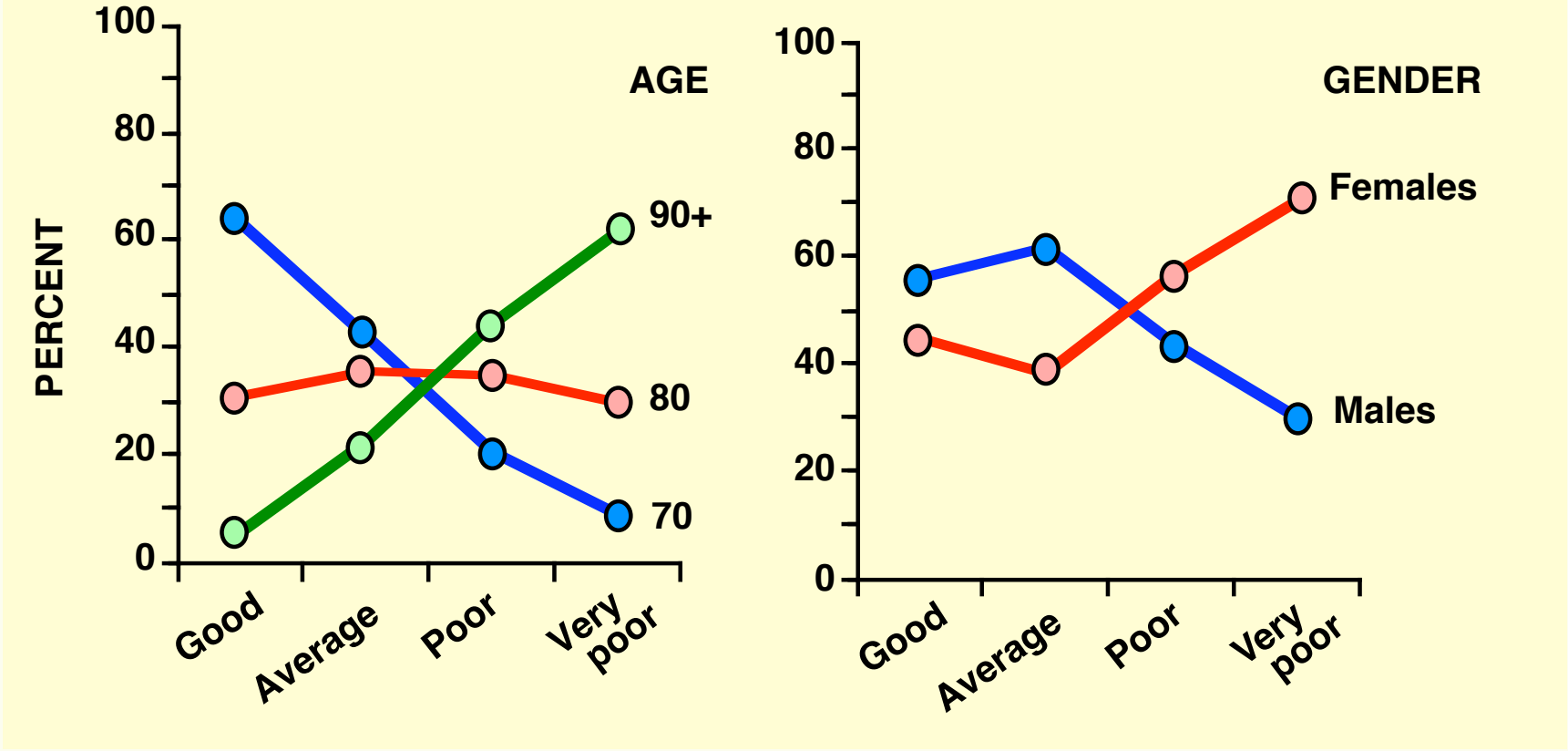
The Fourth Age:

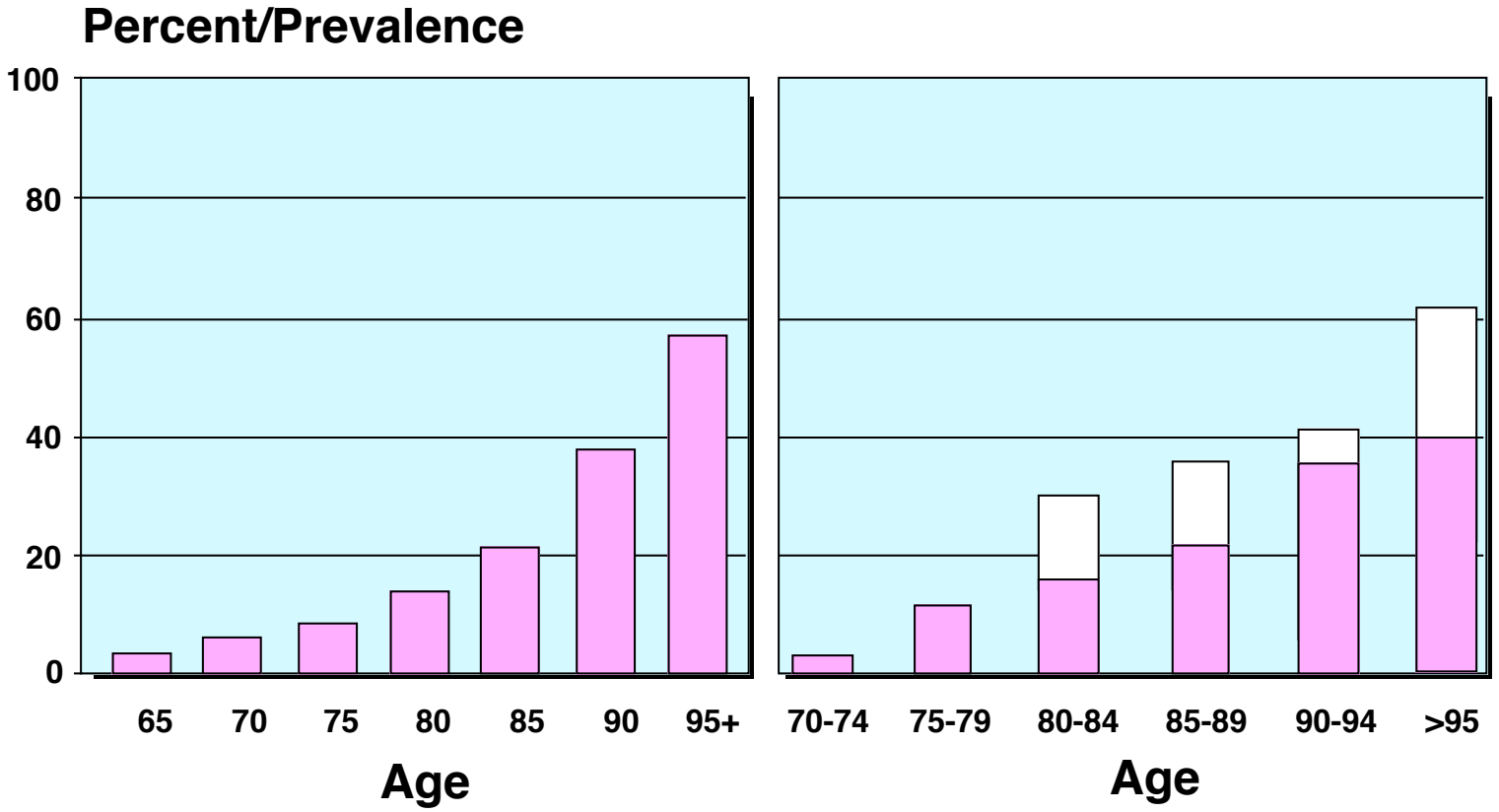
The Most Radical Form of Incompleteness

Age and Gender as Risk Factors in Advanced Old Age (N = 516): Functioning on 23 Indicators (Physical, Mental, and Social)



Smith, Baltes et al. (1996)

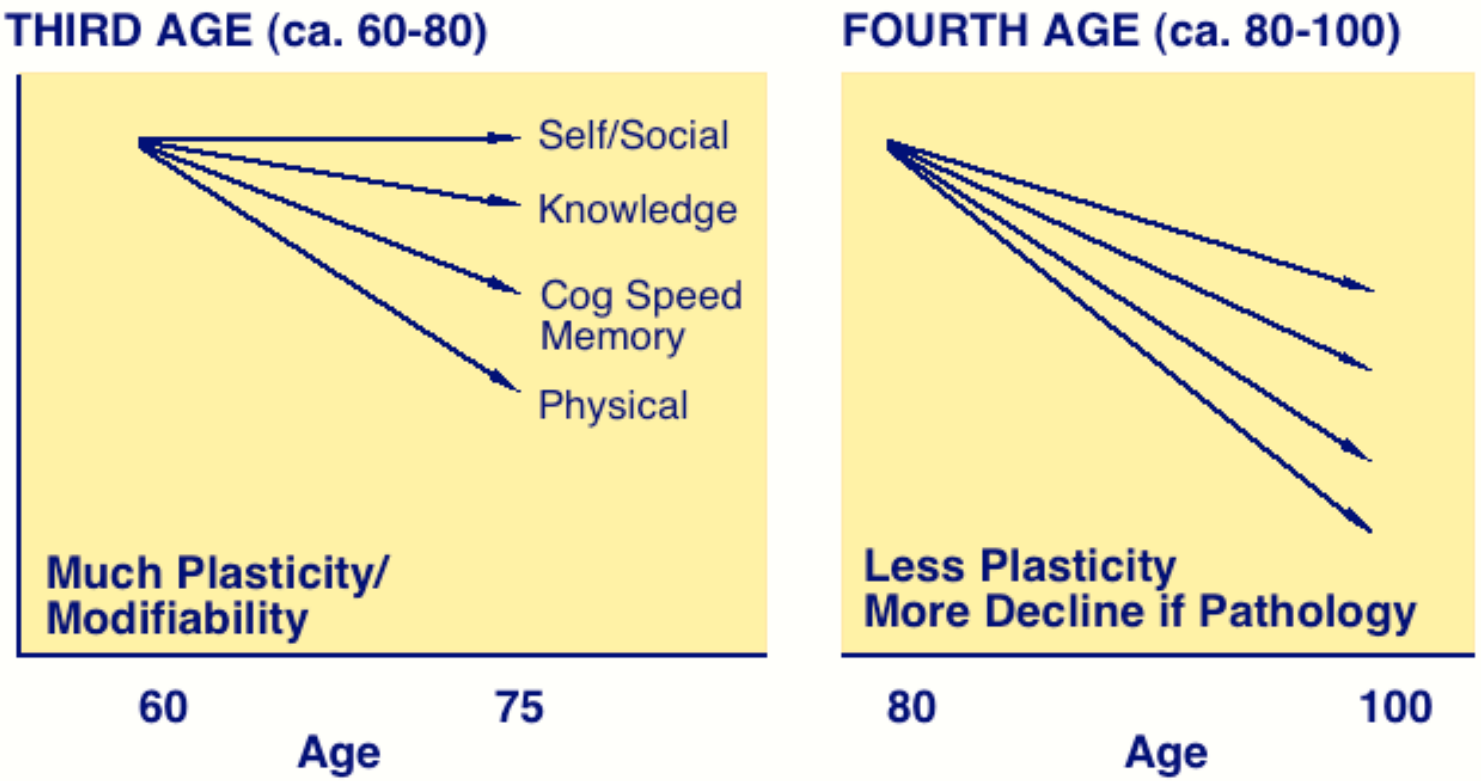
Dementia in Old Age: Two Studies



Ebly et al. , Kanada, 1994

Berlin Aging Study (N = 516)
Helmchen, Reischies, et al. (1996, 1999)

