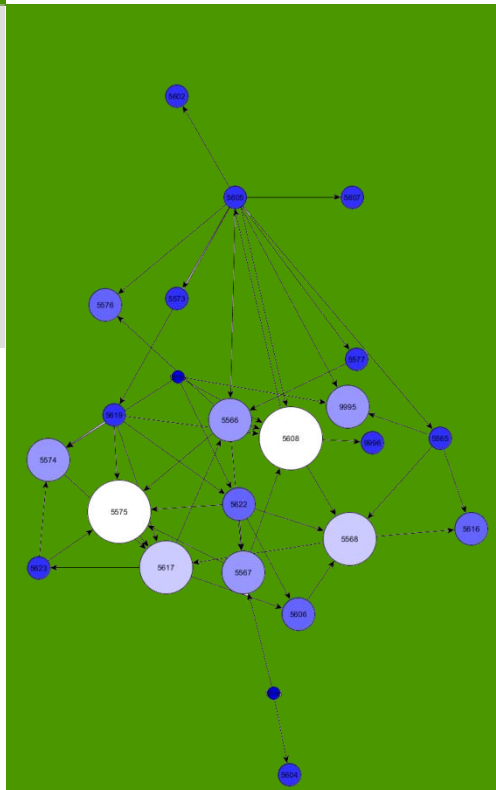
Faculty of Agricultural and Nutritional Science

Christian-Albrechts-University Kiel
Institute of Animal Breeding and Husbandry

Network analysis of tail biting in pigs

The impact of missed events



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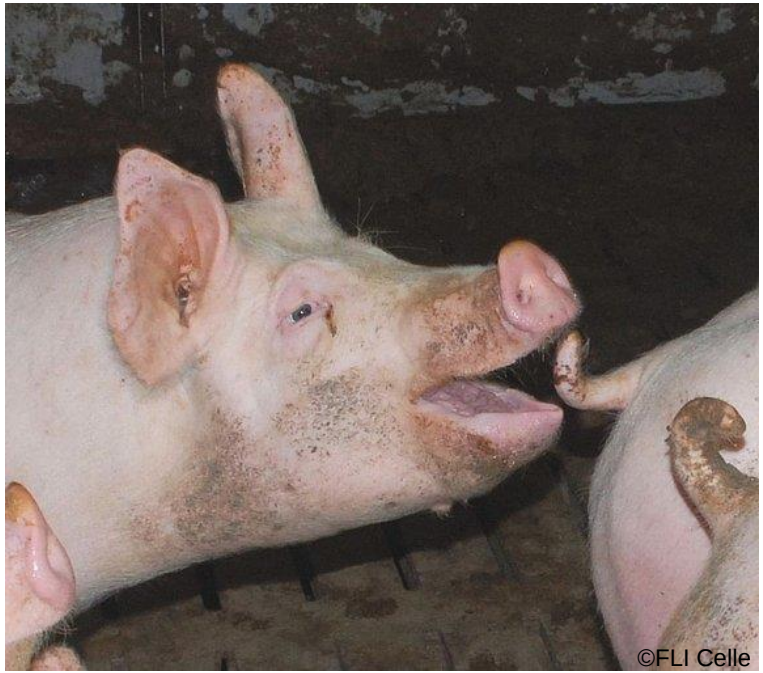
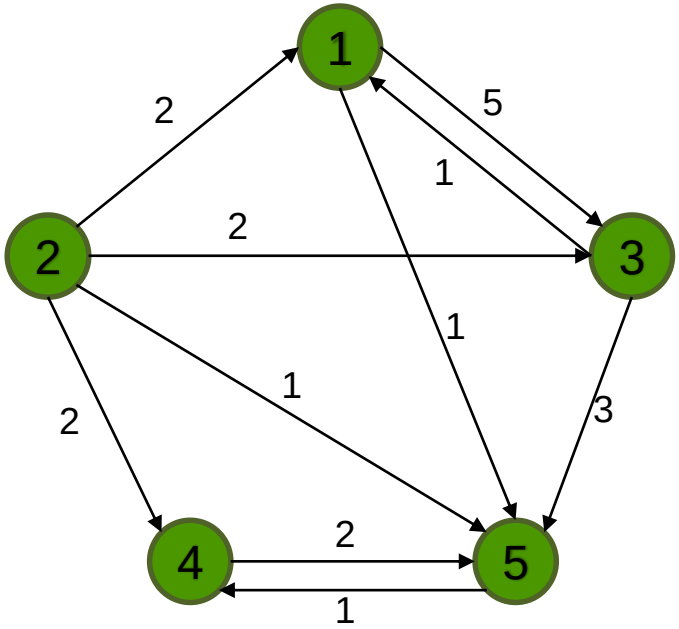
Session 10, Abstract number 31303, twilder@tierzucht.uni-kiel.de

