

THE IMPACT OF REMOTE C2 ON SOLDIERS' PERFORMANCE AND TRUST IN THEIR LEADER

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Outline

- Background
 - Organizational change
- Issues, questions, hypotheses
 - Leader presence \Rightarrow Social impact, Trust
- Experiment
 - Method
 - Results
- Implications
 - The re-organization of the dismounted infantry

Background

- 'Network-centric defense' is the future of the armed forces.
- 'Remote command and control' is an integral part of this future.
- Platoon leaders may no longer serve in the field with their men.

Before the transition: The collocated leader

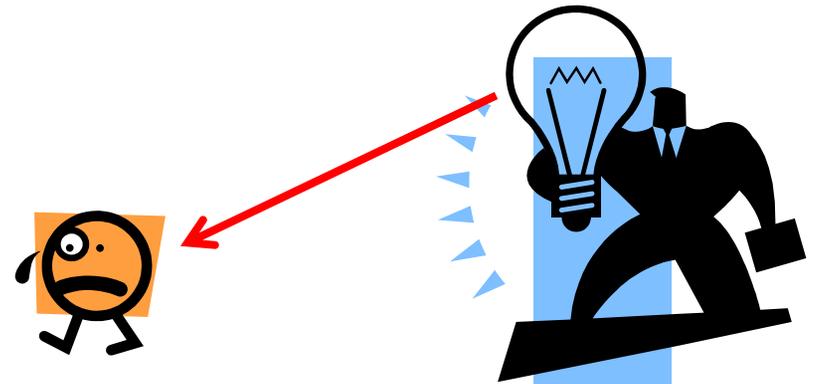


After the transition: Remote command and control



The First Issue

- Removing the platoon leader from the field reduces his 'Social Impact'.
 - Impact = F(S, I, N)
 - Strength
 - Immediacy
 - Number
- Social Impact Theory:
 - Latané, 1981
 - Mullen, 1985
 - Jackson, 1986
 - Mullen, 1986
 - Sedikes & Jackson, 1990



The Second Issue

- Removing the platoon leader from the field may compromise the soldier's trust in his leader.
 - Remote command and control eliminates reciprocal vulnerability.
- Reciprocal vulnerability is one of the foundations of trust.
 - Berg, Dickhaut, & McCabe, 1995
 - Costa, Roe, & Taillieu, 2001
 - Jones & George, 1998
 - Lewicki & Bunker, 1996
 - Mayer, Davis, & Schoorman, 1995
 - Rousseau, Sitkin, Burt, & Camerer, 1998

Questions

- Is the transition to remote command and control associated with a decrement in trust in the leader?
- Are there measurable behavioral consequences of the inferred decrement in trust?
- Are soldiers faster to execute (to complete) an oral command when it is issued by a collocated leader than by a remote leader?

Hypothesis

- Leader presence matters.
 - Soldiers will be less likely to trust a remote leader than a collocated leader.
 - Soldiers will be slower to execute a direct order issued by a remote leader.
 - Response times to verbal orders to move and to shoot will be greater when issued by a remote leader than by a collocated leader.

Previous work

- Three repeated-measures experiments with civilian participants found faster response times to a collocated leader than a remote leader.

Pangburn, Freund, Pangburn, & Smith (2003)

Smith & Liberg (2005)

Method

The potential confound

- Repeated measures designs are conducive to eliciting responses guided by 'Demand Characteristics'.
 - The participants may figure out what they think the experimenter wants to see.
- We must attempt to control this potential confound.

The buzzer



About the buzzer

- The buzzer generated mild tactile stimuli - a gentle buzzing rumble that lasted for 2 seconds.
 - A small metal box containing an electric motor driving an eccentric cam
- The participant carried the buzzer in a pocket on the inside of the back of a military-issue flak jacket.
- Putting the buzzer in the pocket, turning it on (and off) took time and attention.

The control

- 3 conditions (6 orders counterbalanced)
 - Remote leader activating the buzzer
 - Remote leader, no buzzer action
 - Present leader, no buzzer action
- Participants wore the buzzer in all 3 conditions.
- If demand characteristics are present, we should see preferential responses in the active buzzer condition.

Ecological validity vs. IRB

- How can we simulate a battlefield setting without putting participants in harm's way?
- **PAINTBALL**
 - Protective gear
 - Non-damaging projectiles
- The paintball arena allows us to
 - maintain a steady stream of hostile fire,
 - manipulate leader presence, and
 - obtain reliable measures of its influence on participants' responses to the commands to move and to shoot.

