What's really in a Name?

An Assessment of Feedback Mechanisms

Stefan Wehrli*, Dominik Hangartner†, Martin Abraham†

* ETH Zürich - Professur für Soziologie
† Universität Bern - Institut für Soziologie
Contact: wehrli@soz.gess.ethz.ch

Rational Choice Sociology, Venice International University

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

u b
b
UNIVERSITÄT
BERN

Outline

I. Research Question

How does the formation of reputation work in an online reputation system? What are its effects?

II. Theoretical Analysis

Game theoretic analysis of the trust game and rating game.

III. Experimental Design

Compare 4 regimes: none, one-sided, mutual sequential and simultaneous.

IV. Empirical Results & Conclusion

Experimental evidence for different levels of placing trust, honoring trust, and submitting feedback.

Research Question

Is the observed behavior on auction platforms like eBay reproducible in the experimental lab? What can we learn from such experiments?

- Does a reputation system help to overcome trust problems in electronic markets? Do we find "reputation effects"? (Replication of BKO 2004).
- Do different feedback regimes produce different levels of trust?
- Will negative feedback be oppressed due to retaliation power in regimes with mutual feedback? (Reporting Bias)

Normally we assume, the more information in a system, the better! And that it doesn't matter where the information comes from (BKO Information-Hypothesis).

- Do higher information levels – i.e. more feedbacks – lead to higher trust levels? Does it matter how information is generated?

Review of recent findings

- Repeated Games (Folk Theorem, Shadow of the Future)
- Image Scoring Games (Nowak & Sigmund 1998)
- Altruistic Punishment (Fehr & Gächter 2002)
- Effectiveness of reputation systems (Bolton, Katok & Ockenfels 2004)

$\Rightarrow$ Online reputation systems as rewarding and sanctioning institutions against deviant behavior.

Figure 3 **Trust Measured as the Percentage of Buying per Round**

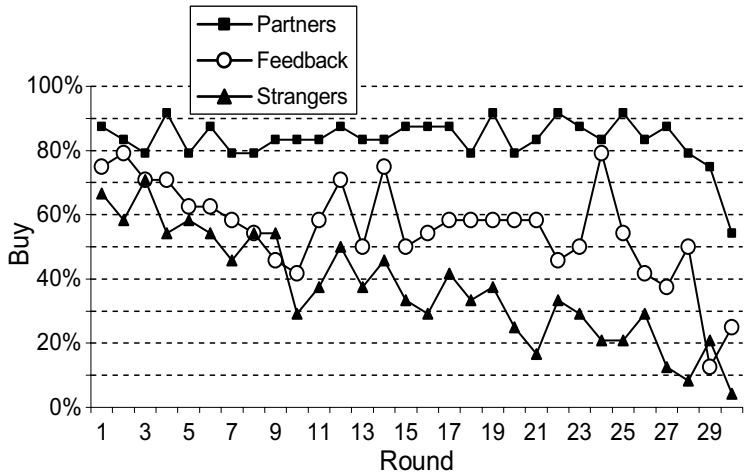
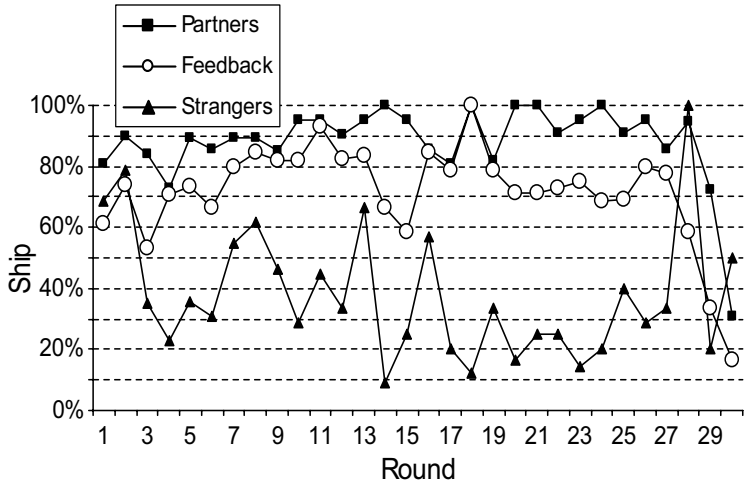


