

Thinking Tools for Infection Prevention and Patient Safety

Dr. Hugo Sax, University of Zurich Hospitals

A Webber Training Teleclass

Thinking tools for infection prevention and patient safety

Hugo Sax, MD

HumanLabZ

Division of Infectious Diseases and Hospital Epidemiology

University Hospital Zurich

University of Zurich

Switzerland

Hosted by Dr. Michael Gardam
University of Toronto



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July 16, 2015

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infection prevention philosophy



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thinking



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- introduction to the concept of thinking tools and mental models
- what thinking tools have in common with Swiss army knives and viruses
- why we are bad system thinkers and why we shouldn't be
- why all of this can help preventing infections and spread of multi-resistant pathogens



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“going meta”



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“Huston, we have a problem!”

Apollo 13



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Preventable proportion of healthcare-associated infections


32%	10-70%	7-70%
1979	2003	1989-2006

Haley RW, Culver DH, White JW, et al: **The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals.** Am J Epidemiol 1985, 121:182-205.

Harbarth S, Sax H, Gastmeier P: **The preventable proportion of nosocomial infections: an overview of published reports.** J Hosp Infect 2003, 54:258-266.

Umscheid CA, Mitchell MD, Doshi JA, et al.: **Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs.** Infect Control Hosp Epidemiol 2011, 32:101-114.

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thinking tools

Daniel C. Dennett
Intuition pumps and other tools for thinking. 2013, Norton & Co., NYC

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mental models

Hugo Sax, Lauren Clack. Mental models: a basic concept for human factors design in infection prevention. J Hosp Infect 2015;89(4):335-9



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You can't do much carpentry with your bare hands and you can't do much thinking with your bare brain.

Bo Dahlbom



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virtual machines = information to treat information

Daniel Dennett



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brains are expectation makers

mining the presence and the past
to anticipate the future

Daniel Dennett



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thinking tools

labels

examples

analogies and metaphors

staging

intuition pumps

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hazardous thinking tools

“boom crutches”

Daniel Dennett



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Ockham's razor

Other, more complicated solutions may ultimately prove to provide better predictions, but—in the absence of differences in predictive ability—the fewer assumptions that are made, the better.

Wikipedia



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Ockham's razor



Other, more complicated solutions may ultimately prove to provide better predictions, but—in the absence of differences in predictive ability—the fewer assumptions that are made, the better.



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Ockham's broom

underexplain a proposition

whisking inconvenient facts out of sight

Douglas Hofstadter

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Ockham's broom

underexplain a proposition

whisking inconvenient facts out of sight

Douglas Hofstadter

good remedy: talk to a lay audience

Daniel Dennett



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all thinking is interpersonal

Daniel Dennett



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JOOTSing -- Jumping Out Of The System