Introduction

Tail biting



Network analysis



Introduction

Problems of video analysis

- Different observers
  - Different ways of interpreting the ethogram
- Very time-consuming
  - Weariness
  - Distraction

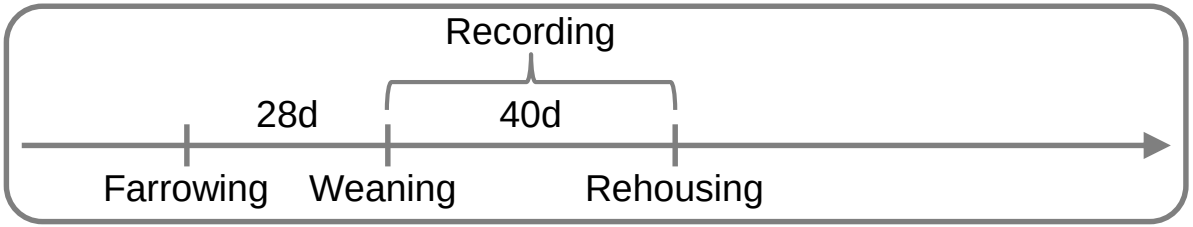
→ Missed events

How many events can be missed without changing the networks considerably?

Material & Methods

Data basis

- Video footage of 6 pens
  - 24 pigs each
  - Undocked
  - Individually marked
  - Gender sorted
  - Uncastrated
- Continuous video recording



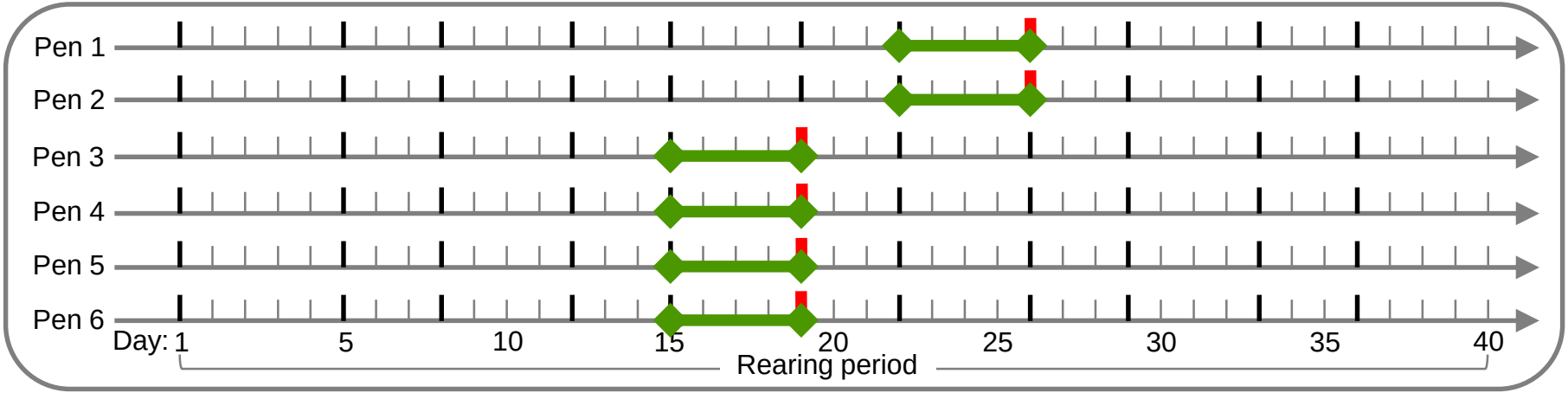
- Documentation of tail lesions and losses (’dt. Schweine Boniturschlüssel’)

