



Test of Variables of Attention®

**T.O.V.A. 9.1-339
Comma-Separated Values (CSV)
File Format**

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Introduction

The T.O.V.A. version 8.0 and later is able to export session data as a “comma-separated variable” (usually abbreviated CSV) file. CSV files are like spreadsheet files, and can be opened by all well-known spreadsheet programs such as Excel, SPSS, or OpenOffice. Statistical processing tools like MATLAB, R, and Python should also have no problems opening CSV files.

The first row of a CSV file is the “header” row, which contains an alphanumeric title describing the data in the column below it. The title is usually 8 or fewer characters except for custom fields which use the field’s name as a title. Each row below the header row is a single T.O.V.A. test session, consisting of data separated by a comma. Cells with commas in them are escaped with double quotes (“”). For more information on CSV file format, please see http://en.wikipedia.org/wiki/Comma-separated_values.

Here’s an example of a raw CSV file:

```
SUBNUM,NAME,DOB,AGE,AGEYR,AGEMO,AGEDAY,GENDER,SESNUM,TDATE,TTIME,CMTS, ...
1,John Doe,1985-11-01,29.758219178082193,29,9,11,M,1,2015-08-15,12:52,, ...
2,Jane Smith,1990-10-01,25.002739726027396,25,0,12,F,2,2015-10-05,11:22,, ..
```

And on importing the data to a spreadsheet program (like Microsoft Excel) you’d expect to see something like:

	A	B	C	D	E	F	G	H	I	J	K	L
1	SUBNUM	NAME	DOB	AGE	AGEYR	AGEMO	AGEDAY	GENDER	SESNUM	TDATE	TTIME	CMTS
2	1	John Doe	1985-Nov-01	29.758219178082193	29	9	11	M	1	2015-08-15	12:52	
3	2	Jane Smith	1990-Oct-01	25.002739726027396	25	0	12	M	2	2015-10-05	11:22	
4												

The data in the comma-separated variable export from the T.O.V.A. are roughly grouped together by variable type. See the Table of Contents (above) for a list of those rough groups.

If you have any questions about this format, or using T.O.V.A. variables in statistical analyses, please don’t hesitate to contact us!

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Part 1: Subject Information

Information on the subject. For subjects with multiple sessions, the subject information is simply repeated for each session.

Note that if “Remove Protected Health Information” was left checked during the export process, all Protected Health Information (PHI) is removed (fields are present, but left blank). In the subject information variable group, PHI currently only applies to the subject’s name.

Header	Description	Range & Units
SUBNUM	Subject number: An identification number automatically assigned to T.O.V.A. subjects. Deprecated in the T.O.V.A. 8. For sessions administered with the T.O.V.A. version 7.x, SUBNUM is the T.O.V.A. 7 Group Number added to the T.O.V.A. 7 Subject Number.	0-999999
NAME	Subject Name: first name, followed by a space, followed by the last name. NOTE: This field is considered Protected Health Information (PHI) and will be cleared (left blank) if “Remove PHI” is checked during export.	String (255 char max)
DOB	Subject Date of Birth	yyyy/mm/dd [ISO date]
AGE	Subject age (on the day of testing)	03.500 - 99.999 [decimal years]
AGEYR	Subject age, years component	3 and up [integer years]
AGEMO	Subject age, months component	0-11 [integer months]
AGEDAY	Subject age, days component (within approx. \pm 1 day)	0-31 [integer days]
GENDER	Gender	M/F

Part 2: Custom Subject Fields

Custom subject fields are custom database fields that a T.O.V.A. user can create that are associated with subjects (not sessions). For example, ‘Weight’, ‘Other diagnoses’, etc.

Important: this section has a variable number of columns. Each custom subject field will create one column in the CSV file. In other words: if there are any custom subject fields in your exported file, they are included as one column per custom subject field. If there are no custom subject fields, there will be no columns in this section.

Note that if “Remove Protected Health Information” was left checked during the export process, the data in custom subject fields that were attributed as PHI will be cleared (left blank).

Header	Description	Range & Units
Custom subject field name	<i>Optional:</i> Data from custom subject field. NOTE: If this field is marked as Protected Health Information (PHI), then this field will be cleared if “Remove PHI” is checked during export.	String (255 char max)

Part 3: Session Information

Information on the session (the “test”), including date and time, tester comments, recorded treatments, and the type of T.O.V.A. test given.

Important: this section has a variable number of columns set by the number of treatments in the sessions that were export. In other words: if there are any treatments in the sessions included in the CSV file, they are included as three columns per treatment entered. For example, if one or more session has two treatments entered, then there will be six treatment columns. If there are no treatments in any exported sessions, then there will be no treatment columns.

