The Influence of Descriptive Information and Experience on Trust in Decision Support Systems

Nirit Gavish

Advisors:

Prof. Daniel Gopher

Dr. David Sinreich (deceased)

INTRODUCTION

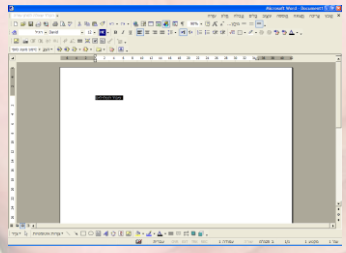
The Problem of Trust in Decision Support Systems

- Human performer nowadays should collaborate with artificial intelligence (Roth, Malin & Schreckenghost, 1997)
- Variety of decision support systems / decision support components, which generally perform well
- Lack of trust in decision support systems (Dzindolet et al., 2002; Sinreich & Marmor, 2005)

Two Types of Decision Support Systems

Real-Time decision support systems

Word processing



Process control

Feedback on system's performance is immediate during interaction

Trust is developed during experience

Long-term decision support systems

Planning systems

Candidates selection

Feedback on system's performance is delayed

Should we trust the system???

Research Question

The focus of the present study:

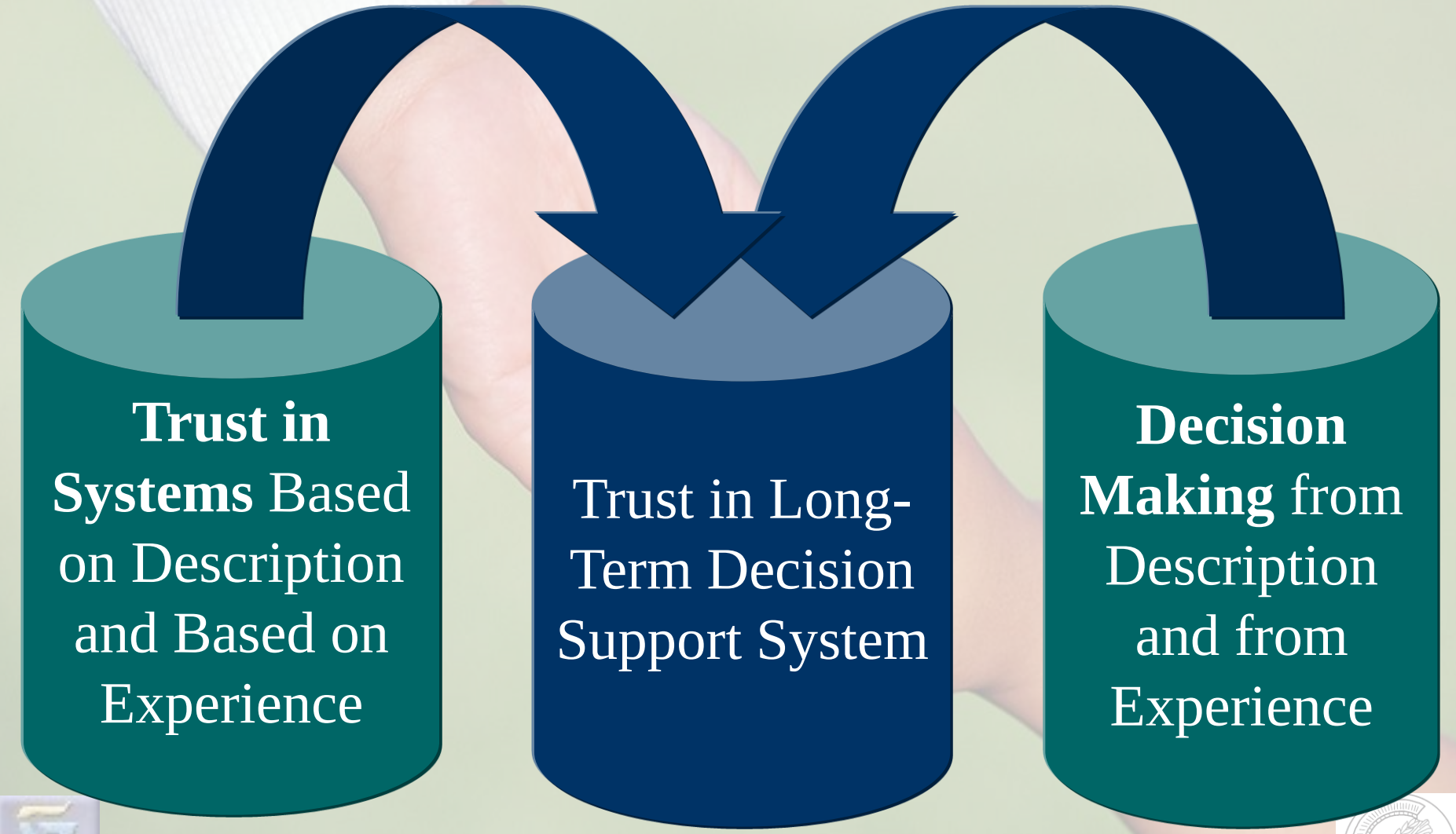
Long-term decision support systems, performances distributed normally with positive expected value

How to increase the trust of human performer in these systems? How to make him generalize over similar systems?

