ShadowBox® Approach to Cognitive Skills Training

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www.psychologytoday.com/blog/seeing-what-others-dont

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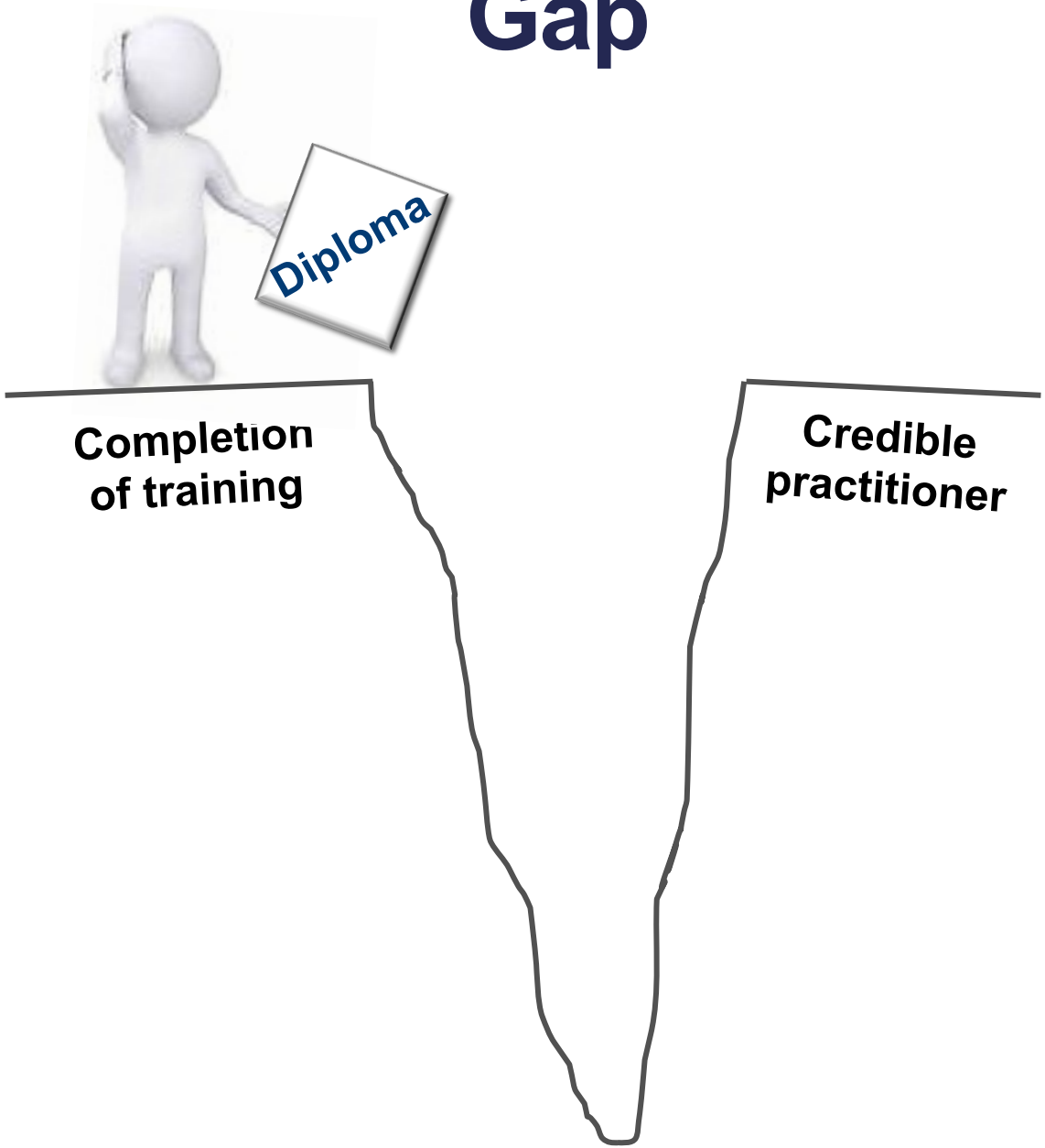
MacroCognition