Material & Methods

Video analysis

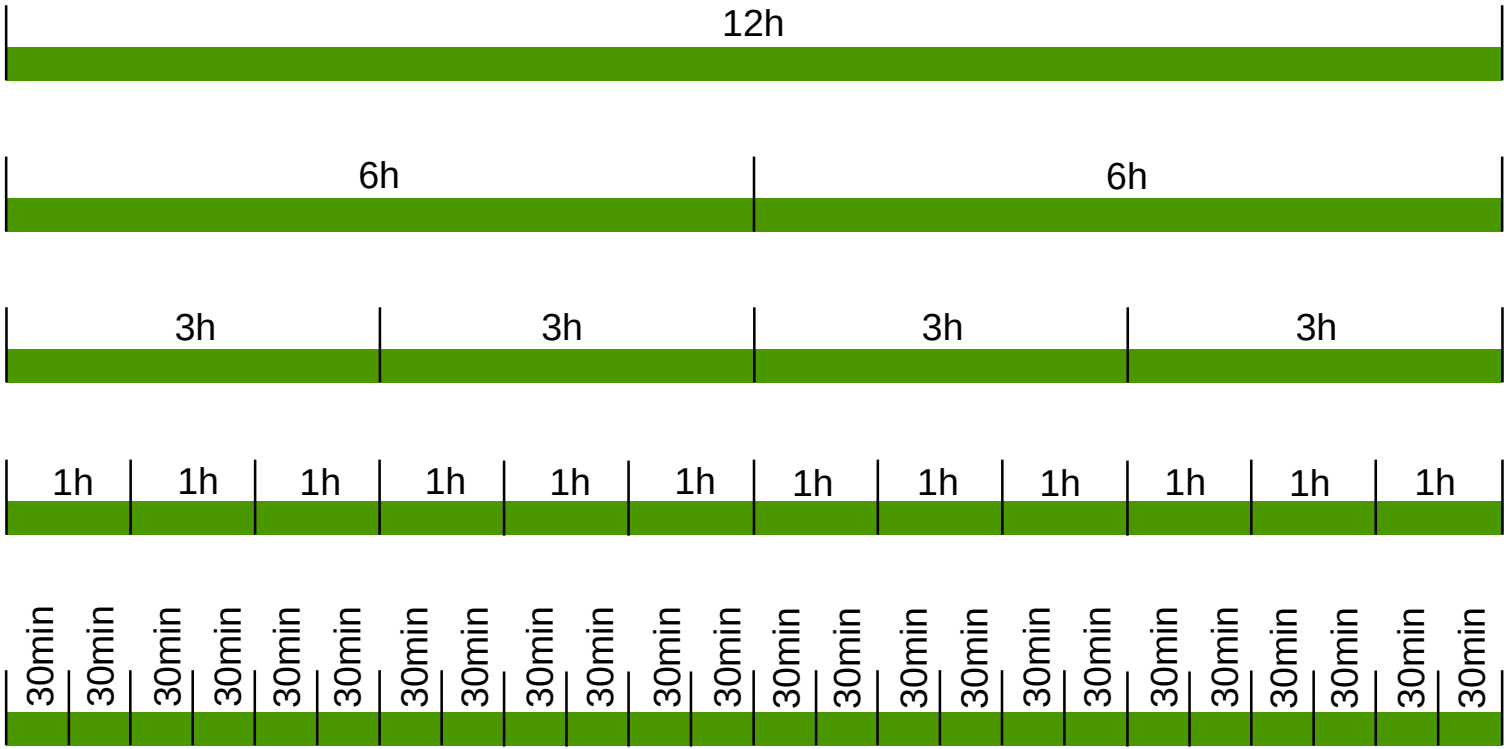
- Event sampling of tail biting behaviour
  - Tail bite (manipulate, suck or chew tail of pen mate)
  - Parameters: Initiator, receiver, reaction, duration
- Analysing 4 days before first large tail lesions

Large lesions
(lesions > diameter of the tail)



Material & Methods

Time aggregation



Resulting networks

1

2

4

12

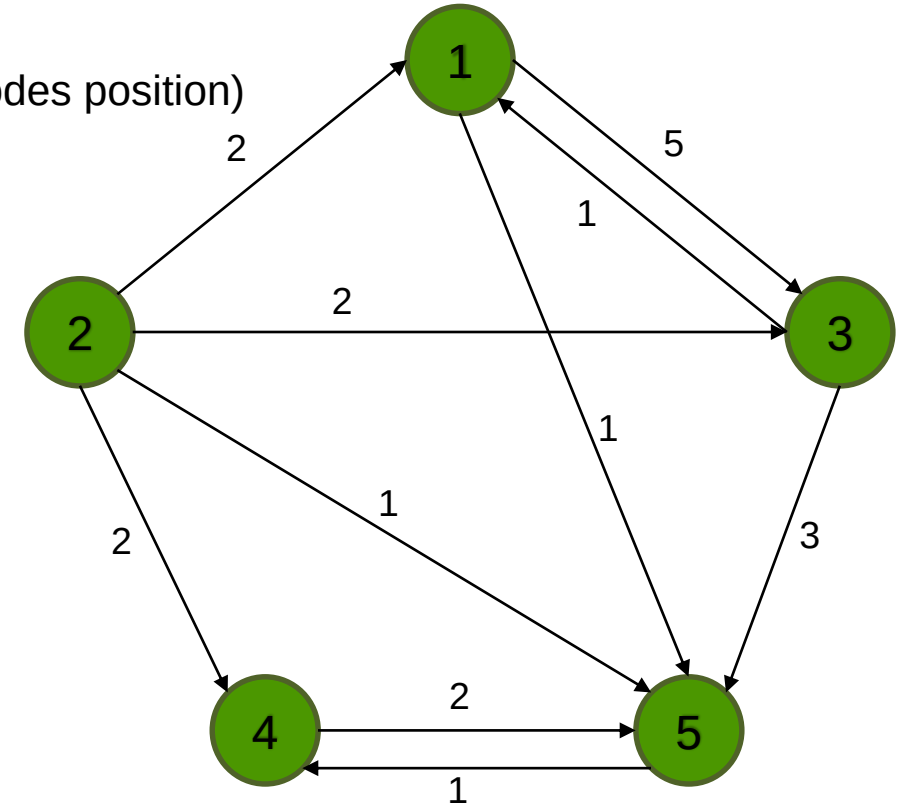
24

Material & Methods

Network analysis

Centrality parameters (Describing the nodes position)

