

Intelligent Support of e-Learning Groups

How to prompt the benefits of group conflict without the costs

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FOCUS & BASICS

Common problems of large online courses (e.g. MOOCs):

- High dropout-rates
- Low levels of participation &
- Low levels of course satisfaction (Erdmann et al., 2017)

Small-group cooperation (3-5 persons) within large courses:

- Potential solution to low motivation & low understanding?
- Requires participation & depends on group development processes (Walther & Bunz, 2005)
- Is related to higher course satisfaction (Bernard et al., 2009)
- Interaction process more important than outcomes (Vuopala, Hyvönen, & Järvelä, 2016)

Supervision & support by tutors needed, but unaffordable for high amount of groups:



Media equation theory (Reeves & Nass, 1996): interactions with computers and media = real life interactions • people treat computers similar to humans, e.g. avoid to deliver directly negative feedback

-> Differences and limitations: more likely abused robots instead of humans (Bartneck, Rosalia, Menges, & Deckers, 2005); virtual humans increased willingness to disclose confidential information (Lucas, Gratch, King, & Morency, 2014)

'Nudging' or 'prompting' other group members to do their share of the work: challenging for interpersonal relationships(Wang et al., 2013, Strauß, Rummel, Stoyanova, & Krämer, 2018) - more beneficial given by a system? How?

STUDY

1| Please don't shoot the messenger!
Prompts in online learning groups – Influences of nudging messages' sender and publicness on recipients' perception and attribution

2| Face it!
The influence of personification of a prompting system on users' behavior & satisfaction in online learning groups

3| Carrot-and-stick procedure without carrots
Vicarious punishment prompts & system transparency in e-learning groups

