Simulating Language
Assessment 1

Deadline: 12 noon, 2nd March
Marks returned: 24th March
Feedback: brief comments on work, plus overall discussion in lecture

By submitting this work you are agreeing that you understand the plagiarism rules and that this assessment is entirely your work alone. Group work on this assessment is not permitted.

Submit electronically, via TurnItIn. Please remember to number your answers. For questions with word limits, please make sure you **include the word count with your answer**. Word count does not include any python code, or graphs etc. Please note that we are using Python 2 in this course, rather than Python 3.

ANY ANSWER THAT GOES OVER LENGTH WILL RECEIVE A MARK OF ZERO!

IMPORTANT:

For every question I expect concise answers plus, where appropriate, the use of simulation results to illustrate key points.

Credit will be given particularly for **clarity, brevity and precision** in writing plus **convincing use of simulations** in support of your argument.

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1. The following python code is meant to remove all the zeros from a list and work out the average of the remaining numbers. It has a lot of bugs in it! Fix as many bugs as you can. Try to do it with the smallest number of edits possible!

```
def average_non_zero(input list)
     non_zero=input_list
     total=0
     for i in len(input_list):
          total==total+i
          if i=0:
          non_zero.remove(i)
     print "The original list was:" input_list
     print 'The non-zero numbers in the list are:", non_zero
          print 'The average is:', total/len(input_list)
```

2. Briefly state how the number of iterations of a monte carlo calculation of communicative accuracy relates to the result of that calculation. Illustrate your answer with one or more graphs of simulation results. **[word limit: 100]**

3. Two agents with innate signalling systems are illustrated below. Assuming they use winner take all production and reception, what would be the expected communicative accuracy of a population of agents made up of 10% of type A, and 90% of type B? (i.e. what's the chance that any random communicative episode between two members of such a population will be successful?)

A:

	s1	**s2**	**s3**
m1	7	1	1
m2	2	7	7
m3	1	0	7

	m1	**m2**	**m3**
s1	2	2	1
s2	0	1	0
s3	1	0	3

B:

	s1	**s2**	**s3**
m1	7	1	0
m2	2	7	6
m3	1	0	7

	m1	**m2**	**m3**
s1	2	2	1
s2	0	1	0
s3	-2	1	3

4. Why does spatial organisation lead to communication in Oliphant's (1996) simulations? **[word limit: 300]**

5. Change the `pop_update` function in `signalling2.py` so that it simulates a situation in which different meanings crop up in the environment with different frequencies. Show your new `pop_update` function here.

6. The mutation function in `evolution1.py` can completely change the value of a cell in the matrix of an offspring. It might be more realistic for mutation to be gradual instead - changing a cell only slightly. Modify the code so that this happens instead. Show your new mutation function here.

7. What corresponds to the concept of innateness in the `evolution1.py` simulation? What about in the `learning2.py` simulation? **[word limit 200]**

8. When Smith (2002) talks about "learners", "maintainers" and "constructors", what does he mean? **[word limit 500]**