- In-degree
- Out-degree

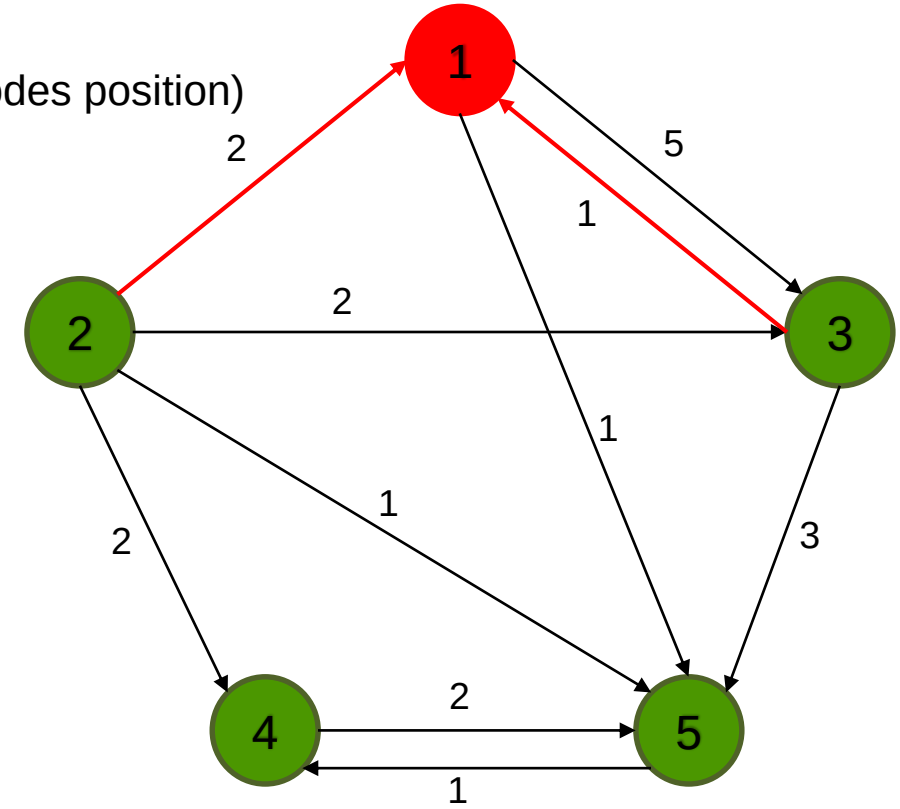


Material & Methods

Network analysis

Centrality parameters (Describing the nodes position)

- **In-degree**
- Out-degree

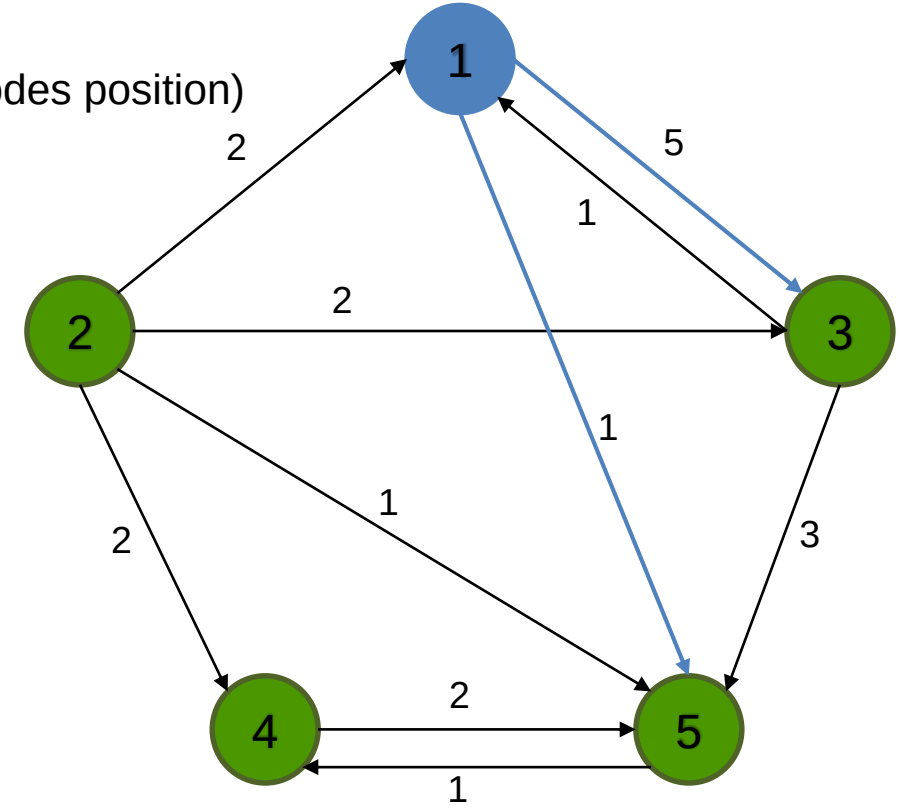


Material & Methods

Network analysis

Centrality parameters (Describing the nodes position)