Fitness and Ages of Age:
From Highly Differential to More Universal Decline



Note: Sizeable Interindividual Variability in Level and Onset Continues into Fourth Age

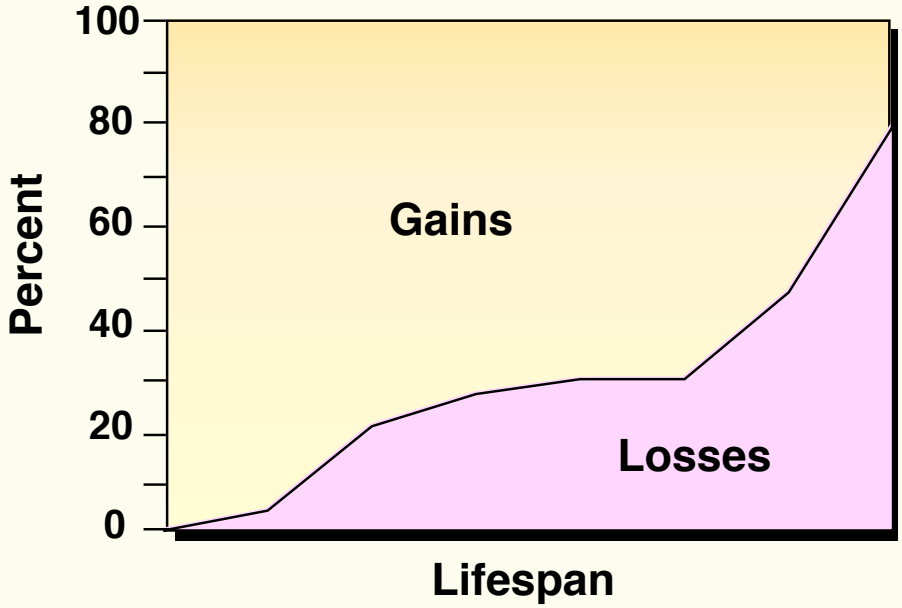
Baltes, 2000

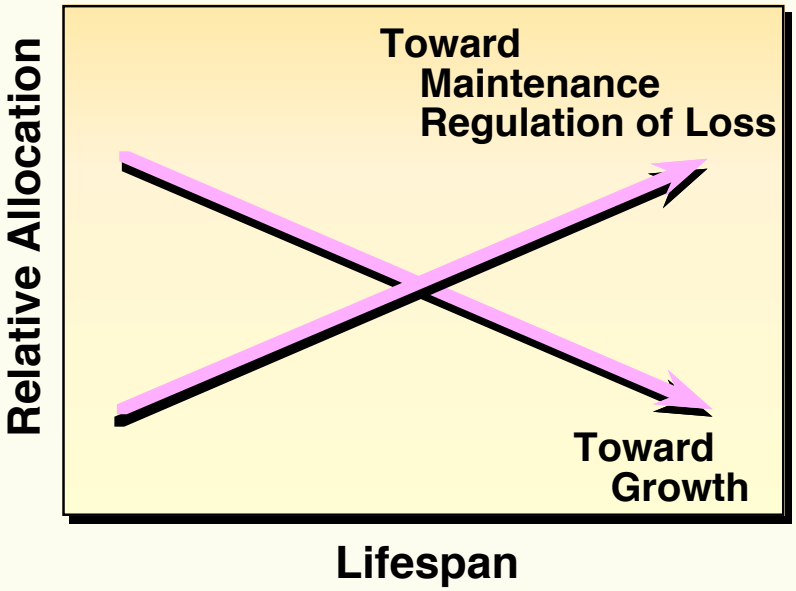
Overall Guiding Frame

- The Biocultural Architecture of the Life Course
- Aging as Outcome of Lifelong Biocultural Co-Construction
- Aging as Universal (Nomothetic) and Increasingly Individualized (Idiographic) Change

Baltes (1997)
Baltes, Reuter-Lorenz, Rösler (in press)

Life-Span Development:
Changes in Allocation of Resources to Functions





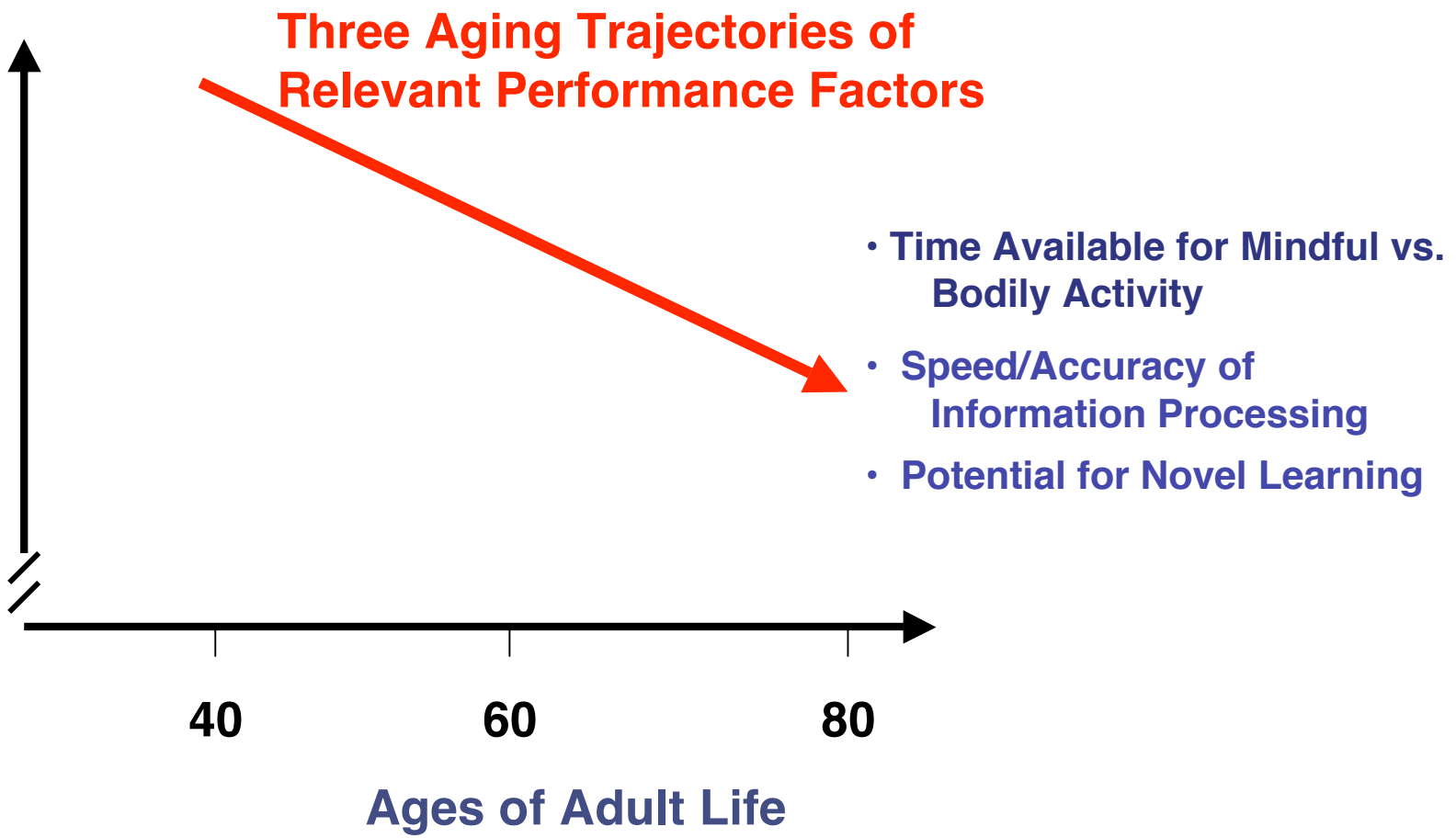
Baltes, Staudinger et al., 1995

Societal Productivity Potential of an Aging Population

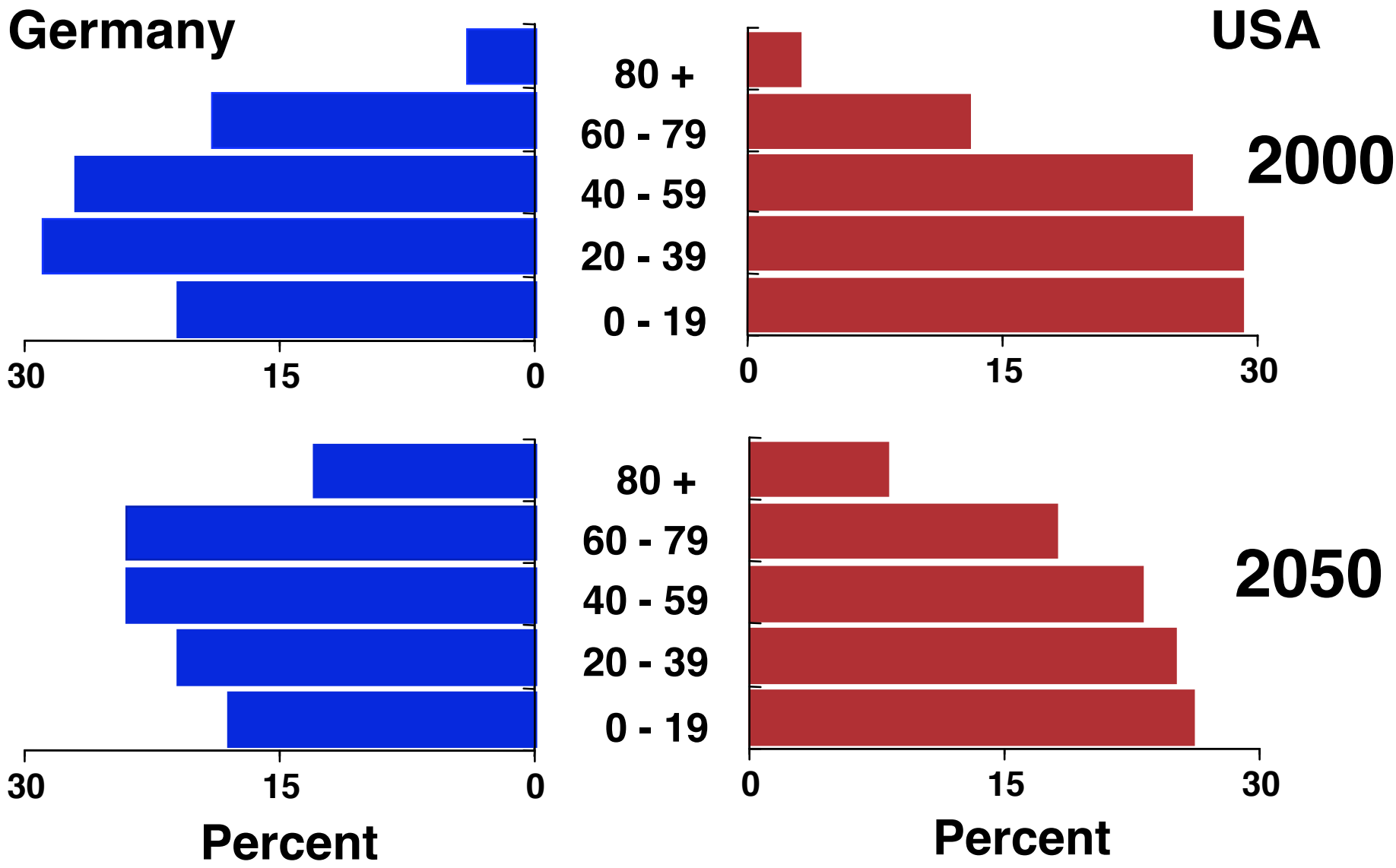
– A New Challenge for Western Countries?