System being as invisible as the air you breath

A dispute with a hidden false assumption

Douglas Hofstadter



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preventability



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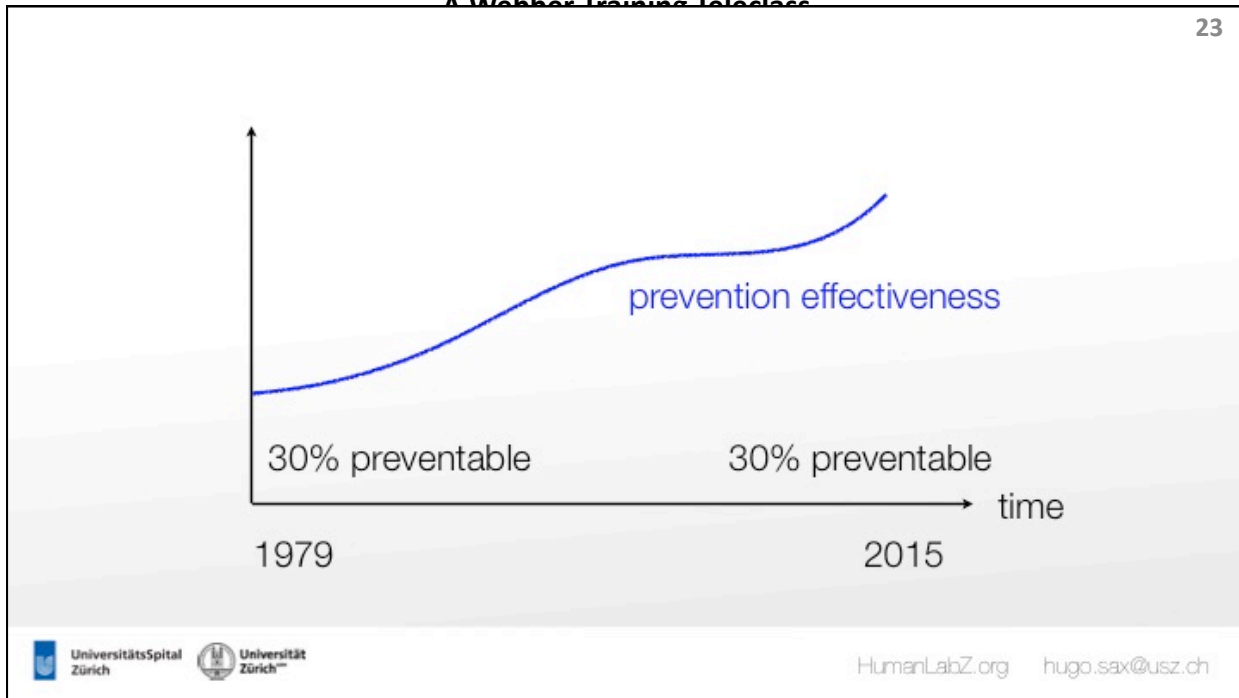
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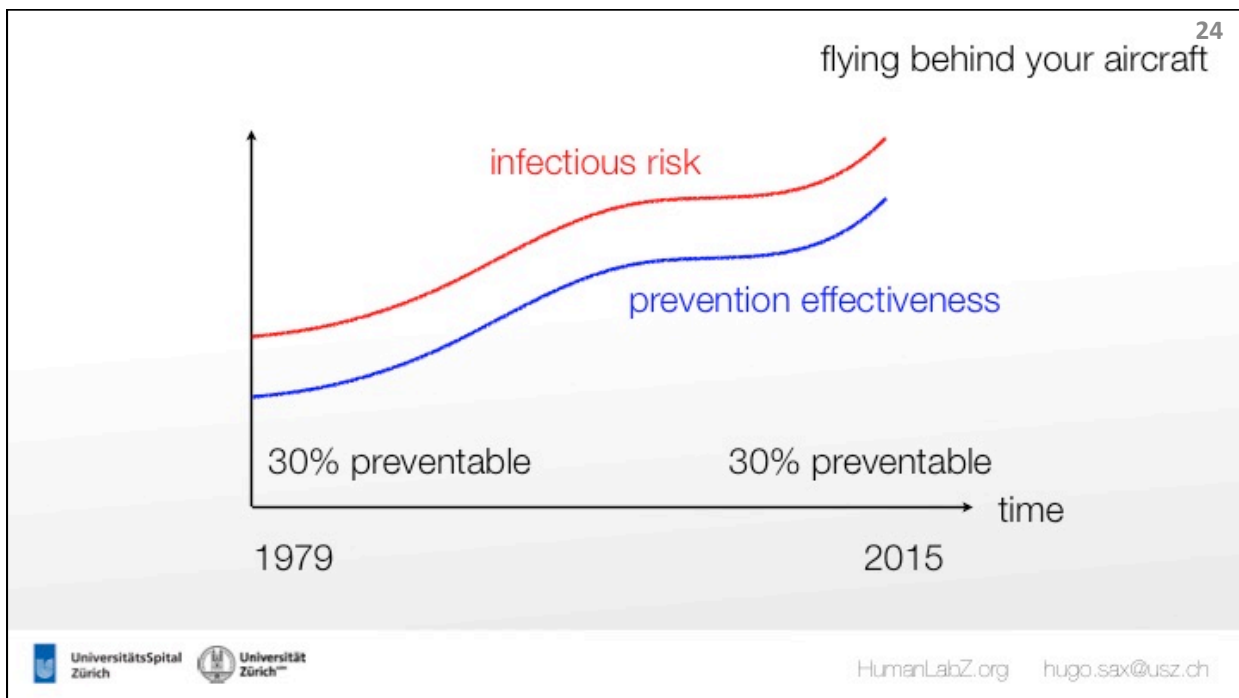
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flying behind your aircraft