Descriptive Information of the expected future performance

Experience with immediate feedback using simulations

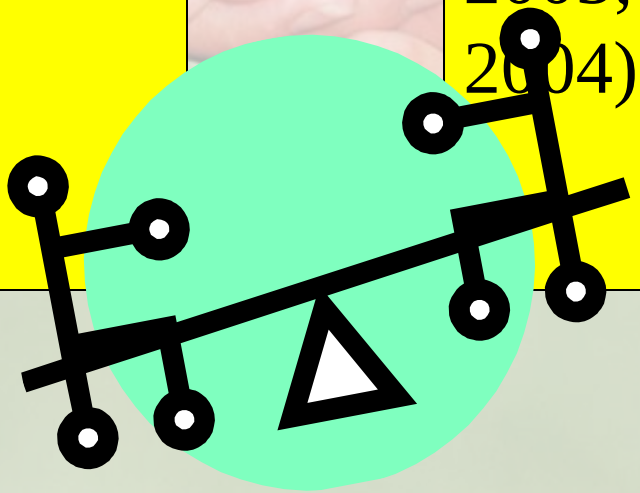
Sources of Theoretical Background



Description Vs. Experience – **Total Trust Level**

Decision from description:
Overestimation of small probability of losses (Kahneman & Tversky, 1994)

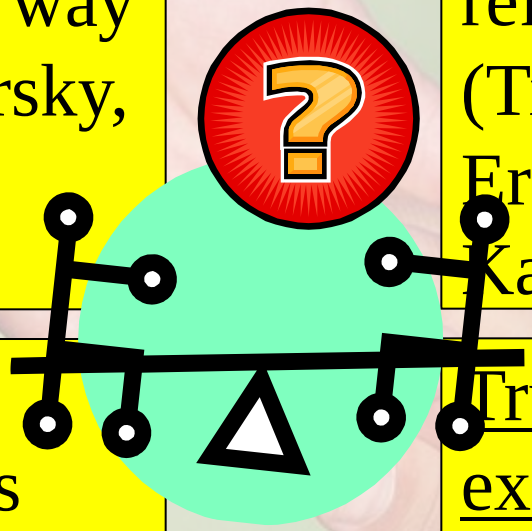
Decision from experience:
Underestimation of small probability of losses (Barron & Erev, 2003; Hertwig et al., 2004)



Description Vs. Experience – **Sensitivity to System's Expected Value**

Decision from description: Perceiving payoff in a relative way (Kahneman & Tversky, 1979)

Decision from experience: Adjusted reference points (Tinkelepaugh , 1928; Erev & Roth, 1998; Karandikar, 1998)



Trust based on description: Trust is sensitive to system performance (De Vries & Midden, in press)

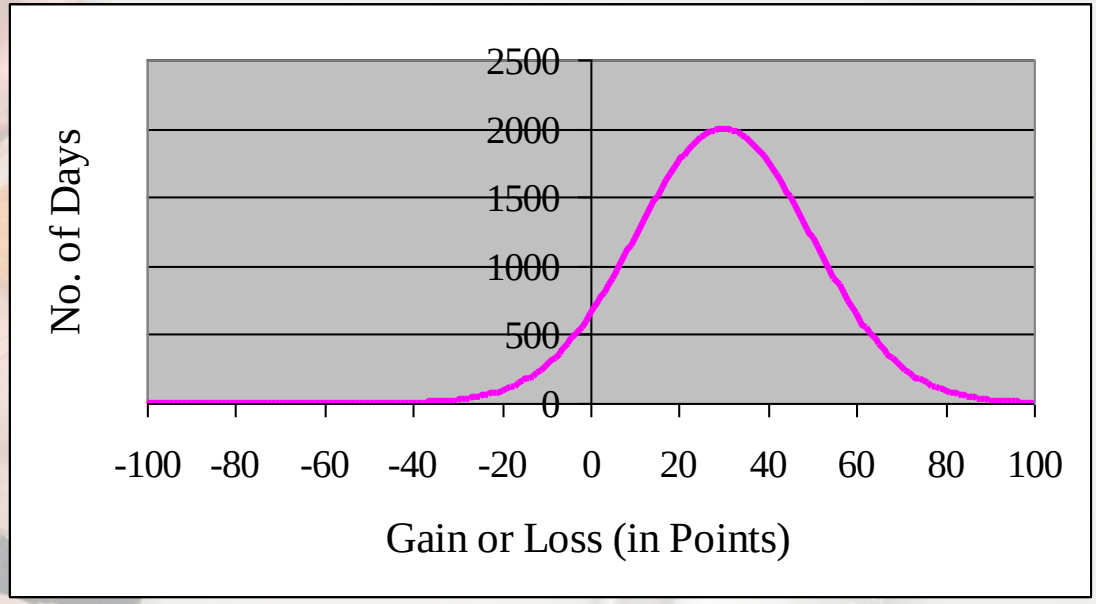
Trust based on experience: Reliance on the system is relative (Dzindolet et al., 2003; Meyer, 2001; Meyer et al., 2003)