– An Opportunity for Near-Industrialized Countries?

Cognitive Innovation Potential of Societies:
Cognitive Research Suggests Risk Factors for Populations Older in Age



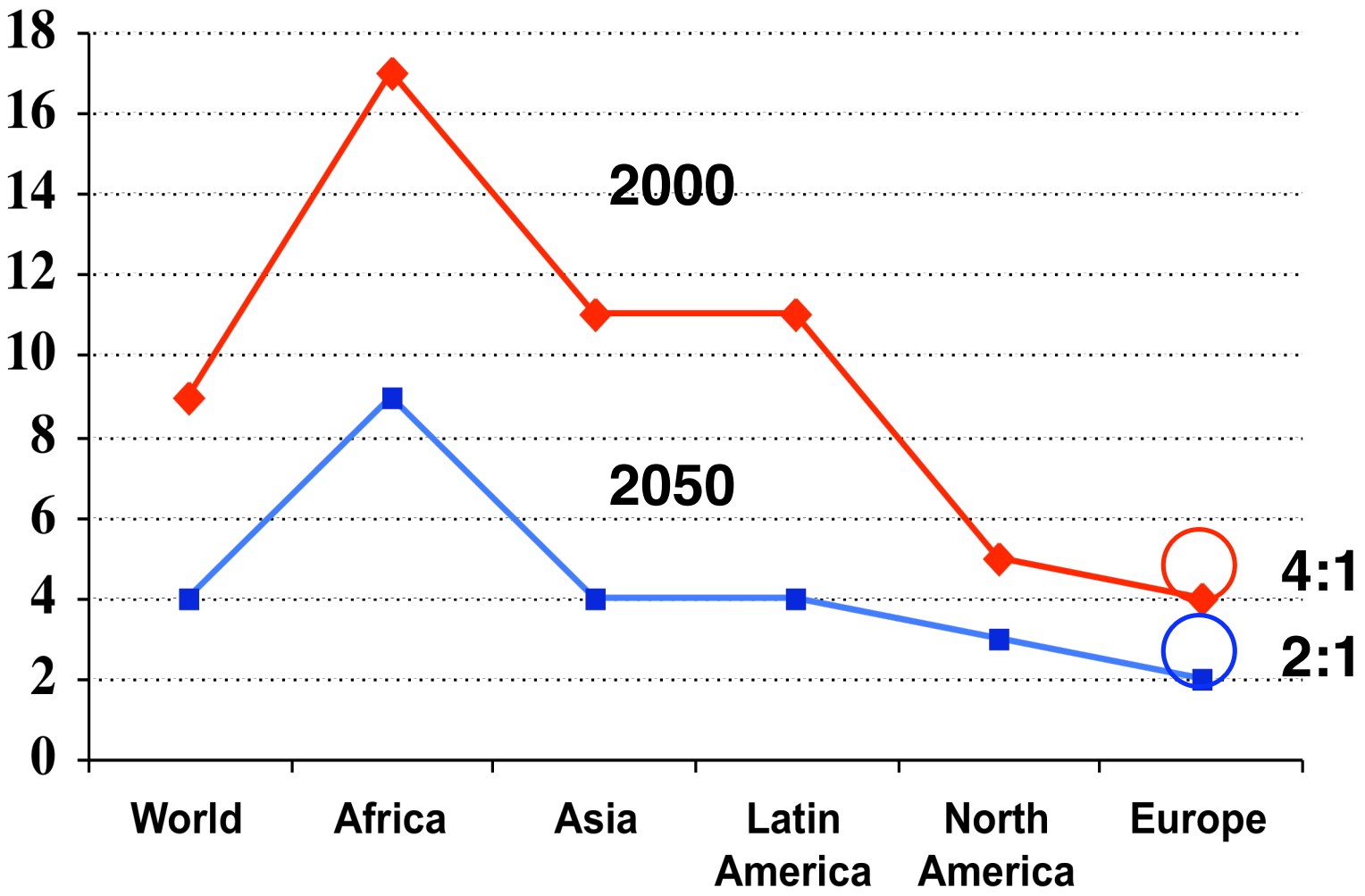
Age Distribution: Germany vs. USA
The German Population is Aging Faster Than the US Population



Source: U.S. Census Bureau, 2003 (USA)

0330 02 0504

Young-Old Numbers: 15–64 vs. 65 plus



UN: Population Division (2003)

A General Model of Successful (Proactive) Development: Selective Optimization with Compensation

– To Develop Resources (Goals and Means)

– To Manage Resources (Goals and Means)

– To Deal with Opportuninites and Constraints (Internal and External)

Why Use Selection, Optimization, and Compensation (SOC) as the Adaptive Strategy of Life Management?

1. To DEVELOP General and Specific Resources/Skills
   - Physical
   - Cognitive
   - Social
   - Personality

2. To ALLOCATE Resources to Task Solution and Longterm Development in Adaptive Ways

A Theory of Adaptive Development: Selective Optimization With Compensation (SOC)

Definition
SOC involves the orchestration of three processes: selection (contexts, goals), optimization (means/resources) and compensation (substitutive means/resources)

Selection: Elective and Loss-Based
Concerns directionality (goals) of development including selection of alternative contexts, outcomes, and goal structures

Optimization
Concerns means for achieving desired outcomes and attaining higher levels of functioning

Compensation
Concerns activation or acquisition of new substitutive means for counteracting loss/decline in means that threatens maintenance of a given level of functioning

- SOC behaviors are universal processes of optimal development
- SOC behaviors are relativistic in that their phenotype depends on person- and context-specific features

Baltes, P. B. & Baltes, M. M. (1990); Freund & Baltes (in press)

General Empirical Approach to SOC

Multiple Methodologies and Paradigms

Multiple Domains/Functions

Multiple Contexts (lab ↔ life)

Multiple Group Comparisons Including Age and Health Status

Multiple Levels of Analysis

Baltes, Freund, & Krampe (2001)

SOC: Self Report Data

SOC Questionaire: Prototypical Items

Elective Selection

I concentrate all my energy on a few things

I consider exactly what is important

Loss-Based Selection

When things don‘t work so well, I pursue my most important goals first

When I can no longer do something in my usual way, I think about what, exactly, is really important to me

Optimization

I make every effort to achieve a given goal

When I want to go ahead, I also look at how others have done it

Compensation

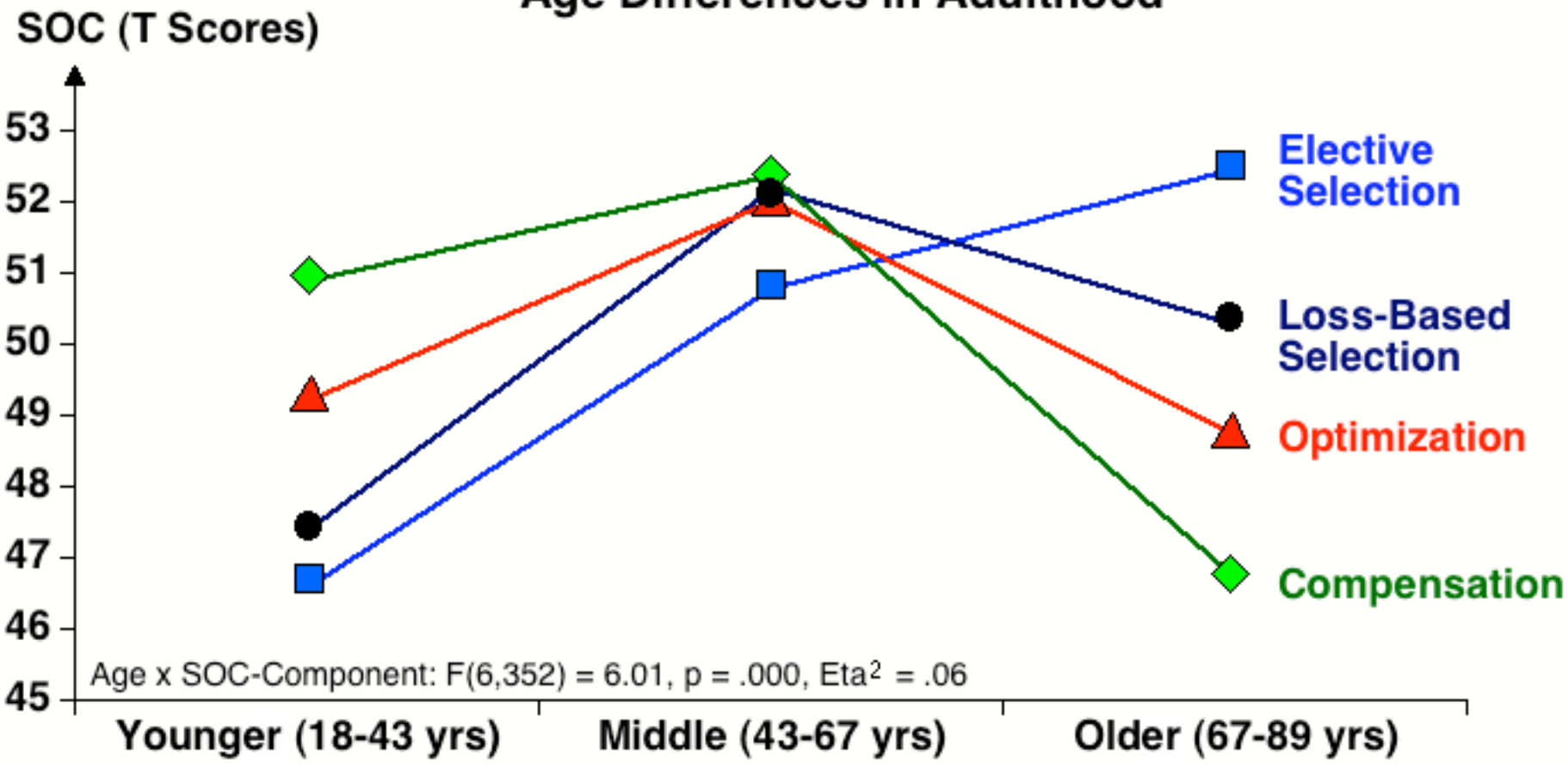
When things don‘t work the way they used to, I look for other ways to achieve them