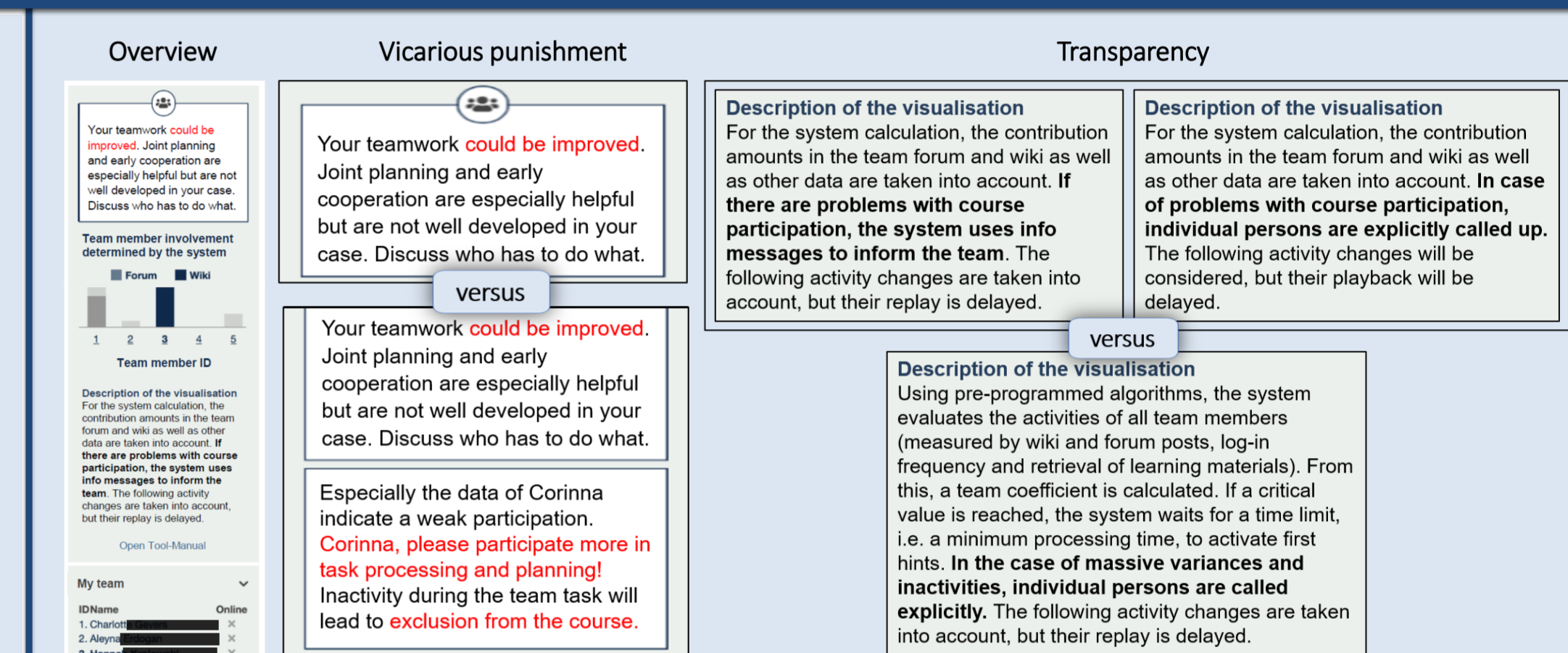
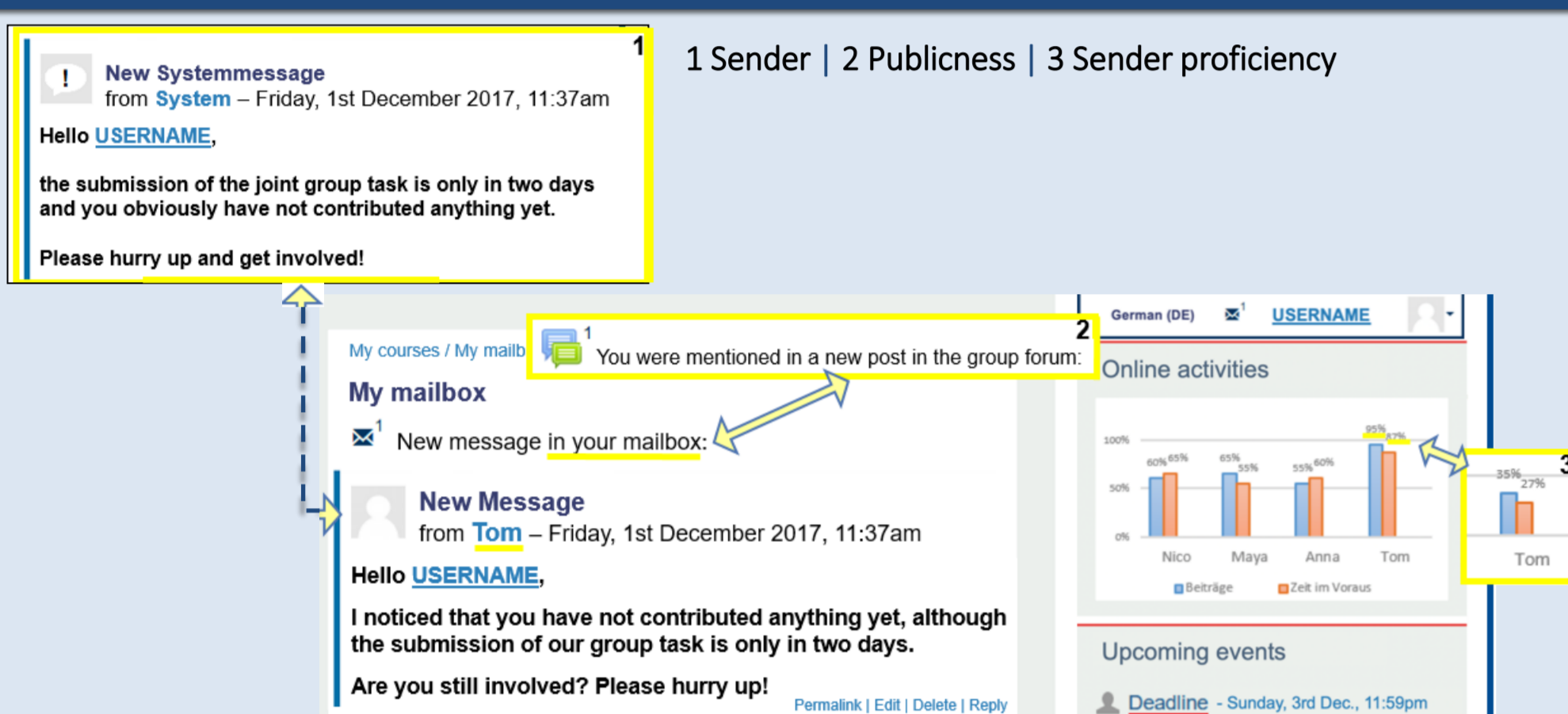
THEORY