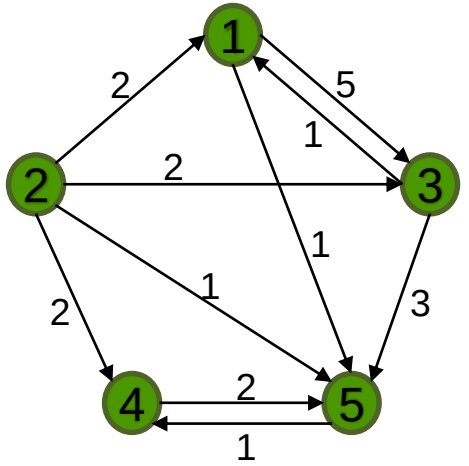
- In-degree
- **Out-degree**

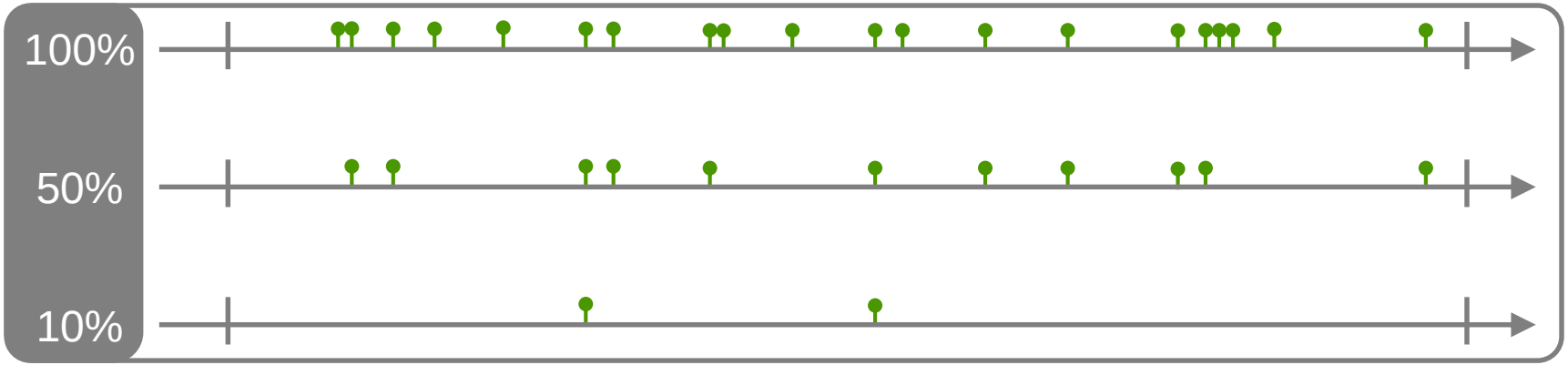


Material & Methods

Creating networks with missed events

- Drawing random samples from all tail biting events
  - Rate: 10 – 90%
  - 1,000 repetitions / rate