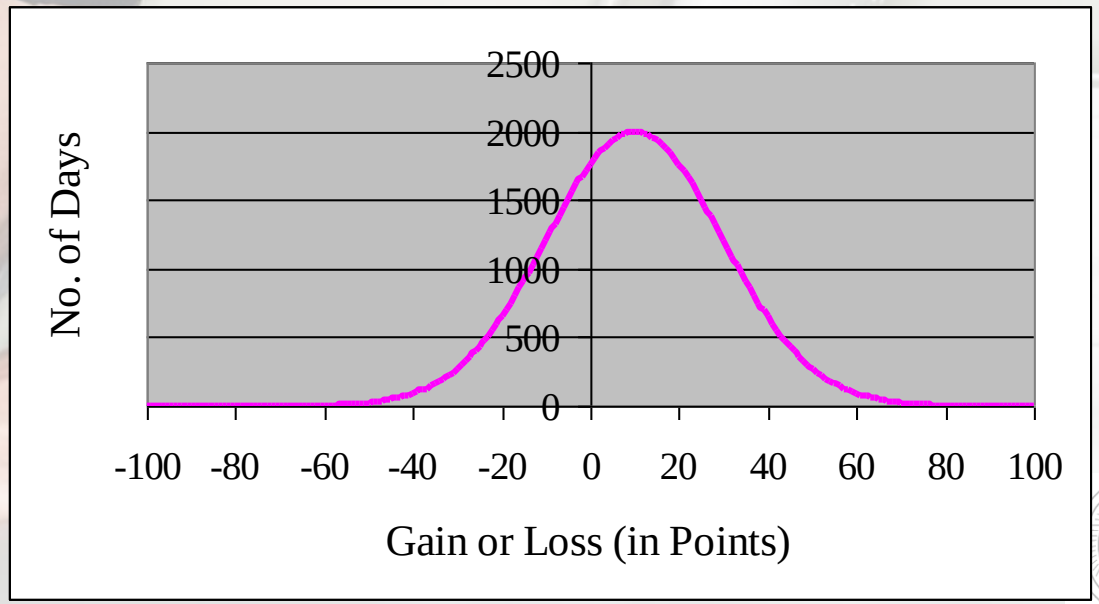
METHOD

Two Recommendations

- Very good recommendation: ~N(+30, 20^2) ("EV 30")

- Good recommendation: ~N(+10, 20^2) ("EV 10")

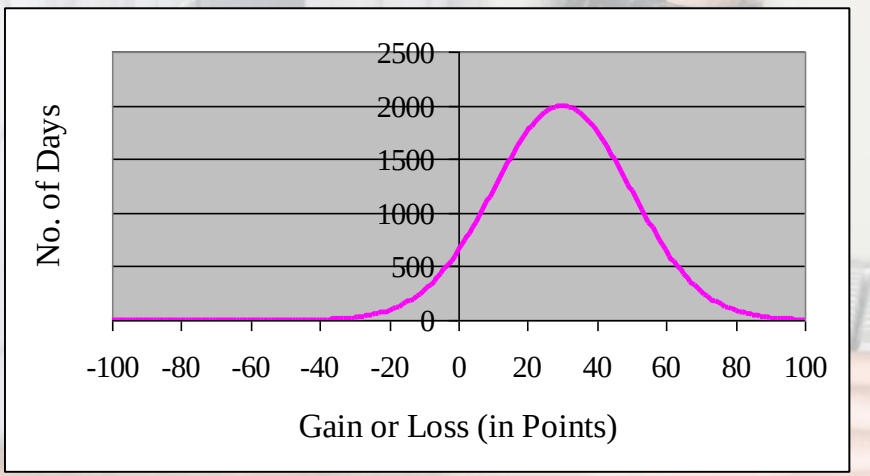




Description Vs. Experience

Description

Here is the distribution of the results when implementing the recommendation:

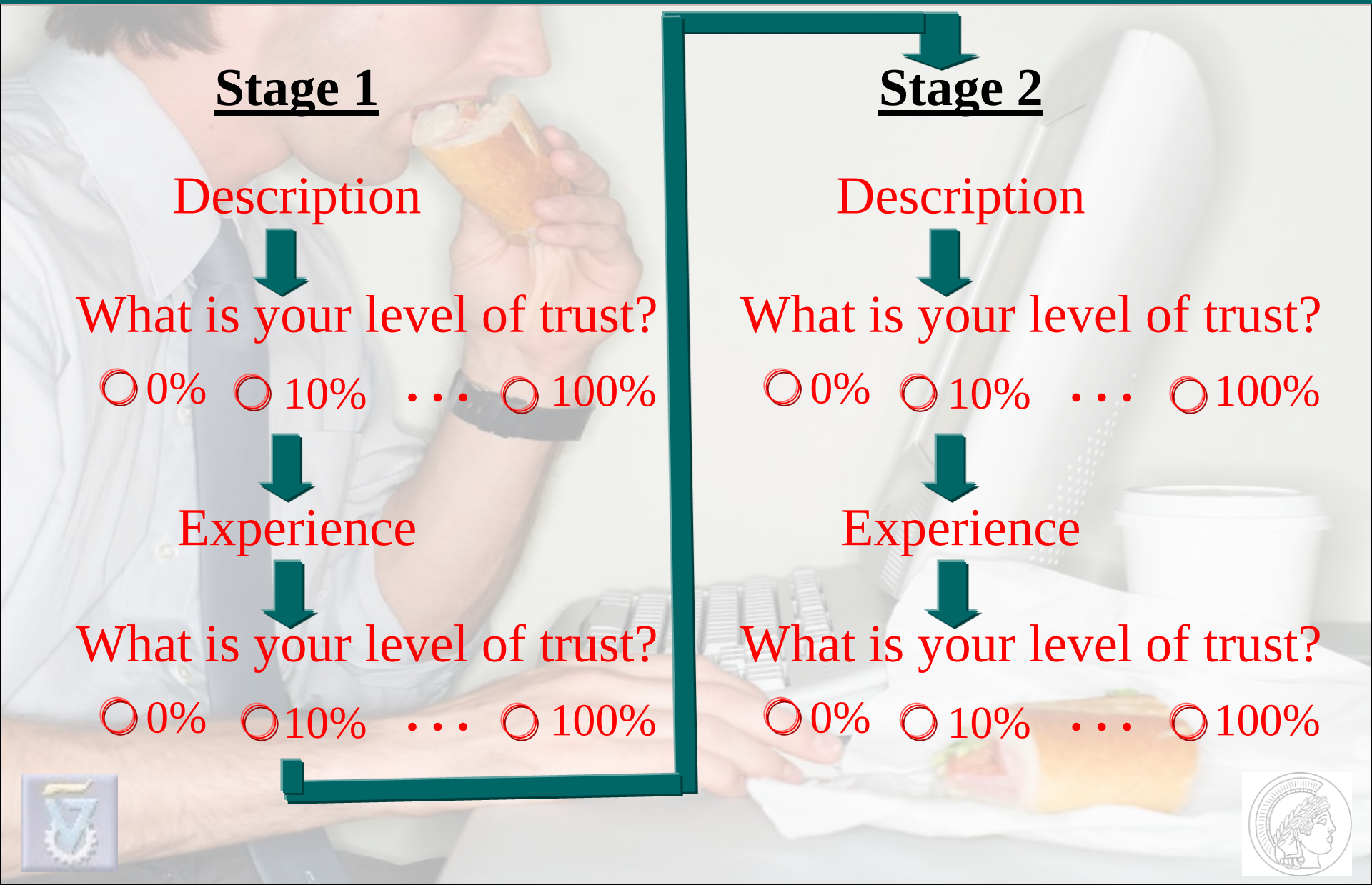


Experience (50 simulations)