When I can‘t do something as well as I used to, then I ask someone else to do is for me

SOC Project
MPI for Human Development, Berlin

Baltes, Baltes, Freund, & Lang (1999)

Life Management: Selection, Optimization, Compensation
Age Differences in Adulthood



Middle-aged adults report more SOC-related behavior than younger and older adults.
One exception: Elective selection increases throughout adulthood

MPI for Human Development, Berlin
Project: SOC-Act

Freund & Baltes (2002), Journal of Personality and Social Psychology

Overview: SOC (Self-Report) Predicts Successful Development (Outcomes)

OUTCOME		SOC PREDICTION
Berlin Aging Study (72 – 102 yrs; N = 200) (Freund & Baltes, 1998)		
Satisfaction with Age		.33**
Positive Emotions		.47**
Emotional Loneliness		-.31**
Adulthood and Well-Being (14 – 89 yrs; N = 395) (Freund, & Baltes, 2000)		
Positive Emotions		.32**
Ryff Scales:	Environmental Mastery	.35**
	Personal Growth	.37**
	Purpose in Life	.44**
Work and Family in Adulthood (25 –36 yrs; N = 206) (Wiese, Freund, & Baltes, 2000)		
Overall Well-Being (Ryff Scales)		.49**
Emotional Balance		.37**
Self-Esteem		.21**

Note. These associations between SOC and outcomes are not based on overlap in content of items. They vary by SOC components and remain significant when controlling for a number of rival predictors (e.g., NEO, Control Beliefs, Self-Regulation, Intelligence, Health)

Reduction of Work-Family Conflict By SOC?
Results of Structural Equation Modelling

PEOPLE WHO REPORT/SHOW

More Work-Related SOC Behavior	→	Report less Job Stress
	→	Report less Work-in-Family Conflict
More Family-Related SOC Behavior	→	Report Less Family Stress
	→	Report Less Family-at-Work Conflict

RELATIONSHIPS REMAIN SIGNIFICANT WHEN STATISTICALLY CONTROLLED FOR:

- Gender
- Job Involvement
- Family Involvement
- Social Support
- Hours Worked

Baltes, Boris B. & Heydens-Gahir, A.
Wayne State University
N= 241 Heterogeneous Adults

Journal of Applied Psychology, 2003

SOC: In Proverbs

Freund & Baltes
Journal of Gerontology (2002)

Examples of Proverbs Reflecting Selection, Optimization, Compensation

Selection

- Jack of all trades, master of none
- You cannot have the cake and eat it too
- No man can serve two masters

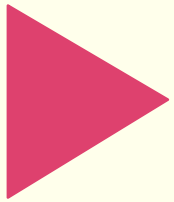
Optimization

- Practice makes perfect
- Make hay while the sun is shining
- Never put off till tomorrow what you can do today

Compensation

- Where one door shuts another opens
- Desperate diseases call for desperate remedies
- Make the best of a bad bargain

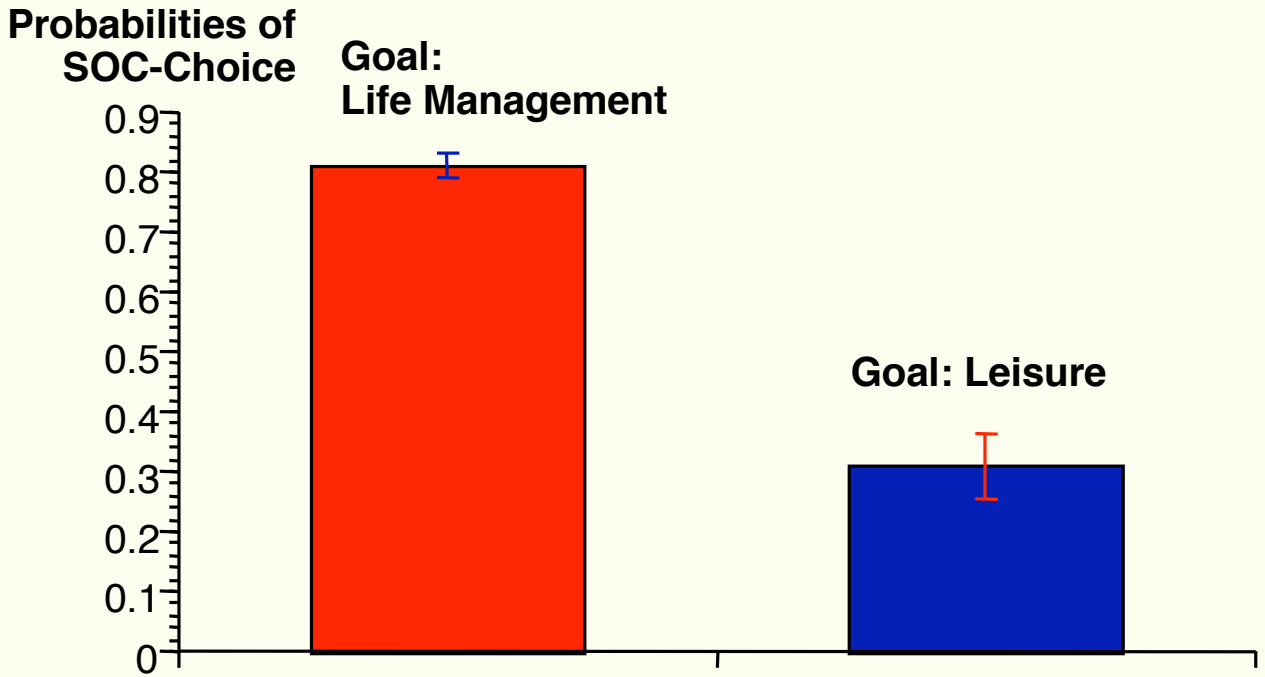
Selection (S), Optimization (O), and Compensation (O) Proverbs: Which Matches Better to this Problem of Life Management?



Adults choose from two alternative proverbs more FREQUENTLY and FASTER the proverbs that reflect selection, optimization, or compensation than a non-SOC, but equally well-known and liked, proverb

Freund & Baltes (2002)

When are SOC Proverbs Activated/Chosen?
Only when Goals of Life Planning (Not Leisure) are Involved



Note. Contextual variations involve different instructional sentence stems:
Life Management: "When you think what you want in life..." vs.
Leisure:" When you want to relax..."

Freund & Baltes (2002)
The Journals of Gerontology: Psychological Sciences

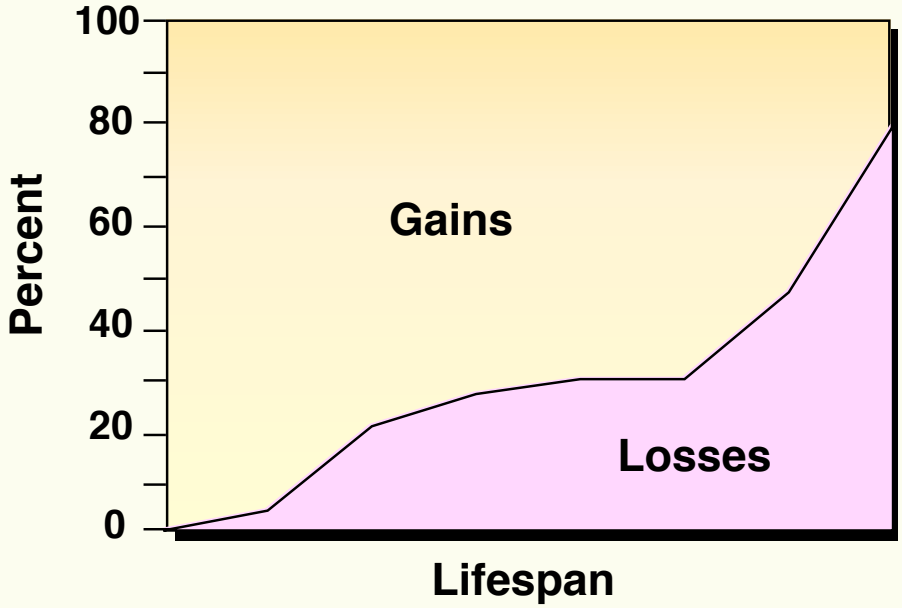
SOC: Goal Structures Across Life

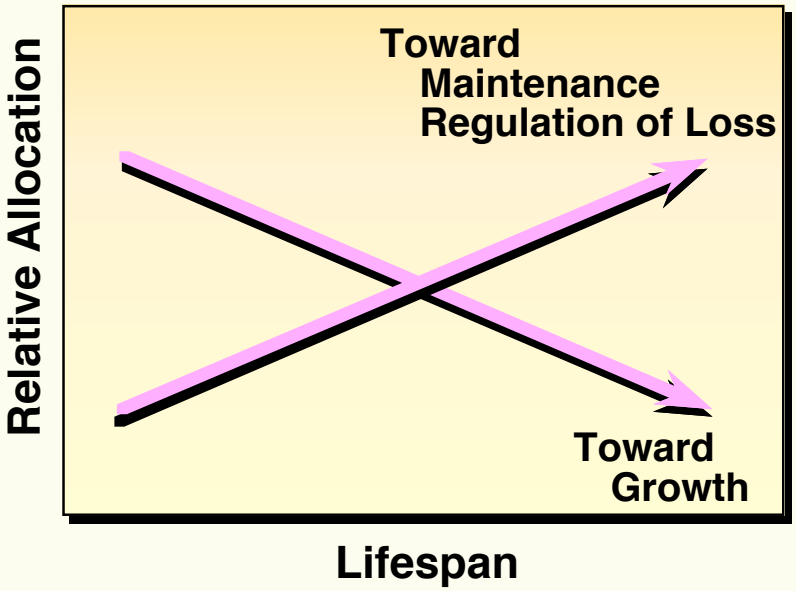
Riediger, Freund, & Baltes (2003)

