Social norms and strategies in crowds – where pedestrian dynamics need social psychology

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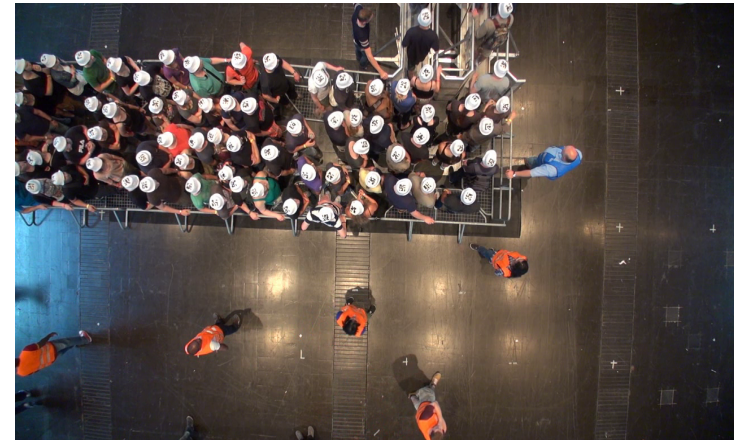
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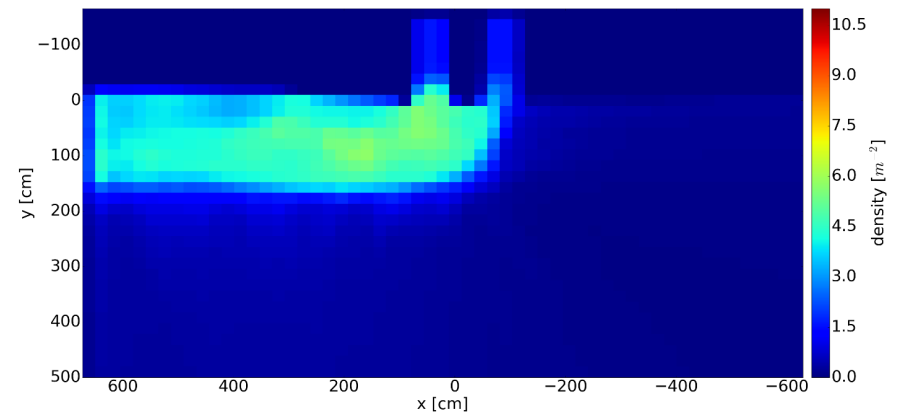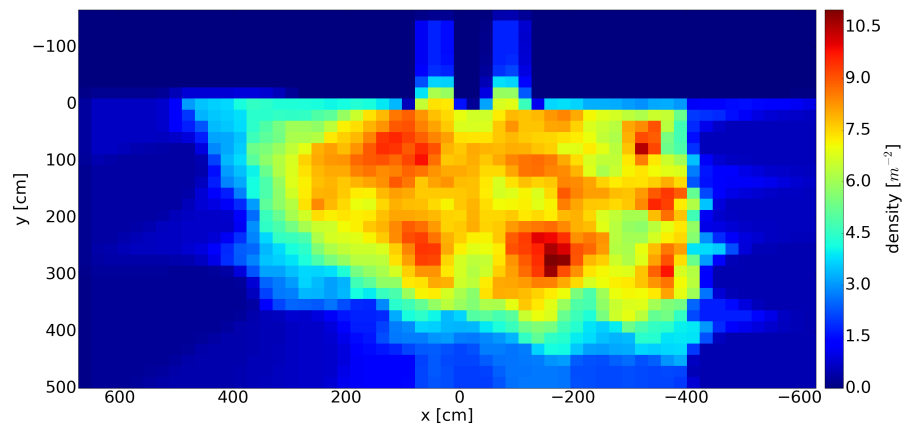
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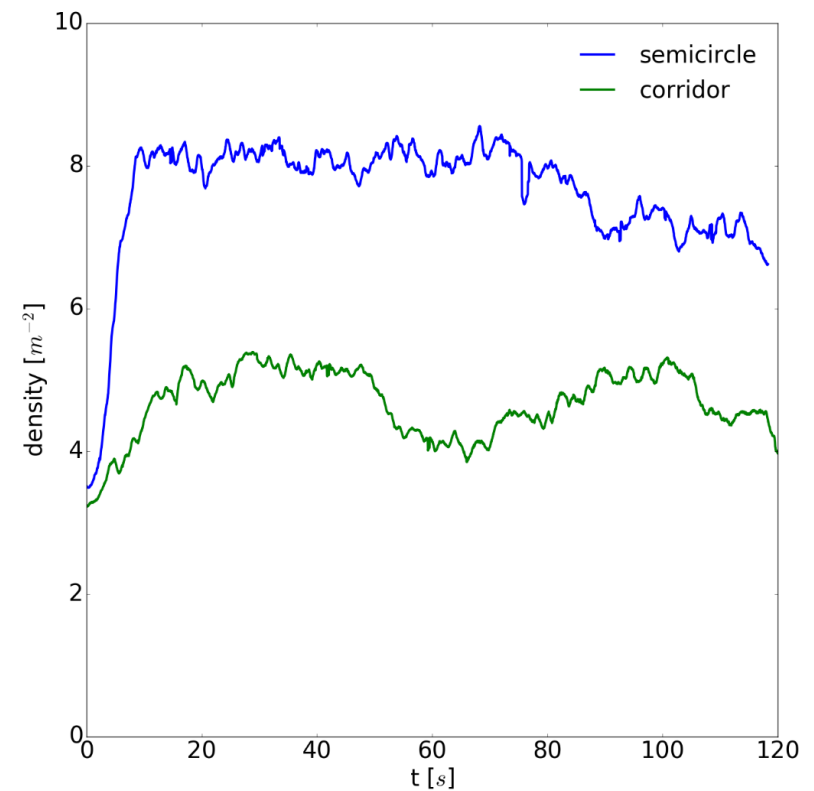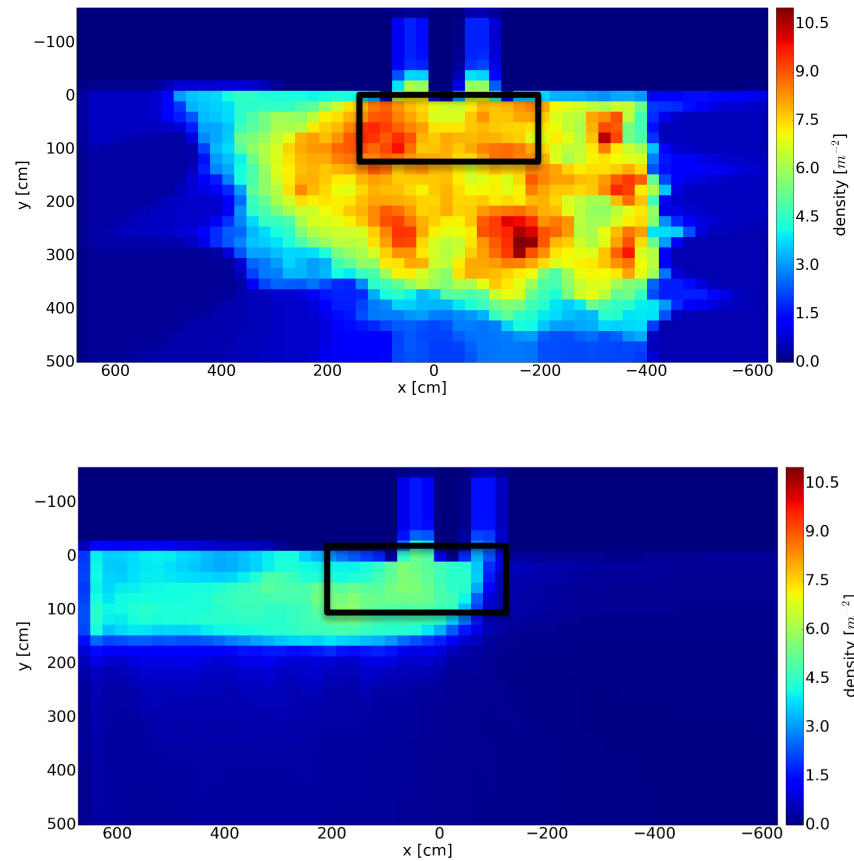
1. Experimental setup