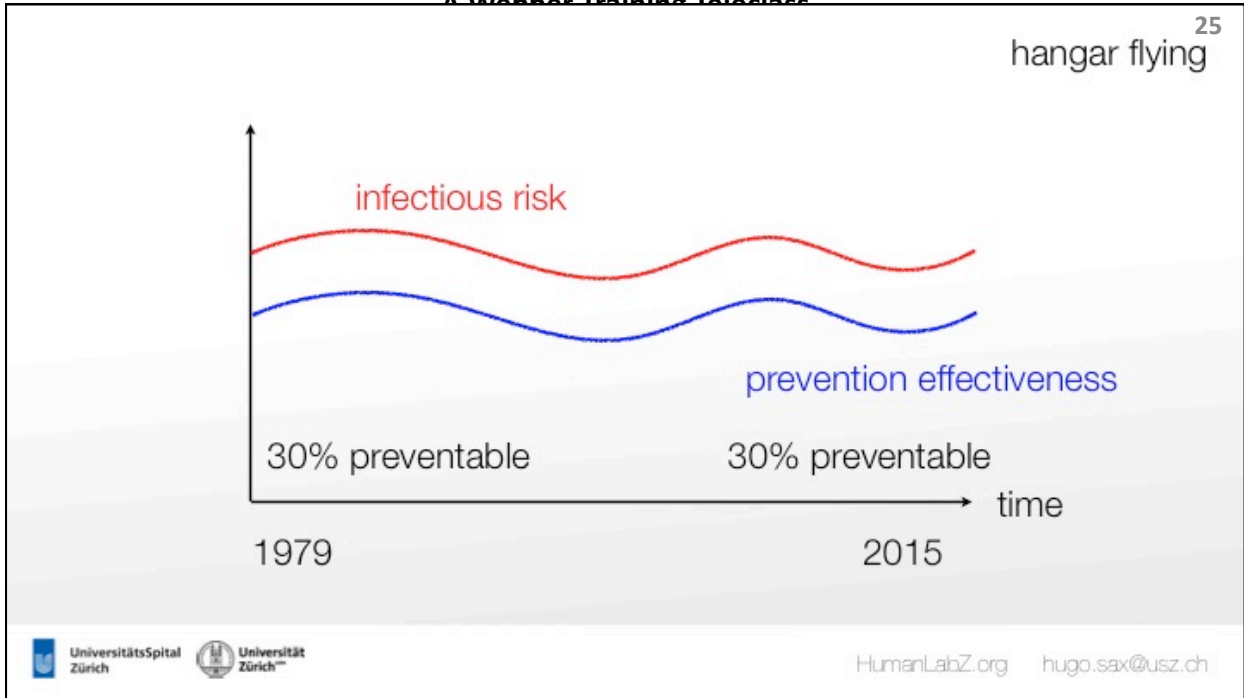


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pathogens are invisible

infections always happen later

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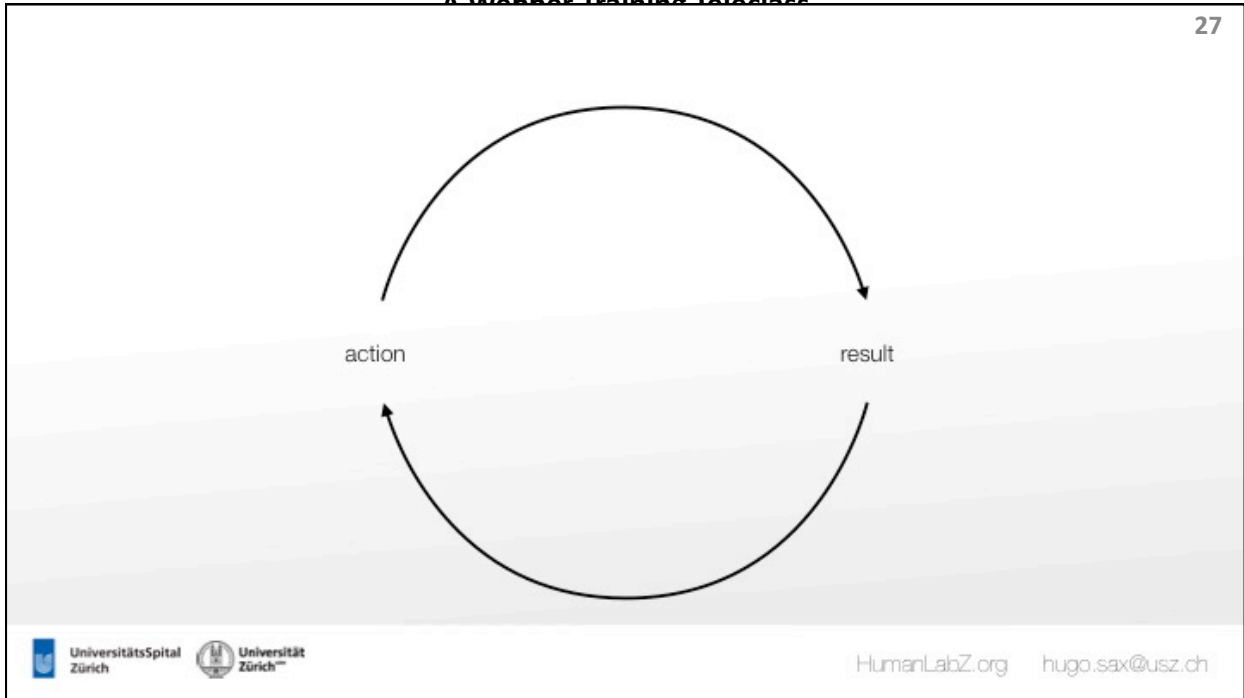
