

*THE ROLE OF PSYCHOLOGY IN THE
DEVELOPMENT, APPLICATION, AND
ASSESSMENT OF LEAN HIGHER
EDUCATION*

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November 6-8, 2019 Lean HE Conference, Ann Arbor MI, USA

How was lunch?

Did you eat red meat?

Did you eat LOTS of red meat?



- » Johnston et al. (October, 2019). Unprocessed red meat and processed meat consumption: Dietary guidelines from the NutriRECS consortium. *Annals of Internal Medicine*. doi: 10.7326/M19-1621

Red meat is now OK! Or is it?

What would make you change your attitude or behavior related to red meat consumption?

- A. My opinion
- B. Testimonial of 113 year-old carnivore
- C. Case study of a single person who stopped (or started) eating meat
- D. One study with a few people who self-report eating and wellness on home-made survey measures
- E. One well-designed longitudinal study of female Asians
- F. A systematic review of hundreds of studies
- G. A study by the National Cattlemen's Beef Association
- H. Alexa

Which of these options best describe the state of research on Lean Higher Education?

- A. My opinion
- B. Testimonial of 113 year-old Lean HE evangelist
- C. Case study of a university applying LHE for 10+ years
- D. One study with a few people who self-report eating and wellness on home-made survey measures
- E. One well-designed longitudinal study of female Asians
- F. A systematic review of hundreds of studies
- G. A study by a Lean consulting firm
- H. Alexa

How would you answer the following?

- » What is the difference among employee engagement, satisfaction, & motivation?
- » How should LHE training be done to be effective?
- » How good are single-item measures?
 - » e.g., “My job has improved”
- » If LHE is introduced and job satisfaction improves, is it due to LHE?
- » Does LHE improve “respect for people?”
 - » Under what circumstances?

General Answer

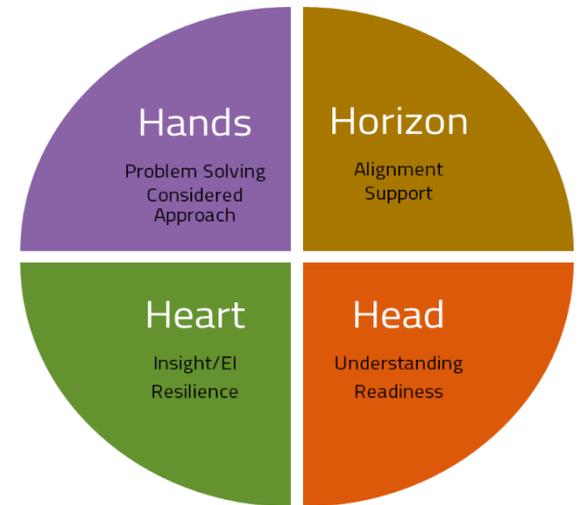
- » Our understanding and analysis of Lean is perhaps weakest in the area of applied psychology (Liker, 2004, p. 119)
 - » Not much has changed in the past 15 years (Balzer et al., in press)
- » LHE practitioners and LHE researchers with industrial management background (or related area) generally do not have the academic background and professional expertise to answer these questions
- » LHE practitioners and LHE researchers with psychology background (or related area) do

Key Takeaways

- » There needs to be a scientific basis of support for LHE to advance as an evidence-based practice and a respected research discipline
 - » Not all findings from world of Lean may generalize to LHE
- » There are many key issues in Lean/LHE that have not been studied well
 - » Especially those related to “Respect for People”
- » Faculty colleagues in psychology (or related areas) can be enticed to collaborate to improve LHE practice and research

LHE Example: Assessment of change readiness for implementation of LHE

- » Edinburgh Napier University HR Change Team's noble effort (and acknowledged difficulty) to conceptualize and design a “Change Readiness Diagnostic”
 - » 4 quadrants (e.g., Head, Heart, Hands, Horizon)
 - » Each with two readiness factors (e.g., insight, resilience)
- » Ten respondents rated 24 items on 10-point scales



