Software exercise: Gradual Learning Algorithm (GLA)

0   Overview—more on each item below
1. Download software
2. Download data file on Finnish (Anttila)
3. Look at predictions of Anttilan partial ranking
4. Apply GLA
5. Turn in brief, prose-less report

1   Download software
- Choose between OTSoft and Praat
- OTSoft (Hayes & al. 2003): Windows-only, detailed instructions below
  - ▪ www.linguistics.ucla.edu/people/hayes**/otsoft/**
- Praat (Boersma & Weenink 2006): Platform-general, but harder to use; no instructions given here (you're on your own)
  - ▪ www.fon.hum.uva.nl/praat

2   Download data file
- If OTSoft: Download Anttila_data_adapted_from_Boersma.xls from class web page
- If Praat: Download Anttila_data.txt from www.fon.hum.uva.nl/paul/gla/Anttila_data.txt

3   Look at predictions of Anttilan partial ranking—OTSoft instructions
- Apply Gradual Learning Algorithm
- Use the "Initial rankings" menu to tell the program what the rankings should be.
- Assign bigger numbers to higher strata, with the numbers 20 points apart
- Set "Number of times to go through forms" to zero—this tells the program <u>not to try to learn anything; just use the rankings we gave it</u>
- The results file tells you how often each candidate won in the testing phase.
- If you like, try modifying a constraint or moving it to a different stratum and see what happens.
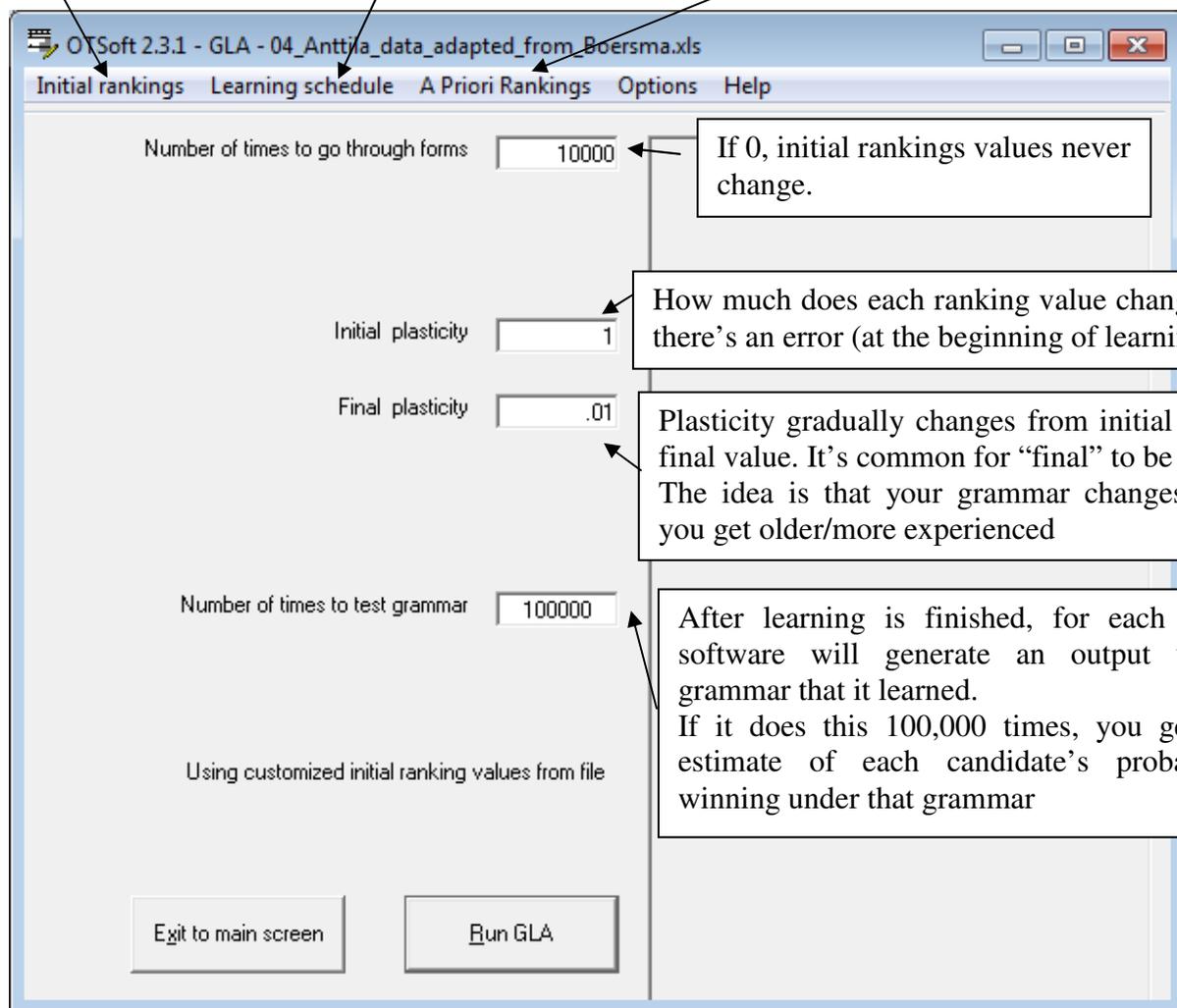
4   Apply GLA

- Now apply the GLA to Finnish but with "Number of times to go through forms" much bigger, say 1,000 or 10,000
- See next page for explanation of options in OTSoft
- Look at the results file—think about whether/where/how much, with this flexible model, the fit to the Finnish data improves as compared to with the more restrictive partial-ordering model

By default, all constraints start at 100. You can change that.

By default, plasticity gradually changes from the initial to the final value. You can change that.

You can specify that certain constraints must outrank others—they will be kept 20 units apart (or some other value that you specify)

OTSoft 2.3.1 - GLA - 04_Anttila_data_adapted_from_Boersma.xls

Initial rankings   Learning schedule   A Priori Rankings   Options   Help

Number of times to go through forms   10000

If 0, initial rankings values never change.

Initial plasticity   1

How much does each ranking value change when there's an error (at the beginning of learning)

Final plasticity   .01

Plasticity gradually changes from initial value to final value. It's common for "final" to be lower. The idea is that your grammar changes less as you get older/more experienced

Number of times to test grammar   100000

After learning is finished, for each input the software will generate an output using the grammar that it learned.
If it does this 100,000 times, you get a good estimate of each candidate's probability of winning under that grammar

Using customized initial ranking values from file

Exit to main screen   Run GLA

5   Turn in brief, prose-less report
Just paste the following into a document and print:
1. Screenshot of OTSoft GLA options window, to show what settings you used. If using Praat, give the options settings you used.
2. Partial-ordering results (just the part that compares input frequency to output frequency)
3. GLA results (just the part that compares input frequency to output frequency)

6   Some useful tricks to know for the future
- To just see what probabilities are assigned to candidates under a certain grammar:
    - create a file with customized initial ranking values (use "Initial rankings" menu)
    - set "Number of times to go through forms" to 0
- To train a grammar on certain data (training data) and test it on other data (testing data):
    - In your OTSoft input file, for the testing data, give frequency of 0 to all candidates.
    - Thus they won't contribute to learning, but they'll still be used in testing
- To see how the grammar evolves over time, use the Options menu (see screenshot above) to choose "Print file with history of ranking values"