Header	Description	Range & Units
SESNUM	Session Number (may not be available)	1-99 [integer]
TDATE	Date of test (local)	yyyy/mm/dd [ISO date]
TTIME	Time of test (local)	hh:mm, 00:00 - 23:59 [ISO time]
CMTS	Session comments: Notes on the session, with carriage returns and line feeds stripped out.	String (1024 char max)
TRTNAMi	<i>Optional:</i> Treatment #i name: This is either the medication name or the more generic “Treatment” field where the user can record information on the treatment being monitored by this particular session.	String (255 char max).
TRTCHAI	<i>Optional:</i> Treatment #i challenge medication status: A flag indicating if this session is being used to monitor a specific short-acting treatment (e.g., an “on” medication trial).	‘TRUE’ or ‘FALSE’
TRTDOSi	<i>Optional:</i> Treatment #i dosage: Dosage of a medication (or treatment).	0-999.99 [mg]
TRTINTi	<i>Optional:</i> Treatment #i medication-test interval: The length of time from when the subject took the medication to the beginning of the test session.	0-99.9 [hours]
TESTER	Name or identifier of user administering the T.O.V.A. session	String (255 char max)
TTYPE	Test Type: either visual or auditory test	‘V’ or ‘A’
TFORM	Test Format #: Which format of the T.O.V.A. test was administered. The standard form, #1, is the standard 21.6-minute test used for ages 6.0 years and above. The short form, #6, is the short 10.8-minute test used for ages less than 6.0 years.	0-9 [integer]

Part 4: Session Format Details Information

Information on the T.O.V.A. session type, format, and testing details, including the T.O.V.A. version information.

Header	Description	Range & Units
ISI	Inter-Stimulus Interval: Time between stimuli. Default: 2000 ms.	0-9999 [ms]
STIMON	Stimulus on time: Time from the start of the ISI (where time = 0) to when the stimulus will be presented. Default: 200 ms.	0-9999 [ms]
STIMOFF	Stimulus off time: Time from the start of the ISI (where time = 0) to when the stimulus will be turned off. Default: 300 ms.	0-9999 [ms]
ANTTIME	Anticipatory cutoff time: Time from the STIMON time (the presentation of the stimuli) to the longest response to be considered an anticipatory response. Default: 150 ms.	0-9999 [ms]
VERSION	Software version: Version of the T.O.V.A. test that administered the test. Typical values include '6.08', '7.0.3', 'HT1.1', '7.1', '7.2', '7.3', '8.X-XX-gXXXXXXXXX'.	Fixed strings (255 char max)
SERIAL	Hardware serial #: the serial number of the T.O.V.A. test that administered the test.	000000 - 999999 (6 digits)
USERTYPE	User type: Either 'clinical' or 'screening'	Fixed strings (255 char max)
CALMEAN	Calibration data mean: the mean value of the screen calibration data. Note that response times already have this delay subtracted; this value is for reference only.	floating point [s]
CALSTATE	Calibration data outcome: the success or failure of the calibration algorithm. Typical results are: GOOD, MORE_DATA, BAD.SLOPE, BAD_VAR, BAD_TIME, BAD_ZEROS.	Fixed strings (255 char max)
FILNAME	Imported filename: the filename of the session if the session was imported into the T.O.V.A. (typically a T.O.V.A. 7 filename).	String (255 char max)

Part 5: Custom Session Fields

Custom session fields are custom database fields that a T.O.V.A. user can create that are associated with sessions (not subjects). For example, 'Sleep the night before', 'Coffee intake', etc.

Important: this section has a variable number of columns. Each custom session field will create one column in the CSV file. In other words: if there are any custom session fields in your exported file, they are included as one column per custom session field. If there are no custom session fields, there will be no custom session field columns.

Note that if "Remove Protected Health Information" was left checked during the export process, the data in custom session fields that were marked as PHI will be cleared (left blank).

Header	Description	Range & Units
Custom session field name	<i>Optional:</i> Data from custom session field. NOTE: If this field is marked as Protected Health Information (PHI), then this field will be cleared if "Remove PHI" is checked during export.	String (255 char max)

Part 6: Conversion Information

The version information on the T.O.V.A. software that created the CSV file.

Header	Description	Range & Units
CVERSN	Converter Version: this is version of the T.O.V.A. software that exported the CSV file. In the form of '8.X-XX-gXXXXXXXX'.	Fixed string (255 char max)

Part 7: Tabulated Data

These columns are the tabulated raw data for the test, and is *not* the comparison to the norming study.

Each variable is tabulated into seven data "blocks": Quarters 1 to 4, Half 1 and 2, and the Total, indicated by the suffixes Q1, Q2, Q3, Q4, H1, H2 or T. For example, "CORRSPxx" becomes "CORRSPQ1", "CORRSPQ2", "CORRSPQ3", "CORRSPQ4", "CORRSPH1", "CORRSPH2", and "CORRSPT".