Participants

- 54 active duty soldiers in the Swedish Army (3 platoons)
 - 52 men, 2 women
 - Ages: 18 – 22 yrs.

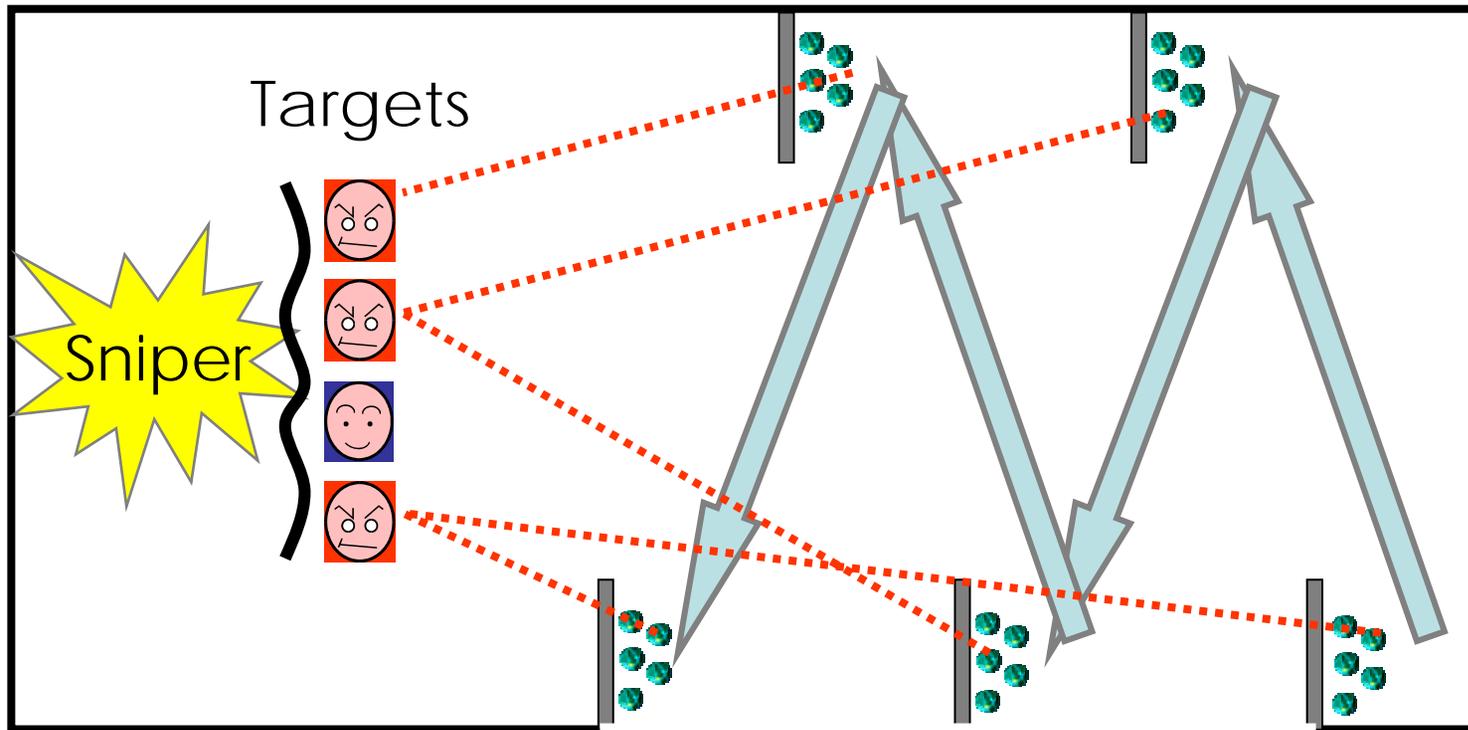
Confederates

- A fourth platoon acted as uninformed confederates.
 - They did not know the hypotheses to be tested.
 - They outfitted the participants with all equipment, including the buzzer.
 - They recorded all the behavioral data.
- 2 Majors and 1 Captain served as leaders.
 - Their interest was the utility of the buzzer.
 - None of the soldiers reported to these officers.

Mission brief

- The Krasnovian Army has taken an unknown number of allied POWs.
 - These prisoners are being held in a firing line and are about to be executed.
- You are to rescue these prisoners.
 - Sneak into the enemy camp.
 - Eliminate all enemy targets while minimizing friendly casualties.
 - Avoid being hit by sniper fire.

Procedure



Fire!

Move!