* Referenced in Hurley & Yorkstone (2019)

Psychology example: A more systematic development of “Readiness for Change” measure

- » Holt et al. (2007) publication: *Readiness for organizational change: The systematic development of a scale*
 - » Only two of 34 existing “Readiness for Change” instruments meet APA standards for measurement
 - » Holt et al. described their development of a psychometrically sound “Readiness for Change” scale (see Table 2)

Holt et al. scale development process

- » Model of readiness (e.g., one component of model: attributes of the change initiative being implemented)
- » Item development (pool of 44 items across 5 dimensions)
 - » Tests of content adequacy by experts
- » Scale (30 items) administered to 264 employees prior to implementation of organizational change
 - » Psychometric data to evaluate items and dimensions
 - » Convergent and discriminant evidence
- » Replicated in second sample (228 employees)
 - » Confirmatory factor analysis, convergent validity

Results: Multidimensional “Change Readiness” measure for assessment at individual level

- » Beliefs among employees that:
 - » They are capable of implementing a proposed change
 - » The proposed change is appropriate for the organization
 - » The leaders are committed to the proposed change
 - » The proposed change is beneficial to organizational members

Application: How a good measure of “Readiness for Change” can improve LHE

- » Validated measure of Change Readiness we can (should!) use
- » Insights into both overall and dimensional levels of readiness reported by employees
- » Organizational development activities targeting select dimensions (e.g., what to do when employees don't feel capable)
- » Organizational development activities targeting select units/divisions in university (e.g., what if leaders in Academic Affairs aren't committed?)
- » Is Change Readiness level predictive of LHE success?

The arc of my discontent: Why a model or theory matters

- » Your recommendations are only as good as your analysis
- » Your analysis is only as good as your design and data
- » Your design and data are only as good as your measurement system
- » Your measurement system is only as good as what your model or theory includes
- » **Therefore: You need a model or theory to guide**

Your recommendations are only as good as your analysis (Balzer, 2015)

- » Overreliance on descriptive statistics from case studies (e.g., reduction in number of steps in a single process)
- » No inferential statistics across large number of observations from multiple universities (i.e., demonstrating that LHE can significantly reduce the number of steps in ANY process)

Your analysis is only as good as your design and data (Balzer & Rada, 2014)

- » Limited/No rigorous scientific research demonstrating the effectiveness of LHE
 - » Case studies, no control group, no quasi-experimental designs
- » LHE should complement its ART of practice with the SCIENCE of research
 - » Systematic review and evidence synthesis

Your design and data are only as good as your measurement system (Balzer et al., 2009)

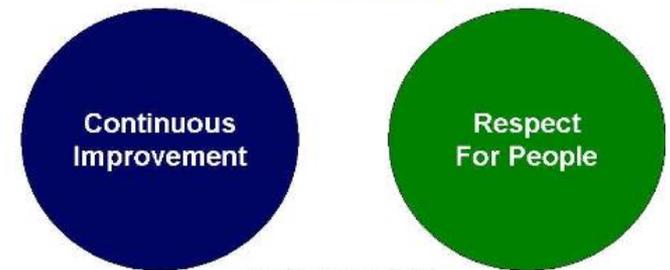
- » Poor measurement of perceptions and attitudes
- » Review of literature yields no consensus **conceptual** definition of Lean
- » Lack of an **operational** definition of Lean
- » Results: Inconsistencies across studies
 - » Impossible to integrate these studies to conclude that Lean works

Your measurement system is only as good as what your model or theory includes (Balzer et al., in press)

- » Lean principles: Continuous Improvement and Respect for People
 - » LHE: Rich in continuous improvement
 - » More about how processes are improved
 - » LHE: Poor in respect for people
 - » Less about how people are respected

