**Tool for the Automatic Analysis of Syntactic Sophistication and Complexity**

**(TAASSC)**

**User Manual for TAASSC 1.3.8 (updated 2-8-2017)**

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This document is intended to assist users of TAASSC. It includes a brief explanation of how to use the tool. Additional information about TAASSC is included in the supplementary Index Description Spreadsheet (available at www.kristopherkyle.com).

Please use the following citation when referencing TAASSC in your work:

Kyle, K. (2006). *Measuring syntactic development in L2 writing:* *Fine grained indices of syntactic complexity and usage-based indices of syntactic sophistication*. (Doctoral dissertation).

If you use any of the SCA indices, please also use the following citation:

Lu, X. (2010). Automatic analysis of syntactic complexity in second language writing. *International Journal of Corpus Linguistics*, 15(4):474-496.

**Getting Started**

TAASSC is freely available at <http://www.kristopherkyle.com/taassc.html>. Download the version that is appropriate for your operating system.

For TAASSC to work properly, you must also download and install the Java Development Kit (JDK), which is freely available at: <http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html>.

To open TAASSC on either of the compiled versions (Mac or Windows), just click on the TAASSC icon.

***Advanced:*** To open TAASSC using the Python 2.7 version, make sure that you have Python 2.7 installed on your computer (Canopy makes a nice free version of Python with a lot of useful packages pre-installed). Then, navigate to the TAASSC folder, and type: “python TAASSC\_1.3.7.py”, which will open the TAASSC GUI.

**Options**

TAASSC analyzes a number of textual aspects related to syntactic complexity and sophistication. The user can choose to include indices related to all of these aspects, or can choose to constrain the output.

The user may choose to include indices from any (or all) of the following categories:

* clause complexity
* phrase complexity
* syntactic sophistication
* aggregated component scores related to clause complexity, phrase complexity, and syntactic sophistication
* classic indices of syntactic complexity as measured by the L2 Syntactic Complexity Analyzer (L2SCA) version 3.3.3
  + Note that including SCA indices will significantly increase processing time. Consider running other desired indices first, then running SCA indices separately.

The user may also choose to output files processed by TAASSC and SCA for follow-up analyses (advanced). Output may include:

* text file databases, which include information pertaining to each clause and/or phrase in your target texts in tab-delimited format
* parsed versions of each of your target texts in xml format
  + TAASSC indices use "collapsed-ccprocessed-dependencies" in the xml files included in the “mod\_parsed” folder
  + SCA indices use the parse trees in the xml files included in the “sca\_parsed” folder

**Frequency list generation (new in TAASSC 1.3.7)**

The user may also choose to create frequency (and strength of association/contingency) lists with their own corpora. Note that frequency figures are reported both as raw frequency and normed frequency (per million constructions). Output comprises a tab-delimited .txt file that includes:

* Main verb lemma frequency (LF)
* Construction frequency (CF)
* Verb-VAC frequency (LCF)
* Verb-VAC direction (whether the verb and the construction co-occur more or less frequently than expected by chance)
* Collostructional strength (calculated via Fisher’s exact test – see Gries, Hampe, & Schönefeld, 2005) – note, only available in Python 2.7 version (and only if numpy is installed)
* Approximate collostructional strength (much faster to calculate that the original method and almost perfectly correlated)
* Faith (construction as outcome)
* Faith (verb as outcome)
* Delta P (construction as outcome)
* Delta P (verb as outcome)

The user may also choose to constrain the frequency list output by Verb-VAC frequency. Unless the user is creating a frequency list for a very small corpus, it is suggested that the minimum Verb-VAC frequency be set to at least “2”.

**Input**

All input files must be text files (.txt) that do not include any type of markup (e.g., XML, HTML, etc.). Files must be located in a single folder. TAASSC will process all .txt files in the chosen input folder. Please note the following when formatting your files:

* Input text filenames should not include spaces, quotation marks, or commas
* For best results, your texts should be in sentence case (i.e., not all lower-case or upper case).
* Any and all text in a file will be processed and factored into index scores. For accurate results, make sure no unwanted headers are included in the input files.

**Saving Your Output**

TAASSC provides output in the form of a comma-separated (.csv) file that can be opened with any spreadsheet software. The default output file name is “results.csv”, though we would recommend changing this file name each time you run TAASSC to ensure that the file is not overwritten. Syntactic components and SCA indices will be included in separate .csv files (i.e., “results\_components.csv” and “results\_sca.csv”).

**Indices**

TAASSC 1.0 calculates 372 indices in five categories: Clause complexity (32 indices), phrase complexity (132 indices), syntactic sophistication (190 indices), syntactic component scores (9 indices), and classic syntactic complexity indices (14 indices). Please see the supplementary spreadsheet file for more information. Also, see the dissertation referenced above for more information.

**Use of component scores**

Note that the component scores are computed based on standardized scores. This means that if one plans to compare data with regard to these scores, ALL data included in the analysis must be processed by TAASSC at the same time. For example, if one were to compare high and low quality essays, both the high and the low quality essays would need to be placed in the same folder to be processed by TAASSC.

**Visualization (Advanced)**

Also included at [www.kristopherkyle.com](http://www.kristopherkyle.com) is a visualization tool for analyzing dependency relations in TAASSC processed xml files (i.e., files included in the “mod\_parsed” folder). This visualization is implemented using [brat](http://brat.nlplab.org/) and requires some programming knowledge to use. To try it out, download the visualization folder from [www.kristopherkyle.com](http://www.kristopherkyle.com) and follow the instructions in the readme file.

SCA output can be visualized using [Tregex](http://nlp.stanford.edu/software/tregex.shtml). One can enter the Tregex search patterns used by SCA (e.g., clause, complex nominals, etc.), which are found in the [Python script for SCA](http://www.personal.psu.edu/xxl13/downloads/l2sca.html), to see what is identified.