

'Thinking, Fast and Slow' and the architecture for a new theory of health behaviour

Jaikishan Desai

Health Services Research Centre

School of Government

Victoria University of Wellington

Health
Services
Research
Centre

Te Hikutuoi Rangahau Hauora



SCHOOL OF GOVERNMENT
Te Kura Kāwanatanga

Thinking, Fast and Slow

Daniel Kahneman

Eugene Higgins Professor of Psychology Emeritus at Princeton University
Nobel Prize in Economic Sciences 2002

- From the book jacket:
 - “...a landmark book in social thought...” – Nassim Nicholas Taleb, author of *The Black Swan*
 - “Daniel Kahneman is among the most influential psychologists in history His work has reshaped social psychology, cognitive science, the study of reason and of happiness... The appearance of *Thinking, Fast and Slow* is a major event.” – Steven Pinkner, Harvard University and author of *How the Mind Works*
 - “.... It will change the way you think, on the job, about the world, and in your life.” – Richard Thaler, Professor of Economics, University of Chicago
 - “*Thinking, Fast and Slow* is a masterpiece – a brilliant and engaging intellectual saga by one of the greatest psychologists and deepest thinkers of our time...” – Daniel Gilbert, Professor of Psychology, Harvard University and author of *Stumbling on Happiness*
 - “This book is a must-read for anyone with a curious mind.” Steven Levitt, University of Chicago and co-author of *Freakonomics* and *SuperFreakonomics*

What is *Thinking, Fast and Slow* (TFS) about and what does it have to do with health behaviour?

- TFS is an invitation to rethink thinking and rethink how we explain human behaviour
- Health behaviour (i.e. staying alive and healthy, in that order) is the most important dimension of human life
 - As we say in Hindi & Urdu **जान है तो जहान है** / **جان ہے تو جہاں ہے**
 - Jaan hai to jahaan hai (transl. Only if you are alive, do things matter)
- Changing health behaviour is probably the key, and the ultimate hurdle, in improving efficiency of any health system; just re-orienting healthcare delivery is not enough – you have to get people to do what is best for themselves

The Plan for this talk

- Overview of TFS
- ~~• Summarize existing theories of health behaviour~~
- Constructing a theory of health behaviour from scratch
 - What is health – physical and mental?
 - What are the actions that serve health maintenance?
 - How should these be modelled?

Thinking, Fast and Slow

- Part I: Two systems
- Part II: Heuristics and Biases
- Part III: Overconfidence
- Part IV: Choices
- Part V: Two selves

TFS: Two systems

- **Fast thinking (intuitive) – System 1** – operates automatically and quickly, with little or no effort or no sense of voluntary control
- **Slow thinking (reasoning) – System 2** – allocates attention to the effortful mental activities that demand it, including complex computations. The operations of System 2 are often associated with the subjective experience of agency, choice, and concentration
- System 1 continuously generates suggestions for System 2: **impressions, intuitions, intentions and feelings**. If endorsed by System 2, **impressions and intuitions turn into beliefs, and impulses turn into voluntary actions**

Examples of System 1 & 2

System 1

- Detect that one object is more distant than another
- Orient to the source of a sudden sound
- Complete the phrase “bread and....”
- Make a “disgust face” when shown a horrible picture
- Detect hostility in a voice

System 2

- Brace for the starter gun in a race
- Focus attention on the clowns in the circus
- Focus on the voice of a particular person in a crowded and noisy room
- Look for a woman with white hair

More on the two systems

- Control of attention is shared by the two systems
- Attention (much more so than time and money) is a limited resource
- Division of labour is highly efficient: it minimizes effort and optimizes performance
- System 2 is mobilized when a question arises for which System 1 does not offer an answer
- But system 1 has biases (systematic) and it cannot be turned off
- One of the tasks of System 2 is to overcome the impulses of System 1 – it is in charge of self-control

Characteristics of System 1 (1)