Non-Zero-Sum

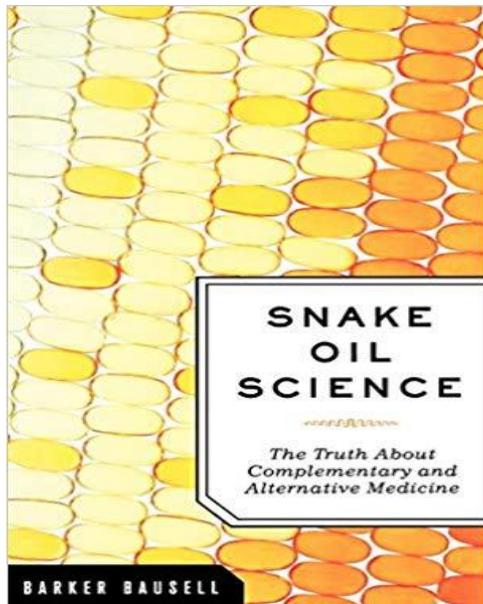
REAL LEAN



Source: Toyota Motor Corporation, 2001

Why it matters: Pseudoscience

- » Race biases in intelligence (bad analysis)
- » Measles vaccine causes autism (bad design and data)



- » Escalating suicide rates (bad measurement)
- » Homeopathic cancer cures (bad model/theory)

Rvangurp.wordpress.com

Advancing a model or theory to guide LHE

CI: Process Side

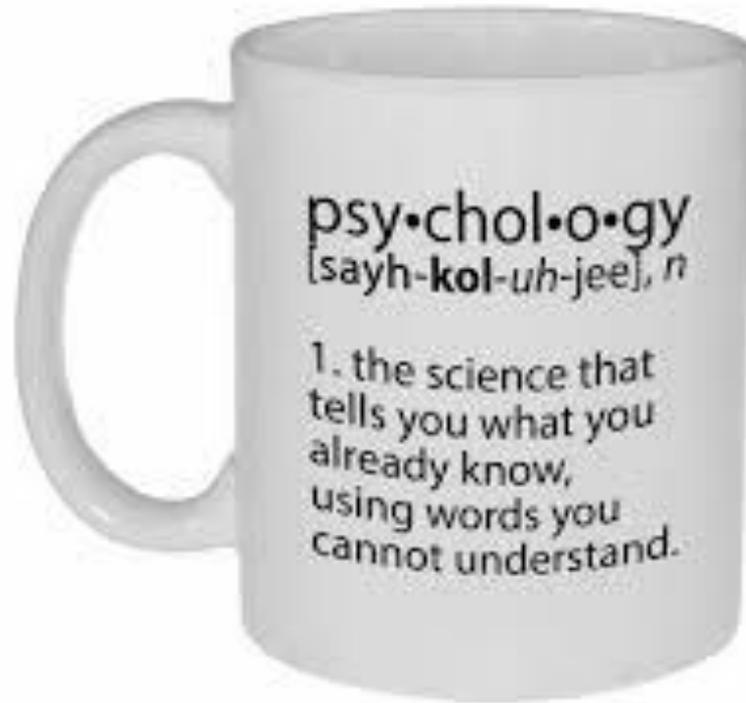
- » Industrial Management
- » Quality Systems
- » Supply Chain
- » **Design/Statistics for process capability**
- » **Technical** tools to improve process (conducting kaizen event)

RfP: People Side

- » Organizational Behavior
- » Management Sciences
- » Psychology
- » **Design/Statistics for individual, group, organization**
- » **Acceptance** tools to improve people (managing change and conflict)

Psychology as a model in LHE: The study of perceptions, attitudes, and behaviors

- » Understand
- » Explain
- » Predict
- » Change



Where's the Psychology in Lean/LHE? (Balzer et al., in press)

- » Psychology has ignored Lean/LHE as much as Lean/LHE has ignored psychology
 - » **One** mention of Lean in 42 chapters (1427 pages) in handbook of work psychology-related topics
 - » Ten seminal book on Lean (e.g., Liker, Ohno, Rother, Womack) cited only **10** times in top work psychology journals since 2007
 - » **None** of the studies reported in two literature reviews on Lean (1990-2012) were in work psychology journals
 - » **Three** studies on Lean were published in work psychology journals between 1970-2009

