**Model set-up**

We are using C++ to implement our model. A population consists of 1000 individuals, who all have a certain intrinsic tendency to cooperate (P0) between 0 and 1. This trait determines whether the individual cooperates or defects during a given interaction. Each individual has 10 interactions within its lifetime with randomly chosen individuals from the population. The interactions are based on the snowdrift game, which means that when either individual cooperates, both receive the benefits, but only the one who cooperates receives the costs. When both cooperate, they share the costs. The payoff one receives from the interactions is taken to be the individual’s fitness. These fitness values are used as the weights for a weighted lottery in order to determine which individuals produce how many offspring for the next generation. During the reproduction, there is a chance (µ) of 0.01 that a mutation occurs. This mutation leads to a small change in the P0 value, taken from a Gaussian distribution with a standard deviation of 0.01.

Responsiveness is introduced as another trait value (Pi) which is either 0 or 1. An individual with a Pi of 0 is unresponsive and one with a Pi of 1 is responsive. A responsive individual can observe which strategy its partner used in a previous interaction and respond to that by changing its own strategy. The responsive individual does have to pay a fitness price for this, however. Responsiveness is also affected by mutation; during the reproductive phase, there is a 0.01 chance of mutation (µ) which turns a responsive individual into an unresponsive individual and vice versa.

According to a paper, the fitness price an individual pays for obtaining information has to be sufficiently low in order for responsiveness to emerge in the population. The exact value can be calculated by the following formula.

The different α values are the values from the payoff matrix. This simplifies the formula to the following.

In the simulation with a price of 0.0, we found that the standard deviation was ???. This lead us to assume that the price can be no larger than ??? if responsiveness is to emerge.