Gap



ShadowBox: Letting trainees see the world through the eyes of experts — without the experts being there

- Present complex scenarios
- Insert Decision Points with a small set of multiple choice options
  - Actions to take, priorities, information to track, etc.
- Trainees rank the alternatives and record their rationale
- Trainees compare responses and rationale to a panel of SMEs
- Trainees identify what the experts were seeing and thinking that they (the trainees) weren't

Mission Statement for ShadowBox LLC

- Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA)
- Use an *electronic* version of ShadowBox so that *individuals* can learn on their own time
- Success is the trainees' *match to the expert rankings*
- Achieve *quality control* of the ShadowBox scenarios by carefully reviewing all materials generated by the customers

Mission Statement for ShadowBox LLC

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance.*

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Cognitive: Textbook chapters

- Language acquisition
- Language production
- Language comprehension
- Working Memory
- Long Term Memory
- Intelligence
- Connectionism
- Logical reasoning
- Cognitive neuroscience
- Sensation and perception
- Face recognition
- Attention and consciousness
- Procedural versus declarative knowledge
- Deductive, inductive and abductive reasoning

Cognitive Skills

- **Physical skills**
- **Technical knowledge**
- **Procedures**
  - Compile experience — Best Practices
  - Essential to build a playbook of procedures
  - Procedures are necessary but not sufficient
- **[Cognitive skills]**

Strengths of Procedures

- They are training tools for novices.
- They are memory aids.
- They can safeguard against interruptions.
- They reduce workload.
- They compile experience and historical information.
- The help teams coordinate by imposing consistency.

Procedures Aren't Sufficient: The boundary conditions for procedures

- **Procedures are advisable for well-ordered situations**
- **They become brittle in complex situations**
  - **They may be insensitive to context, and can mislead us**
- **They rarely apply to anomalies**
- **They are hard to keep updated**

Cognitive Training Outcomes

- Make better decisions
- Make sense of situations more quickly and accurately
- Prioritize goals better
- Manage attention: prioritize cues to monitor, info to seek
- Manage uncertainty
- Anticipate future states, consequences of actions, problems
- Detect and diagnose problems more quickly and accurately
- Perform workarounds and recoveries
- Shift to more powerful mindsets

Cognitive

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance.*

- **Lesson:** Unpack “cognitive” as quickly as possible, or don’t even use the term

Skills

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance.*

- Sounds procedural
- Suggests a laundry list of skills and sub-skills — leading to stovepiped training
- Paradox of precision

- **Lesson:** Find ways to improve tradecraft strengthen mental models and shift mindsets

Training

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance.*

- Interpreted as conveying the procedures, putting on courses, having instructors, lesson plans

- **Lesson:** We are interested in triggering insights and revising mental models and mindsets, not in conveying rules and procedures
- **Lesson:** Don't try to use the same exercises to train and to evaluate at the same time

Expert

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance.*

- Trainees can bristle when they don't match the experts. And experts are uncomfortable with that label.

Lesson: We are still searching. One client used "wizards." Other possibilities are: highly respected practitioners, veterans, etc.

Lesson: Don't automatically believe in the skills of people nominated as experts

Cognitive Task Analysis

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance.*

- R&D organizations can sponsor front end CTA work. But training departments don't have this kind of budget.

Lesson: Fold the CTA into the scenario building. The Applied CTA toolkit includes a simulation interview strategy

Lesson: Explore other streamlined CTA strategies — e.g., Borders & Klein (2017) on Critical Decision Audit.

Improve Performance

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance*.

- This objective can excite people in the short-term, but what really matters is reducing pain and worries.