Figure 4 **Trustworthiness Measured as Percentage of Shipping per Round**



Source: BKO 2004

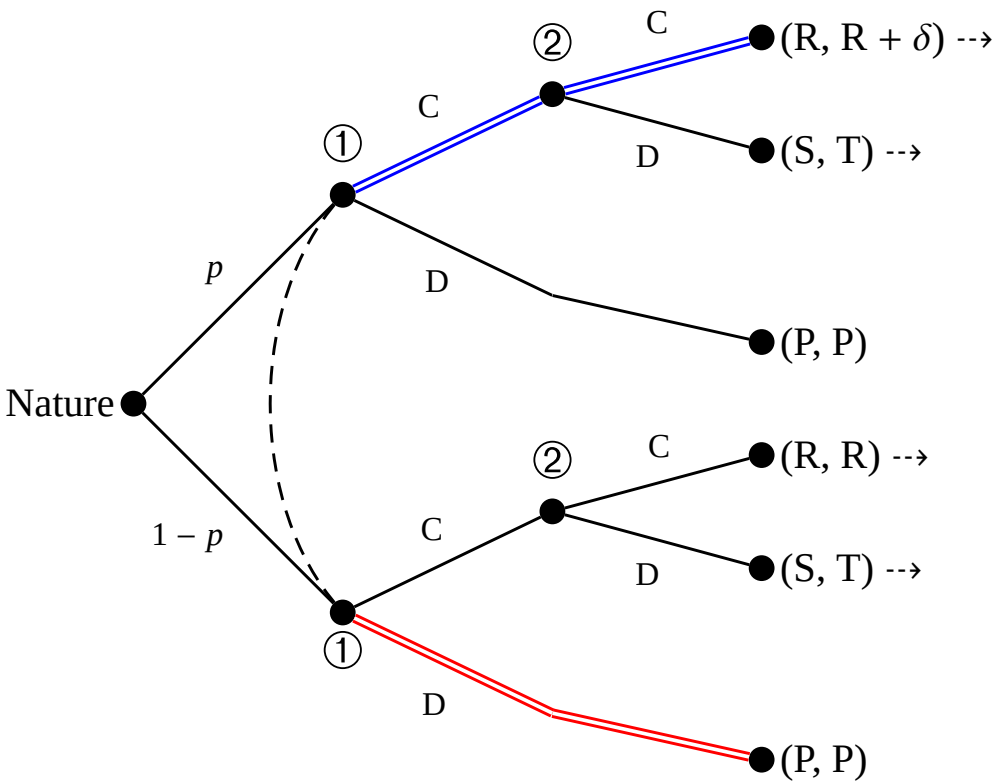
Theory: The Binary Trust Game

Interaction between strangers are modeled as a binary trust game, where the buyer (①) doesn't know if he faces a trustworthy seller (②).

Stage Payoffs

① / ②	Ship(C)	¬ Ship (D)
Buy (C)	20, 20	-10, 40
¬ Buy (D)	0, 0	0,0

Standard Game Theory (SGT) predicts (D,D), experimental evidence often reveals a substantial amount of (C,C)-Choices.



Binary Trust Game with Incomplete Information

and $T > R > P > S, \delta > 0, 0 > p > 1$

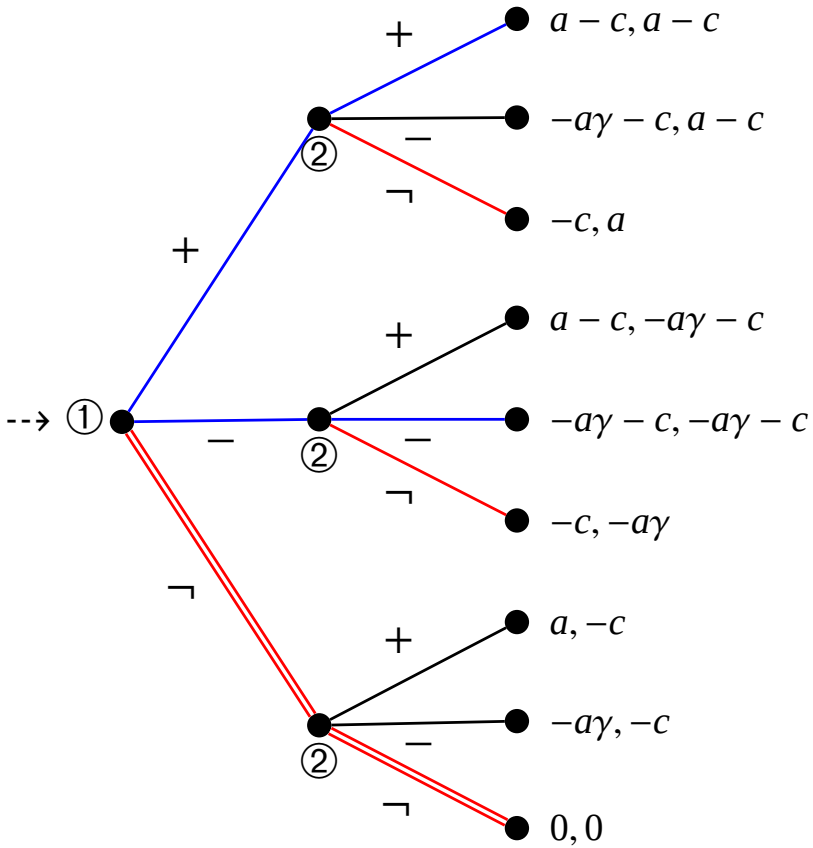
Cp. Approach with Investment Game: Keser (2002), Mascalet and Penard (2006)

Theory: The "Rating Game"

Players can decide to submit positive, negative or no feedback. SGT predicts (¬,¬), i.e. no feedback at all. Behavioral Game Theory (BGT) suggests effects of *strong reciprocity*, i.e. $(+,+)$ and $(-,-)$.

