Analysing and visualising who's dispersing and when

This concerns the 1st set of experiments - the zero dimensional runs. The question is who is most likely to disperse and how does it differ throughout a sine cycle. So how do we measure this? One possibility would be to calculate the absolute numbers of genes in the migrant wave (so, the migrant wave is composed of, say, 30% hot, 30% cold and 40% versatilist). Another would be to look at what proportion of the gene migrates (so, at each check point, say, 20% of hot, 10 % of cold and 70% of versatilist genes present in the population migrated).

I have rerun the simulation (50 seeds) but this time collecting data every 10 time steps (the base run collected them every 100 steps). Collecting every 100 means we'd only pick the signal at the beginning of a full environmental cycle (the cycle is 50 steps). I thought it may bias the results but actually it made no difference.

In [1]:

```
from IPython.display import Image
```

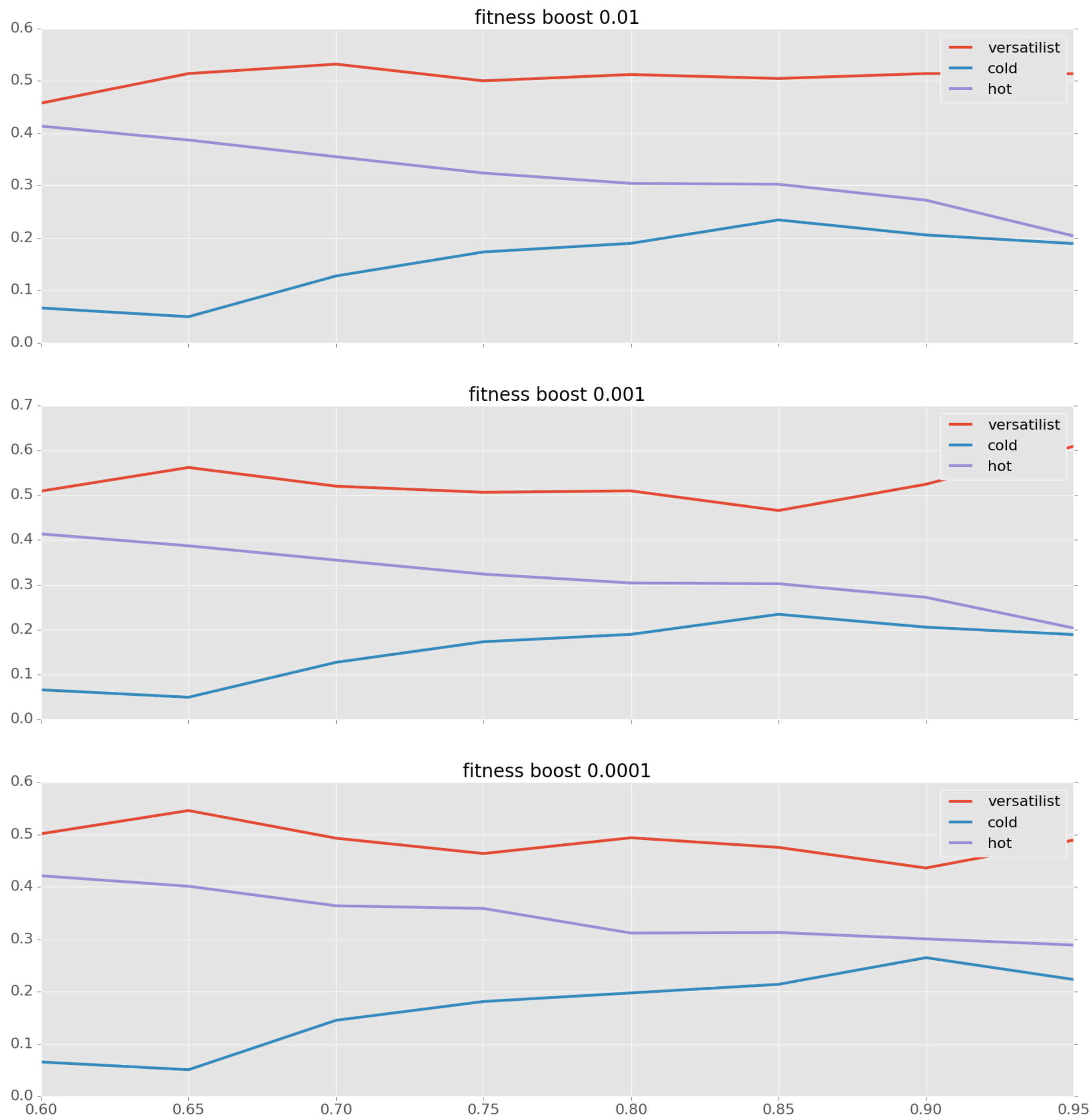
Absolute numbers

The graph below shows the composition of the dispersing wave broken down by gene type (hot, cold, vers). The y-axis shows the percentage of each gene among the dispering front, the x-axis shows different levels of environmental fluctuations (low numbers - high level of fluctuations, high numbers - low level of fluctuations). There is a large gap between the specialists in scenarios with high level of temperature fluctuations - this is because these runs are much shorter (they go in tens or low hundreds rather than thousends) so the intial conditions (we start with a hot regime) play a much higer role (the hot specialist gain an advantage early on but the run ends before this is offset).