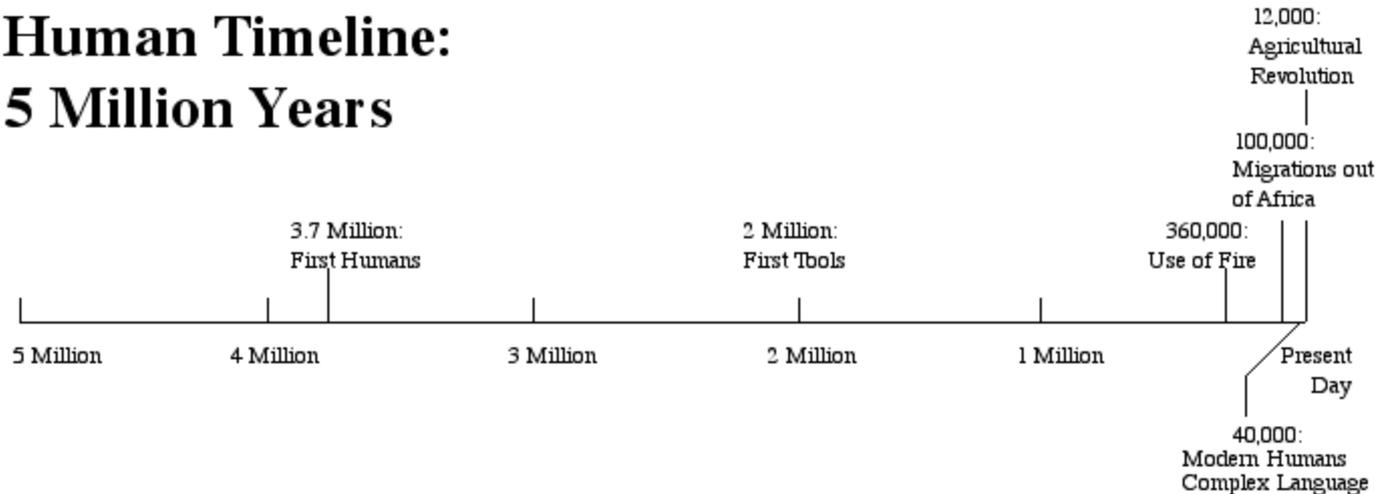
- Generates **impressions, feelings and inclinations**; when endorsed by System 2 these become beliefs, attitudes and intentions.
- Operates **automatically and quickly**, with little or no effort, and no sense of voluntary control.
- **Can be programmed** by System 2 to mobilise attention when a particular pattern is detected (search)
- Executes skilled responses and generates skilled intuitions, after adequate training
- Creates a **coherent pattern of activated ideas in associative memory**
- Links a sense of **cognitive ease** to illusions of truth, pleasant feelings, and reduced vigilance
- **Distinguishes the surprising from the normal**
- **Infers and invents** causes and intentions
- **Neglects** ambiguity and suppresses doubt
- Is **biased to believe** and confirm
- **Exaggerates emotional consistency** (halo effect)
- **Focuses** on existing evidence and **ignores absent evidence**