Assumptions:
a: Payoff from an extra feedback
c: Cost of a feedback
γ: Loss aversion parameter
$a_S = a_B$: Seller and buyer gain/lose same utility of an additional feedback.

Information Set:
– sequential or
– simultaneous



Symmetric Sequential Rating Game

with $a > c > 0, \gamma \geq 1, a_S \geq a_B$

Experimental Design

Game: Participants play binary trust games with and without a feedback mechanisms over 30 Stages.

Treatments: 4 different feedback regimes
- stranger: no feedback mechanism
- asymmetric: only the buyer can post feedback
- symmetric-sequential: feedback are revealed during play
- symmetric-simultaneous: revealed at end of stage

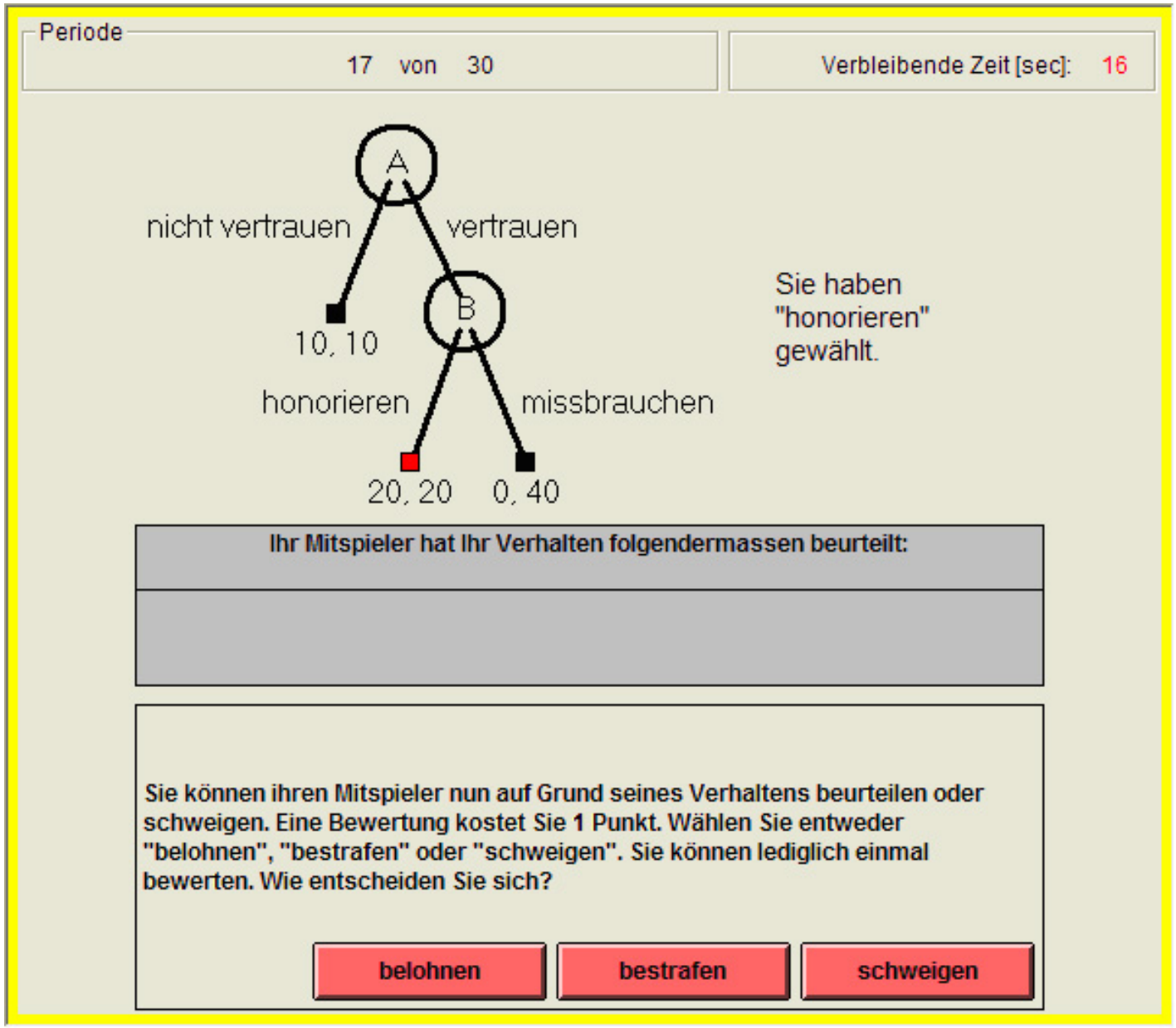
Participants: 208 Students from University of Berne, playing in 13 sessions with 16 participants.