In [5]:

```
Image(filename='/Users/iar1g09/Dropbox/IZA/PHD/case_studies/variability_case_study/whosDispersing1.png')
```

Out[5]:

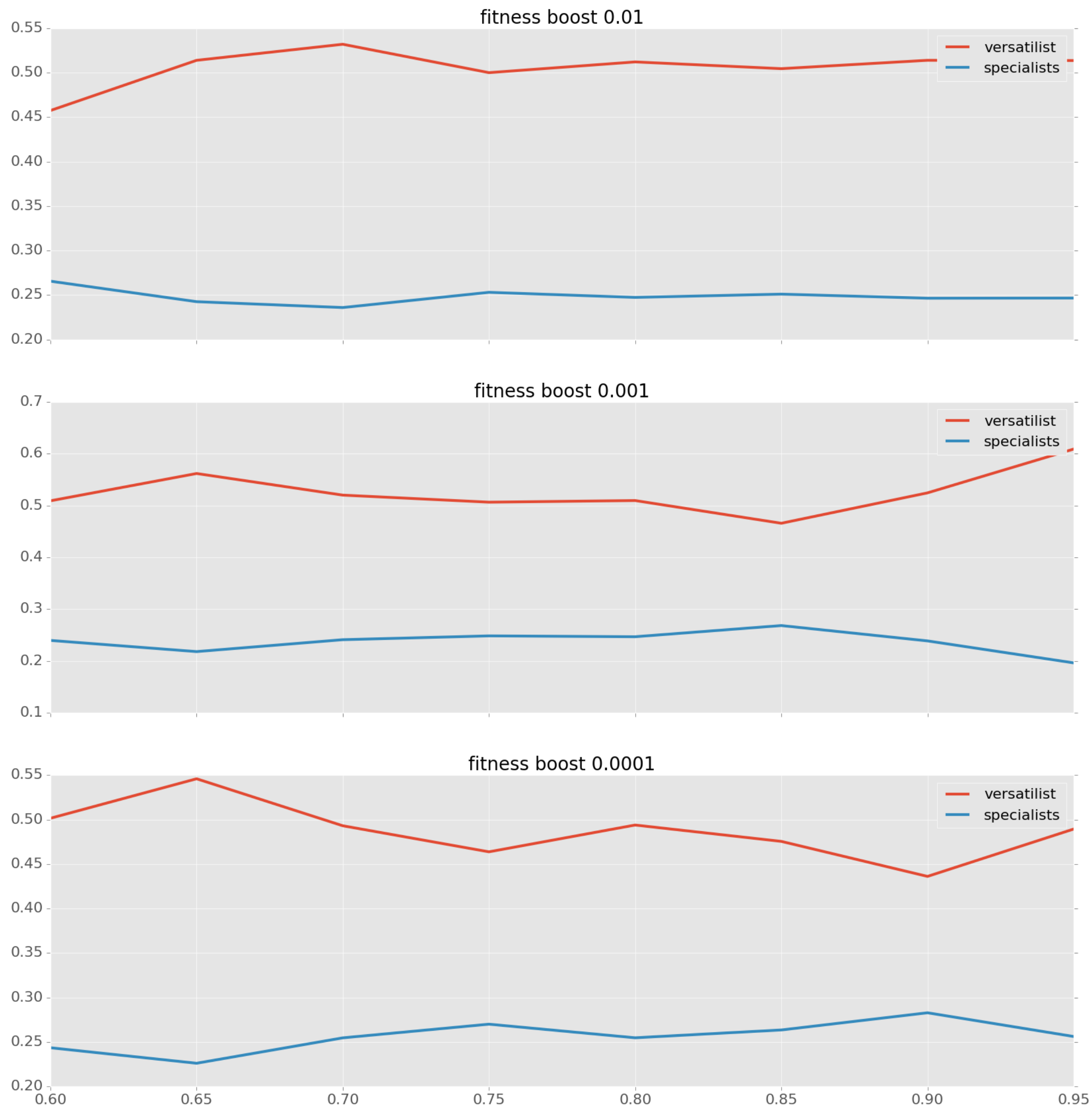


To even it out, I plotted both specialists as one line (using the mean of their values). Either way, the versatilists are at the forefront of the dispersal. (Note that the lines are symmetrical - this is a good sign because, in principle, they need to add up to 1).