Personal remarks in CMC hinder the success of groups' decision making process (Walther, 1996)
Reciprocal dis-liking: even justified criticism can generate conflict (Ilgen, Mischell, & Frederickson, 1981)
Co-Regulation of learning (CoRL) defined mutual but not on-sided (Vuopala, Hyvönen, & Järvelä, 2016)
Task conflict often results in a relationship conflict (e.g. Janssen, Van de Vliert, & Veenstra, 1999) as well as Negative Feedback can be detrimental in Groups (e.g. Shute, 2008)

1| Referencing results from Study 1 (Stoyanova & Krämer, 2019)
Personification – image vs. no image, but a name (Baylor & Ryu, 2003); Pedagogical agents mostly animated, contradicting results (Heidig & Clarebout, 2011)
Satisfaction with group work barely targeted
• mainly learning outcomes or exclusive design (e.g. Baylor & Kim, 2004)
• barely field settings with real groups (e.g. Kulik & Fletcher, 2016)
• long term effects not explored yet

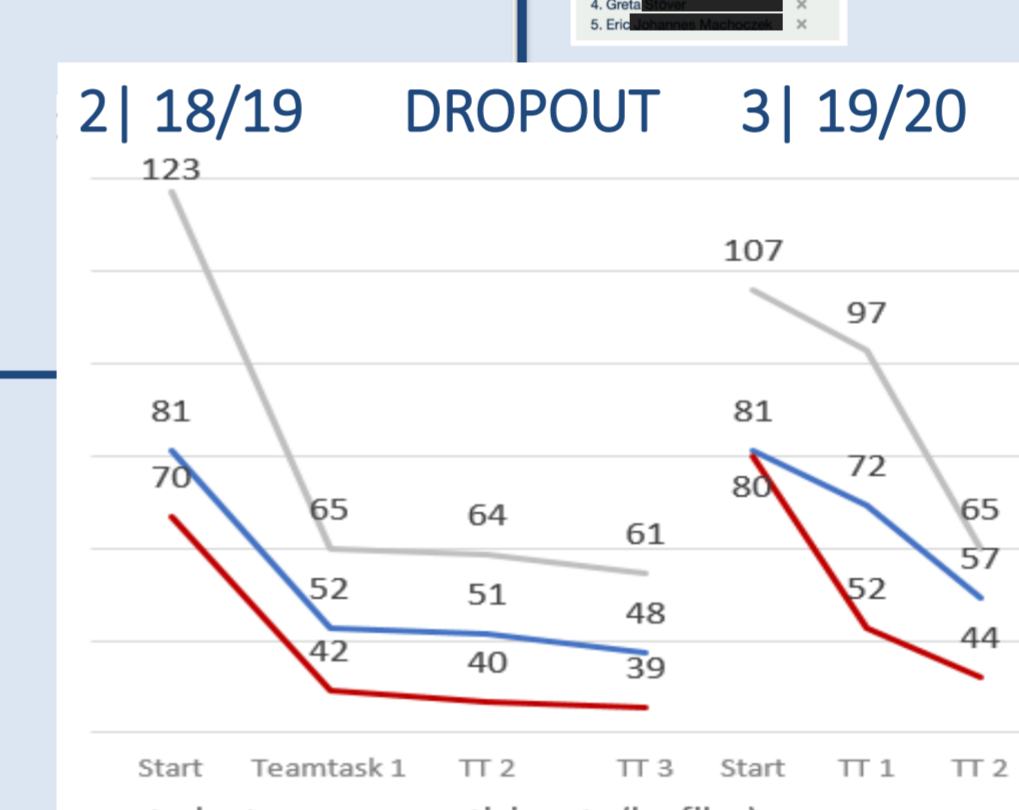
1&2| Referencing results from Study 1 and 2
Vicarious punishment: demonstration of negative consequences for inactivity = more activity by remaining teammates (offline, Malouff et al, 2009)
Transparency as knowledge about system's functionality:
• increased confidence & liking (recommender systems, Sinha & Swearingen, 2002)
• not for financial advisory (Nussbaumer & Matter, 2011)
Human Robot Interaction
• less blaming others if transparent robot acts (grading system, Kim & Hinds, 2006)
• transparency balance: neither too little, nor too much(interface, Kizilcec 2016)