Topology: Players are matched with new opponent at every stage (minimal iteration, maximal anonymity.).

Roles: Players change role by turns (switch seller and buyer role).

Payoffs: Initial Endowment: 500 Points (10 CHF)
Exchange Rate: 1:50, average payoffs of CHF 18.
Stage Payoffs: T=40, R=20, P=0, S=-10;
Feedbacks Cost: 1 Point

zTree Screen



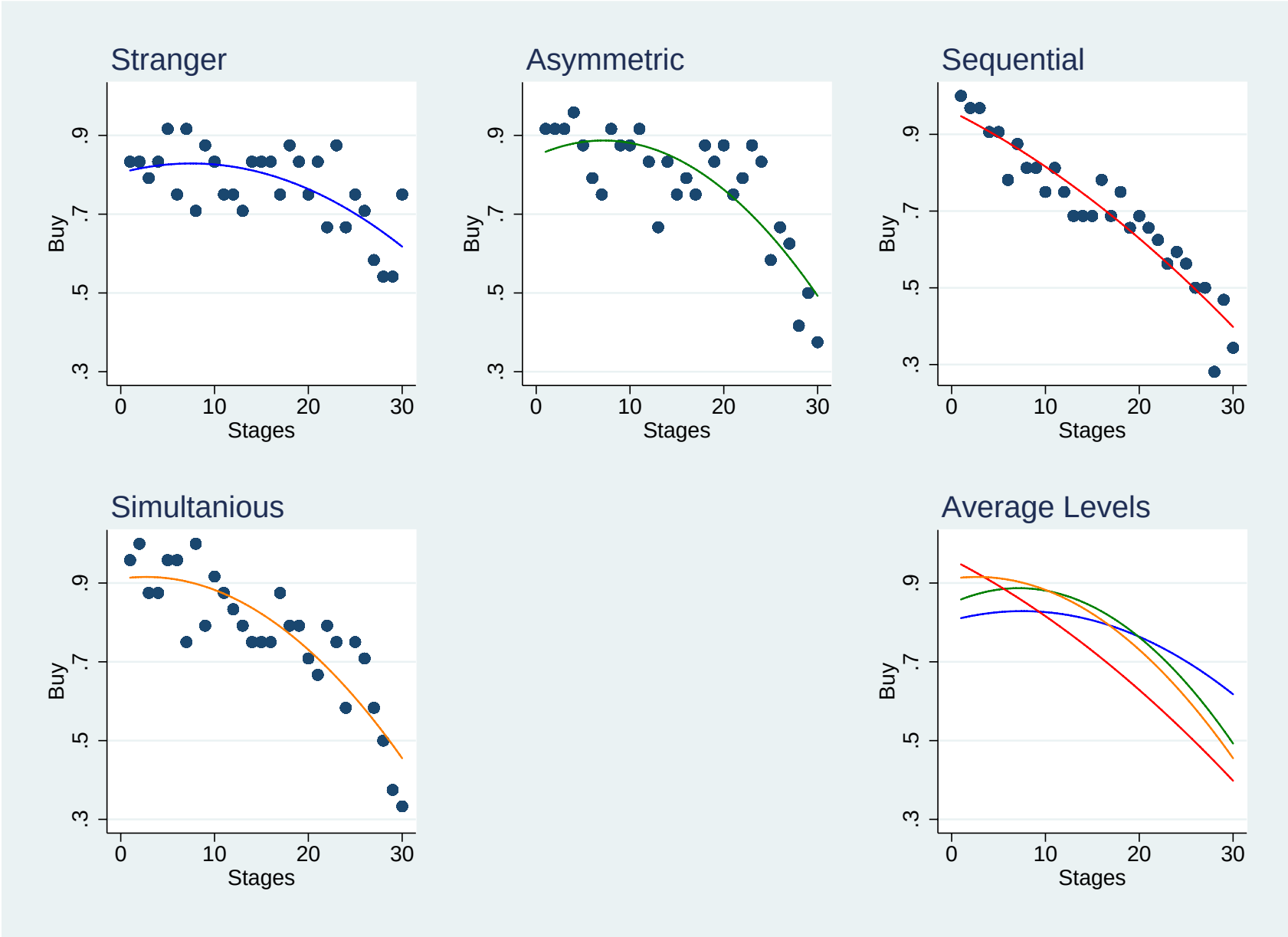
Descriptives

Proportion Buying, Shipping and Submitting Feedback

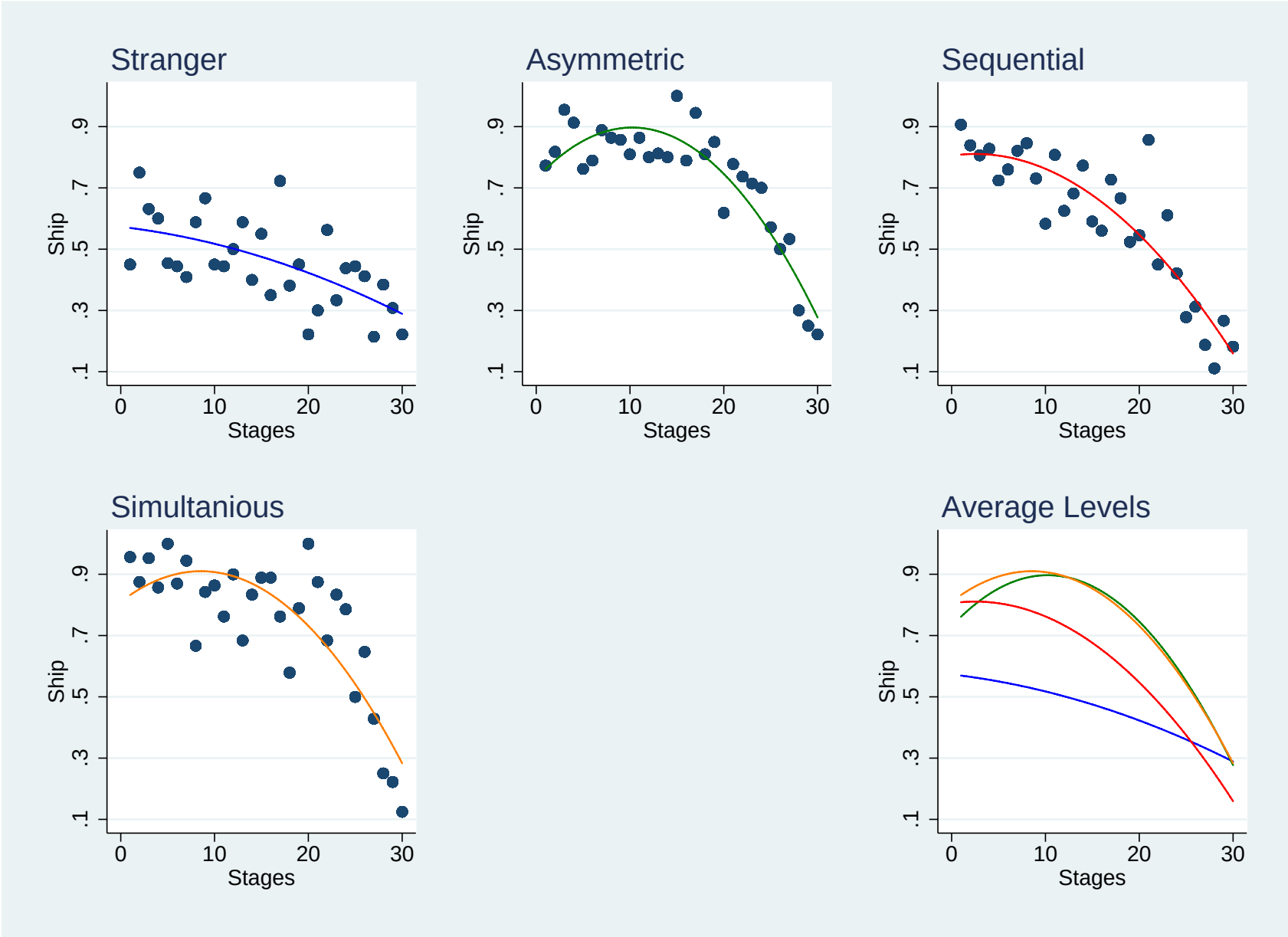
	Treatments			
	Stranger	Asymmetric	Sequential	Simultaneous
Sessions	3	3	4	3
Participants	48	48	64	48
Interactions	720	720	960	720
Buying	77.1%	77.8%	70.2%	76.8%
	555	560	674	553
Shipping	46.0%	76.4%	65.0%	77.8%
	255	428	438	430
Buyer Feedback	–	60.4%	74.3%	60.8%
		338	501	336
Seller Feedback	–	–	61.6%	31.1%
			415	172

Example: In the asymmetric treatment, 48 participants play in 720 interactions (48*30 stages / 2). The trust level, i.e. proportion buying, equals to 77.8% (560/720). The level of trustworthiness, i.e. shipping is about the same size at 76.4% (428/560). In 60.4% of the cases where trust was placed, the buyer submits positive or negative feedback (338/560).