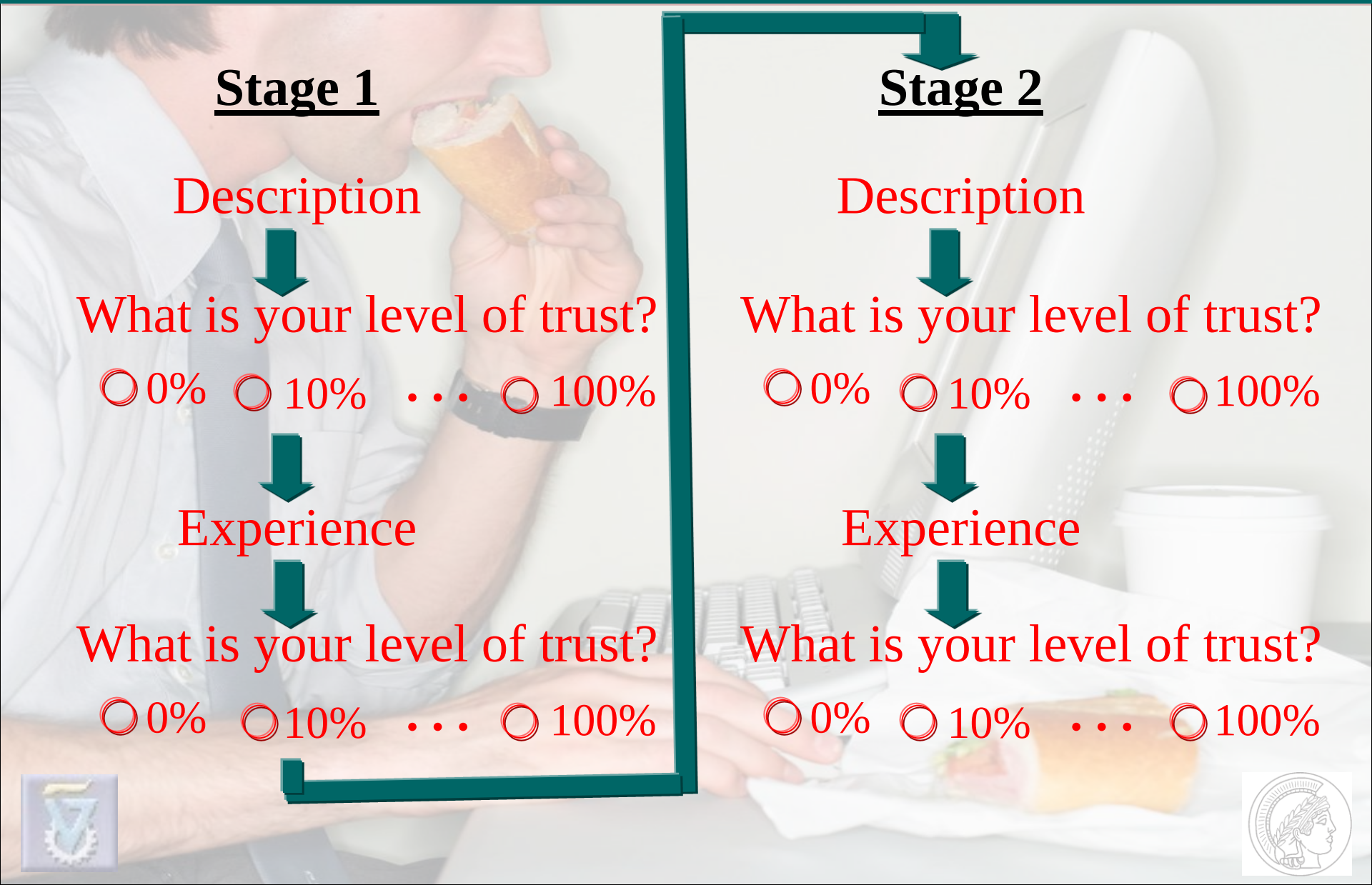
The 3rd simulation results are:
You lost 5 points

CONTINUE

Experimental Task



Only Experience



Stage 1

Description

What is your level of trust?

0% 10% . . . 100%

Experience

What is your level of trust?

0% 10% . . . 100%

Stage 2

Description

What is your level of trust?

0% 10% . . . 100%

Experience

What is your level of trust?

0% 10% . . . 100%

Homogeneous Experience

	Stage 1	**Stage 2**
1st Group	Recommendation EV **30**	Recommendation EV **30**
2nd Group	Recommendation EV **10**	Recommendation EV **10**

Heterogeneous Experience

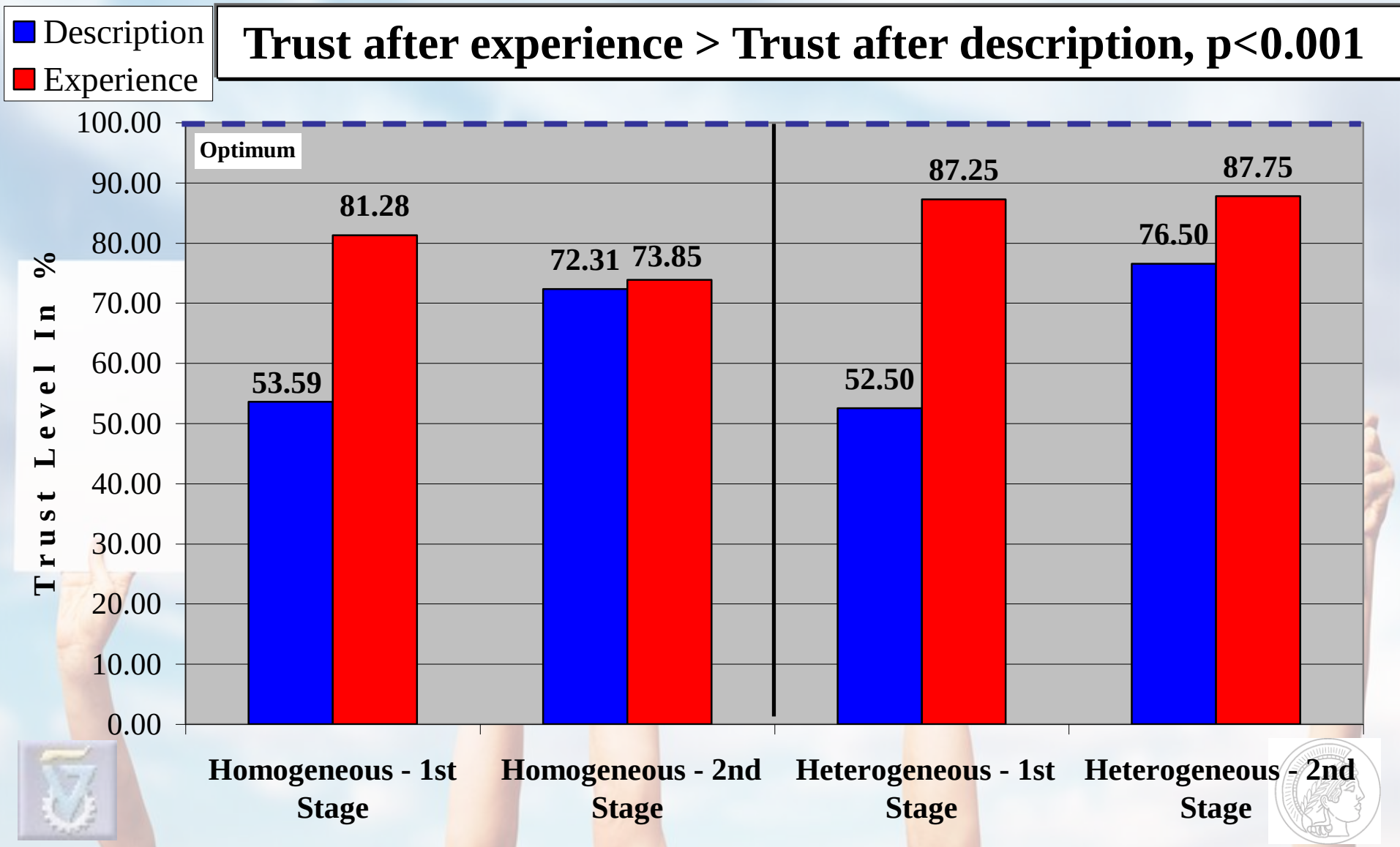
	Stage 1	**Stage 2**
1st Group	Recommendation EV **30**	Recommendation EV **10**
2nd Group	Recommendation EV **10**	Recommendation EV **30**

