

## 6 Wuthering Roads

Author: Marvin Lücke (ZIB)

Project: *Concentration Effects and Collective Variables in Agent-Based Systems* (EF 4-8)



Arwork: Julia Nurit Schönnagel

### Challenge

To make sure all the Christmas presents will be ready on time, the diligent Christmas elf Gilfi works intently in Santa's gift factory. One evening, he totally forgets the time: "Oh, dear! Now, it's already 6:50 pm, and I promised my elf family that I'd be home in time for dinner at 7:00 pm." Gilfi quickly sets off. But as he leaves the gift factory, he is startled: a huge storm has approached the North Pole!

The little elf boldly advances at a speed of 100 meters per minute. This way, he will soon make the 500 meters to his home. But every minute, with probability  $p = 0.2$ , Gilfi is caught by a squall and whirled 200 meters backwards. Consequently, every minute he is *either* 100 meters closer to his destination *or* 200 meters farther away than before.

With what probability  $q \in [0, 1]$  does Gilfi manage to be home in time for dinner?

**Possible answers:**

1.  $q < 0,1$
2.  $0.1 \leq q < 0.2$
3.  $0.2 \leq q < 0.3$
4.  $0.3 \leq q < 0.4$
5.  $0.4 \leq q < 0.5$
6.  $0.5 \leq q < 0.6$
7.  $0.6 \leq q < 0.7$
8.  $0.7 \leq q < 0.8$
9.  $0.8 \leq q < 0.9$
10.  $0.9 \leq q$