Placing Trust: Does the first mover buy?



Honoring Trust: Does the second mover ship?



Testing Differences in Trust Levels

Placing Trust

Stranger vs. Asymmetric:
$\Delta = 0.007, p = 0.753$

Stranger vs. Sequential:
$\Delta = 0.069, p = 0.002^{**}$ (‡)

Stranger vs. Simultaneous:
$\Delta = -0.002, p = 0.900$

Asymmetric vs. Sequential:
$\Delta = 0.076, p = 0.001^{***}$

Asymmetric vs. Simultaneous:
$\Delta = -0.009, p = 0.659$

Sequential vs. Simultaneous:
$\Delta = 0.066, p = 0.003^{**}$ (‡)

Honoring Trust

Stranger vs. Asymmetric:
$\Delta = -0.305, p < 0.001^{***}$

Stranger vs. Sequential:
$\Delta = -0.190, p < 0.001^{***}$

Stranger vs. Simultaneous:
$\Delta = -0.318, p < 0.001^{***}$

Asymmetric vs. Sequential:
$\Delta = 0.114, p < 0.001^{***}$

Asymmetric vs. Simultaneous:
$\Delta = -0.013, p = 0.598$

Sequential vs. Simultaneous:
$\Delta = -0.128, p < 0.001^{***}$

Tests for the equality of proportions. $H_0 : \Delta = 0, H_a : |\Delta| <> 0$. ‡ Not significant on OLS with clustering. Results indicate only moderate differences in placing trust (buying), but substantial differences in honoring trust (shipping).

Comparing Treatments

	Place Trust (Buy)		Honor Trust (Ship)	
Asymmetric	0.443*	0.233	0.700**	0.664*
	(2.276)	(0.911)	(3.076)	(2.374)
Simultaneous	0.382+	0.072	0.752**	0.655**
	(1.929)	(0.308)	(3.145)	(2.581)
Stages	-0.094***	-0.074***	-0.091***	-0.079***
	(-13.748)	(-5.382)	(-10.305)	(-4.870)
Pos. Reputation		0.191***		0.108***
		(5.882)		(3.645)
Neg. Reputation		-0.362***		-0.225***
		(-6.001)		(-3.731)
McFadden R^2	0.100	0.208	0.101	0.139
N	2400	2400	1787	1787
Clusters	160	160	160	160

Maximum likelihood estimates of the probabilities of buying and shipping (Logistic Regressions). Absolute z-statistics in parentheses (adjusted for clustering), significant at $\alpha = 0.05(*), \alpha = 0.01(**), \alpha = 0.001(***)$. Sequential Treatment as reference category, constant omitted.

Reputation Effects

Reputation Effects on the Decision to Buy and Ship

	Place Trust (Buy)			Honor Trust (Ship)		
	Asym	Seq	Sim	Asym	Seq	Sim
Stages	-0.043*	-0.122***	-0.051*	-0.057*	-0.109***	-0.086**
	(-2.012)	(-5.293)	(-2.003)	(-2.187)	(-3.416)	(-3.257)
Pos. Rep.	0.398***	0.204***	0.169*	0.189*	0.116**	0.158**
	(3.839)	(5.360)	(2.426)	(2.373)	(2.700)	(2.710)
Neg. Rep.	-0.793***	-0.179*	-0.488***	-0.455***	-0.120	-0.243**
	(-6.071)	(-2.374)	(-5.533)	(-3.800)	(-1.378)	(-2.647)
Constant	2.396***	2.517***	2.474***	2.280***	1.943***	2.431***
McFadden R^2	0.227	0.225	0.216	0.120	0.136	0.138
N (Clusters)	720 (48)	960 (64)	720 (48)	560 (48)	674 (64)	553 (48)

Note: Maximum likelihood estimates of the probabilities of buying and shipping (Logistic Regressions). Absolute z-statistics in parentheses (adjusted for clustering), significant at $\alpha = 0.1(\dagger), \alpha = 0.05(*), \alpha = 0.01(**), \alpha = 0.001(***)$. Polynomials of stage not reported.