- **part of BaSiGo experimental studies**
- **two structures of spatial barriers: semicircle setup and corridor setup**
- **instruction: "Try to be one of the first to pass through the entrance"**

Results: Density

Results: Density and its development over time

2. Questionnaire study

- **ex post study, participants did not take part in experiments**
- **videos projected onto screen, participants asked to imagine to be standing in one of the designated areas**
- **questionnaire contains of four parts: before and after watching video; setup semicircle and setup corridor (half of them in reverse order)**
- **participants: 60 students (social sciences, engineering)**

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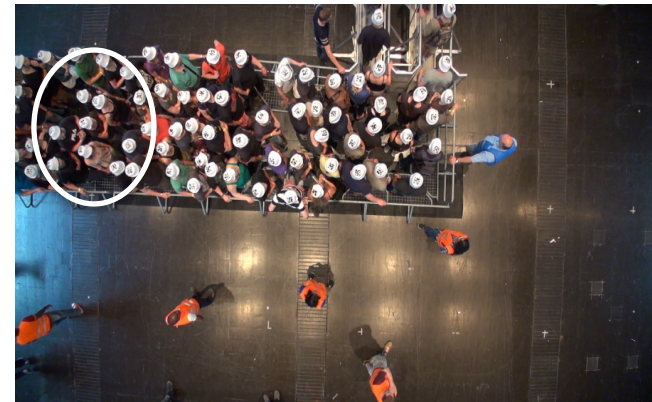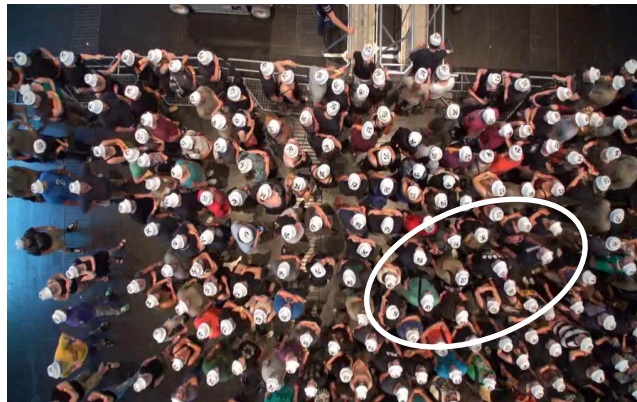
Variables in questionnaire:

6-point-scale:
- how just?
- how likely to be one of the first 100?
- how comfortable?

yes/no:
- can you contribute to accessing faster?
- have you observed inappropriate behavior?

open-ended:
- strategies for accessing faster
- forms of inappropriate behavior
- social norms

Fragebogen: Video 1, Zeitpunkt 1

a) Wie gerecht wird dieser Einlass ablaufen?

sehr ungerecht ☐ ☐ ☐ ☐ ☐ ☐ sehr gerecht

b) Wie wahrscheinlich ist es, dass Sie zu den 100 Gästen gehören, die eine Eintrittskarte bekommen?

sehr unwahrscheinlich ☐ ☐ ☐ ☐ ☐ ☐ sehr wahrscheinlich

c) Wie wohl fühlen Sie sich?

sehr unwohl ☐ ☐ ☐ ☐ ☐ ☐ sehr wohl

d) Können Sie dazu beitragen, dass Sie möglichst schnell zum Eingang kommen?

ja ☐

nein ☐

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Results: Social norms

open-ended question: Which norms apply for this setup?
in brackets: frequency of mentioning

semicircle	corridor
the strongest wins/right of the stronger (15) no rules (15) first come, first served (7)	norm of queuing/lining up (16) orderly behavior (11) pushing and shoving are forbidden (10)