Characteristics of System 1

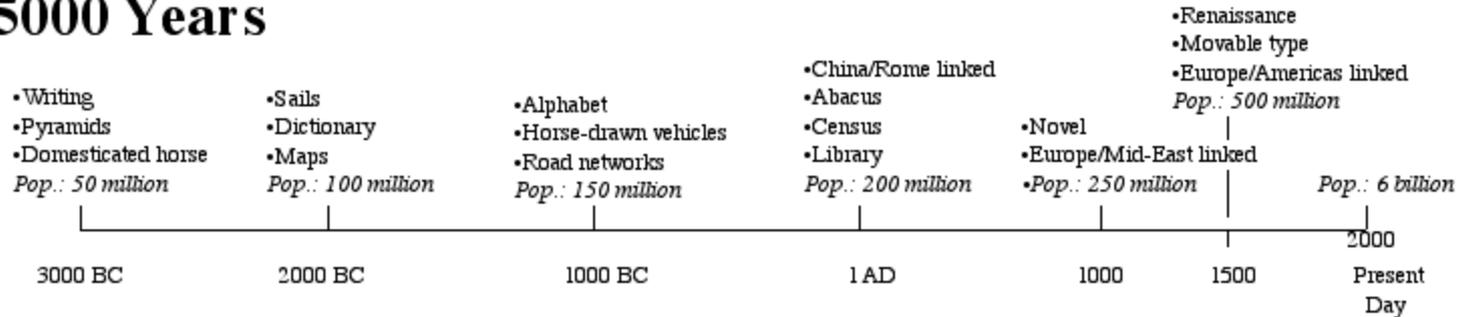
- Generates a **limited set** of basic assessments
- **Represents sets by norms and prototypes**, does not integrate
- Matches intensities across scales (e.g., size to loudness)
- **Computes more** than intended (mental shotgun)
- Sometimes **substitutes an easier question for a difficult one** (Heuristics)
- Is **more sensitive to changes than to states** (prospect theory)
- **Overweights** low probabilities
- Shows **diminishing sensitivity to quantity** (psychophysics)
- Responds **more strongly to losses than to gains** (loss aversion)
- **Frames** decision problems narrowly, in isolation from one another

Why System 1 & 2: Evolution's role

Human Timeline: 5 Million Years



Human History Timeline: 5000 Years



Fuel Source

SUN _____ WOOD _____ COAL _ OIL

Revolutions

AGRICULTURAL _____ INDUSTRIAL
INFORMATION
COMMUNICATIONS

So the gist of TFS is

- We function in a stimuli-rich environment
- We react to these stimuli – automatically (reflexively) and with reasoning (reflectively), often not even noting the non-conscious bits
- This reflexive-reflective mix is largely efficient in use of limited attentional resources, but it can lead to errors in decision-making
- The reflexive dimension can be trained through repeated reflective actions, but it is hard work and we should not expect to train it for every type of action

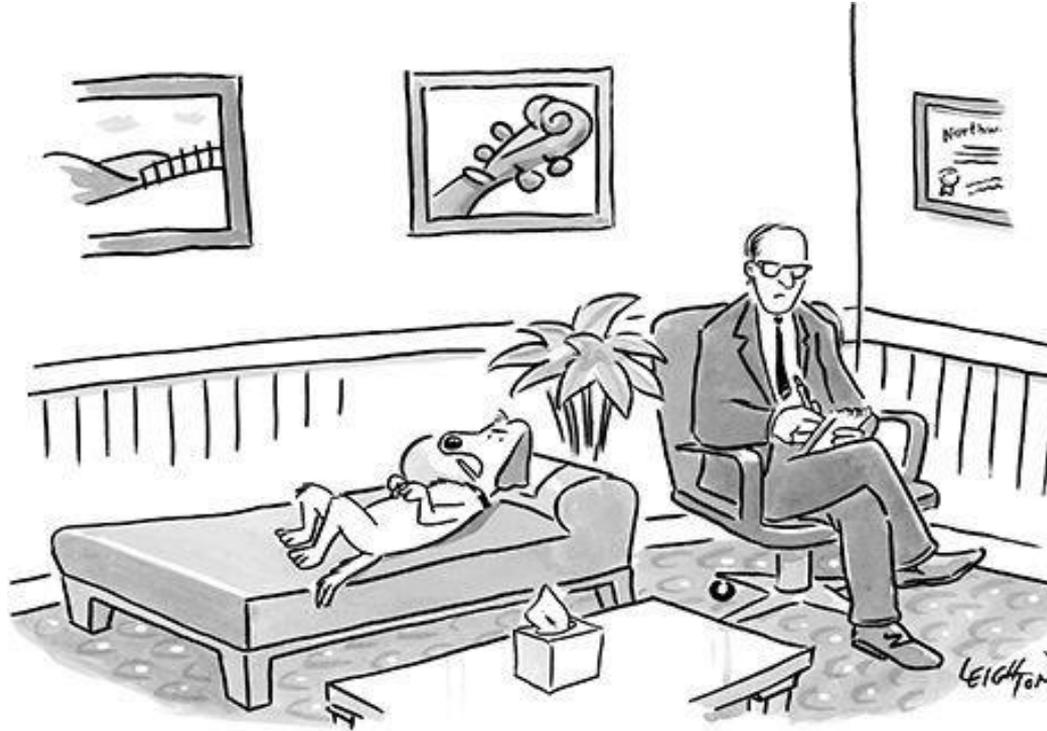
What is less clear in TFS

(or I have just missed it - so far)