Feedback Submissions

1. Asymmetric Treatment

	Pos	Neg	None	Total
Ship	182	46	200	428
	42.5%	10.8%	46.7%	100%
Not Ship	3	107	22	132
	2.2%	81.1%	16.6%	100%
	185	143	222	560

2. Sequential Treatment

	Pos	Neg	None	Total
Ship	247	47	144	438
	56.4%	10.7%	32.9%	100%
Not Ship	8	199	29	236
	3.4%	84.3%	12.3%	100%
	255	246	173	674

3. Simultaneous Treatment

	Pos	Neg	None	Total
Ship	195	32	203	430
	45.4%	7.4%	47.2%	100%
Not Ship	2	107	14	123
	1.6%	87.0%	11.4%	100%
	197	139	217	553

Compare Proportions

	Pos	Neg
Treat 1 vs Treat 2	-0.139**	-0.032
Treat 1 vs Treat 3	-0.029	-0.059
Treat 2 vs Treat 3	0.110*	-0.027

No oppression of negative feedback due to retaliation power! Reciprocity might increases positive feedbacks in the sequential treatment.

Effects on Submission Rates (SEQ / without ship)

	Buyer		Seller	
Partner's ...	Pos	Neg	Pos	Neg
Pos. Feedback	0.616***	-0.654*	1.082***	0.379
	(3.736)	(-2.210)	(6.339)	(1.396)
Neg. Feedback	-1.400*	0.721***	-0.796+	1.738***
	(-1.972)	(3.761)	(-1.943)	(7.904)
Pos. Reputation	0.032	0.014	0.037*	-0.033
	(1.435)	(0.704)	(2.047)	(-1.620)
Neg. Reputation	-0.168***	0.150***	-0.098*	0.044
	(-3.449)	(5.198)	(-2.563)	(1.470)
Pseudo R^2	0.016	0.022	0.030	0.049
N	834(64)	834(64)	991(64)	991(64)
Events	254	246	255	159

Maximum likelihood estimates of the time to feedback (Cox Proportional Hazard Rate Models) incorporating partner feedback as time-varying covariates. Absolute z-statistics in parentheses (adjusted for clustering), significant at $\alpha = 0.05(*), \alpha = 0.01(**), \alpha = 0.001(***)$. Models without shipping variable.

Effects on Submission Rates (SEQ / with ship)

	Buyer		Seller	
Partner's ...	Pos	Neg	Pos	Neg
Shipping	2.521***	-2.235***	1.702***	-1.273***
	(5.789)	(-8.199)	(4.528)	(-4.500)
Pos. Feedback	0.356*	0.066	0.869***	0.792**
	(2.111)	(0.273)	(5.090)	(2.880)
Neg. Feedback	-0.516	-0.004	0.130	1.215***
	(-0.689)	(-0.018)	(0.319)	(5.538)
Pos. Reputation	0.035	0.004	0.043*	-0.048*
	(1.451)	(0.180)	(2.383)	(-2.302)
Neg. Reputation	-0.055	0.009	-0.030	-0.014
	(-1.112)	(0.312)	(-0.715)	(-0.440)
Pseudo R^2	0.049	0.091	0.048	0.067
N	834(64)	834(64)	991(64)	991(64)
Events	254	246	255	159

Maximum likelihood estimates of the time to feedback (Cox Proportional Hazard Rate Models).

Effects on Submission Rates (SIM)

	Buyer		Seller	
Partner's ...	Pos	Neg	Pos	Neg
Shipping	3.039**	-2.714***	0.871	-1.565***
	(3.010)	(-6.895)	(1.454)	(-4.126)
Pos. Reputation	-0.021	0.083*	0.040	0.117*
	(-0.463)	(2.454)	(0.823)	(2.441)
Neg. Reputation	0.030	-0.045	-0.230*	0.086
	(0.396)	(-0.820)	(-1.978)	(1.193)
Pseudo R^2	0.027	0.147	0.019	0.083
N (Clusters)	553 (48)	553 (48)	550 (48)	550 (48)
Events	197	139	91	80

Maximum likelihood estimates of the time to feedback (Cox Proportional Hazard Rate Models).

Conclusions

Place trust Feedback helps surprisingly little to solve the buyer's trust problem. Differences with stranger treatment are very small. The sequential (eBay-like) treatment shows lowest levels of placing trust.

Honor trust Feedbacks give strong incentive for sellers to honor trust. Sequential regime shows poor performance in enforcing trustworthiness, although still better than without any feedbacks.