Results: Level of comfort and perceived justness
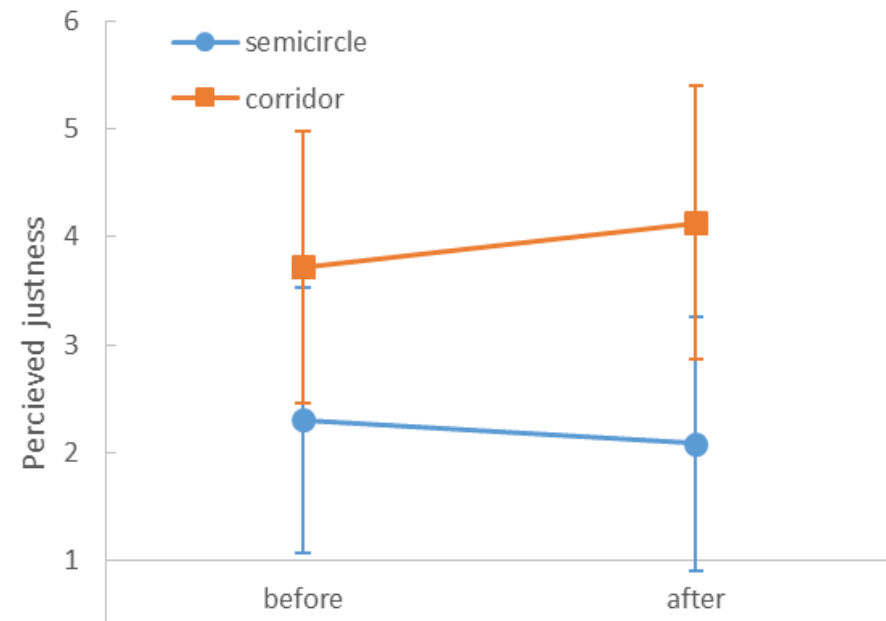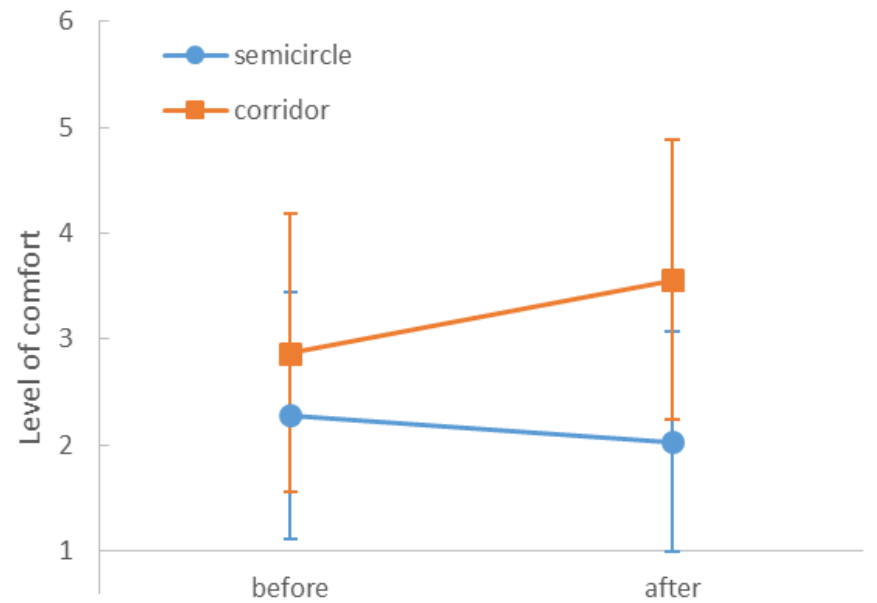
Results: Observed inappropriate behavior

yes/no question: Have you observed inappropriate behavior?

people showing inappropriate behavior	semicircle	corridor
nobody/few	59,4 %	94,9 %
a lot/all	40,6 %	5,1 %

open-ended question: Forms of inappropriate behavior

semicircle	corridor
pushing and shoving (35) pushing someone aside (11) jostling (9)	pushing and shoving (16) slightly pushing and shoving (4) jostling (3) standing still (3)

Results: Strategies for being faster

yes/no question: Can you contribute to accessing faster?

contribution to faster access	semicircle	corridor
before	78.3 %	71.7 %
after	48.3 %	31.7 %

open-ended question: Strategies for accessing faster

semicircle	corridor
pushing and shoving (25) using and filling gaps (10) using elbows/arms/shoulders (9)	pushing and shoving (21) staying on the left hand side (11) using and filling gaps (4)

