Does Herd Behavior Arise Easier under Time Pressure?

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Introduction

Goal of this research
- to discover the effect of time pressure on the individual propensity to herd (=mimic others)
- and the form of this effect in relationship to varying levels of time pressure and personal characteristics

Importance
- Revealing the underlying nature of the relationship is important in the explanation of real-life phenomena such as fads, fashion, but also panic in financial markets
- subjects may be more likely to imitate other's behavior under time pressure

Underlying mechanism
- depends on the accepted explanation of herding
- two main approaches (Baddeley, 2007)
  - informational / Bayesian
  - behavioral

a. Informational approach
- herding as a result of a rational use of additional information extracted from the spotted behavior of others
- depends on the subjective value (reliability) of information
- example - information cascades

b. Behavioral approach
- an innate ability of a human species resulting in preferences for conformity
- instinctive response
- personality dependent
- should not depend on available time

Hypotheses

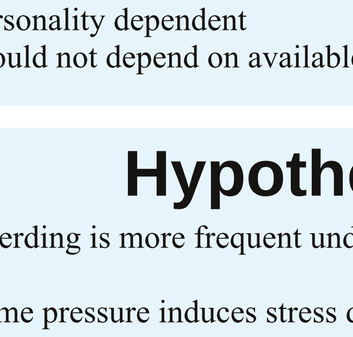
1. Herding is more frequent under higher time pressure

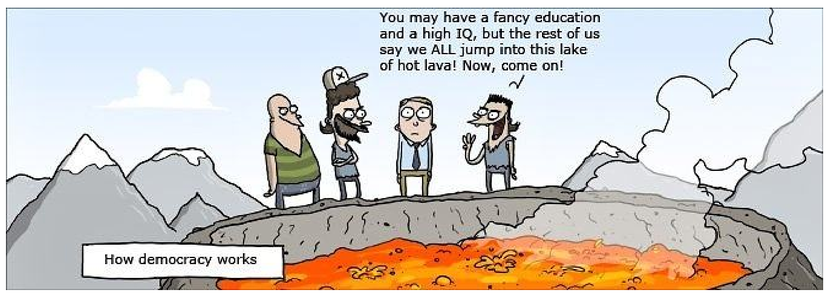
2.Time pressure induces stress during task solution

Methodology

- fully computerized laboratory **experiment**
  - Z-TREE (Fischbacher, 2007)
- 6 sessions, each 15 subjects (+ pilot)
- within-subject design

Procedure
- subjects solve simple effort task repeatedly under different levels of time pressure
- time pressure generates uncertainty about one's result
- all subjects solve the same task at the time
- all subjects under same level of time pressure
- when a subject had solved a task, she typed in her guess (private information)
- after that she could have decided to view solutions of others (public information) and revise her solution
- visible only solutions of faster subjects
- if decision revised, 0/1 proxy variable for herding





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Task
- counting zeros in a matrix of 400 symbols (0s and 1s)
- based on Falk et al. (2006)
- not required cognitive skills / special abilities
- numbers randomly generated, variance sufficient

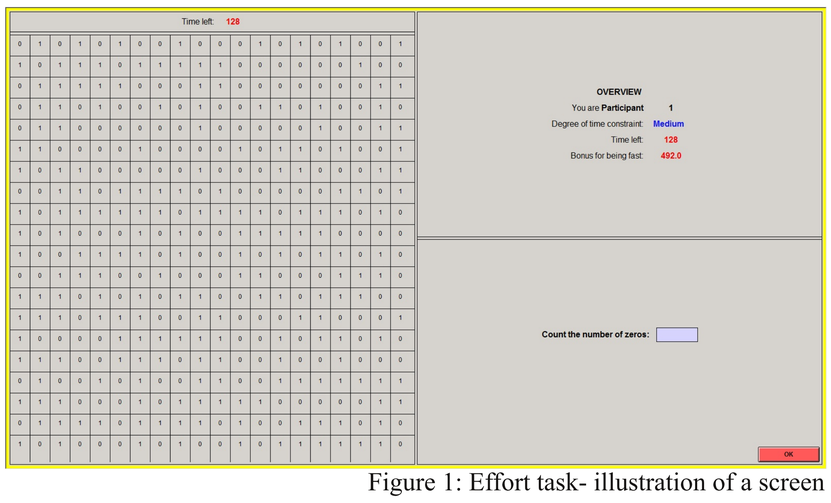

Figure 1: Effort task- illustration of a screen

Time pressure
- levels framed as Low, Medium, High
- strict time constraint - if not in time, payout 0
- Time limit
  - Low - 150s / Medium - 130s / High - 100s
- time-dependent bonus for increased motivation
- source of uncertainty about private information
- time running out during solution as well as during revision