METHOD



EXPERIMENTAL DESIGN| between-subjects, online study
• 2x source - prompt sender, group member vs. system (1)
• 2x publicness level, private vs. group forum message (2)
• (2x senders' past proficiency, high vs. low engaged) (3)

factorial between-subjects + pretest
• personification (appearance & name) vs. none
Tam A & B collapsed for generalizability (no significant differences)
N = 70 (f 65.7%), M_{age} = 23.17, SD = 4.62, n = 24
bachelor & master students
M_{enjoy} = 3.03¹⁻⁵, SD = .95
M_{offline} = 11.43, SD = 11.24, M_{online} = .51, SD = 1.20
positive experiences M = 68.83⁰⁻¹⁰⁰, SD = 26.43



2(x2) between-subjects + pretest
• 2x vicarious punishment vs. none
• (2x transparency in vicarious punishment) teams: 4 teammates + confederate
N = 80 (f 63.7%), M_{age} = 23.47, SD = 3.11, n = 24
bachelor & master students
M_{enjoy} = 3.22¹⁻⁵, SD = .60
neutral experiences M = 48.91⁰⁻¹⁰⁰, SD = 24.20

SAMPLE| N = 352 (f 66.8%), M_{age} = 29.40, SD = 10.46, n = 55-67
education students 64.8%, uni entrance degree 40.9%, higher 46%
partly enjoy teamwork M_{enjoy} = 2.95¹⁻⁵, SD = 1.04
already experienced it offline M = 34.24⁰⁻¹⁰⁰, SD = 11.08
but less online M = 1.29⁰⁻¹⁰⁰, SD = 5.92, 70.7% none

SETTING| imaginary small group, nudges for own inactivity
Field experiment in an online learning course, combining long term survey after group tasks and behavioral data during tasks

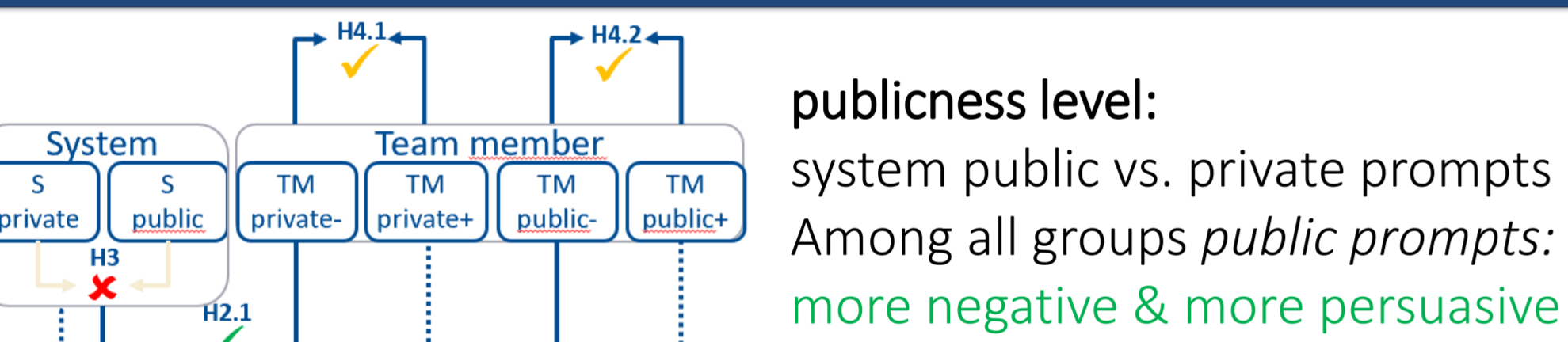
MATERIAL| Vignettes based on online learning environment Moodle

System upgrades of an intelligent group awareness tool in Moodle with prompts regarding contribution's equality in the team