*Psychology can help guide Lean/LHE
(Balzer et al., in press)*

- » LHE Training and Development (T&D)
- » Individual Differences (ID)
- » Employee Health and Well-Being (EH&WB)
- » Judgment and Decision Making (J&DM)
- » Work Groups and Teams (WG&T)
- » Climate and Culture (C&C)
- » Leadership and Influence (L&I)

Psychology and LHE: Examples

Example Topic Area	Relevance to LHE	Research Questions Informing Practice
Training and Development (T&D)	T&D on LHE principles and practices, Lean tools, and leadership practices are needed to transform university to LHE management system	What evidence-based T&D practices are most effective in implementing LHE? Should T&D include content beyond LHE (e.g., conflict management)?
Individual Differences (ID)	Employees differ in knowledge, skills, abilities, experiences, personality, attitudes, motivators, etc.	Do ID play a role in an employee's acceptance of LHE? Can we use ID to select leaders and employees who will thrive under LHE?

Psychology and LHE: Examples (cont'd)

Example Topic Area	Relevance to LHE	Research Questions Informing Practice
Employee Health and Well-Being (EH&WB)	EH&WB is an important metrics for RfP (e.g., less stress from fewer complaints due to bad processes, less overburdening employees with wasteful work processes)	What aspects of LHE contribute to EH&WB? Do employees need to participate in LHE to benefit from EH&WB?
Judgment and Decision Making (J&DM)	LHE shifts significant J&DM responsibilities for work processes from managers and supervisors to individual or groups of employees	What new findings in group decision making (e.g., stepladder technique) could improve Lean tools? Do J&DM biases (anchoring and availability heuristics contribute to LHE failure?

Psychology and LHE: Examples (cont'd)

Example Topic Area	Relevance to LHE	Research Questions Informing Practice
Work Groups and Teams (WG&T)	WG&T are used for Rapid Improvement Events, work cells, daily huddles, etc.	What member characteristics are important for creating an effective WG&T? Are leader-led or self-directed WG&T more effective for daily huddles?
Climate and Culture (C&C)	C&C play important role in creating a long-term and sustainable work environment committed to respect for people and continuous improvement	Is there a preferred C&C “profile” to support a university’s transition to LHE? Does C&C → attitudes & behaviors or do attitudes & behaviors → C&C?

Psychology and LHE: Examples (cont'd)

Example Topic Area	Relevance to LHE	Research Questions Informing Practice
Leadership and Influence (L&I)	Differences in L&I behaviors between traditional and LHE leaders; LHE relies on L&I to empower employees to implement changes to processes	What L&I behaviors most influence continuous improvement and respect for people for the successful adoption of LHE? Does trust in management mediate the relation between L&I behaviors and the success of LHE?

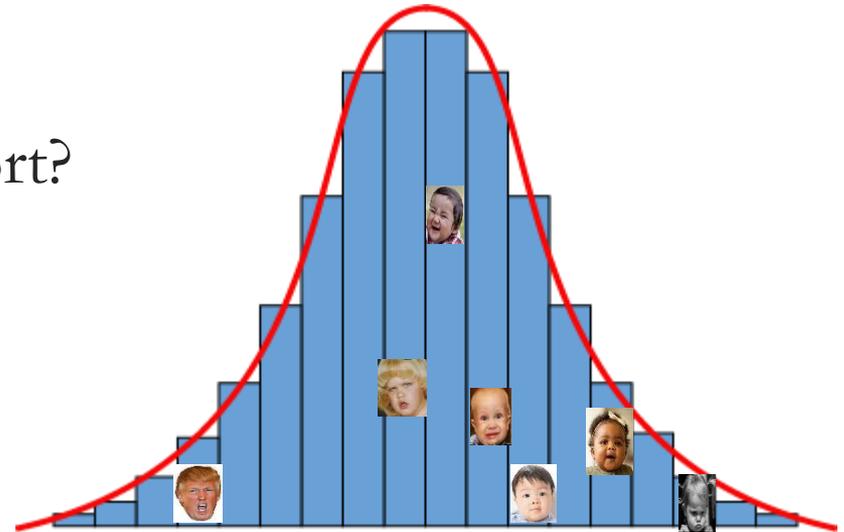
Shallow Dive: Individual Differences (ID)

