

2.2 LM Evaluation – Grammatically Assessment

- a) With score_sentence we computed the score for each Yoda-ish sentence and its English equivalent. The table of scores:

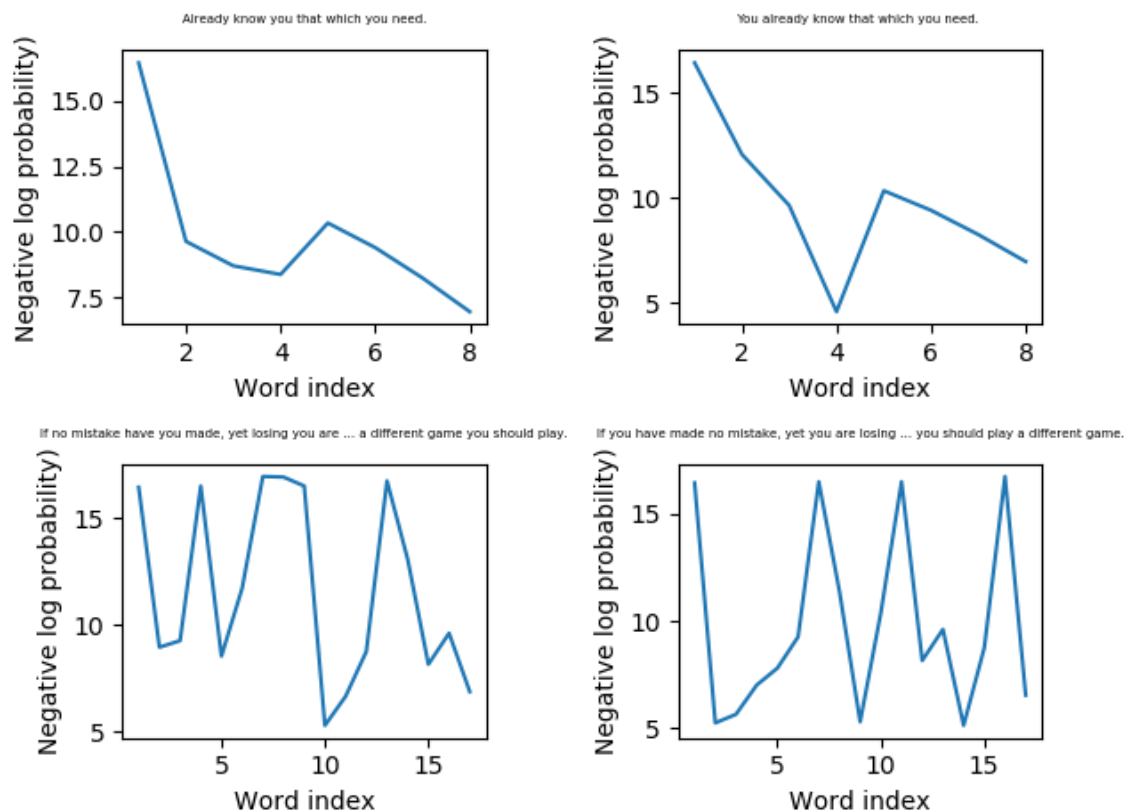
#	Yoda-ish sentence	Score_Yoda	Score_stand
1	Once you start down the dark path, forever will it dominate your destiny, consume you it will.	12.259	11.286
2	Patience you must have, my young padawan.	11.449	11.901
3	When nine hundred years old you reach, look as good you will not.	9.835	8.719
4	Truly wonderful, the mind of a child is.	9.595	9.651
5	Clear your mind must be, if you are to find the villains behind this plot.	10.075	9.613
6	Always two there are, no more, no less. A master and an apprentice.	9.537	9.598
7	In this war, a danger there is, of losing who we are.	9.174	8.365
8	So certain were you. Go back and closer you must look.	9.809	8.801
9	If no mistake have you made, yet losing you are ... a different game you should play.	10.614	8.906
10	Powerful you have become, the dark side I sense in you.	9.617	9.887
11	Through the Force, things you will see. Other places. The future...the past. Old friends long gone.	8.378	8.893
12	Size matters not. Look at me. Judge me by my size, do you?	9.233	8.696
13	You think Yoda stops teaching, just because his student does not want to hear? A teacher Yoda is. Yoda teaches like drunkards drink, like killers kill.	12.205	11.612
14	Happens to every guy sometimes this does.	10.533	11.171
15	The dark side clouds everything. Impossible to see the future is.	9.235	9.402
16	Soon will I rest, yes, forever sleep. Earned it I have. Twilight is upon me, soon night must fall.	10.952	10.091
17	Much to learn you still have ... my old padawan.	10.634	10.206
18	Like his master before him, be destroyed, he must.	10.609	9.041
19	Already know you that which you need.	8.682	8.633

Observations: mostly conventional English equivalents have lower value of the score, in other words, they are scored better than original Yoda-ish phrases.

However, there are several pairs where the scores have small difference and a few pairs where the score of Yoda's phrase is lower than the score of standard sentence.

- b) Considering differences between scores of the sentences in each pair, we found the one with **the smallest difference**: 'Already know you that which you need.' / 'You already know that which you need.' $dif_min = 0.049$

And the pair with **the largest difference**: 'If no mistake have you made, yet losing you are ... a different game you should play.' / 'If you have made no mistake, yet you are losing ... you should play a different game.' $dif_max = 1.708$



In the first pair, we can see that the difference in graphs of the two sentences is related to the first part of the phrase where the part 'know that' looks more fluent or more common than 'you that'. The graph of the first part of standard sentence sharply reduced confirming common usage of 'You already know that'.

In the second pair, we can see drastical rises and drops of the graph. The rises denotes those words, which occur after punctuation (',' and '...'); and semantically they are beginning of the new phrase whereas they are scored in a sequence with the ending of the previous phrase. Larger value of the Yoda-ish sentence is explained by those rises where the subject is replaced by other parts; existing several semantical parts in the sentence explains the highest difference in the scores.

- c) Bigram LM does not succeed well in the task of evaluating which of the phrases in the pair is more fluent. We can see that some of Yoda's phrases are scored to be better than conventional sentence structure. That might be caused by lower value of negative log probability of the words, which appear in the beginning of the sentence, because they often used in training corpus as a subject, whereas in Yoda's sentence they play role of an object.
- d) Unigram LM cannot be applied in this task, as it does not represent any information regarding sentence structure and words sequences. It would give probabilities of single words in the sentence; therefore, scores for both phrases in each pair would be the same.
- e) Russian is not as strict in sentence structure as English and usually words permutations does not make sentence less fluent. However in case the action is expressed by two verb (for example, 'You *want to teach* him' = 'Ты *хочешь обучать* его') moving of the main verb in the end of sentence would make it more unconventional, like from Old Russian epos ('You *to teach* him *want*' = 'Ты *обучать* его *хочешь*'). One more way: to change words in possessive phrases ('*The mind of a child* is truly wonderful.' → '*Of a child the mind* is truly wonderful.' In Russian: 'Воистину удивителен *разум ребёнка*.' → 'Воистину удивителен *ребёнка разум*.'). In order to strengthen the impression we could choose those translation options of words which look obsolete.