Results: Summary

	semicircle	corridor
social norms	right of the stronger	queuing/no pushing
level of comfort	lower	higher
perceived justness	lower	higher
observed inappropriate behavior	more	less
contribution for faster access	more	less

3. Theoretical framework: Locating social psychology in pedestrian dynamics

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3. Theoretical framework: Locating social psychology in pedestrian dynamics

collective action
pedestrians as human subjects
psychological action-theoretical models
e.g. norms, strategies

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3. Theoretical framework: Locating social psychology in pedestrian dynamics

collective action
pedestrians as human subjects
psychological action-theoretical models
e.g. norms, strategies

collective behavior
pedestrians as animals
innate or learned stimulus-response-associations, unconscious cognitive processing
e.g. swarms, flocks

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3. Theoretical framework: Locating social psychology in pedestrian dynamics

collective action
pedestrians as human subjects
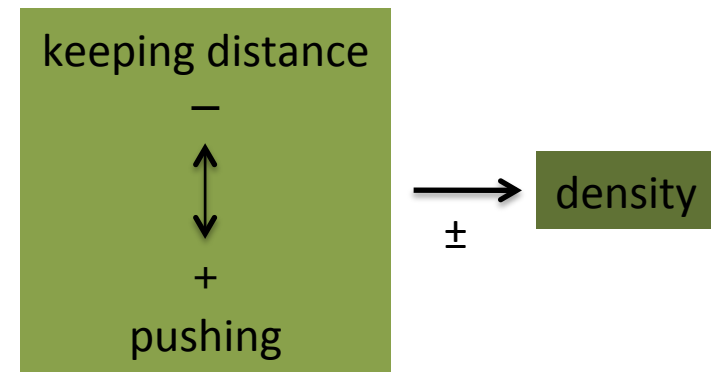psychological action-theoretical models
e.g. norms, strategies

collective behavior
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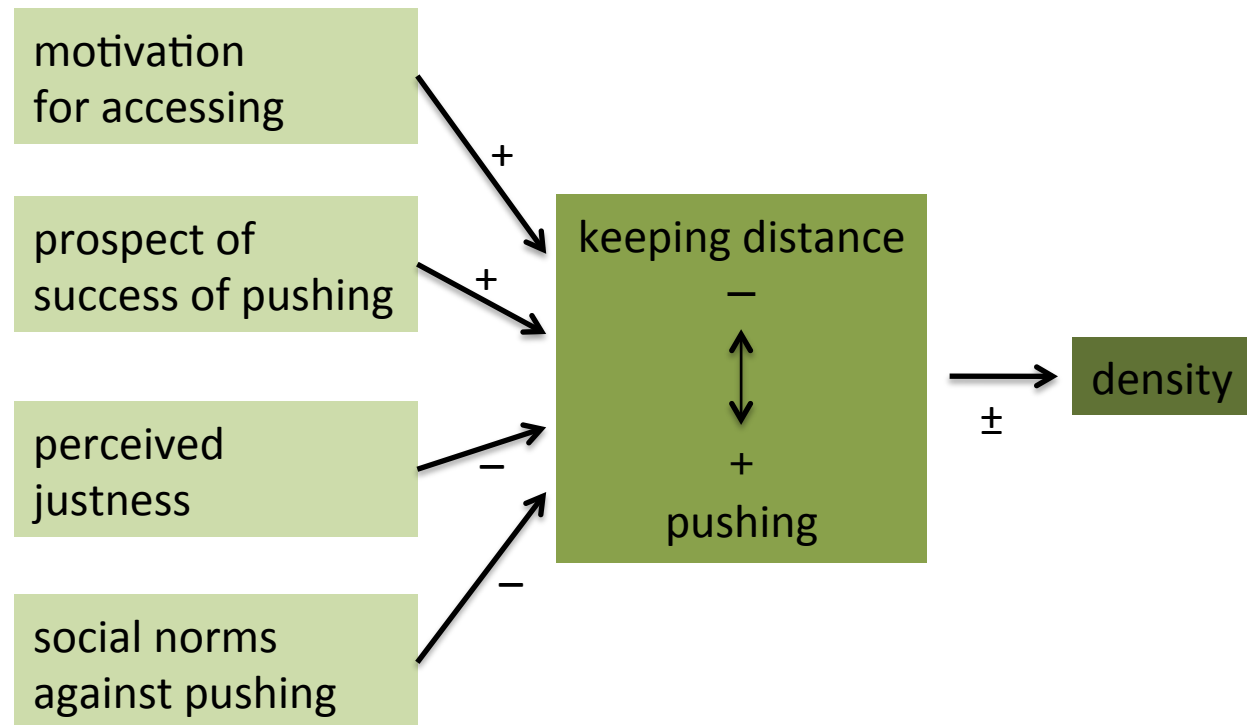e.g. swarms, flocks