- » Lean management assumes that employees (salaried and hourly, professionals and non-professionals, new and old employees, etc.):
 - » Want more of a say in their work
 - » Want more responsibility at work
 - » Want to work in teams
 - » Want to learn new things
 - » Take pride in their work
 - » Want to self-actualize through their work
 - » Are committed to the success of the university
 - » etc.



Shallow Dive: Individual Differences (ID) (cont'd)

- » Do they?
 - » Where are the data to support?
- » Do ID matter?
 - » If so, which ones?
- » How do ID matter?
 - » Perceptions? Attitudes? Behaviors?
- » If ID matter in ways that are important, what do we do?
 - » Modify the ID?
 - » Select/Promote/Terminate employees based on ID?



Deeper Dive: Training and Development (T&D)

- » Salas et al. (2012): Recommended best practices before, during, and after training based on evidence-based psychological research
- » Findings (examples):
 - » *The learning climate can affect the application of training*
 - » *Instructional strategies and principles matter*
 - » *Promoting greater transfer of training to the job*

T&D: The learning climate can affect the application of training

PROBLEM:

- » Skill decay: Overall retention decreases dramatically with longer periods of nonuse or lack of practice

COUNTERMEASURE:

- » Skill decay can be reduced
 - » Employees receive **training shortly before** they will need to apply it
 - » **Refresher training** when decay cannot be avoided
- » Involve supervisors, mentors, and team **leaders in creating a positive climate for training**
 - » They should actively communicate with employees prior to training to **motivate and support** them

T&D: Instructional strategies and principles matter

PROBLEM:

- » Traditional, stand-up lectures are an ineffective and unengaging strategy for developing knowledge and skills

COUNTERMEASURE:

- » Incorporate four critical concepts for effective training:
 - » **Information** on the concepts, facts, and information they need to learn
 - » **Demonstrations** of the desired behaviors, thoughts, and attitudes; opportunities to practice what was learned
 - » **Feedback** to employees with respect to their learning with built in opportunities for remediation
 - » **Practice** opportunities to apply what they learned back on the job
 - » Demonstrated by the trainer using research-supported **behavioral modeling** practices

T&D: Promoting greater transfer of training to the job

PROBLEM:

- » Despite trainees' performance during the training program, trained competencies rarely make it back to the workplace

COUNTERMEASURE:

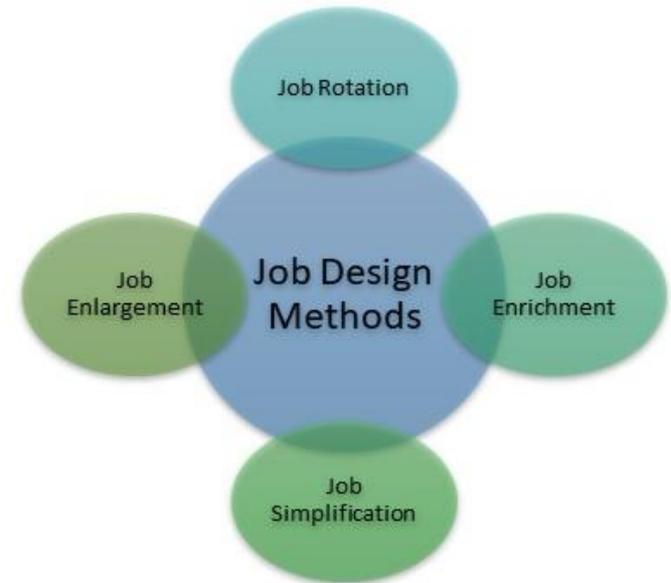
- » Strategies that increase transfer from training to OTJ performance:
 - » Provide supervisors and team leaders with tools, training, and support to **coach employees**
 - » Use **OTJ work assignments to reinforce** their training and continue their learning and skill development
 - » Supervisor motivation and **opportunities to apply the training OTJ**
 - » **Remove obstacles** to apply what they have learned and get feedback
 - » **Post-training resources** (e.g., information sources, access to tools, peer coaches) for employees back on the job