Experimental design

- 3 conditions
 - Present (The leader is present in the lane with the soldier.)
 - Remote (The leader is not in the lane.)
 - Buzzer (The remote leader activates the buzzer.)
- Participants: 54 active-duty privates
- Every participant ran the lane in all three conditions.
 - Participants were randomly assigned to one of the six sequences of conditions.

Behavioral Data

- Two soldier confederates used stopwatches to record response times to the leader's commands to:
 - Move
 - Shoot
- Two other confederates counted the number of targets hit.
- All confederates were blind to the hypothesis.
 - Post-hoc interviews confirmed they assumed the focus was on the buzzer.

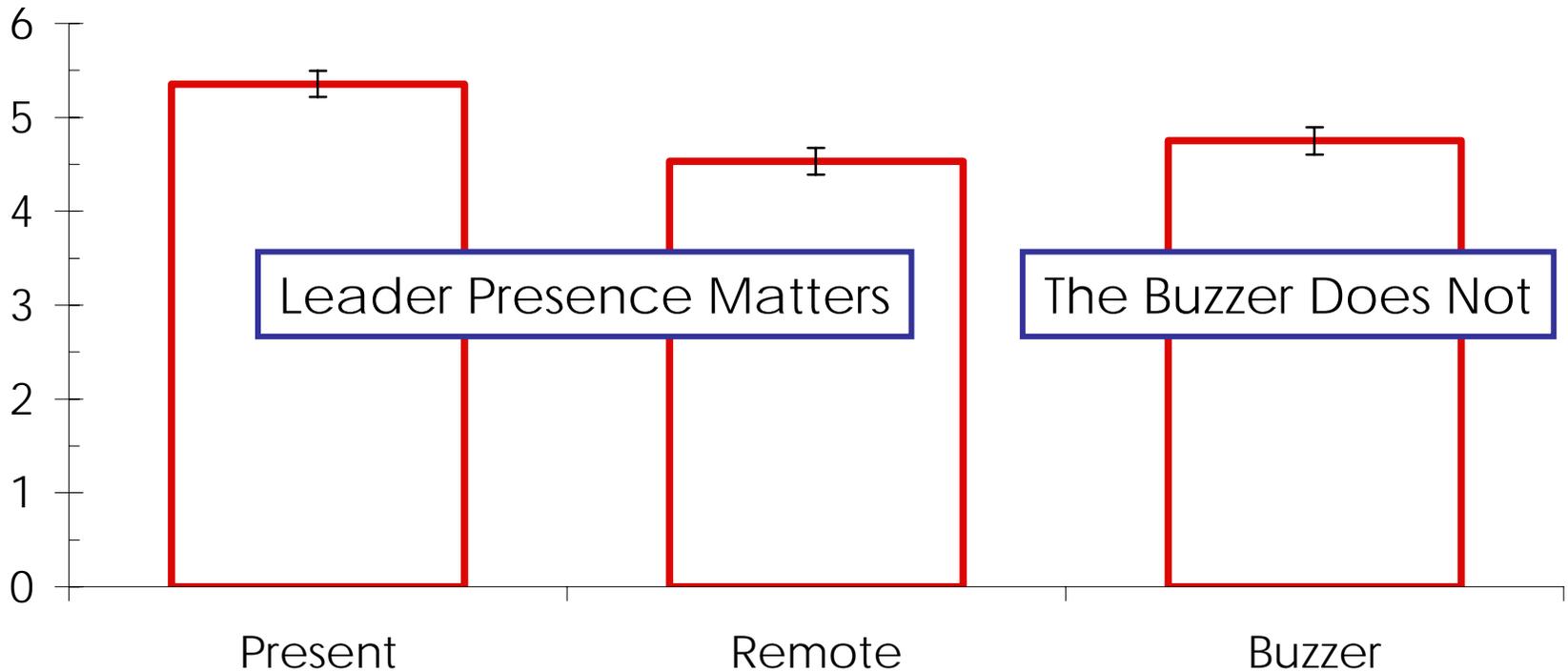
Self-Report Data

- After running the lane in all three conditions, each participant completed questionnaires on experienced trust in the leader.
- One questionnaire for each condition.
- This procedure is susceptible to responses guided by demand characteristics.