Lesson: We need to identify problems the clients are experiencing and need to address

Lesson: Some clients worry more about organizational calibration than individual performance

Electronic ShadowBox for Individuals

Use the ShadowBox strategy to provide *cognitive skills training*, using *expert* feedback, and by building scenarios based on a front-end *Cognitive Task Analysis* (CTA), in order to *improve performance.*

Use an *electronic* version of ShadowBox so that *individuals* can learn on their own time

- However, many clients prefer the small group discussions

Lesson: We had to develop a Facilitator training workshop

Lesson: Need for careful vetting of facilitators

Evaluating Success

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Success is the trainees' *match to the expert rankings*

Lesson: Transfer to job performance is the gold standard, but is usually unrealistic — customers aren't able to judge job performance and decision making very well. A surrogate is to use supervisor ratings

Scenario Quality Control

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Success is the trainees' *match to the expert rankings*

Achieve *quality control* of the scenarios by carefully reviewing all materials generated by the clients

- This strategy made sense at a conceptual level, but clients disliked it, potential clients were turned off, and we were unable to keep up

Lesson: Encourage clients to create their own scenarios. And that means developing a training program in scenario development.

Initial Mission Statement

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Current Mission Statement

Use ShadowBox to shift mindsets using 'aha' moments by presenting scenarios based on tough cases

ShadowBox®

Getting up to speed faster

Letting trainees see the world through the eyes of experts — without the experts having to be there