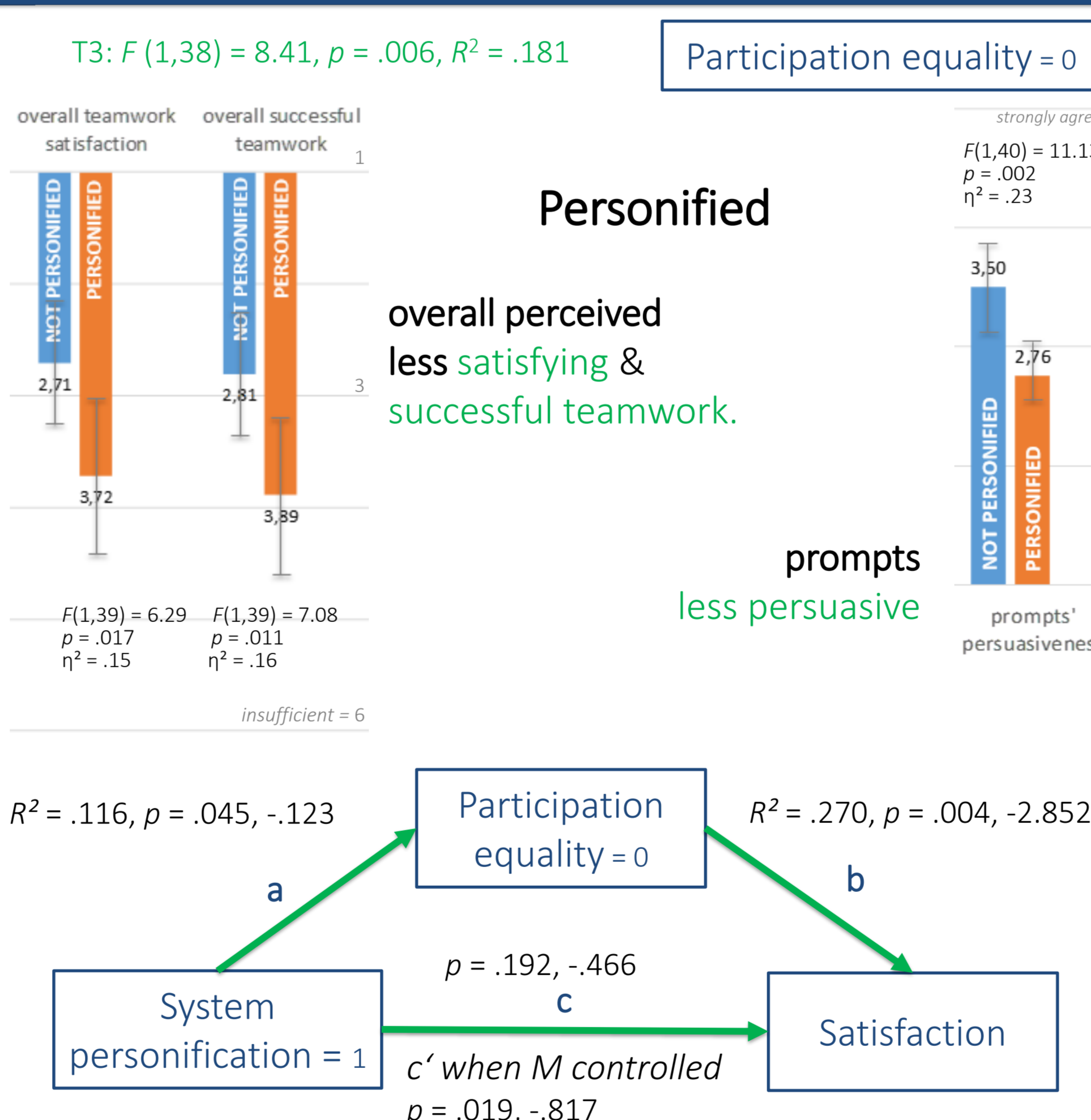
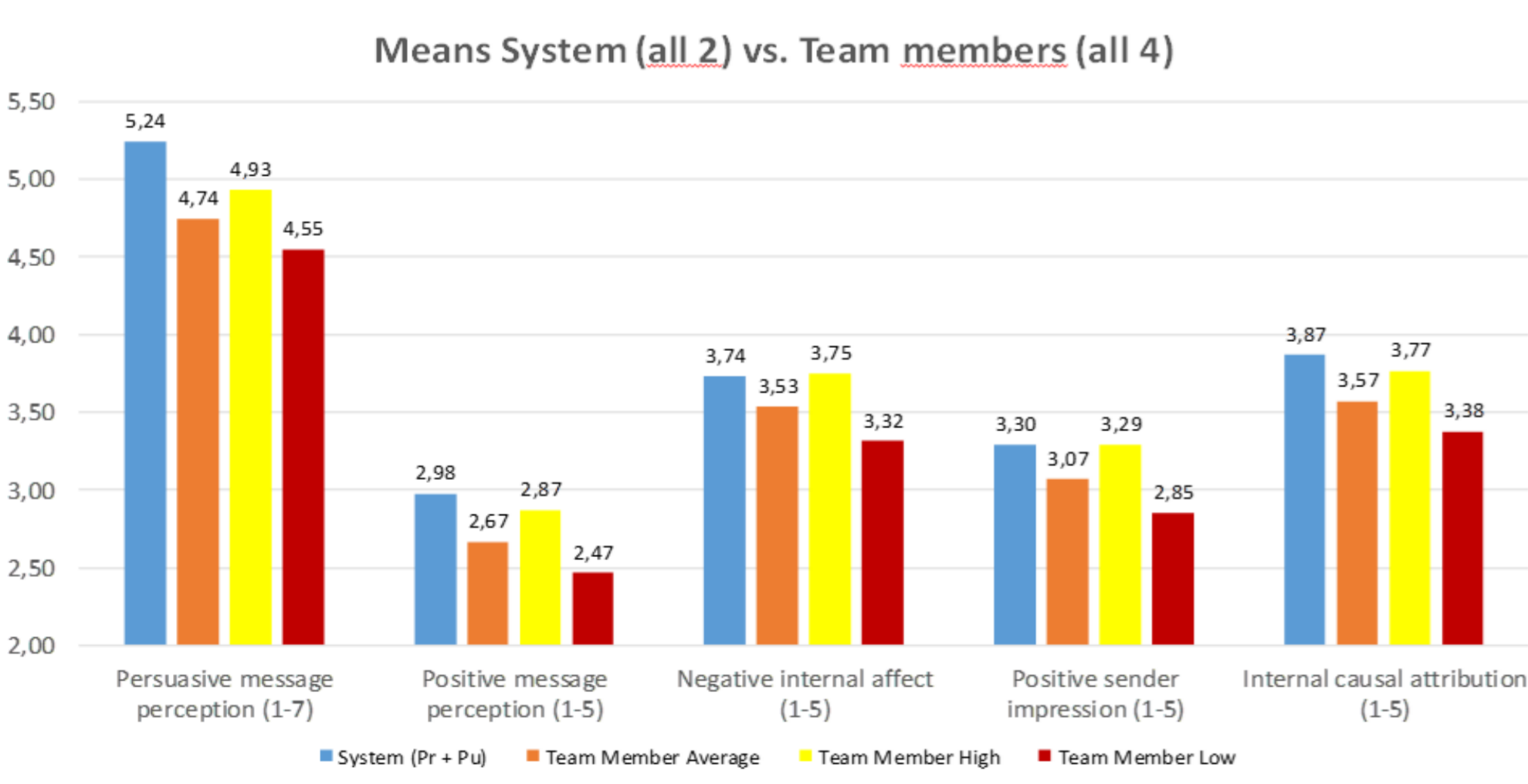
MEASURES| emotional affect, prompt perception, sender impression, causal attribution