Lifespan Development and SOC: Continuity and Change in Goals and Goal Structures

- Goals and goal structures are **organizers** of human life and human development
- **Lifespan Changes**: Emergence, maintenance, transformation, disengagement
- Goals **originate** from age-, cohort-, period-, group-, and idiosyncratic constellations
- Aging involves **reductions in scope** of goals, can include **advances** in goal organization and goal pursuit

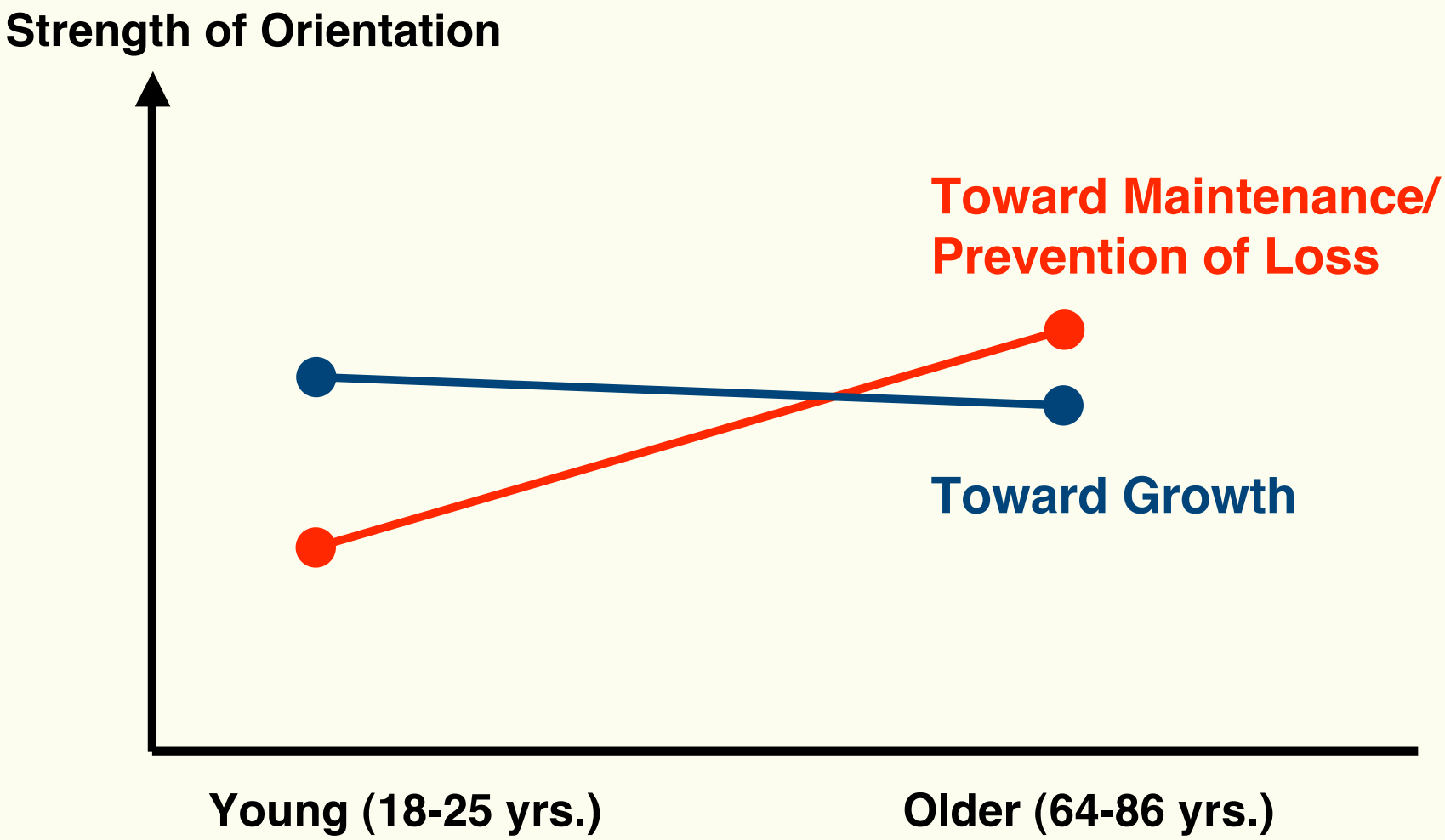
Life-Span Development:
Changes in Allocation of Resources to Functions





Baltes, Staudinger et al., 1995

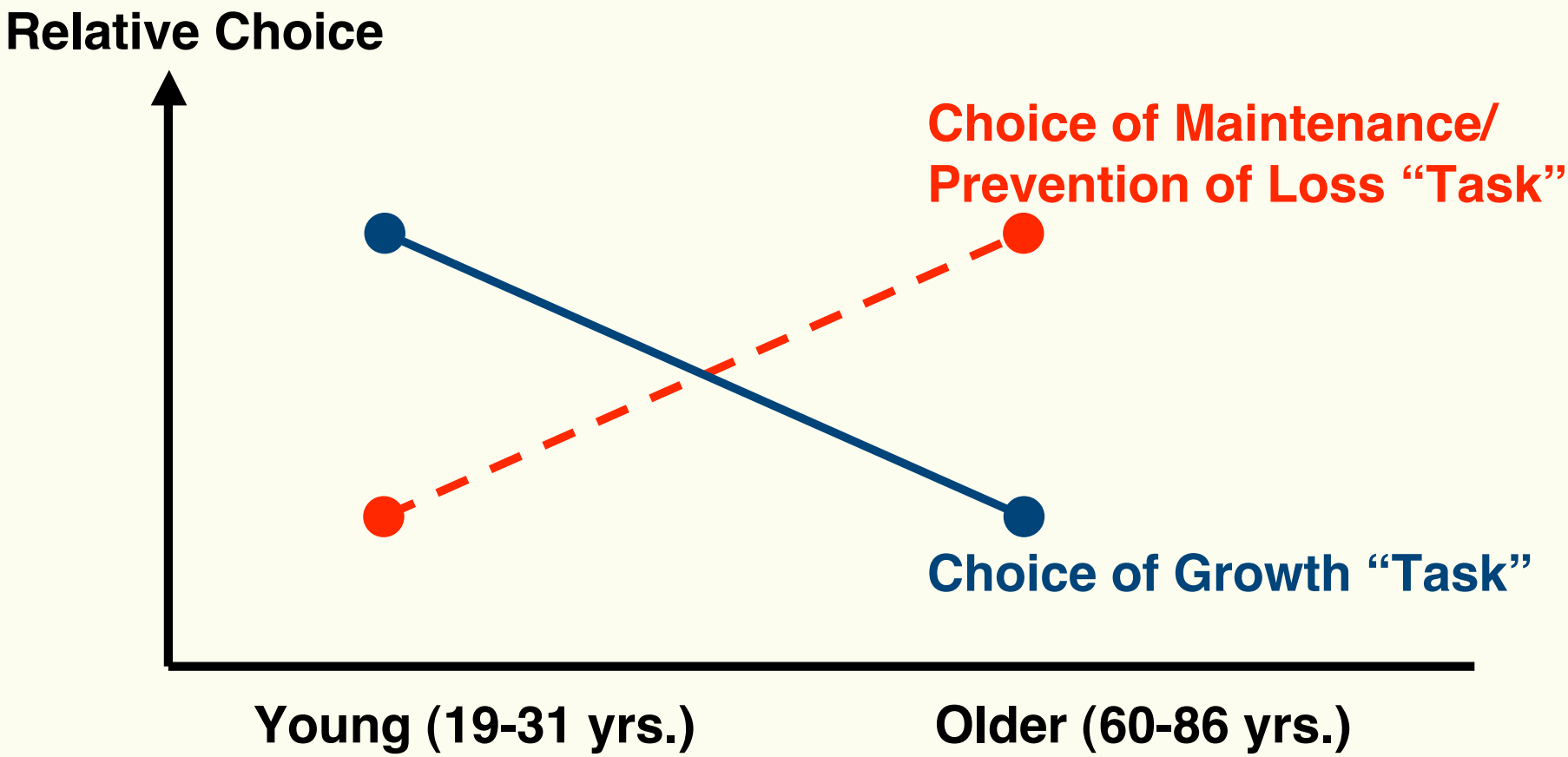
Changing Goal Orientation and Goal Pursuit Across Adult Life



Berlin MPI (2004), Ebner Dissertation

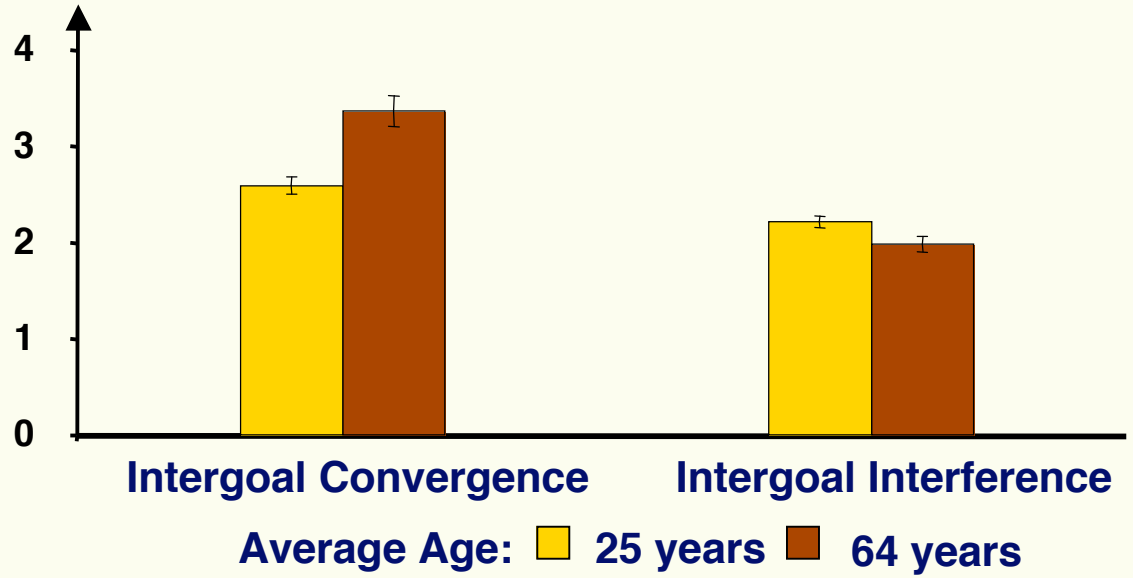
Interaction: $F_{(1,98)} = 57.1$, $p < .05$, $\eta^2 = .37$

Working on Identical Tasks Characterized as Different in Goal Orientation: Age Groups Differ in Tasks Selected