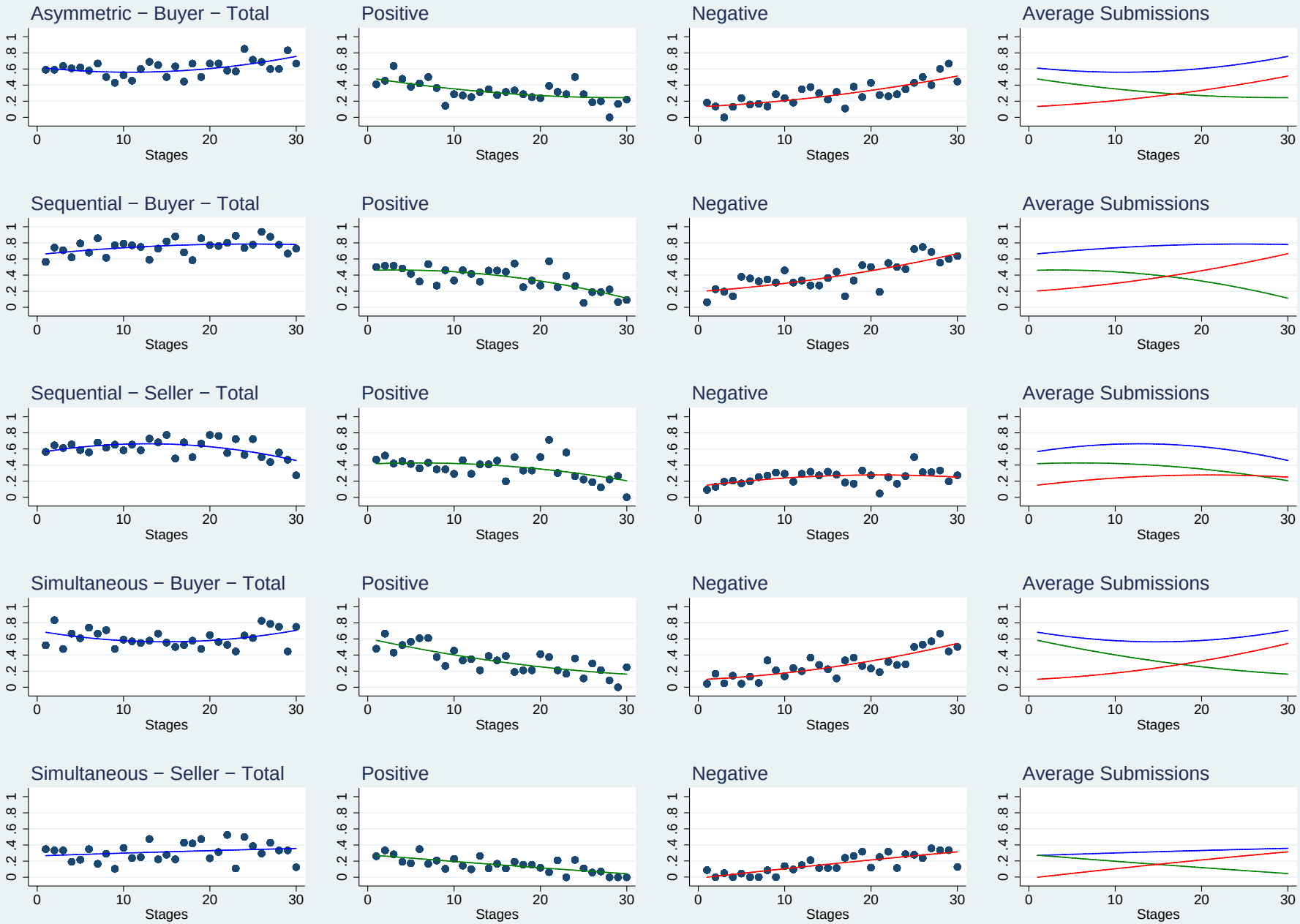
Feedback Submission Sequential treatment shows a higher feedback submission rate, but information seams less credible. Submission behavior looks weekly determined by direct and indirect reciprocity.

Recommendation Replace sequential regime with simultaneous solution where feedbacks are revealed after both partners have rated!

Appendix

References

- Bolton, G.E., E. Katok, and A. Ockenfels (2004): "How Effective Are Electronic Reputation Systems? An Experimental Investigation." *Management Science* 50(11): 1587-1602.
- Fischbacher, U. (forthcoming): "zTree: Zurich Toolbox for Ready-made Economic Experiments". *Experimental Economics*.
- Keser, C. (2002): "Trust and Reputation Building in E-Commerce." Montreal: CIRANO Working Papers.
- Mascalet, D. und T. Pénard (2006): Pourquoi évaluer son partenaire lors d'un transaction à la e-Bay: une approche par l'économie experimentale. Université de Rennes 1: Working Paper.
- Nowak, M.A und K. Siegmund (1998): "Evolution of indirect reciprocity by image scoring." *Nature* 393: 573-577.
- Wehrli, S. (2005): "Alles bestens, gerne wieder." Reputation und Reziprozität in Online-Auktionen. Master's Thesis, University of Berne.


Asymmetric − Buyer − Total
Positive
Negative
Average Submissions
Sequential − Buyer − Total
Positive
Negative
Average Submissions
Sequential − Seller − Total
Positive
Negative
Average Submissions
Simultaneous − Buyer − Total
Positive
Negative
Average Submissions
Simultaneous − Seller − Total
Positive
Negative
Average Submissions
0 .2 .4 .6 .8 1
0 10 20 30
Stages