subjective user perception of the system, the prompts, satisfaction with group work, group awareness, in-group conflict, inactive members
objective user behavior (login frequency, contribution quantity, equality of participation)

RESULTS

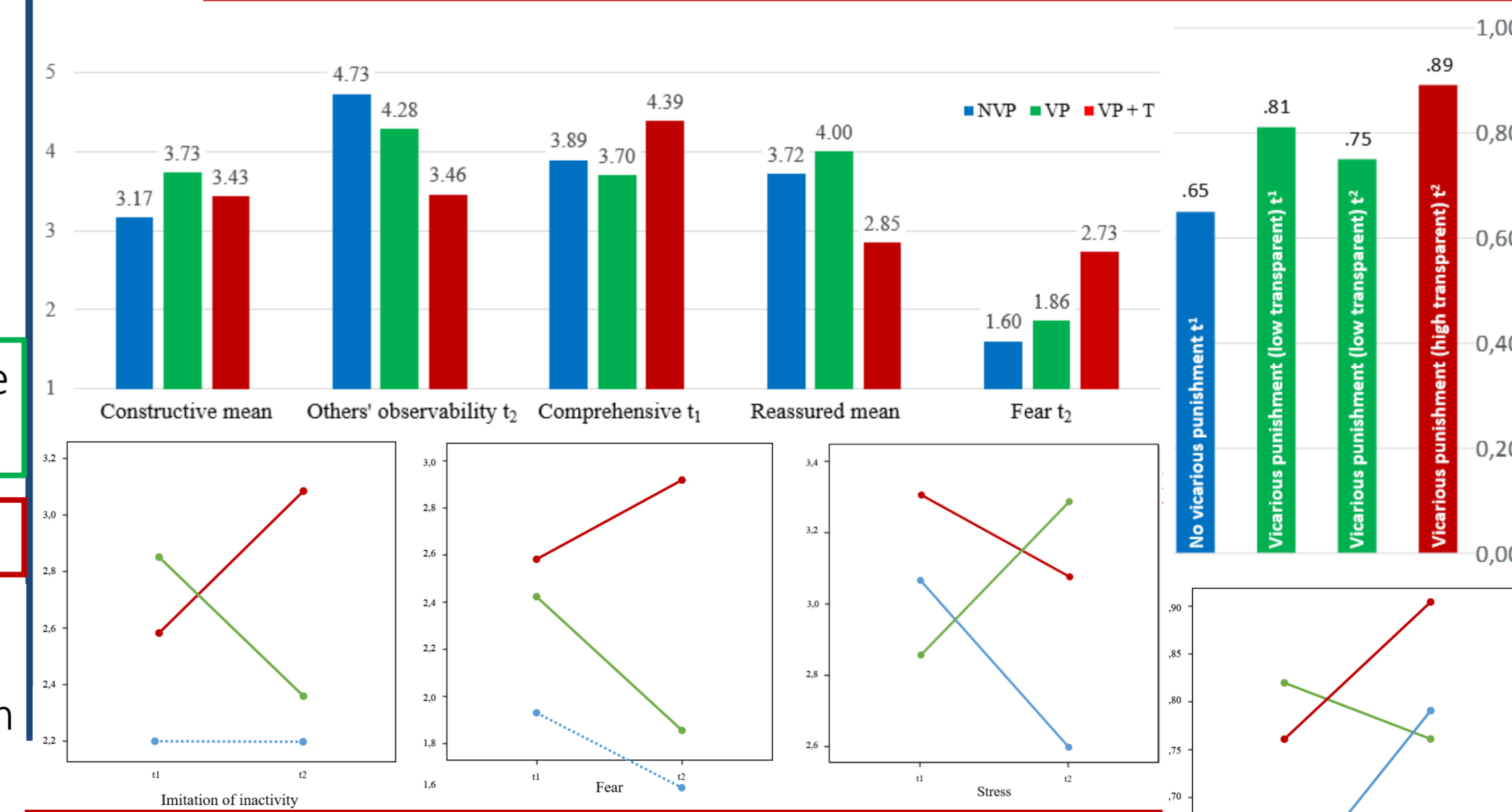


publicness level:
system public vs. private prompts
Among all groups public prompts:
more negative & more persuasive



Subjective user perception: group awareness others' contribution less observable, F(1,27) = 5.03, p = .033, η² = .16
prompts more constructive, F(1,36) = 5.25, p = .028, η² = .13
Objective user behavior: less participation equality (T1), F(1,46) = 22.69, p < .001, η² = .33; M = .645 vs. .807 with vic. punishment

Subjective user perception: more afraid to get criticized too by the system, F(1,26) = 7.11, p = .013, η² = .22, action against inactive members less reassuring F(1,33) = 7.51, p = .01, η² = .19
prompts more comprehensive & noticed less frequently, F(1,31) = 7.49, p = .01, η² = .20; group awareness - others' contribution less observable F(1,26) = 5.08, p = .033, η² = .16
Objective user behavior: less participation equality (T2), F(1,37) = 15.21, p < .001, η² = .29; M = .747 vs. .898 with transparency



DISCUSSION & CONCLUSION

- Main implication: identification of the influencing factors of nudging in online learning groups & the potentials of automated support to release group members of negative consequences.

- Media equation theory & social agency/cue theory re-examined: both partly supported, since the equal perception of interactions with technology & humans as well as the role of additional social cues revealed mixed results depending on humans' past proficiency, respectively on the category of social cues & further factors.

- Main methodological advantage: combination of objective behavioral data and subjective survey-based assessments within real online-courses which were collected repeatedly across several group tasks.

- Related to this advantage, unavoidable field setting difficulties occurred - rather small and varying sample size in two of three empirical studies.

- Future research to consider MOOCs with more participants to extend the knowledge on automated prompting systems and the role of further social cues categories.

Compared to humans, a nudging system improved prompting. Beneficial: public prompts, abstract appearance, not too transparent function or severe communication.

References

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