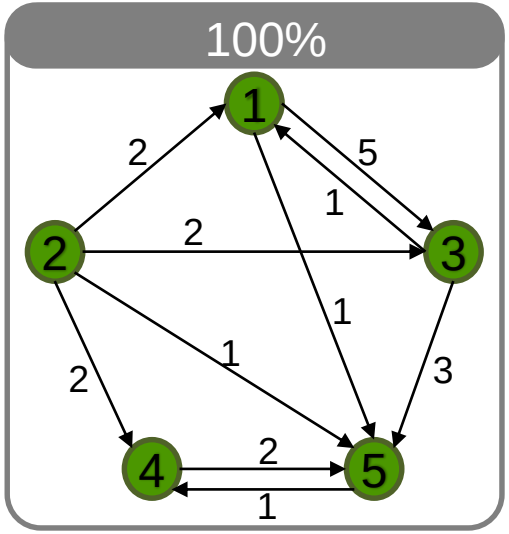


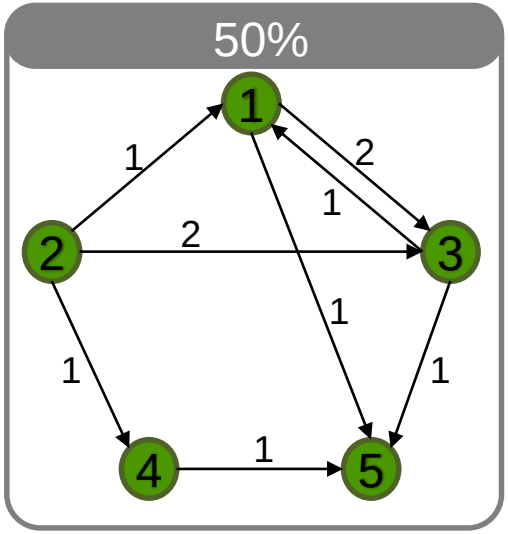


Material & Methods

Creating networks with missed events

- Drawing random samples from all tail biting events
  - Rate: 10 – 90%
  - 1,000 repetitions / rate
- Generating networks with each sample





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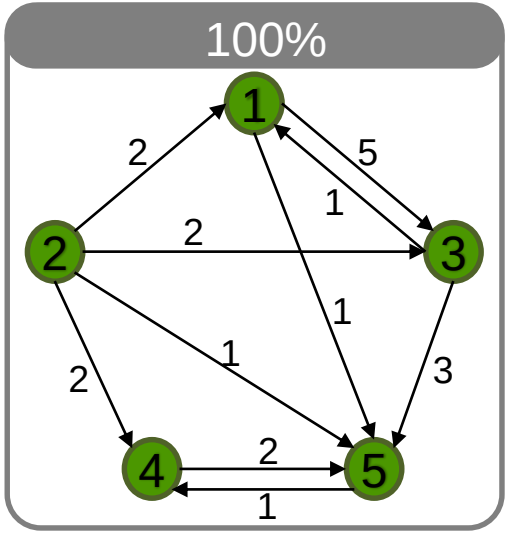
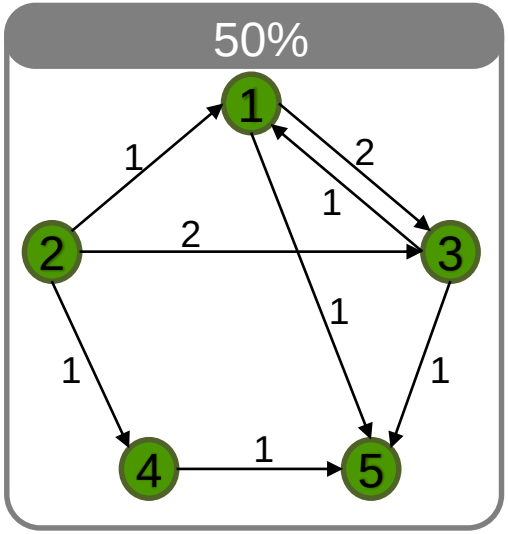
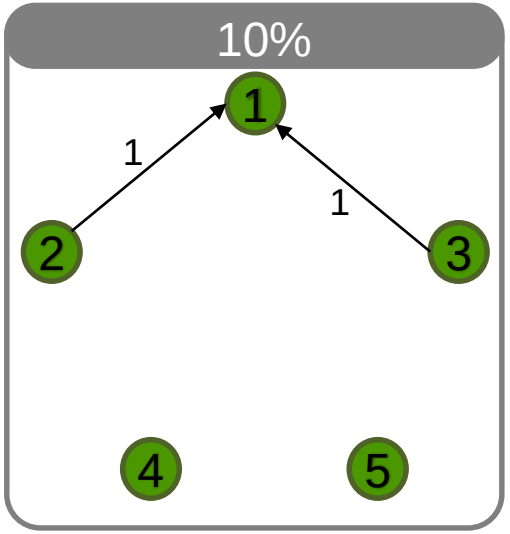