- What explains differences in the reflexive-reflective mix (of deliberation)....
 - Between different types of actions – for the same person
 - Between different people – for the same type of action
 - Over time – for the same type of action and same person
- What is the role of motivations & goals...
 - In overriding system 1 impulses – System 2's self-control does that
 - In ordering reflexive-reflective mix for different actions

A breather

Pavlov's pooch on Freud's couch



"And then it hit me: I'm salivating over a goddam bell."

Source: http://www.newyorker.com/humor/issuecartoons/2012/04/16/cartoons_20120409#slide=13

The architecture for a theory of health behaviour

A. The **phenomenon** of interest ---- health

- Let's look at this closely, and see what we know, what we do not know, and what we cannot reasonably know in our day-to-day lives

B. The **behaviours** that, directly and indirectly, influence health

- The everyday activities - eating, drinking, physical exertion, maintaining personal and public hygiene, and socializing – that keep us chugging along
- The less-frequent activities which involve using professional services to prevent illness and injury, and to cure and manage ailments when they occur.

- **How do we mix these ingredients?**

A. What is health?

- **WHO** (1948 constitution) defines good health as:
“A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”
- LANCET (2009): should really be about **ability to adapt**
- **Survey measurement** (HrQoL) – self-assessment of different physical, psychological, social domains
 - SF-36: physical functioning, role limitations due to physical problems, social functioning, bodily pain, general mental health, role limitations due to emotional problems, vitality, general health perceptions
 - EQ5D: mobility, self-care, usual activities, pain/discomfort, anxiety/depression

What is physical health (PH)?

- **The human body**

- Cells (adults ~ a trillion cells) & tissues (epithelial, connective, muscle, nerve)
- Organ systems (skeletal, muscular, circulatory, nervous, respiratory, digestive, excretory, endocrine, reproductive, lymphatic/immune)

- **Measurement/assessment**

- no single measure of health stock (body) or functioning
- Multiple measures - of organ systems, components & functioning

- **Complexity of Information**

- multiple markers (variables) & system functioning reflects their interaction, with competitive, collaborative, and compensatory aspects

- What we rely on (at this point) is, therefore, **markers** of outward appearance, symptoms, and functioning

- New technologies taking us to more quantification at an individual level (<http://quantifiedself.com/>)