Ebner, Freund, & Baltes (2005)

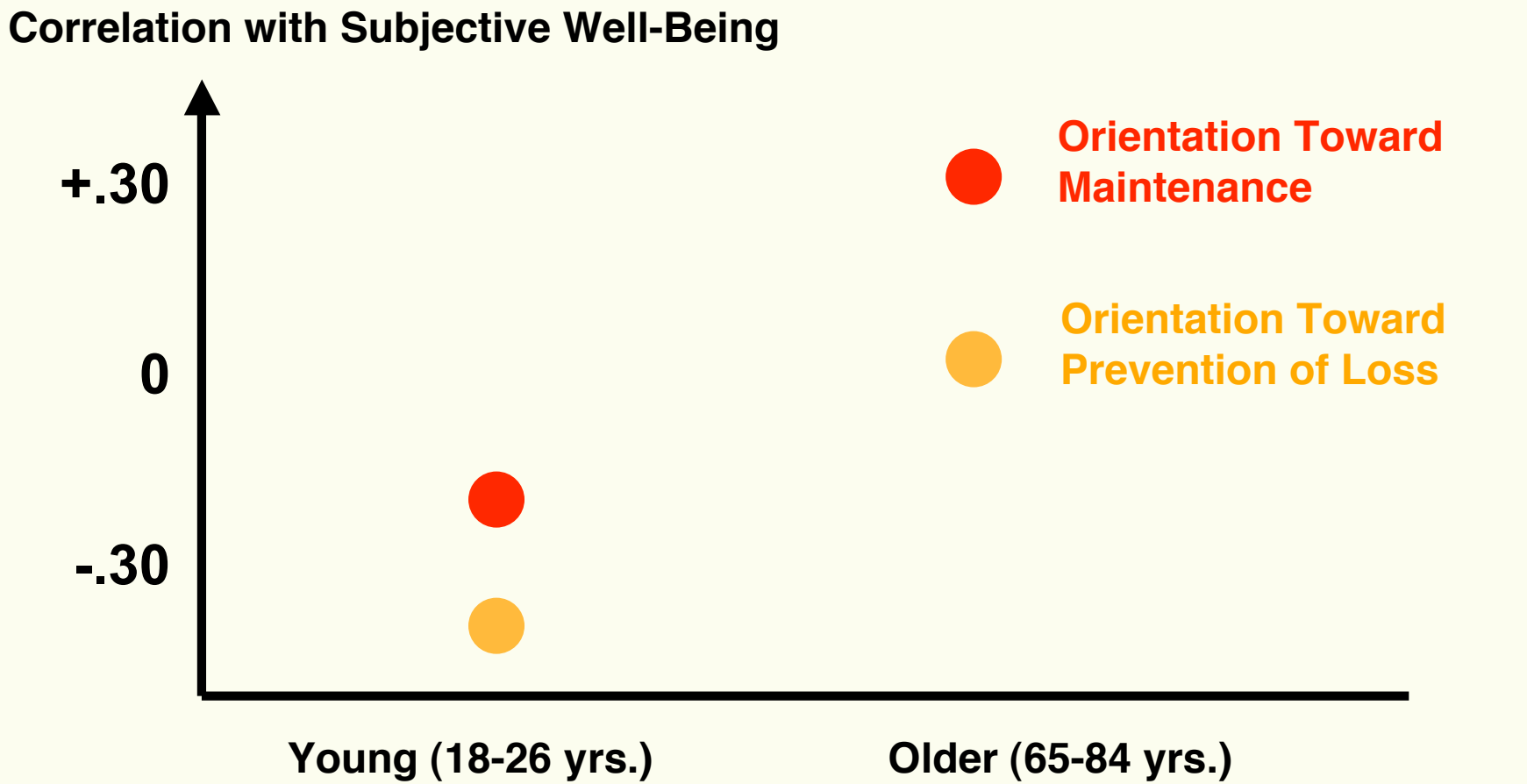
Example of Goal Pursuit Optimization
Convergence Between Means and Goals Increases with Age



- Intergoal Convergence: People higher in goal convergence are more involved in goal pursuit ($r \leq .42$).
- Intergoal Interference: People higher in goal interference report lower well-being ($|r \leq .44$).

Riediger, Freund & Baltes (2003)

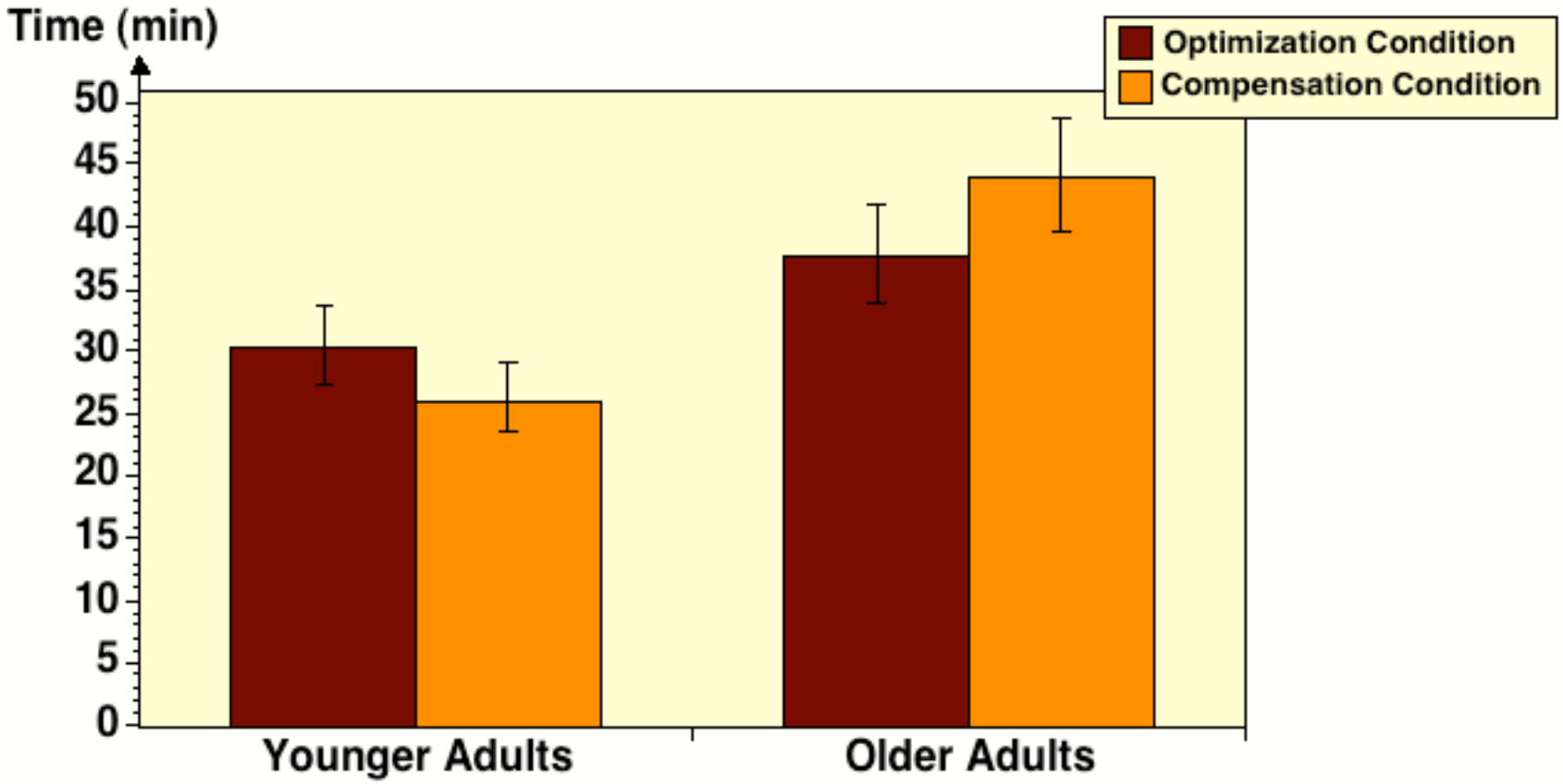
Correlations Between Type of Goal Orientation and Reported Well-Being by Age: Young People Disfavor, Older Adults Favor Goals of Maintenance/Prevention of Loss



Ebner, Freund, & Baltes (2005)

Differential Motivational Effects of Optimization vs. Compensation Goals: Young vs. Old Adults

Persistence: Time until voluntarily giving up the task



Note. Effects hold after controlling for level of performance

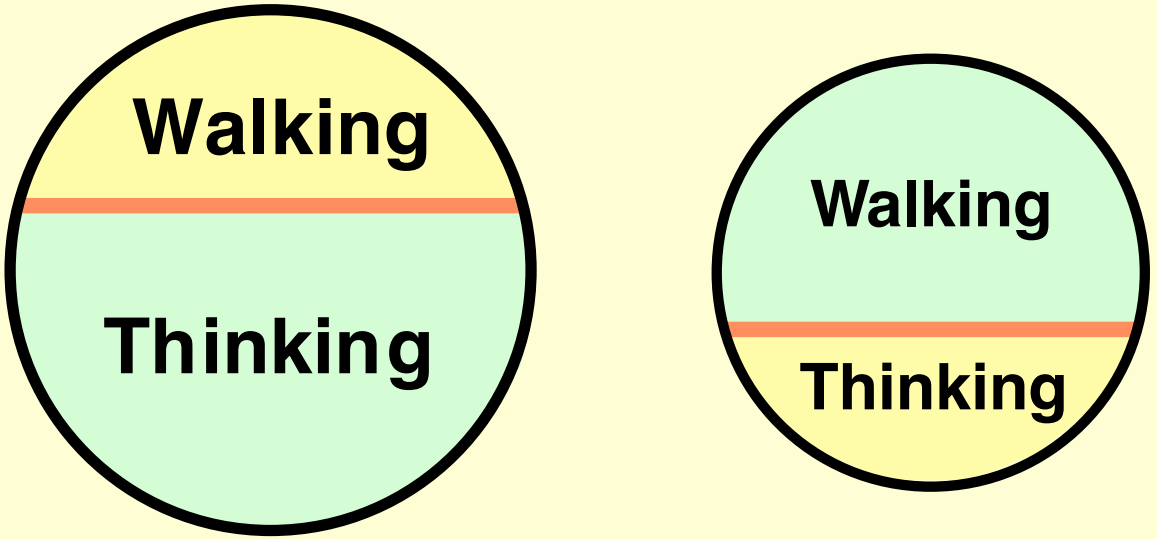
Freund (1999)

1435 01 0600

SOC:
Behavioral Data in Dual-Task Studies

Age Differences in Allocation of Resources
Example: Dual Task of Walking and Thinking (Memory)

What proportion is used for each task?