Child Protective Services – Annie E Casey Foundation

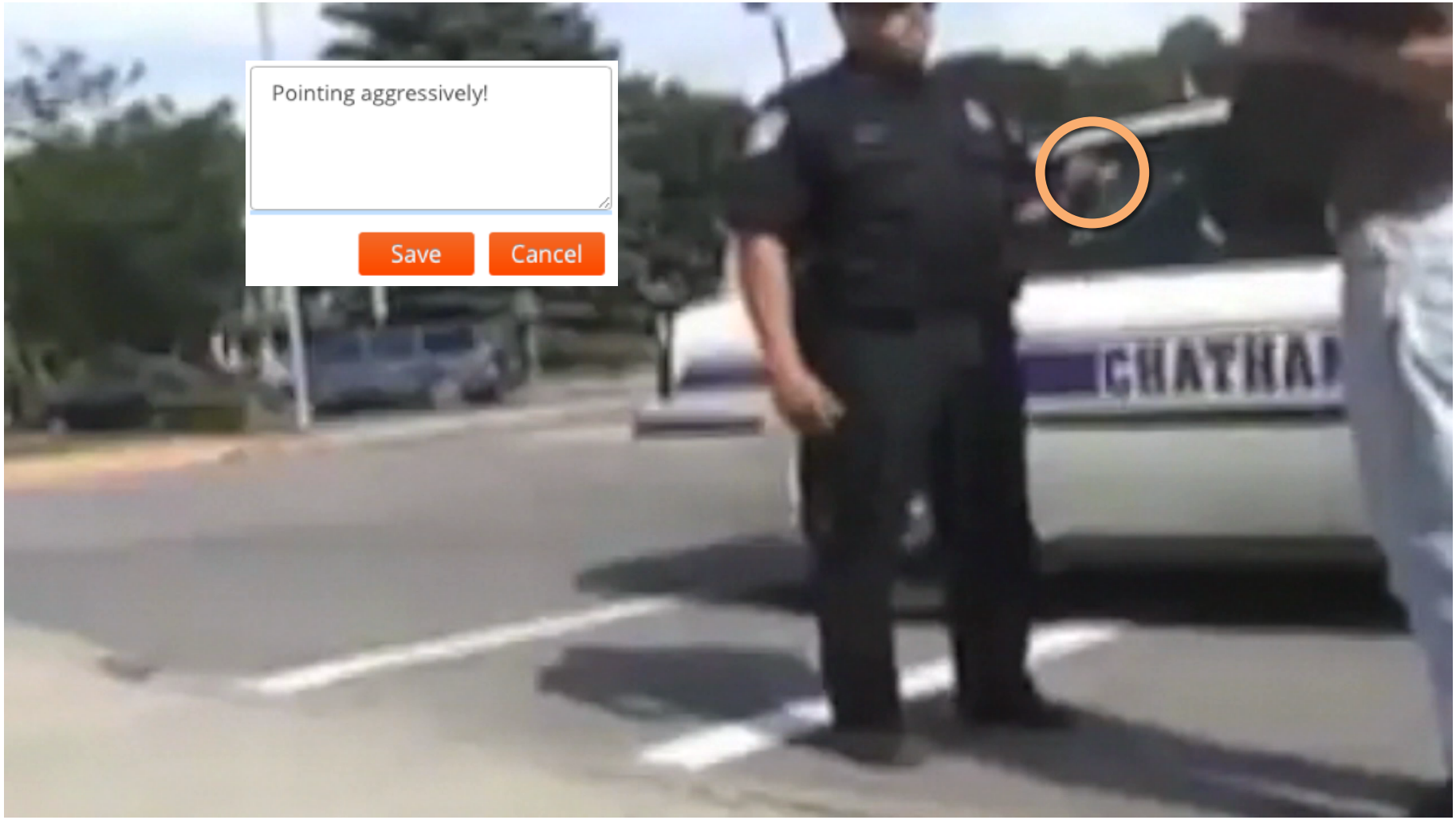
ShadowBox Variations

- **Decision Points**
  - Actions to take
  - Goals
  - Information to gather
  - Cues to monitor
  - Expectations
  - Worries
  - Sensemaking: What's happening in this incident?

ShadowBox Versatility

- **Scalability**
  - Paper & Pencil
  - Desktop/Mobile
  - Integration into existing technologies
- **Training Formats**
  - Decision Point: text, images, audio, video
  - Cue Detect: interactive video

ShadowBox Cue Training



ShadowBox Effectiveness

- **Firefighters**. Hintze (2008): 18% improvement in performance over 4 SBox scenarios, in 1 day of training, with facilitated discussions, experimental v. control conditions. $p < .001$.
- **Warfighters**
  - Klein and Borders (2014): 28% improvement in performance over 4 SBox scenarios, in 3 training hours, providing expert feedback but no facilitated discussion, from Time #1 (T1) to Time #4 (T4). $p < .05$.
  - Also a 28% improvement, Exp Group over controls, $p < .05$.
  - Klein and Borders (2014): 20.5% improvement in performance over 4 SBox scenarios, presented individually on an Android tablet, avg time = 47 minutes, from T1 to T4. $p < .05$.
- **Nurses**. H. A. Klein & team: 27% improvement in ½ day in the match to experts, 56% match on T1 to 71% match on T4.
- **Petrochemical plant operators.** Klein, Borders and Polander (2015): In ½ day, a 26% improvement in accuracy of recognizing the problem (.68 to .85), and a 32% reduction in time needed, 47m to 32m.

ShadowBox Projects

- Military/Police DARPA Good Strangers project (2011-2015)
- Petrochemical industry (2013-ongoing); Marathon, Nova Chemicals, Citgo, Chevron Phillips
- Child Protection Services (2014-ongoing); Annie E. Casey Foundation
- Healthcare – Nurse training (2014-2015); Baylor
- Law Enforcement – California POST (Peace Office Standards & Training) (2015 – ongoing)
- Helicopter rescue (2017) Air Force Research Laboratory
- Emergency response: Singapore Civil Service College

ShadowBox Objectives

Accelerating expertise = Getting novices up to speed faster

- Augmenting on-the-job experiences with the virtual experiences
- Presenting a wide range of situations – building experiences and adding repetitions
- Presenting challenging situations — tough cases
- Promoting individual discovery and correcting flawed mental models and immature mindsets

ShadowBox Applications

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