Results

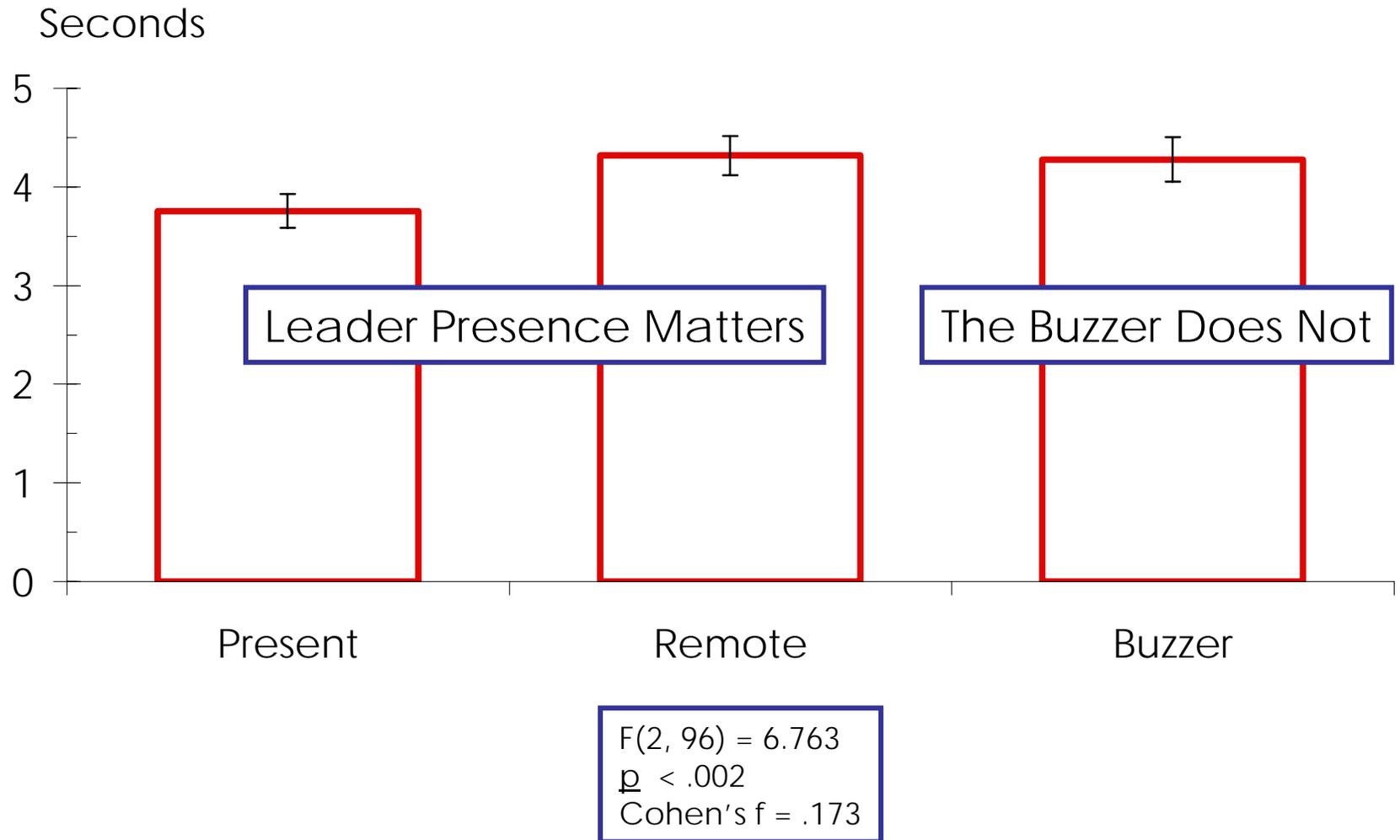
Questionnaire

Index of Trust



$F(2, 96) = 16.56$
 $p < .0001$
Cohen's $f = .315$

Response times to 'Move!'