collective phenomena
participants as particles
physical models
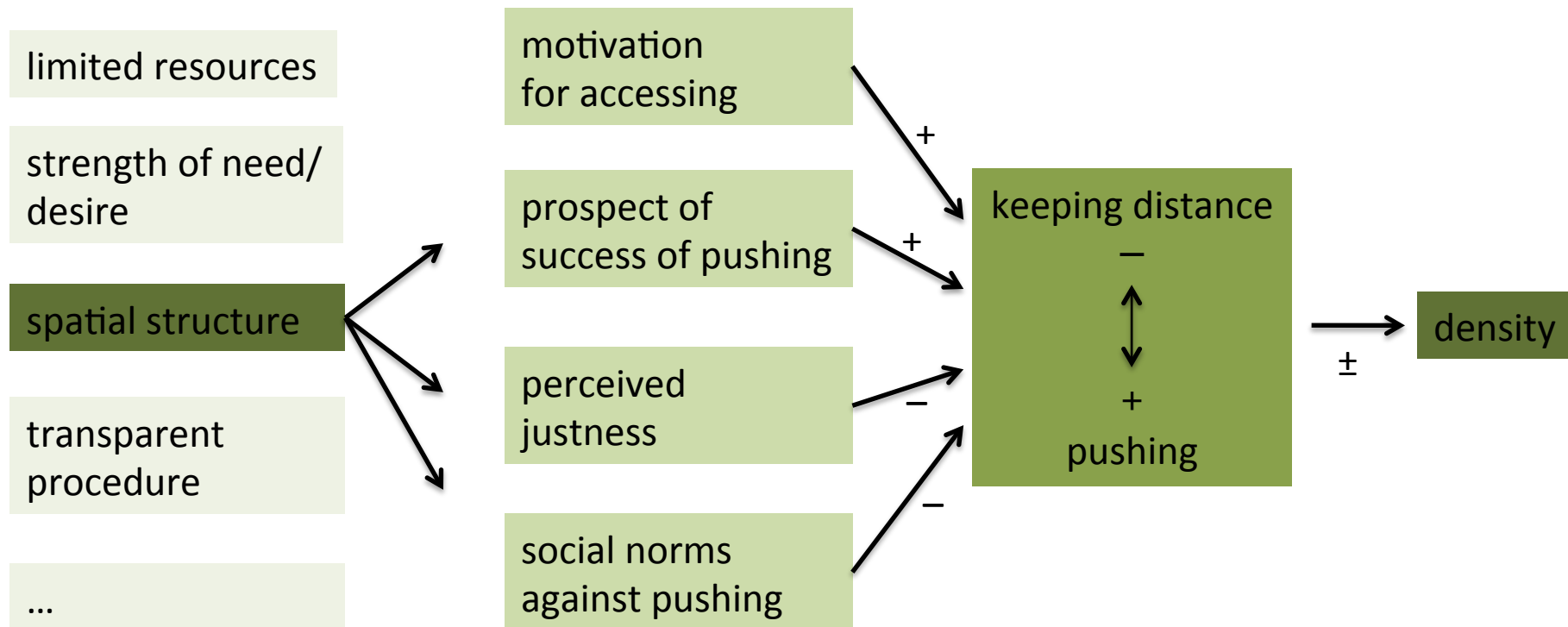e.g. lane formation, clogging at bottlenecks