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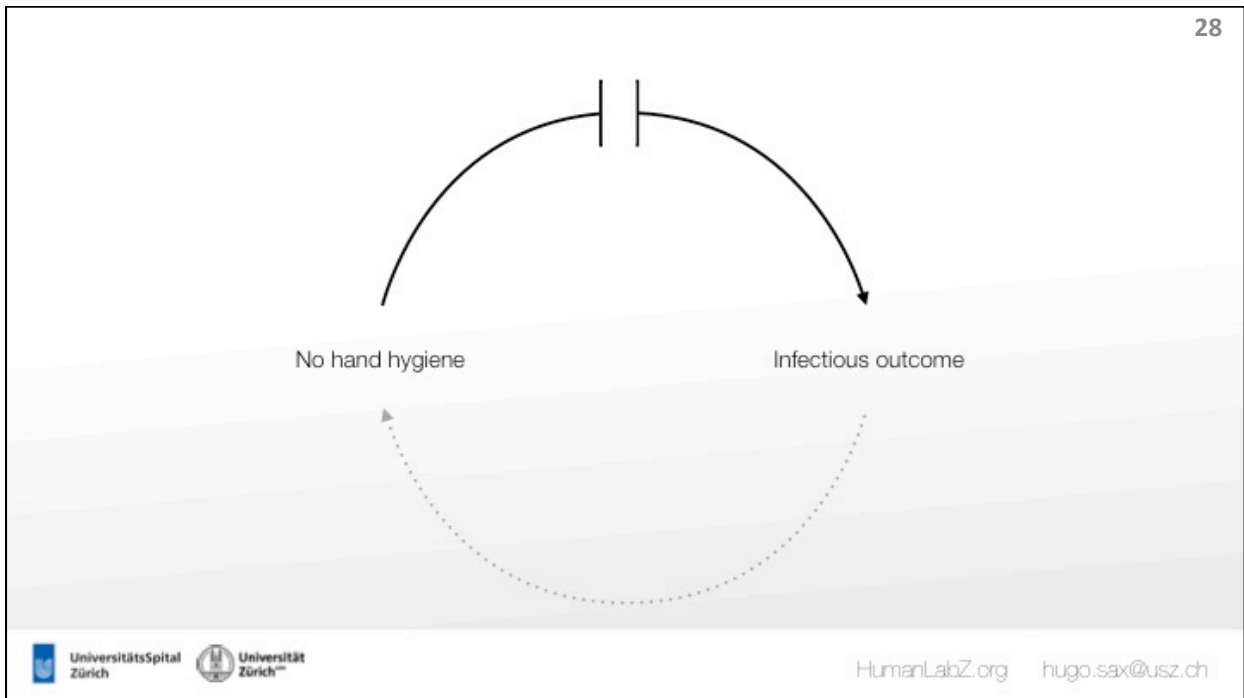
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Johnson-Laird PN. **Mental models and cognitive change.** J Cogn Psy 2013;25(2):131-8