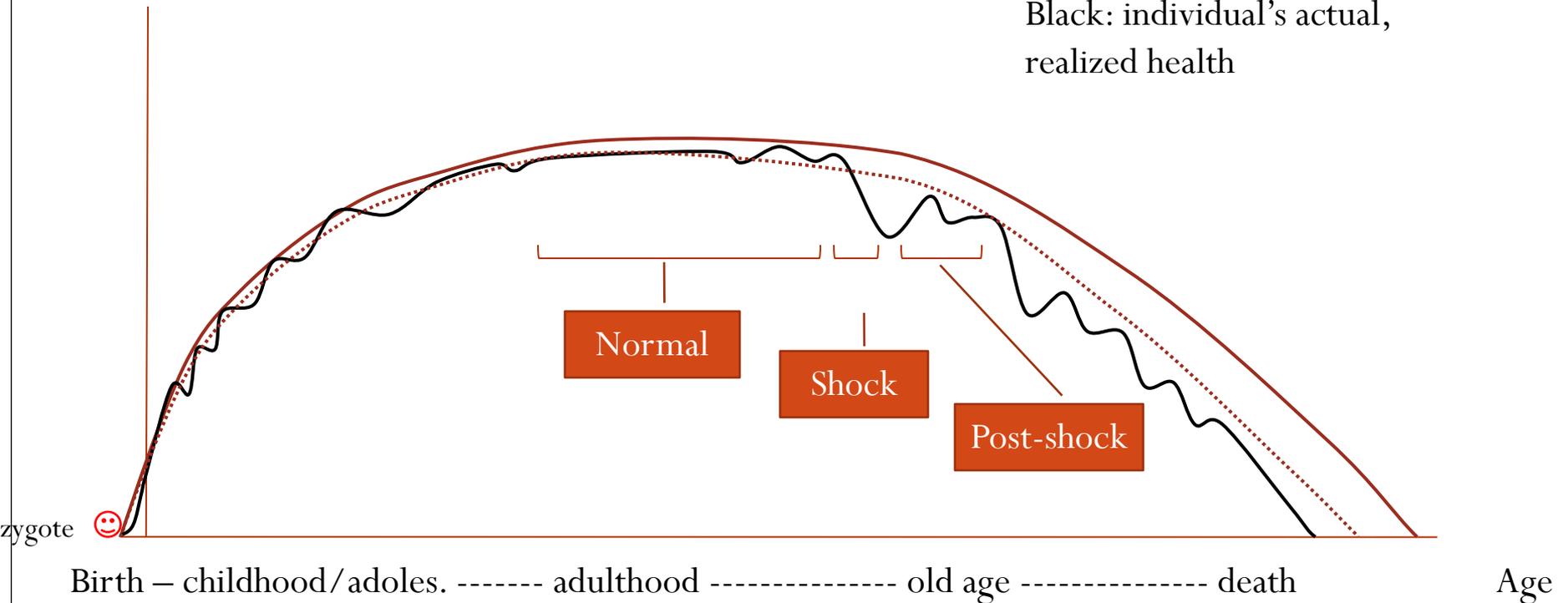
Quantifying health

- **Economist** (March 3rd 2012): **The quantified self: Counting every moment**
 - Technology and health: Measuring your everyday activities can help improve your quality of life, according to aficionados of “self-tracking”
- Ted talks conversation: A ‘periodic table’ of all the gadgets still to be invented (20 examples):
 1. Teeth. Toothbrush that measure fluoride and remembers the cavities, discoloration and notifies us of bad breath
 2. Eyes. Glasses that monitor our eyesight and advise correction
 3. Hair. Comb that screens the follicles, report on dandruff density, scan for fungus or lice, and count the hairs (hair loss)
 4. Bottom. Toilets that test excrements both liquid and solid. Feces graded following the Bristol Stool scale.
 5. Chest. Airports scanners that broadcast their results to our phone
 6. Body. Clothes that are smart because the fibers compute
 7. Underbelly. A new field of underwearables that integrate markers for early detection of cancers or other anomalies
 8. Forearms. Shirts that screen the microbiome on your forearms (40x more than our own cells)
 9. Neck. Collars that chemically analyse our sweat
 10. Ear. Earphones that measure our hearing and that analyze our emotional level while we are listening ('total communication is bidirectional)
 11. Heart. Pacemaker and stent that broadcast data to our cardiologist plus ECG (CORVENTIS)
 12. Nose. Tissues that examine snot and mucus when we blow our nose
 13. Chin. Razors that plot the surface of the skin looking for acne
 14. Lips. Balm that scans for cold sores.
 15. Tongue. Tongue scrapers that screen salivary microbes
 16. Back. Chairs that plot our posture and broadcast data for our spine
 17. Nails. Nail cutters that determine the quality of our nails and count the ridges
 18. Feet. Step counter (FITBIT)
 19. Back arm. Blood pressure measurement (IHEALTH99)
 20. Pulse. Heart rate (GARMIN)
 21. Brain. Electrical activity that conveys brain waves
 - http://www.ted.com/conversations/53/make_a_periodic_table_of_gad.html