In [3]:

```
Image(filename='/Users/iar1g09/Dropbox/IZA/PHD/case_studies/variability_case_study/whosDispersing.png')
```

Out[3]:



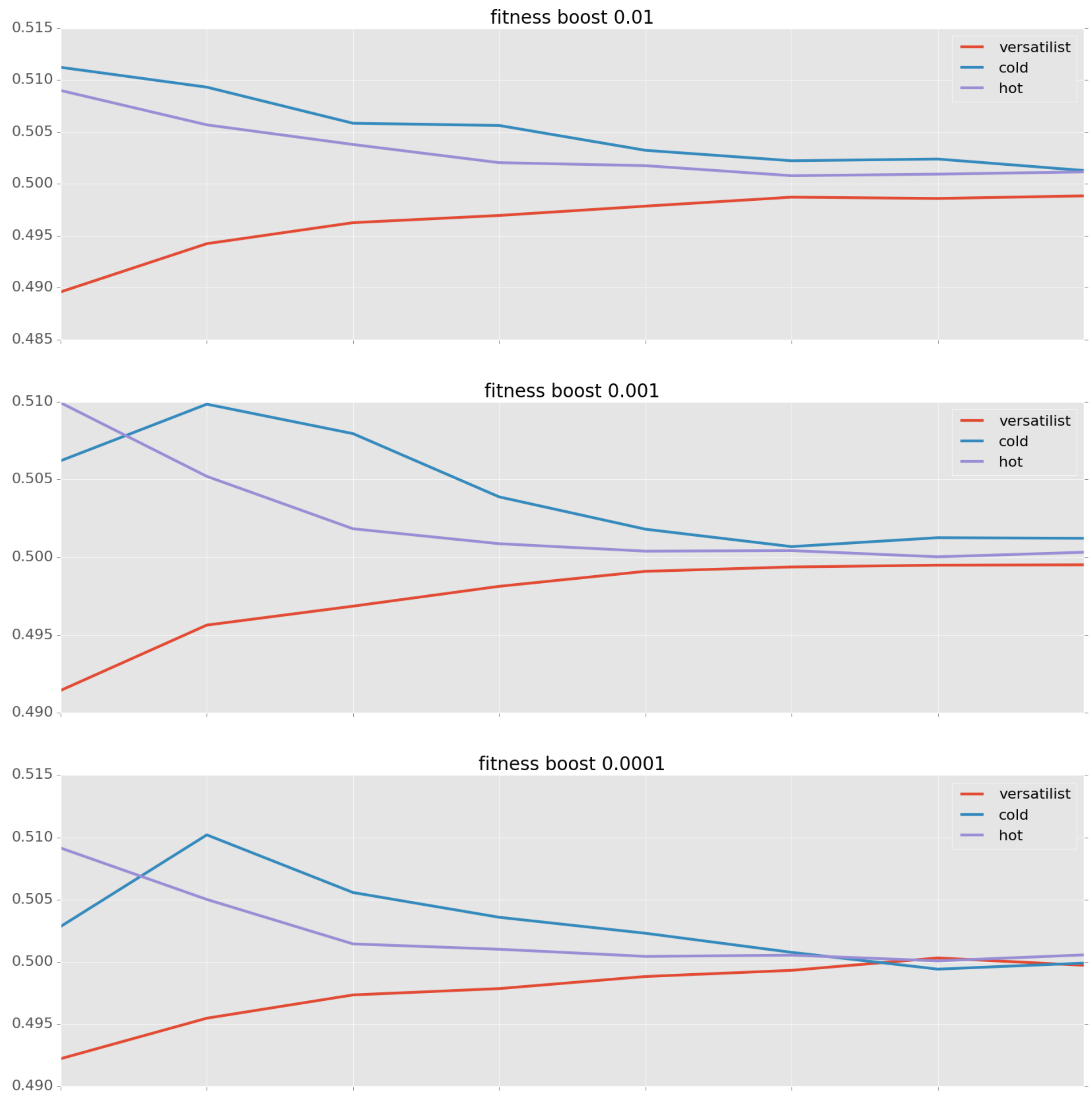
Relative numbers

Now, this is the same data, but what we plot here is 'what percentage of the entire population of a given type migrates?' So if there are, e.g., 10 versatilists what percentage of these 10 versatilists migrates.