Reflecting on Training and Development Research

- » Which **countermeasures** are in place during your LHE training?
 - » JIT training?
 - » Opportunities to practice with feedback after seeing it demonstrated?
 - » OTJ work assignments and access to resources post-training
- » How do you assess training (Kirkpatrick, 1994)
 - » Reactions; knowledge; OTJ behaviors; workplace outcomes?
- » Are there opportunities to apply psychology research to your LHE practice?
 - » To evaluate and improve your training efforts?

Even more psychology topics related to LHE

- » Job & Work Design
- » Job Performance
- » Organizational Design
- » Motivation & Reward Practices
- » Organizational Development & Change
- » Communication Practices



Shifting gears from psychology to psychological metrics and measurement

- » Lawrence & Cairns (2015)
 - » Excellent framework for conceptualizing metrics to evidence benefits of LHE
 - » Financial, Quality, Operational Delivery, **Staff Engagement**
- » Measuring Staff Engagement metrics is the bailiwick of psychology (and related areas)
 - » How do you measure work satisfaction?
 - » Overall?
 - » Facets (job, boss, peers)?

Measurement of perceptions, behaviors, attitudes, & outcomes thought to be affected by LHE (examples)

- » Creative problem solving
- » Autonomy
- » Cognitive demands
- » Responsibility/Accountability
- » Provider engagement
- » Social support
- » Leadership perceptions
- » Job security
- » Social interaction
- » Satisfaction (beneficiary and provider)
- » Self-efficacy
- » Lean behaviors
- » Job strain/stress
- » Health outcomes
- » Absenteeism and turnover

Shifting gears (cont'd): *Research design*

- » More rigorous research designs
- » Better descriptions of LHE interventions
- » Larger samples
- » Statistical tests to confirm conclusions
- » Replication and extension of findings



“Grave Concerns” about the “red meat is OK” research study by Johnston et al. (October, 2019)

- » Omitted studies would have changed the conclusion
- » Were non-red meat eaters eating fried chicken?
- » You can't do a randomized controlled trial for lifelong diet
- » Shouldn't discount the results from observational studies
- » Taste preference shouldn't factor into red meat guidelines
- » Researcher biases influence study design and conclusions

OVERALL: Difference is not the evidence
but the interpretation of evidence

That said,

- » A 2019 comprehensive review of more than 3000 rigorous studies of nearly 400 common medical practices and theories concluded that **1 in 10 of the current medical wisdom practices among doctors are wrong**, including:
 - » *Peanut allergies occur whether or not a child is exposed to peanuts before age 3*
 - » *Fish oil does not reduce the risk of heart disease*
 - » *A lifelike doll carried around by teenage girls will not deter pregnancies*
 - » *A single dose of oral opioids is no better than drugs like aspirin and ibuprofen to treat emergency room patients in acute pain*
 - » *It won't help to keep your house free of dust mites, mice and cockroaches to protect against asthma attacks*
 - » *Step counters and calorie trackers do not help you lose weight*

Herrera-Perez et al. eLife 2019;8:e45183 DOI: [10.7554/ELIFE.45183](https://doi.org/10.7554/ELIFE.45183)



PIE IN THE SKY OR POSSIBLE?

Good
Measurement

Good
Design

Can LHE community tackle this?



Good
Analysis



Good
Model



Absolutely! Glover et al. (2015) example

Research Question: Does a continuous improvement culture support the sustainable implementation of kaizen rapid improvement events?