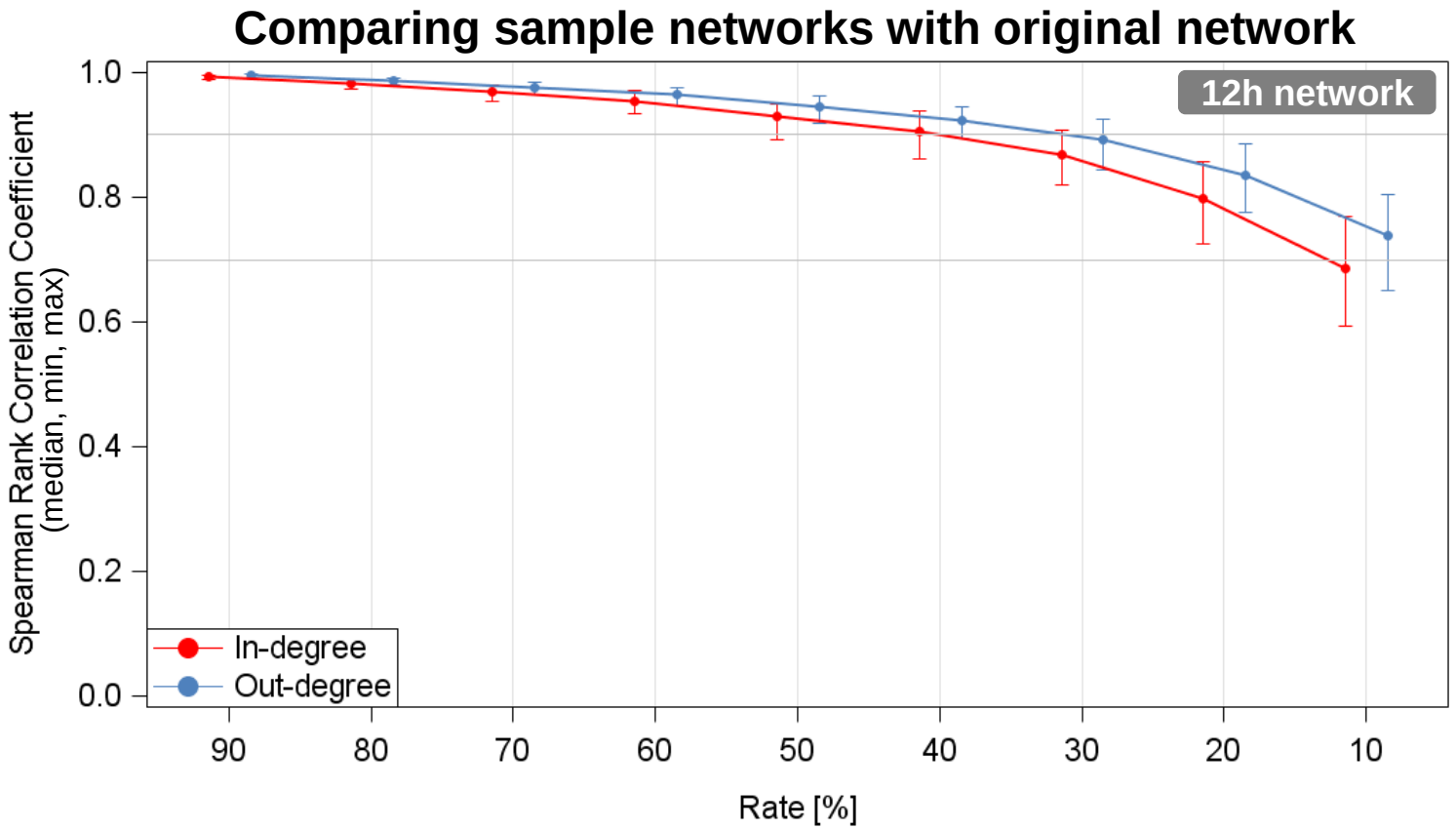


Material & Methods

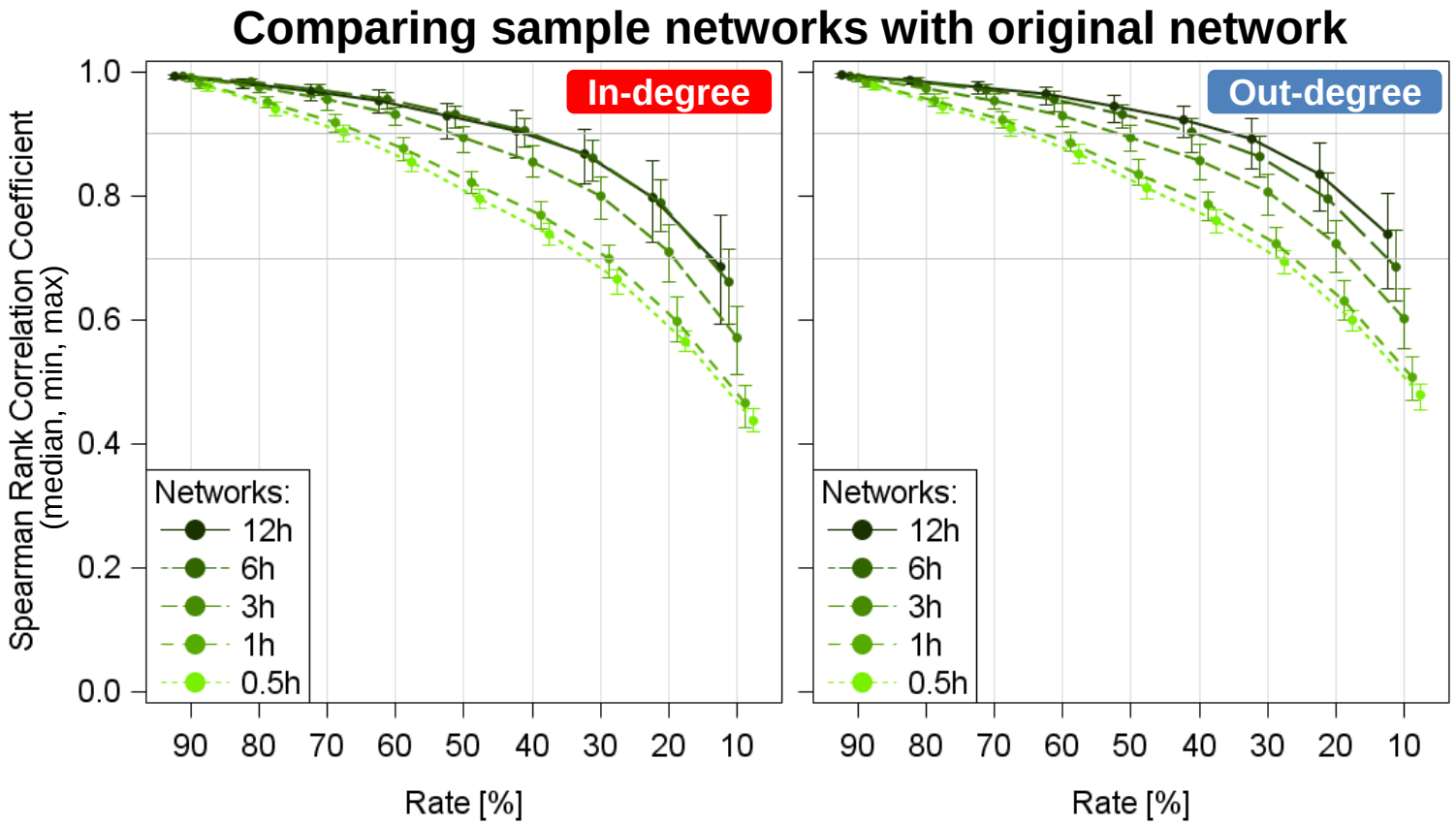
Creating networks with missed events

- Drawing random samples from all tail biting events
  - Rate: 10 – 90%
  - 1,000 repetitions / rate
- Generating networks with each sample
- Comparing centrality parameters of sample networks with original network
  - Spearman Rank Correlation Coefficients

Results


Comparing sample networks with original network
12h network
Spearman Rank Correlation Coefficient
(median, min, max)
1.0
0.8
0.6
0.4
0.2
0.0
In-degree
Out-degree
90
80
70
60
50
40
30
20
10
Rate [%]

Results


Comparing sample networks with original network
In-degree
Out-degree
Spearman Rank Correlation Coefficient
(median, min, max)
1.0
0.8
0.6
0.4
0.2
0.0
Networks:
12h
6h