2*2 Design

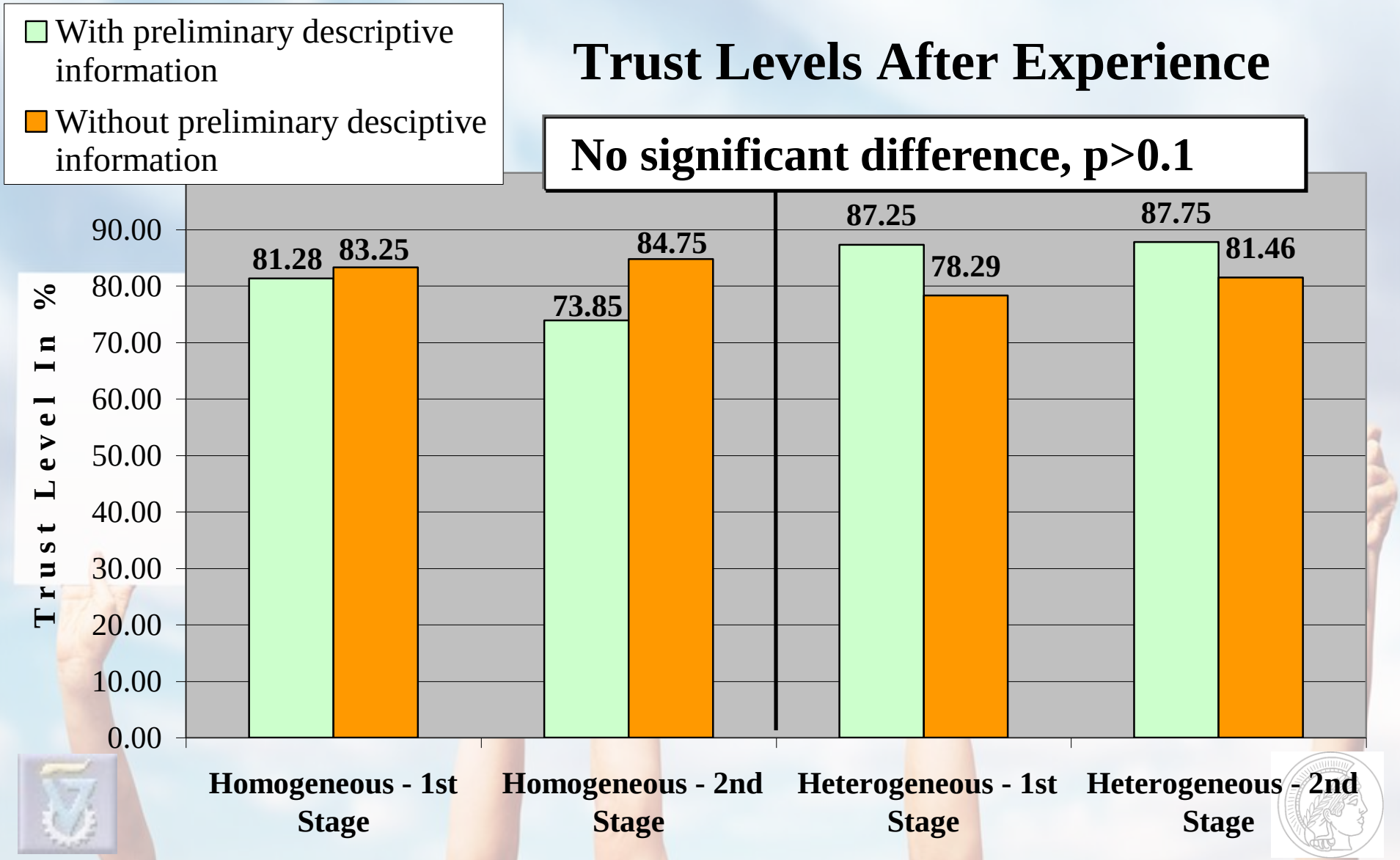
	Description + Experience	Only Experience
Homogeneous Experience	2 groups	2 groups
Heterogeneous Experience	2 groups	2 groups