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Johnson-Laird PN. **Mental models and cognitive change.** J Cogn Psy 2013;25(2):131-8

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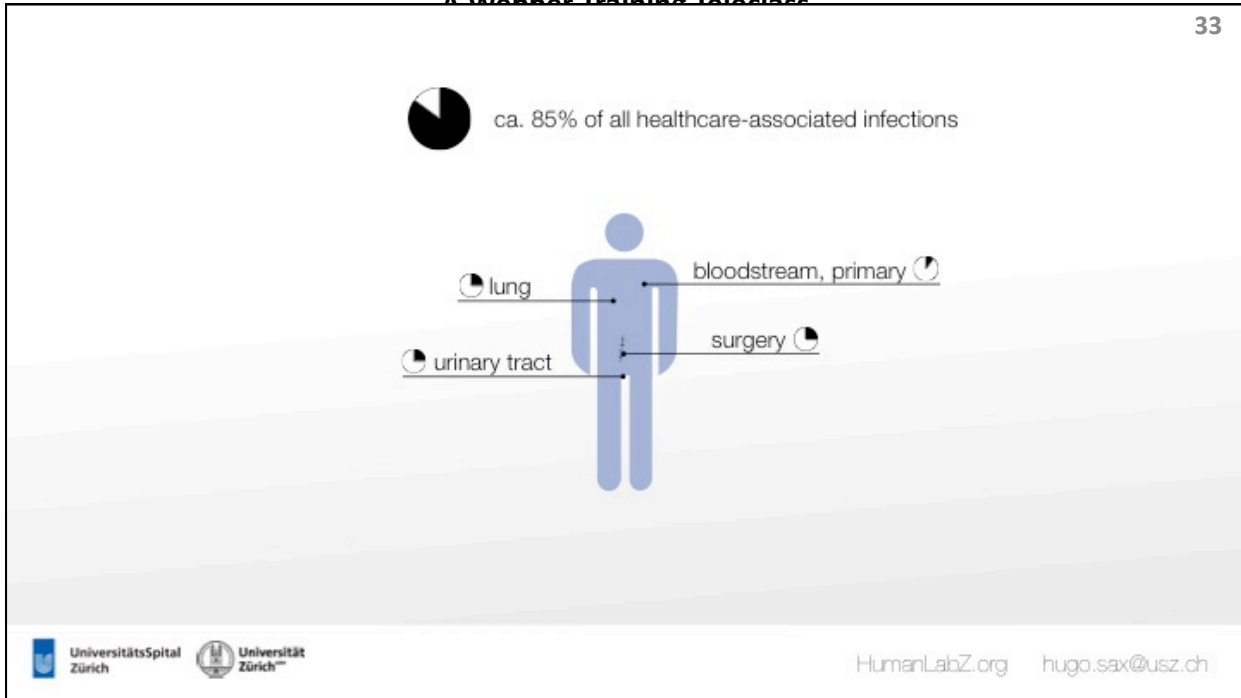