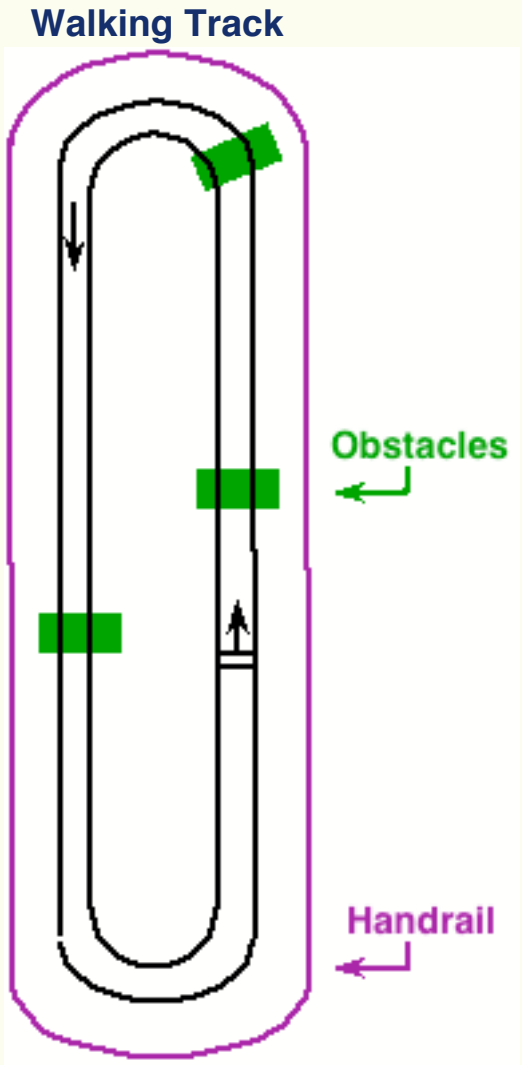
Young Adults (20 - 30)

Older Adults (60 - 70)

Lindenberger & Baltes (1996)

1595 01 0502

SOC: Dual-Task Thinking & Walking Project



Specific Methods

Measures

- Number of words correctly recalled (Method of Loci)
- Walking speed
- Walking accuracy

Independent Variables

- Compensatory aid use: Allowed vs. Not allowed
- Variation of Task difficulty

  Memory: Speed of presentation

  Walking: Number of obstacles on track

Compensation

- Memory: Request for extra encoding time with button box
- Walking: Use of handrail as support

Li, Lindenberger, Freund, & Baltes (2000)

Age Differences in Compensatory Aid Use Frequency and Performance Gain: Correlation Under Conditions of Loss

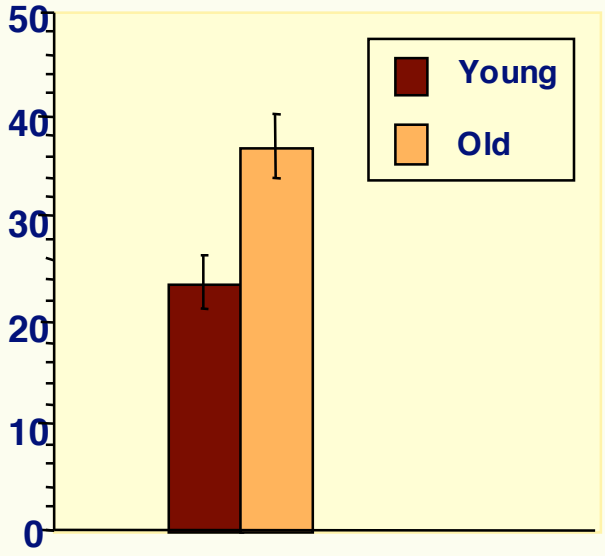
	Young	Old
Memory (Button Box)	.58	.13
Walking (Handrail)	.18	.63

Li, Lindenberger, Freund & Baltes (2001)

Which Suffers When Doing Both in Dual Tasks (Walking and Memorizing) Older Adults Show Larger Losses in Memory but not in Walking

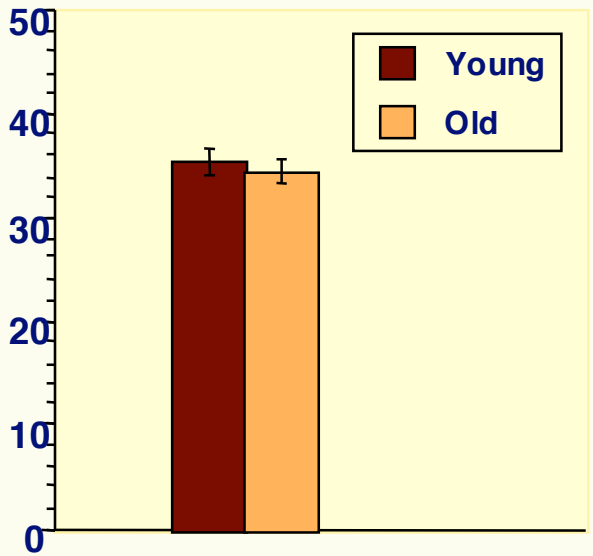
% Loss in Memorizing While Walking

Older More than Young



% Loss in Walking While Memorizing

Same Amount for Old and Young



Suggested SOC Interpretation: Older Adults Prioritize Walking over Memorizing

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Li, Lindenberger, Freund, & Baltes, *Psychological Science* (2001)

The Expanded View on Effect of Physical Training

Traditional Approach:

Direct Effect of Training on Bodily and Brain Health

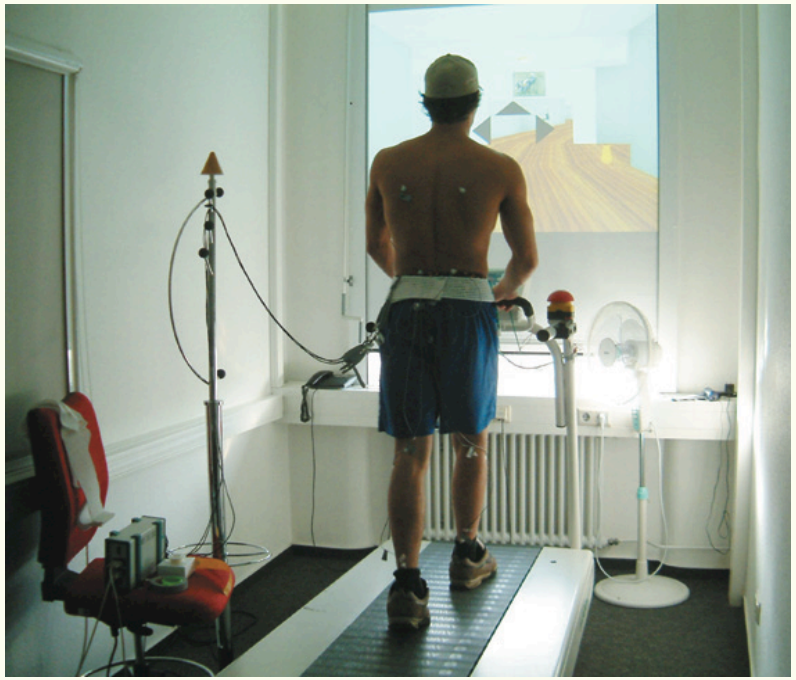
New Additional Insight: The Mortgage Effect of Body on Mind

Indirect Behavioral Allocation Effect Resulting in Freeing Up of Cognitive Resources for Other Mindful Behavior

Baltes, Lindenberger, Li et al.

The Aging Body as Mortgage on the Mind

- Sensory Functions and Motor Behavior Decline and Require more Cognitive Resources for Performance
- When Older Adults Train their Bodies, Cognitive Resources are Released for Use by Mind



Baltes, Lindenberger, Li, et al. (2004)

Other Areas Where SOC Theory Has Been Applied

- Social Interactions and Preferences
  Carstensen, Lang, et al.
- Language Behavior
  Kemper et al.
- Arthritis
  Gignac et al.
- Lowest Levels of Functioning in Oldest-Old
  Lang, Jopp et al.
- Goal Structures and Goal Selection
  Freund, Ebner, Riediger et al.
- Occupational/Supervisory Behavior
  B. Baltes et al.
- Resource Allocation in Memory
  Hess et al.
- Dual-Careers
  Wiese et al.

Selection, Optimization, and Compensation: Summary Perspectives

SOC is a metatheory that needs implementation with domain-specification. S, O, and C vary in their operational definitions by context, level of analysis, and mechanisms involved.

SOC is inherently a systemic and functionalist theory. Its focus is on the whole and the coordination of its parts in terms of three functions (S, O, C).

SOC is a general theory of behavior and development. It can be applied to many levels of analysis including the study of societies and the biological functioning of organisms (evolutionary and ontogenetic).

Baltes (1999)

SOC and Levels of Analysis

– Individual
– Collective
– Cultural

Why Use Selection, Optimization, and Compensation (SOC) as the Adaptive Strategy of Life Management?

1. To DEVELOP General and Specific Resources/Skills
   - Physical
   - Cognitive
   - Social
   - Personality

2. To ALLOCATE Resources to Task Solution and Longterm Development in Adaptive Ways

SOC: Universal Relevance for Successful Aging
Any Domain or Function Will Benefit