RESULTS

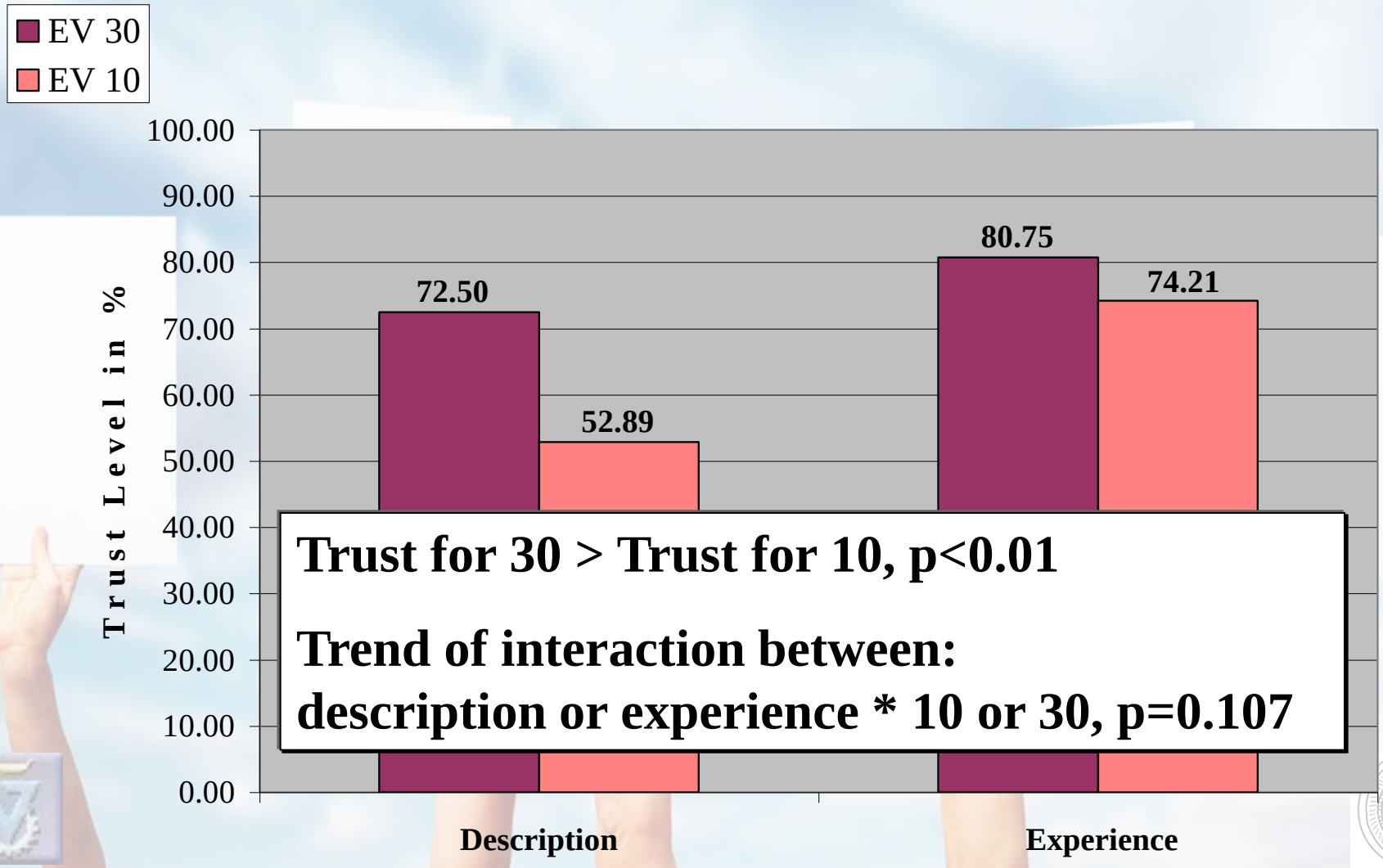
Results: Description Vs. Experience



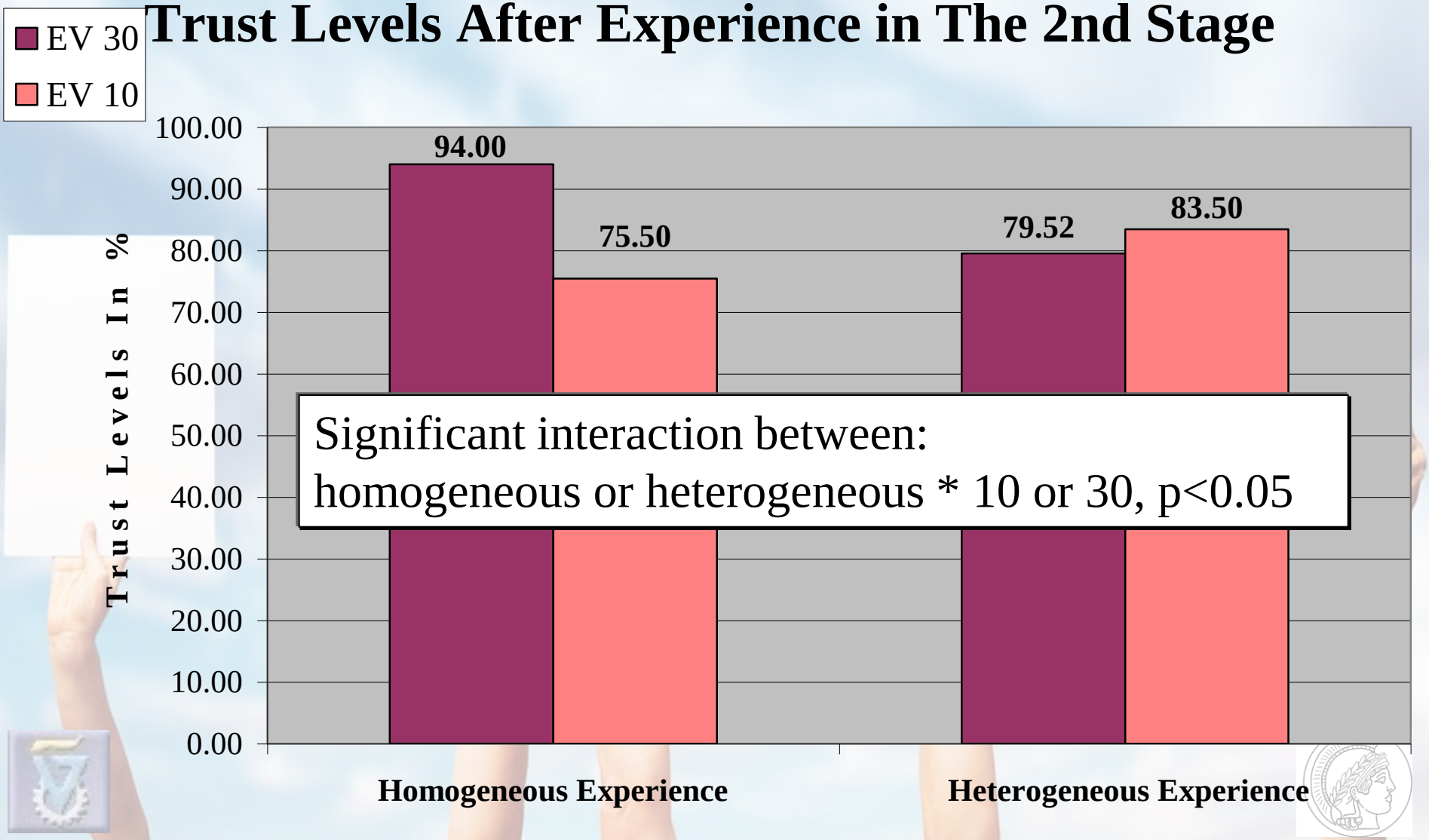
Results: The Added Value of Descriptive Information



Results: Sensitivity to System's Expected Value - Description Vs. Experience, Homogeneous Experience



Results: Sensitivity to System's Expected Value - Homogeneous Vs. Heterogeneous Experience



DISCUSSION

Conclusions

- Experience with the simulation increased trust as compared to descriptive information (Kahneman & Tversky, 1994; Barron & Erev, 2003; Hertwig et al., 2004)
- The power of experience: adding descriptive information before experience had no effect on trust levels
- Experience, and especially heterogeneous, encourage generalization of trust level over similar systems

Design Implications

ATTENTION: should be applied only to normally distributed, positive expected value systems

- Simulation are efficient and inexpensive way to increase trust in long-term decision support system
- In the presence of simulation, additional descriptive information has no effect
- Exposure to heterogeneous experience is important in order to achieve generalization over similar systems

Thanks!

niritg@tx.technion.ac.il