An analyst's view of PH over the life cycle

Healthiness
(objective
overall measure
of health)

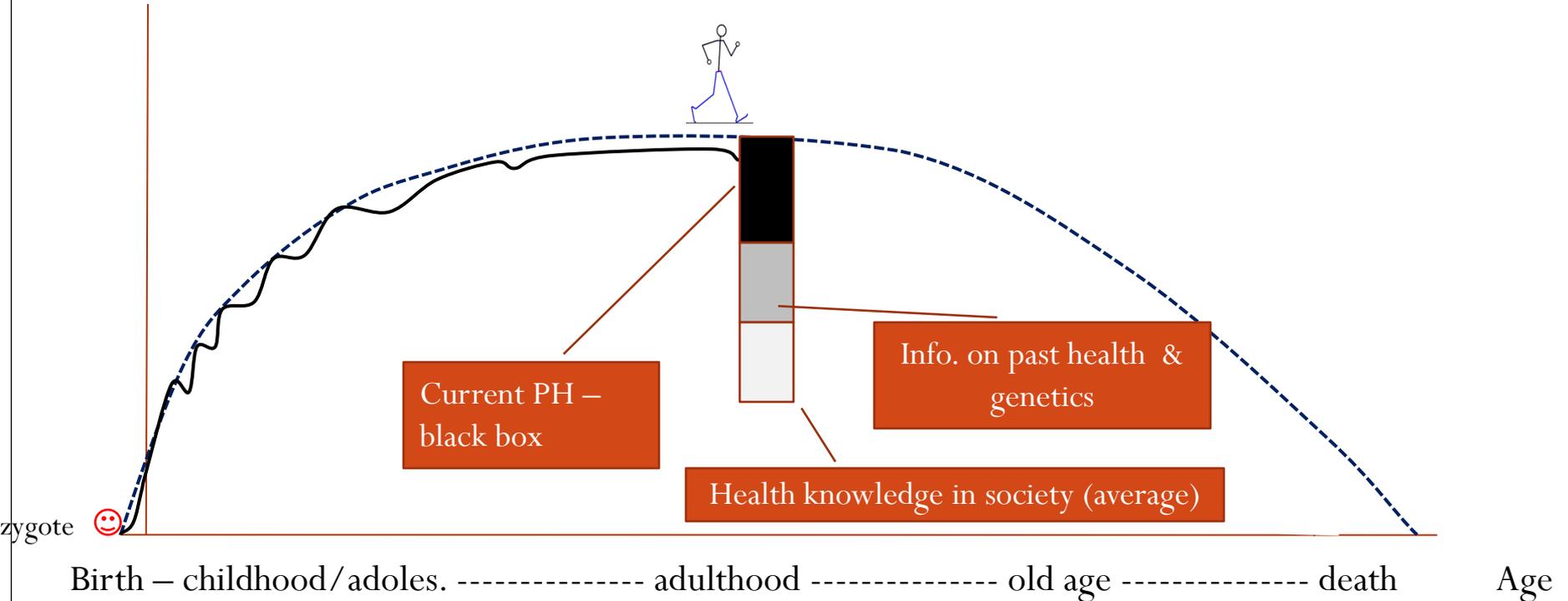
Red: individual's health
possibilities frontier
Black: individual's actual,
realized health



An individual managing his/her own health

Healthiness
(objective
overall measure
of health)

Blue: individual's reference
(group) health profile
Black: individual's actual,
realized health



Characteristics of physical health

- **Changes** over the life cycle
 - predictable age-pattern of growth, aging, death
 - less predictable are diseases but with age-sex specificity
 - unpredictable – accidents and injuries
- **Limited observability** of true health status (biological)
 - Observe only markers - of outward appearance, symptoms, and functioning.
- Health **changes very slowly** (aging, but even illness)
 - Homeostasis (maintaining internal balance)
 - Dynamic allostatic regulation
- Plasticity or **adaptability** – to external environment, internal changes, and shocks

- **Do these features have any behavioural implications?**

What is mental health?