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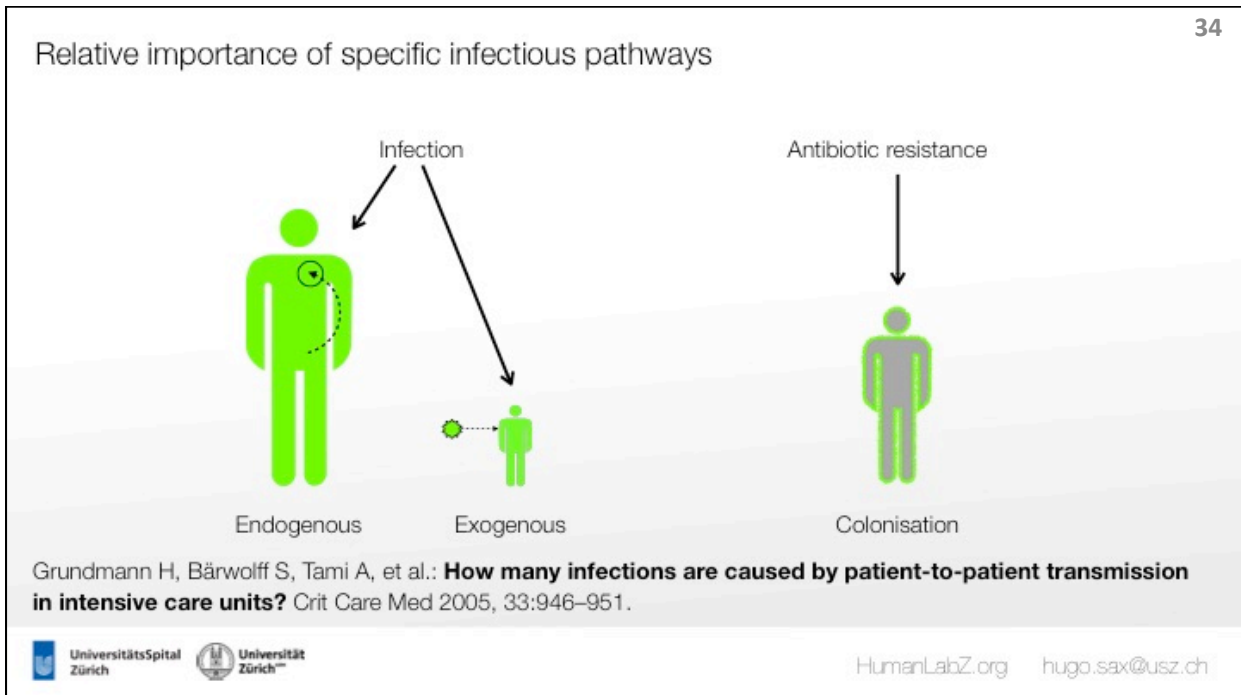
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Relative importance of specific infectious pathways

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Relative im

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HAND HYGIENE

1 BEFORE PATIENT CONTACT

2 BEFORE ASEPTIC TASK

3 AFTER BODY FLUID EXPOSURE RISK

4 AFTER PATIENT CONTACT

5 AFTER CONTACT WITH PATIENT SURROUNDINGS

1 BEFORE PATIENT CONTACT	WHEN? Clean your hands before touching a patient when approaching him or her.
2 BEFORE AN ASEPTIC TASK	WHEN? To protect the patient against harmful germs carried on your hands.
3 AFTER BODY FLUID EXPOSURE RISK	WHEN? Clean your hands immediately before any aseptic task.
4 AFTER PATIENT CONTACT	WHEN? To protect the patient against harmful germs, including the patient's own germs, entering his or her body.
5 AFTER CONTACT WITH PATIENT SURROUNDINGS	WHEN? Clean your hands immediately after an exposure risk to body fluids (e.g., blood, secretions, excretions, vomit, feces, urine, sweat, tears, saliva).