- » Theoretical framework to guide hypotheses
 - » Institutionalization of Planned Change Framework
- » Studied 65 kaizen events across 8 organizations
 - » Multi-site, cross-sectional field study with randomized selection at the kaizen event level
- » 67-item survey (measures “validated” based on survey responses)
- » Inferential statistics (multiple linear regression) with tests of significance

*Glover, et al. (2015)*_(cont'd)

Findings:

- » Perceived impact of kaizen events 9-18 months after implementation are related to Lean climate factors:
 - » Work area employees exhibit peer learning
 - » Awareness and responsibility both inside and outside of their work area
 - » Extent to which change efforts are accepted in workplace

*Glover, et al. (2015)*_(cont'd)

Overall:

- » Characteristics of the workplace (independent of the focus of the kaizen event itself) impact sustainability of kaizen event results

Application:

- » How can the findings guide LHE practice?
 - » Teach kaizen participants to teach coworkers
 - » University-wide communication plan
 - » Facilitate support for kaizen changes in the workplace

Conclusion

- » Research is all about continuous improvement of knowledge
- » LHE practitioners and psychology (or related areas) colleagues can be great partners in the research enterprise



People are THE most important asset!
Complement the technical (e.g., tools) side of LHE with philosophy and management practices – with people at the center

Liker, 2004, p.176

Live the Lean principle: Continuous improvement in LHE practice & research

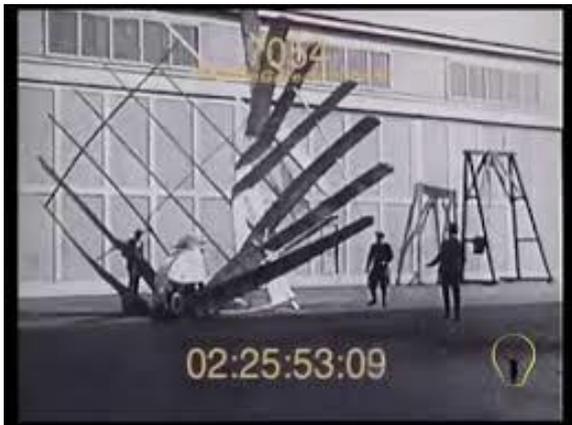
- » Continuous improvement of LHE research and practice
 - » Confirm successes
 - » What made it a success?
 - » How can we improve success?
 - » Learn from failures
 - » Where is failure?
 - » Failure to launch LHE; Failure to implement LHE; Failure to sustain LHE
 - » What contributed to failure?
 - » Are countermeasures possible?
 - » Do they work?

But not everyone agrees with Balzer (shocker!)

- » Emiliani (2019):
 - » Scientific approach will limit LHE's appeal to those who do not bend toward science
 - » Social science (psychology) is less hardheaded than real science (industrial engineering)
- » Balzer (in press) replies:
 - » Lean in the absence of scientific evidence is a pseudoscience with overreliance on “proof” from anecdotes, exaggerated claims, etc.
 - » Science or Snake Oil Science (did I just say that out loud?!)?

It's (y)our choice!

- » Which plane do you want to fly in, which doctor do you want treating, or which bridge do you want to drive over?



- » Which management system do you want for your students, employees and university?

Youtube.com; https://www.tes.com/lessons/zt0y_Mxjuzw0TA/copy-of-civil-war-photos; en.Wikipedia.org

Getting Started

- » Use psychology (and related areas) in the background – no one needs to know!
- » Engage psychology (and related) faculty on your campus
 - » Help in exchange for data/publications
 - » Graduate students as well
- » Engage psychology (and related) faculty in the LHE community
- » Build LHE research/practice consortium
- » Professional development for current and aspiring LHE practitioners
- » External funding (government, foundations, private sector)

Key Takeaways

- » There needs to be a scientific basis of support for LHE to advance as an evidence-based practice and a respected research discipline
 - » Not all findings from world of Lean may generalize to LHE
- » There are many key issues in Lean/LHE that have not been studied well
 - » Especially those related to “Respect for People”
- » Faculty colleagues in psychology (or related areas) can be enticed to collaborate to improve LHE practice and research

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WELL?

What do you think?

Thanks!

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