In [9]:

```
Image(filename='/Users/iar1g09/Dropbox/IZA/PHD/case_studies/variability_case_study/whosDispersing_relative1.png')
```

Out[9]:



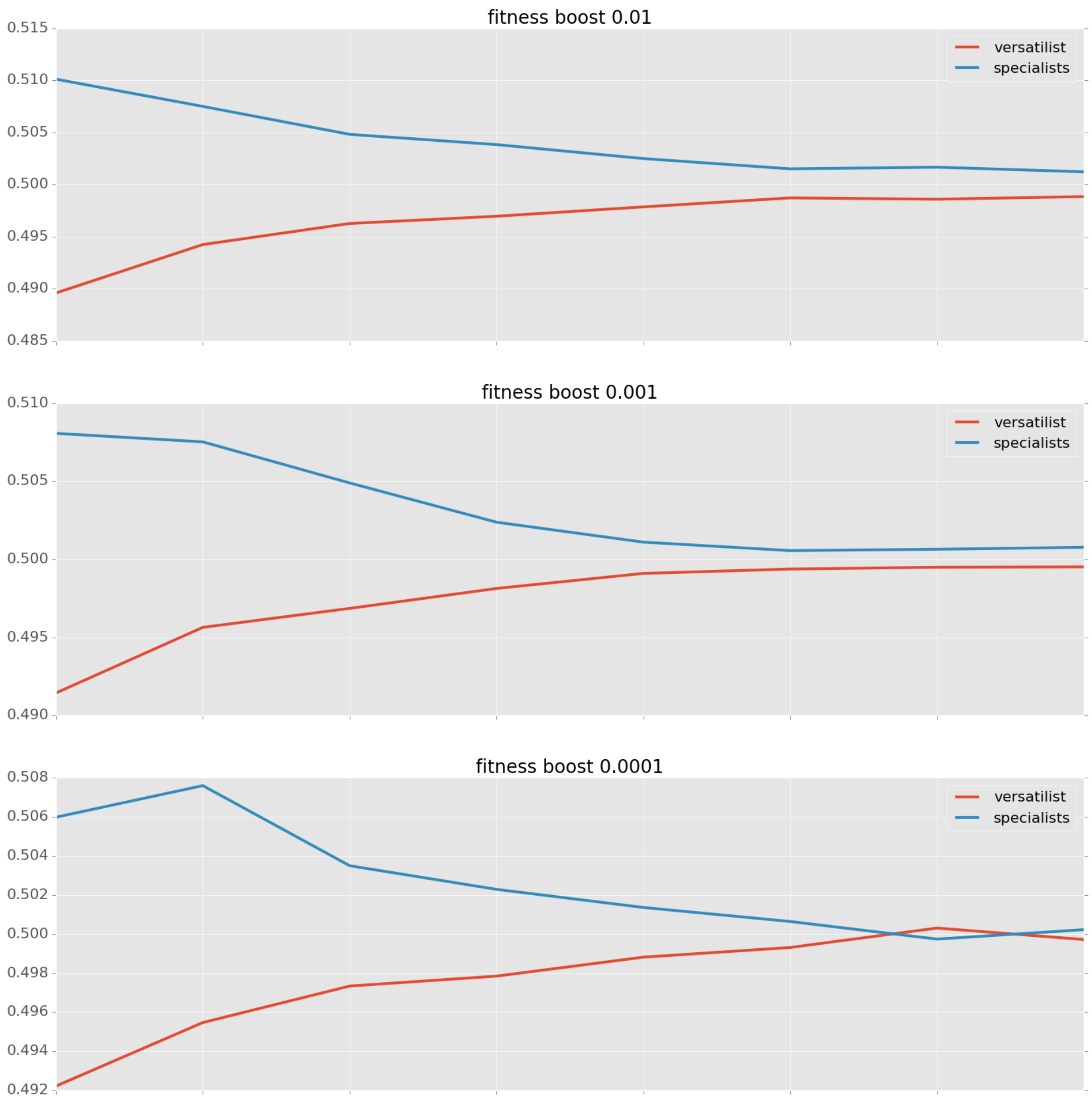
Proportionally the specialists send more migrants away. I think this is because they reach much lower and much higher in their fitness so when the conditions change the effect can be much stronger on a larger number of agents. The initial conditions are again playing up here a bit - as it evens out for longer runs and in the cold specialist, which has the most difficult start, is particularly badly affected.

Below, we take an average of the specialist values.

In [10]:

```
Image(filename='/Users/iar1g09/Dropbox/IZA/PHD/case_studies/variability_case_s
tudy/whosDispersing_relative.png')
```

Out[10]:



In [ ]: