MIT International Design Center

Dr. Ben D. Sawyer's

Human Factors Engineering

Designing for The Human

Lecture 1: The Human Factors Primer

MIT AGELAB

...and now: a word about your instructor...

Dr. Ben D. Sawyer, PhD, MSIE

- Research Interests
  - *Novel Interface Design for Optimal Human Performance*
  - *Multimodal Attention Management In Operational Settings*
- Selected Experience
  - *MIT AgeLab, Postdoctoral Associate*
    - *ClearIP Consortium Lead: Monotype, Google*
    - *AHEAD Consortium Tech Team: Google, Honda, JLR, Subaru, DENSO, Panasonic, Touchstone*
  - *UCF Industrial Engineering, Research Engineer*
    - *Neuroergonomics Laboratory Lead*
  - *Air Force Research Laboratory, Repperger Fellow*
    - *Applied Neuroscience (RHCB)*
    - *Battlefield Accoustics (RHCP) BATMAN Group*
  - *Institute for Simulation and Training: MIT² Laboratory Manager*
    - *Robotics Collaborative Technology Alliance (RCTA) Lead*

Engineering Design for The Human

- What is this?

Engineering Design for The Human

- Is this a good design?
  - Aesthetically
  - From an Engineering standpoint
  - From a Human standpoint

Tools and Human-Machine Systems

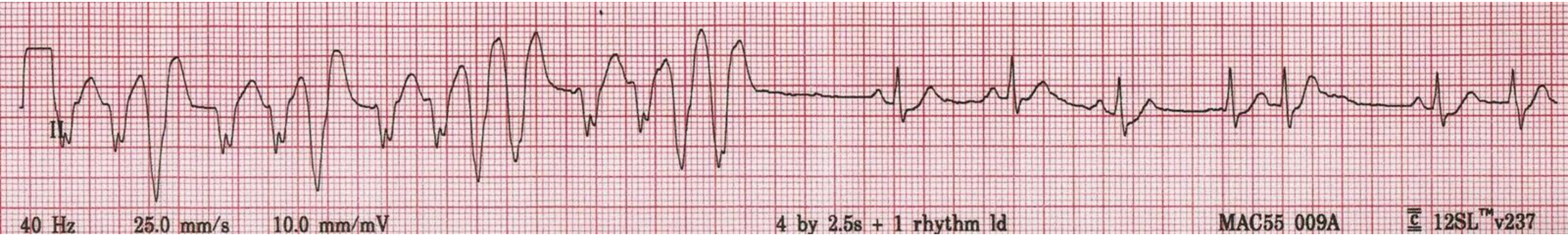
- Is this a good design?
  - Aesthetically
  - From an Engineering standpoint
  - From a Human standpoint

What is Human Factors? Human-centered Design?

- Industrial Engineering
- Systems Engineering
- Information Theory
- Applied Psychology
- Anthropometric Physiology
- Physical Ergonomics & Neuroergonomics
- Neuroscience

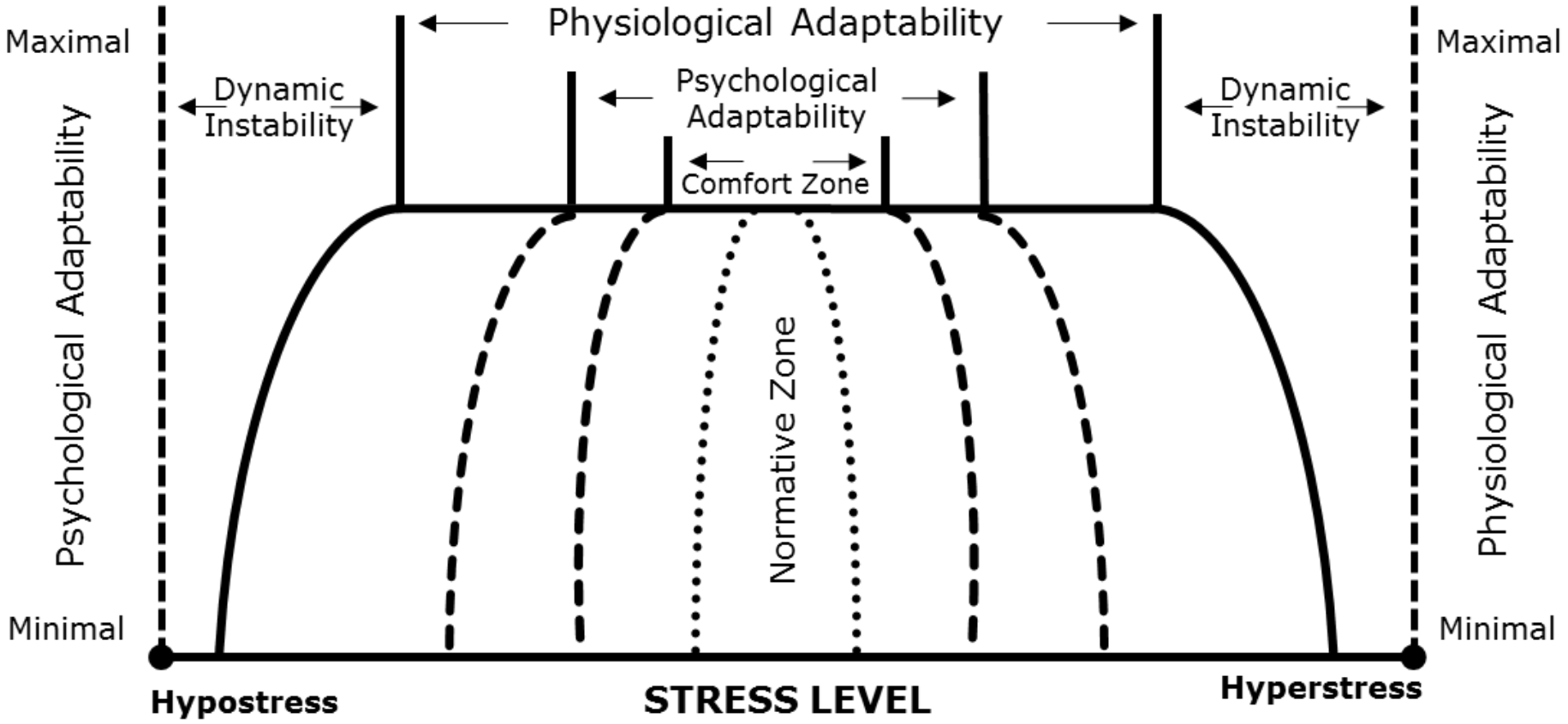
Human Performance

- How do systems fail?
- What does good look like?



Workload & Stress

- Where does optimal performance happen?
- How does homeostasis play a part?



(Hancock & Warm, 1984)

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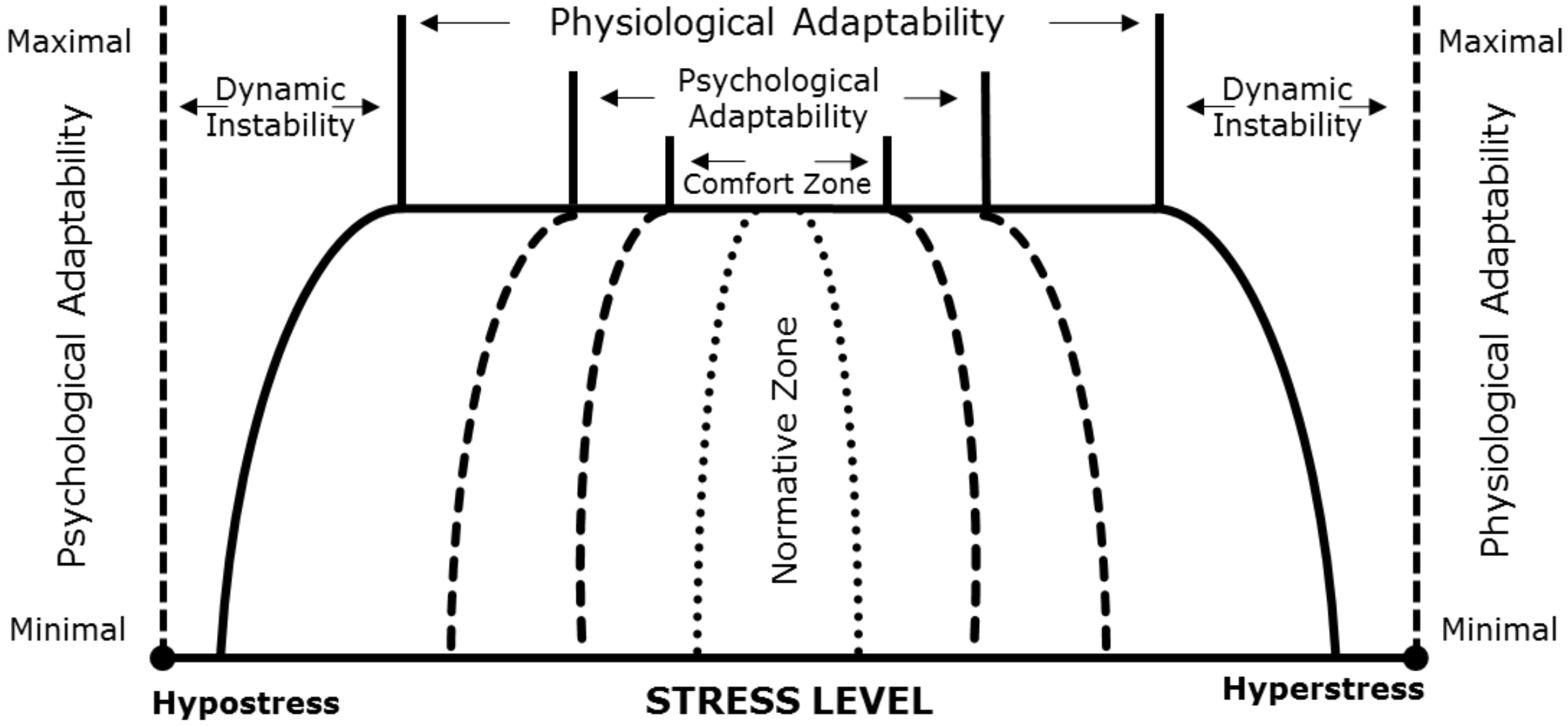

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Performance & Error

Post Nation

Hawaii missile alert: How one employee ‘pushed the wrong button’ and caused a wave of panic

By Amy B Wang January 14

Performance & Error

Post Nation

Hawaii missile alert: How one employee 'pushed the wrong button' and caused a wave of panic

By Amy B Wang January 14

Around 8:05 a.m., the Hawaii emergency employee initiated the internal test, according to a timeline released by the state. From a drop-down menu on a computer program, he saw two options: "Test missile alert" and "Missile alert." He was supposed to choose the former; as much of the world now knows, he chose the latter, an initiation of a real-life missile alert.

"In this case, the operator selected the wrong menu option," HEMA spokesman Richard Rapoza told The Washington Post on Sunday.

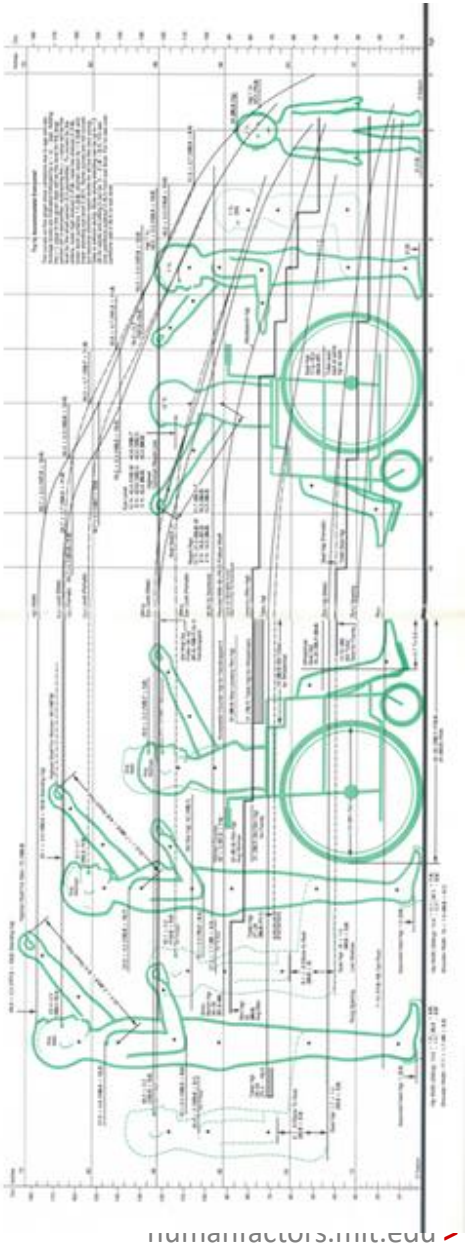
Design & Training

- What is the relationship between design and training?

Design & Training

- What is the relationship between design and training?
- How does population play into this relationship?

Human Centered Design & Engineering



- HCDE Helps
  - Proven Impact
  - Embraced by Leading Companies
  - Taught by Leading Institutions
- HCDE is Hard
  - Ethical Issues Arise in Most Critical Operational Environments
  - Complex Equipment is Often Needed for Safety And Accuracy
  - Success Stories In HCDE Arise from Iteration
- HCDE Costs
  - Present Cost May Bar Many Players from Considering HCDE

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- Is this a good design?
  - Aesthetically
  - From an Engineering standpoint
  - **From a Human standpoint**

Questions ?