Models of Higher Brain Functions: psychophysical thresholds and the psychometric function

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1 Getting started with psignifit

Most exercises in this series require the python package psignifit. The package and documentation is available from

`http://psignifit.sourceforge.net`

The package is already installed at the BCCN. You only need to set your `$PYTHONPATH`:

```
export PYTHONPATH=/home/mohbf/software
```

There is a tutorial (a quick start to pypsignifit), that you should work on as a start. The remaining exercises are add on exercises to this tutorial.

2 Adaptive procedures

The data in table 1 were observed in a 3-1 staircase procedure.

Determine a threshold estimate from these data. To do so, use

1. the geometric mean of the last 10 reversals
2. the arithmetic mean of the last 10 reversals
3. psignifit BootstrapInference
4. psignifit BayesInference

In particular, with the last two methods you will probably have problems inferring the threshold. Why is that? Why is the threshold inferred using bayesian inference most probably wrong?

The following data consist of an equal number of trials from the same observer. This time no adaptive procedure was used.

Index	Stimulus intensity	Number correct	Number of trials
1	3	9	19
2	4	10	19
3	5	14	19
4	6	17	19
5	7	18	18

Could you imagine, why these data constrain the psychometric function better? There is at least one psychological reason and one technical reason.

You can combine all the data from the first table to get a short table with all the trials from one stimulus intensity in one line. This will improve convergence of the fitting procedures in psignifit. Why do these data no longer carry all the information that was contained in the first table? What is lost?

Table 1: Data from an adaptive procedure

Index	Stimulus intensity	Number correct	Number of trials
1	10	3	3
2	9	3	3
3	8	3	3
4	7	3	3
5	6	3	3
6	5	3	3
7	4	0	1
8	5	2	3
9	6	3	3
10	5	1	2
11	6	3	3
12	5	1	2
13	6	2	3
14	7	0	1
15	6	3	3
16	5	3	3
17	4	3	3
18	3	3	3
19	2	1	2
20	3	0	1
21	4	3	3
22	3	0	1
23	4	0	1
24	5	3	3
25	4	0	1
26	5	3	3
27	4	0	1
28	5	3	3
29	4	0	1
30	5	3	3
31	4	3	3
32	3	1	2
33	4	0	1
34	5	0	1
35	6	2	3
36	7	3	3
37	6	3	3
38	5	3	3
39	4	0	1
40	5	3	3