3h
1h
0.5h
90 80 70 60 50 40 30 20 10
Rate [%]

Conclusion

missed events ▲

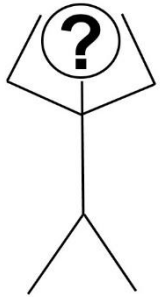
- Correlation between original and sampling networks ▼
- Range of the correlation coefficient ▲

- Most centrality parameters are quite robust
- Longer time intervals are more robust
- For the 12h network, the rank order of in- and out-degree does not change until 60% of the events were missed

Outlook

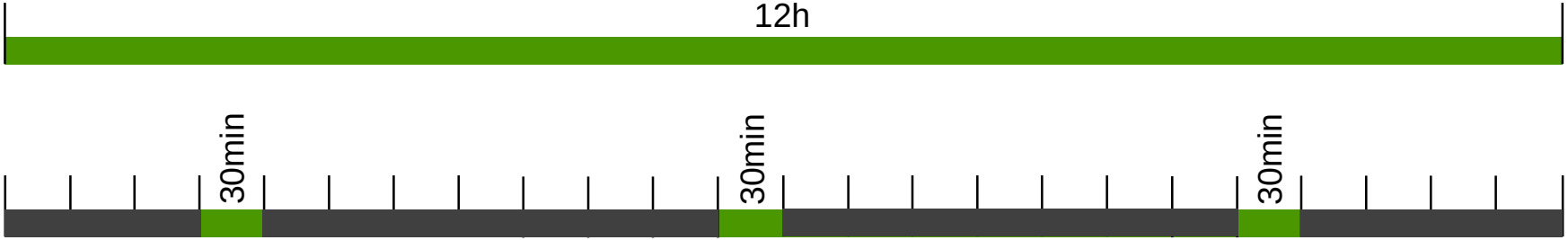
Simulating a bad observer

- Each event has a probability to be seen or missed
- Probability for adding false events
- Probability for adding positive events



Continuous sampling vs. scan sampling

- Comparing smaller time aggregations within the 12h network



Thank you for your attention!

H. WILHELM SCHAUMANN STIFTUNG