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4. Diagram for a static perspective
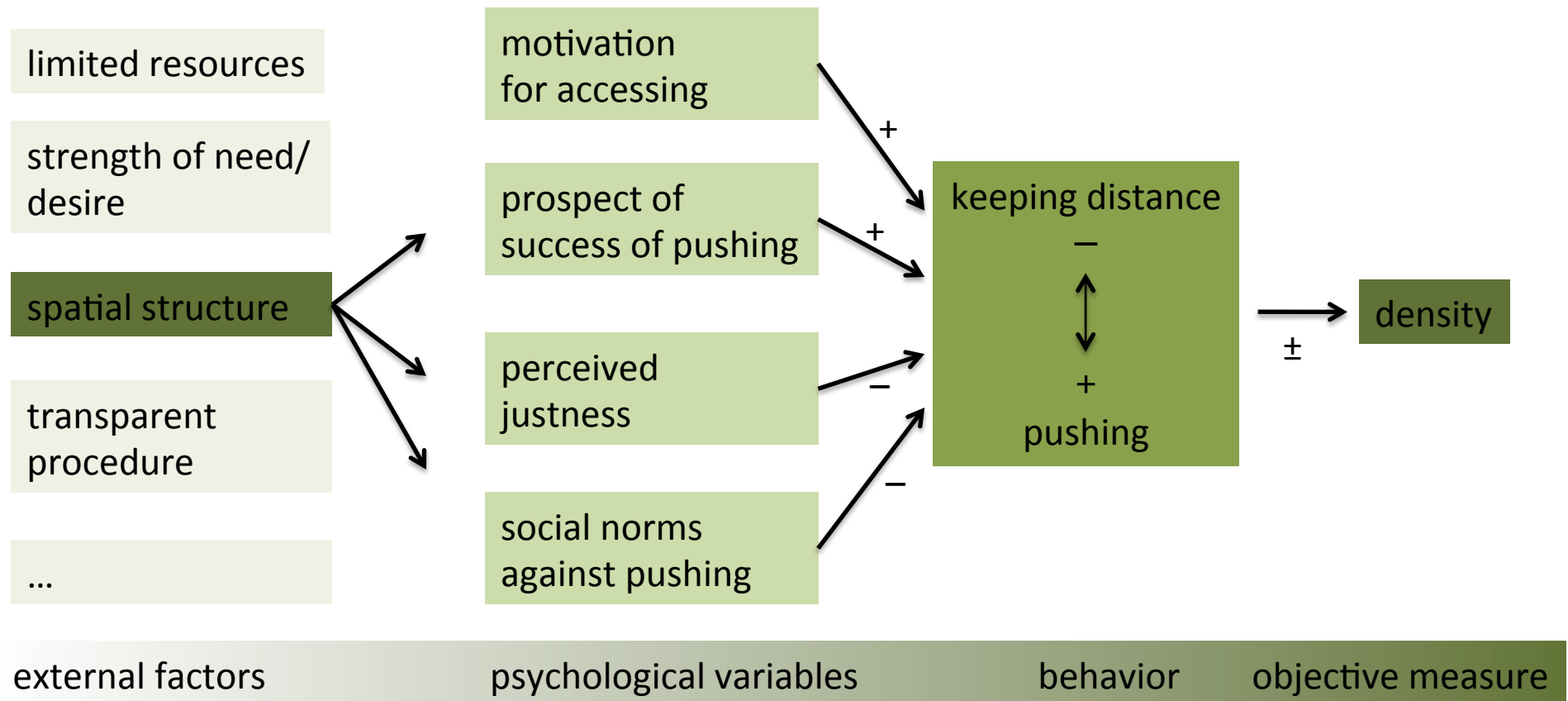
keeping distance

−

↕

+

pushing

±

density

4. Diagram for a static perspective

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4. Diagram for a static perspective

Force-based models:

$$F = F_{drv} + F_{rep} \qquad F_{drv} = (V_0 - V)/\tau \qquad V_0 = \text{intended speed}$$

limited resources

strength of need/ desire

spatial structure

transparent procedure

…

motivation for accessing

prospect of success of pushing

perceived justness

social norms against pushing

intended speed

density

+

+

−

−

±

external factors   psychological variables   behavior   objective measure

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