Stress
- time pressure is a stressor (Kemeny, 2003)
- after each task, question on subjective stress (10p scale)
- heart rate measurement - objective stress
  - HR can increase due to other reasons than stress

Pay-off function
task payoff = fixed payment for accuracy + time-decreasing payment for speed

a. fixed payment
  - if guessed correctly, 100 ECU (2€)
  - if missed by more than 2, 0 ECU

b. time-decreasing payment
- higher time pressure - faster decreasing

Model Description

Logit model with robust SE
  - (conditional on seeing public information)

Dependent: Decision Revised
Independent:
  - Time Pressure dummies
  - OCEAN personality inventory
  - Risk aversion
  - Subjective, objective stress
  - Gender
  - Informativeness of public information
  - Similarity of guess to public information
  - Time deciding, time left for revision
  - log of total profit up to the time of decision
  - task-specific confidence

Results

Herding not significantly higher under higher TP
  p-value > 0.449 in regression

Why
  - missing important observations - "late" decisions
  - results of faster subjects were not perceived as reliable in higher TP
  - time pressure has no effect on herding

		Time Pressure			
		Low	Medium	High	Total
Revisions made after seeing public info	Mean	**41%**	**40%**	**47%**	42%
	Total number of possibilities	106	91	92	289

TABLE 1: PERCENTAGE OF REVISIONS IN DIFFERENT LEVELS OF TIME PRESSURE

Public information used efficiently
- controlling for level of TP
- the more info, the more used
- the closer original guess, the less used

Personality traits significant
- Extraversion - negative
- Neuroticity - negative

Subjective stress significant negative
- the more stressed, the less likely to use info

Time spent deciding significant positive
- Bayesian updating needs more time (Baddeley, 2007)
- or - if decided to revise, had to think of the new number

Heart-rate increased significantly during tasks
- over 50% of curves fit well (legible increase during performance)
- correlation of 0.1 with subjective stress
- may not be due to stress but due to performance

	N	Min	Max	Mean	SE (Mean)	Std. Dev.
Average heart-rate during a task	677	59	151	90.94	0.601	15.634
Base-line Heart Rate	677	50	98	74.47	0.391	10.179
Difference of base-line to actual HR	677	0	53	**16.47**	0.377	9.816

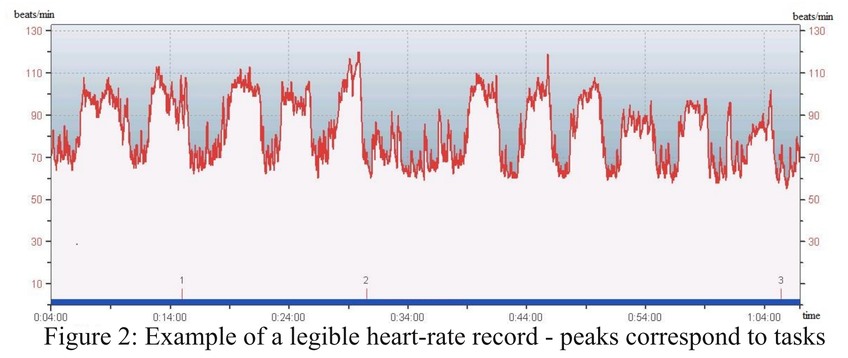

Figure 2: Example of a legible heart-rate record - peaks correspond to tasks

Conclusion

1) Time pressure did not play a significant role in explanation of probability to herd

2) Herding relatively common
  - in 31/33 rounds at least one subject revised

3) Heart rate increased during tasks
  - subjective and objective measure weakly correlated
    - $\rho = 0.105$ (*)
  - probably not due to stress but rather effort
  - need of better stress measures (cortisol)

4) Personality traits significant
  - personality differences matter

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Further Research

Information Updating under Psychosocial Stress
  - stress induced by using TSST protocol
  - Bayesian information updating - one important channel of herding

Uncertainty Aversion under Psychosocial Stress
  - Risk aversion
  - Loss aversion

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