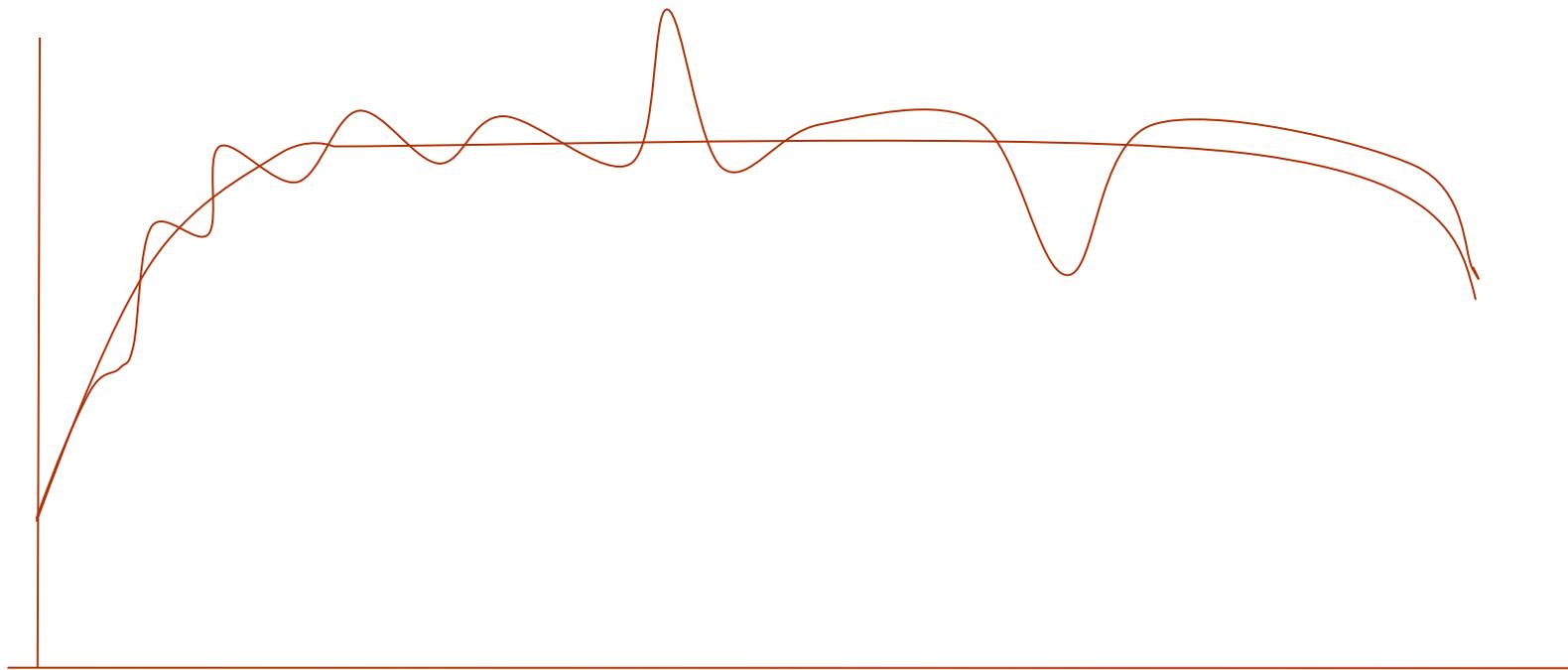
- Mental health is described by WHO as:

... a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community (WHO 2001a, p.1).