Cognitive Functioning

Nutritional Behavior

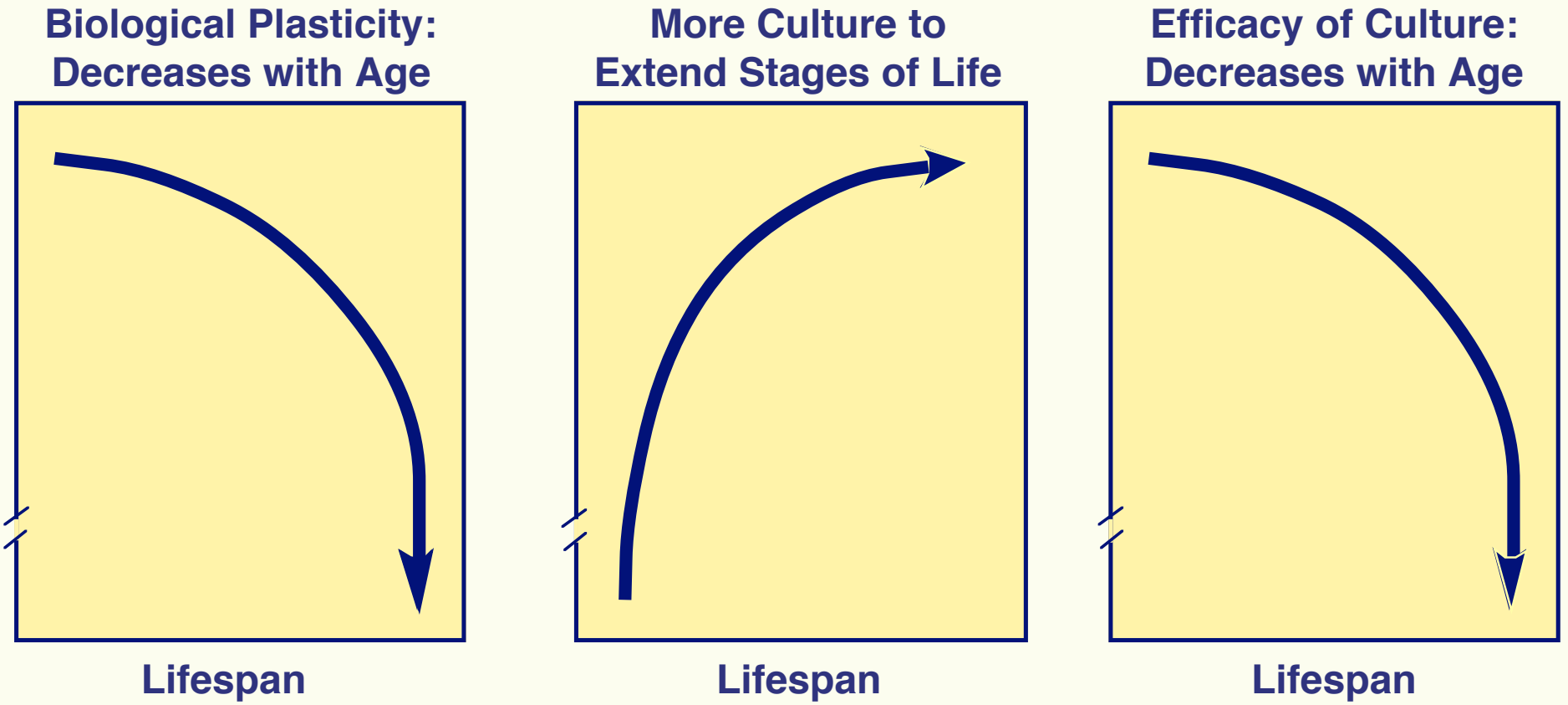
Health Behavior

Professional Skills and Career Development

Family Development

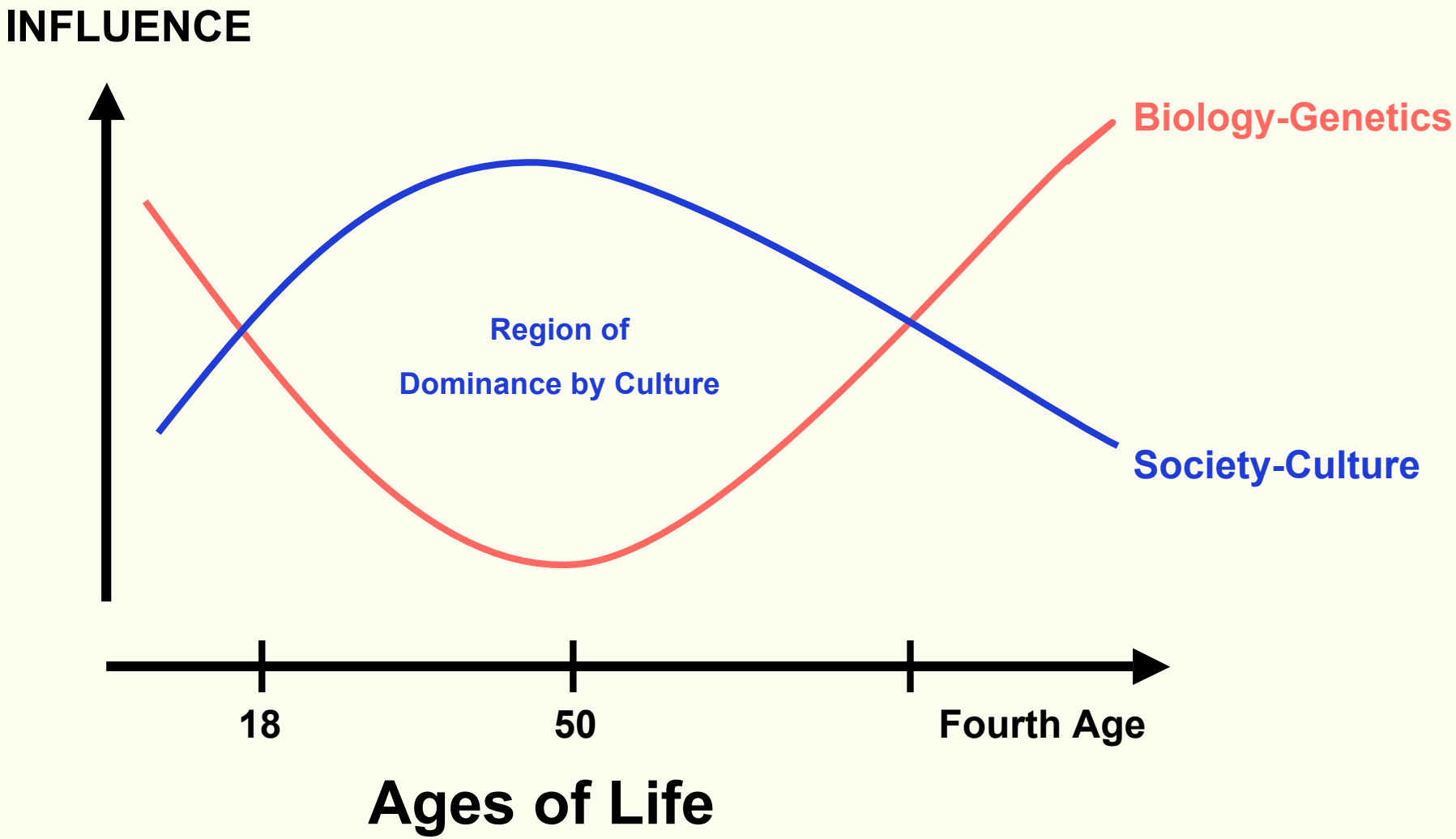
Goal Pursuit in All Areas

Three Meta-Principles Co-Regulate Human Ontogeny: On the Growing Incompleteness of the Life Course



Baltes (1998)

Biology-Culture Dynamic in Life Course: Relative Influence on Level and Individual Differences

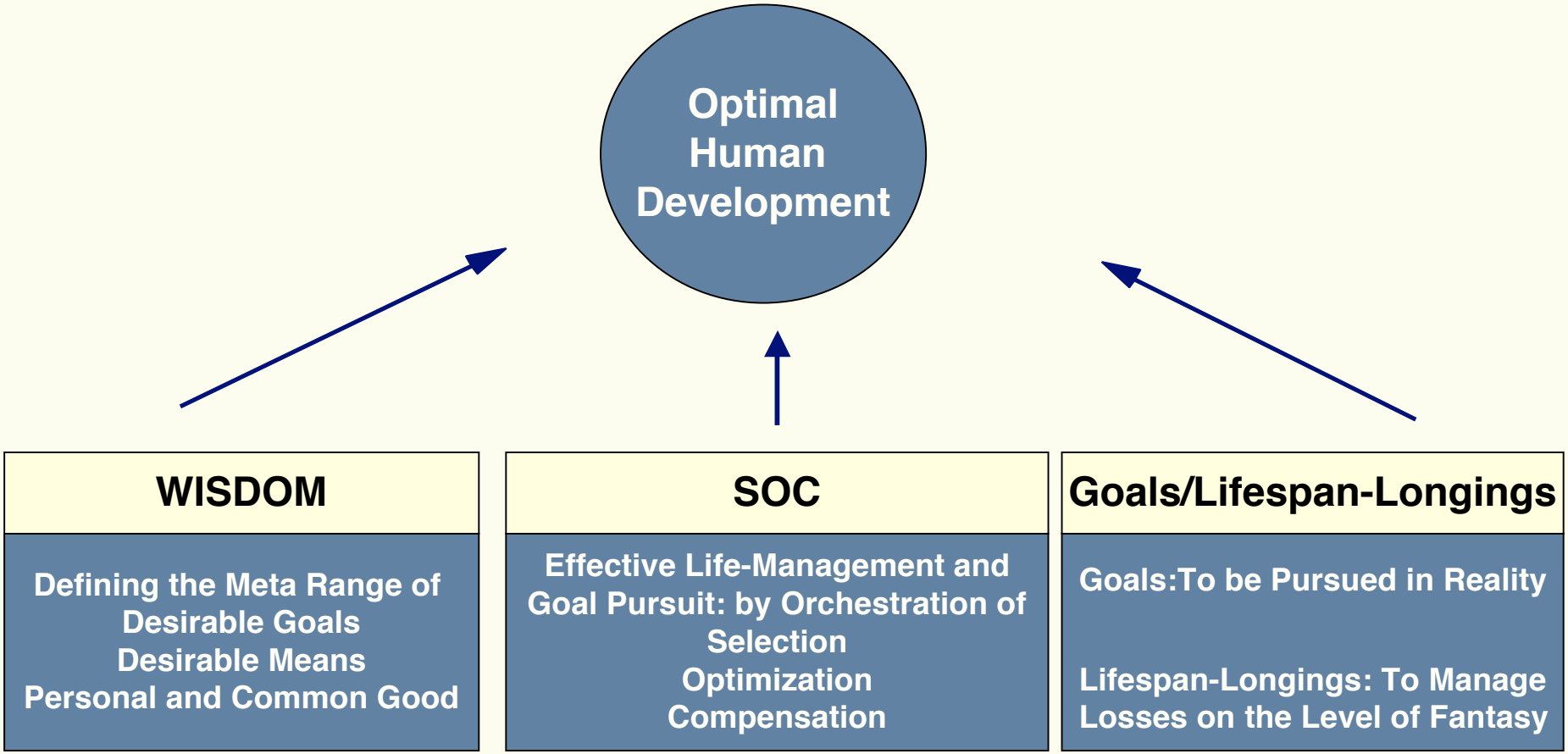


The Primary Entry into Proactive Aging

- Is in early and middle life
- Individuals and societies share in the responsibility to focus on these age periods and their future in the sense of primary prevention
- SOC theory is meant to help focus on prevention and early optimization. It begins in childhood and is the basic motor by which development in the sense of promoting gains occurs

Integrating MPI Research on Composing One´s Life

Wisdom, Selective Optimization with Compensation, and Lifespan-Longings/Goals



Baltes & Freund (2003); Kunzmann & Baltes (in prep.)

The Sisyphos Story Revisited

A Wisdom Saying from Hesiod .....

If you choose the right half,

half will be more than the whole ....

New Frontiers in the Future of Aging:

From Successful Aging of the Young Old to the Dilemmas of the Fourth Age

Baltes & Smith (2004). *Gerontology*, *49*, 123-145.

If you are interested in obtaining a copy of this presentation, please access the following website:

www.baltes-paul.de