Grundmann H, Bär...
in intensive care u

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on

o-patient transmission

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Influencing mental models.

Leveraging existing mental models.

Aligning existing mental models.

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Cleanliness

"Copy a story"
 Ethical
 ↙
 Unethical

Cleansing product	Non cleansing product
Dove shower gel	Post-it stickers
Crest toothpaste	Nantucket Nectars juice
Windex cleaner	Energizer batteries
Lysol	Sony CD pack
Tide detergent	Snickers bar

Zhong C-B, Liljenquist K: **Washing away your sins: threatened morality and physical cleansing.** *Science* 2006;**313**:1451–1452.



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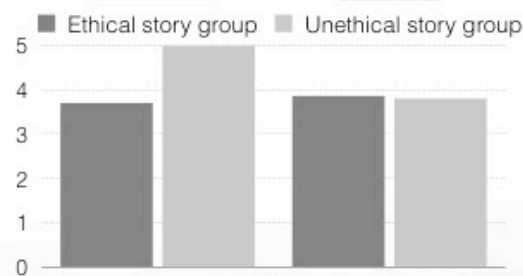
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Cleanliness

"Copy a story!"
 Ethical
 ↙
 Unethical



Cleansing product	Non cleansing product
Dove shower gel	Post-it stickers
Crest toothpaste	Nantucket Nectars juice
Windex cleaner	Energizer batteries
Lysol	Sony CD pack
Tide detergent	Snickers bar

$p=.01$
 $p=.89$



Product Category	Ethical story group	Unethical story group	p-value
Cleansing product	~3.8	~5.0	0.01
Non cleansing product	~3.8	~3.8	0.89

Zhong C-B, Liljenquist K: **Washing away your sins: threatened morality and physical cleansing.** *Science* 2006;**313**:1451–1452.



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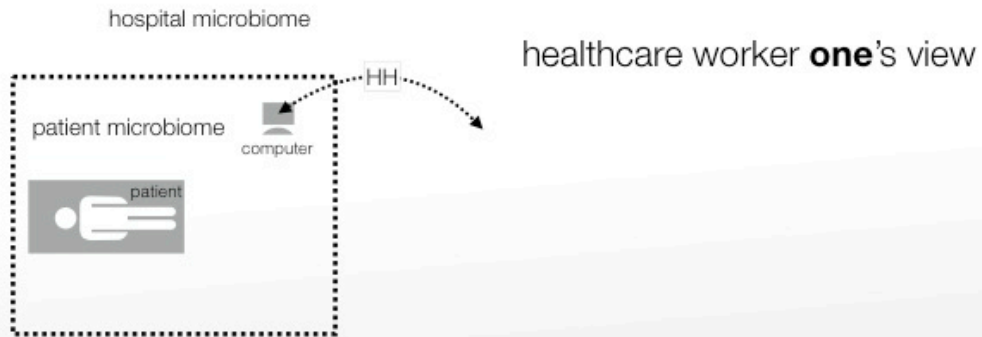
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Aligning mental models



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Aligning mental models



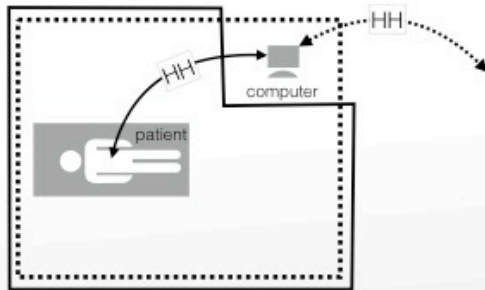
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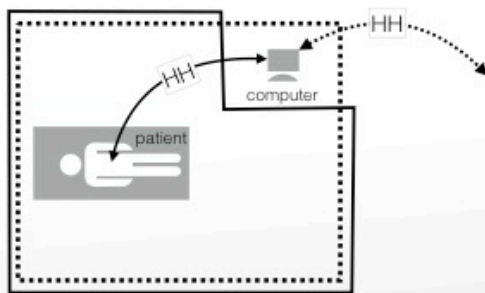
Aligning mental models



transmission!