- DSM (Diagnostic and Statistical Manual of Mental Disorders) orientation
- Comprehensive approach based on **subjective well-being**
 - **Hedonic** (feelings of happiness, satisfaction, and interest in life)
 - **Eudaimonic** (effective functioning as an individual and in society)
 - psychological well-being (self-acceptance, personal growth, purpose in life, positive relations with others, autonomy, and environmental mastery)
 - social well-being (social integration, social contribution, social coherence, social actualization, and social acceptance)
- *Perhaps simpler set = happiness, satisfaction, resilience (stability) self-coherence, adaptability*

Mental health over the life cycle

Healthiness



Birth – childhood/adoles. ----- adulthood ----- old age ----- death

Age

Characteristics of mental health

- **Is there a predictable age profile?**
 - In terms of resilience (to ups and downs) perhaps a growth phase, and then a long stable phase till dementia in old age
- What is the **enduring part** in this, i.e. a slow-changing endowment?
 - Lot of evidence points to personality traits, disposition
- What are the **sources of shocks** to MH?
 - Changes in physical health
 - Changes in life circumstances
- Strong need to maintain **coherence, stability**, and resolve cognitive dissonance
 - Necessary for effective day-to-day functioning – survival
- **Is MH similar to PH?** - Possibly
 - adaptability
 - Slow change (because of need for coherence and stability)
 - limited observability of actual brain & psychological functioning
 - shocks

Sowhat can we go with....

1. Health = physical health (PH) & mental health (MH)
2. Both PH & MH must function within a **stress environment**
 - PH: organic stress from virus, bacteria, fungus, prions
 - MH: internal dynamics (aspirations, actualizations) & social interactions
3. We **know relatively little** about our own PH & MH, constructing and discovering it along the way
4. PH & MH **interact** continuously
 - poor PH (illness) -> unhappiness
 - poor MH (depression) -> illness
4. **Survival and healthiness is about both PH & MH**
 - PH has precedence because without biological survival there is no psychological survival and the selfish gene cannot reproduce
 - but when biological survival is not threatened MH is the main objective & often we compromise future (and even immediate) PH for higher MH (immediate)
5. So perhaps what we have is **two types of interactions**
 - Between PH & MH
 - Between the present and the future
6. **AND managing health is all about managing these interactions WITH limited information**

B. Health Behaviour

1. Health-producing behaviour (basics of daily life) – eating, physical exertion, personal hygiene, social interaction
 - Multiple actions
 - Regular occurrence
 - Spatial and temporal dispersion within a day
 - Biological imperative with behavioural modification
 - Varied satisfaction/utility on their own
2. Health-care behaviour (use of professional products & services)
 - Episodic
 - Typically external (market purchased or provided)
 - Medication – regular occurrence

How should we characterize behaviour?

- **My conceptualization Pre-TFS – of all behaviour**
 - Behaviour = Collection of same-objective actions
 - Varied levels of deliberation of actions (CHN) – because of limited attention resources
 - Consciously deliberated (C) – incentive sensitive
 - Habits (H)
 - Non-consciously processed action (N)
 - Affective dimension to every action – influences N & C
 - Social context to every action
- **Post-TFS**
 - Actions have varying degrees of deliberation - System 1 & 2
 - Action context, self-control, cognitive strategy determine system 1-2 mix
- **For health behaviour - which one is more relevant when?**

Thinking about Health Behaviour

- **Actions**
 - Varied – health-producing (HP) and healthcare (HC)
 - Regular (day-to-day) & episodic
 - Actions subject to varying degrees of conscious deliberation
 - HP – more system 1 oriented (habits and non-conscious)
 - HC – more system 2 oriented (deliberative)
 - One health action has carry-over effects to actions in the future – biologically, and psychologically
- **Influence of health – on health behaviour – varies with health status**
 - During normal phases of life – cognitive context: ease
 - Actions are mainly HP and habit-driven – because slow changing health markers are easily ignored (visual illusion), and limited attention is focussed on other activities that provide utility
 - Actions may be sub-optimal for health but homeostasis and allostatis makes appropriate biological changes to accommodate & change occurs slowly
 - In reaction to health shocks – survival threat
 - In the immediate term System 1 takes over and assigns priority to self-protective actions
 - Later HC use with deliberation – depending on incentives and resources
 - post-shock adjustment – establishment of a new normal
 - Back to a cognitive ease context so mainly HP
 - some HC if necessary but if regular occurrence with limited impact easy to not adhere to