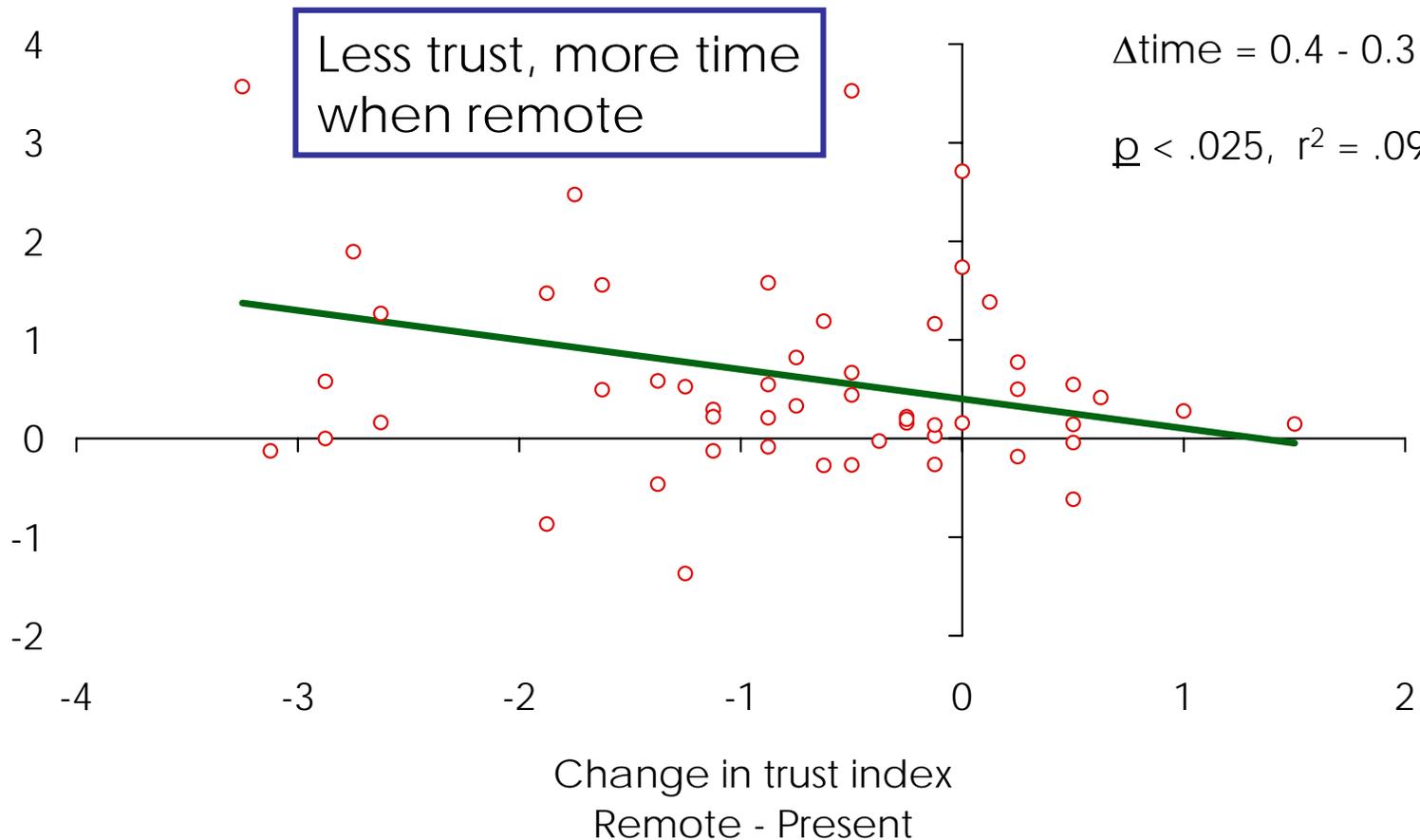
No practice effect for responses to 'Move!'



$F(2, 159) = 0.55, p > .58$

Regression analysis

Change in move time
(sec)



Non-significant results

- Fire times
 - Approximately one second in all conditions.
A clear floor effect
Difficult data collection.
- Shooting accuracy
 - Accuracy was terrible in all conditions.
The sniper's fire was quite effective.
 - Our one true 'performance' variable was ns.

Summary

- Questionnaires:
 - Soldiers reported feeling higher levels of trust in the condition in which the leader was present.
- Move times:
 - Soldiers were faster to complete a collocated leader's commands to cross the fire lane.

The control for demand characteristics

- The buzzer was intended to be a salient and apparently relevant situational cue.
- It had no effect on either the ratings of trust or on the time taken to execute a direct order.
- There is no evidence of demand characteristics shaping participant responses in this experiment.

Implications

- A collocated officer clearly has a strong social impact on a private.
 - Immediacy has the impact predicted by Social Impact Theory
- Trust appears to be the variable that mediates a portion of this social impact.

The Message to the Army

- The data indicate that leader presence matters.
- Remote command and control that removes the platoon leader from the platoon is likely to have a detrimental effect of soldier performance.

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The Questionnaire

- 8 questions, 4 reverse scored, 7 point rating scale
 - 1 I felt trust in the leader.
 - 2 I felt that the leader did all he could so I would not be hit.
 - 3 I did not feel that the leader was sure about what he was doing.
 - 4 I did not feel that the leader knew what was happening.
 - 5 I did not feel that the leader cared about what was happening to me.
 - 6 I felt that the leader appeared competent.
 - 7 I felt that the leader appeared to be there with me.
 - 8 I did not feel that I could trust the leader.
- Modified from materials provided by Peter Svenmarck, FOI