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Aligning mental models

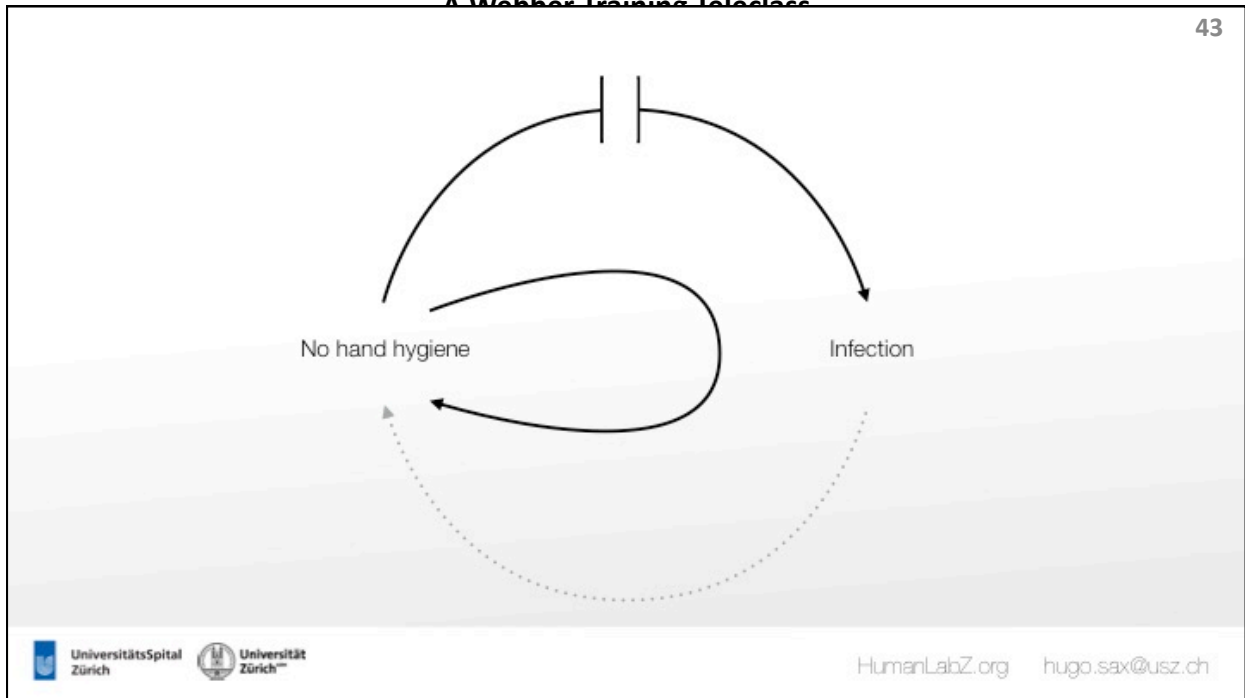


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“going meta”

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I love fools' experiments. I am always making them.

Charles Darwin

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talk less,
soar more!

streckenflug.ch



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Coming Soon

July 21 (British Teleclass)

TO GLOVE OR NOT TO GLOVE, THAT IS THE QUESTION

Dr. Jennie Wilson, Richard Wells Research Centre, University of West London

July 23 **GASTROINTESTINAL ENDOSCOPES: A NEED TO SHIFT FROM
DISINFECTION TO STERILIZATION**

Prof. William Rutala, University of North Carolina Medical School

August 13 **ASSESSING THE IMPACT OF AN EDUCATIONAL INTERVENTION ON
VENTILATOR-ASSOCIATED PNEUMONIA**

Prof. Arti Kapil, All India Institute of Medical Sciences, New Delhi, India

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