Header	Description	Range & Units
CORRSPxx	# of Correct Trials: responses to targets and nonresponses to nontargets	Integer
CORTGTxx	# of Correct responses: responses to targets	Integer
CORNONxx	# of Correct nonresponses: nonresponses to nontargets	Integer
COMERRxx	# of Commission Errors: responses to nontargets	Integer
COMPERxx	% of Commission Errors	Floating point, 0 - 1
COMPSTxx	# of Post-Commission Error responses: a correct response immediately after a commission error	Integer
OMERRxx	# of Omission Errors: nonresponse to a target	Integer
OMPERxx	% of Omission Errors	Floating point, 0 - 1
ANTERRxx	# of Anticipatory Responses: a response before the ability to distinguish target from nontarget	Integer
ANTPERxx	% of Anticipatory Responses	Floating point, 0 - 1
ANTTGTxx	# of Anticipatory Responses to targets	Integer
ANTNONxx	# of Anticipatory Responses to nontargets	Integer
MULTxx	# of Multiple responses: multiple microswitch pushes in one stimulus interval	Integer
UINTxx	# of user interrupts: The times in each block that session was interrupted by the user pressing 'Esc'.	Integer
HDWERRxx	# of session interruptions caused by a hardware errors.	Integer

Part 8: Receiver Operator Characteristics

These columns are the raw receiver operator characteristics (ROC) analysis for the session.

Each variable is tabulated into seven “blocks”: Quarters 1 to 4, Half 1 and 2, and the Total, indicated by the suffixes Q1, Q1, Q2, Q3, Q4, H1, H2 or T. For example, “DPRIMExx” becomes “DPRIMEQ1”, “DPRIMEQ2”, “DPRIMEQ3”, “DPRIMEQ4”, “DPRIMEH1”, “DPRIMEH2”, and “DPRIMET”.

Header	Description	Range & Units
DPRIMExx	D prime	Floating point
BETAxx	Beta	Floating point

Part 9: Response Times

These columns are the raw response time analysis for the session.

Each variable is tabulated into seven “blocks”: Quarters 1 to 4, Half 1 and 2, and the Total, indicated by the suffixes Q1, Q1, Q2, Q3, Q4, H1, H2 or T. For example, “RTMEANxx” becomes “RTMEANQ1”, “RTMEANQ2”, “RTMEANQ3”, “RTMEANQ4”, “RTMEANH1”, “RTMEANH2”, and “RTMEANT”.

Header	Description	Range & Units
RTMEANxx	Correct Response Time Mean: the mean response time of the correct responses.	Floating point [sec]
RTVARxx	Correct Response Time Variability: the first standard deviation of the correct response times.	Floating point [sec]
PCRTMxx	Post-commission Response Time Mean: the mean response time of a correct response that occurred <i>immediately</i> after a commission error.	Floating point [sec]
PCRTVxx	Post-commission Response Time variability: the first standard deviation of the correct response times that occurred <i>immediately</i> after a commission error.	Floating point [sec]
CERTMxx	Commission Response Time Mean: the mean response time of commission errors.	Floating point [sec]
CERTVxx	Commission Response Time variability: the first standard deviation of the response times of commission errors.	Floating point [sec]
EXGMUxx	ExGaussian Mu: The mean response time of the correct responses, modeled using the ExGaussian distribution.	Floating point [sec]
EXGSIGxx	ExGaussian Sigma: The variability of the correct response times, modeled using the ExGaussian distribution.	Floating point [sec]
EXGTAUxx	ExGaussian Tau: The exponential decay (or “right hand tail”) of the correct response times, modeled using the ExGaussian distribution.	Floating point [sec]
MODExx	Correct response mode: Mode of the correct response times.	Floating point [sec]
SKEWxx	Correct response Deviation: Deviation from the mode for correct response times.	Floating point [sec]

Part 10: Comparison Scores: Standard Scores and Z Scores

These variables are the comparison of the tabulated raw data to the T.O.V.A. norming study. They are presented as both standard scores and as standard deviations from the mean.

Each variable is tabulated into seven “blocks”: Quarters 1 to 4, Half 1 and 2, and the Total, indicated by the suffixes Q1, Q1, Q2, Q3, Q4, H1, H2 or T. For example, “VARSSxx” becomes “VARSSQ1”, “VARSSQ2”, “VARSSQ3”, “VARSSQ4”, “VARSSH1”, “VARSSH2”, and “VARSSST”.

Some notes:

- It is important to remember that H1, H2 and T are not a simple average of the quarters or halves - they are recalculations of the data set for that block and thus may be quite different from an average of their sub-blocks.
- The norming study used to create the spreadsheet file is the latest T.O.V.A. norming study. Do not be surprised if the variables in the file have slightly to significantly different values from older versions of the T.O.V.A. (e.g., 7.0.3). Numbers in the norming study change, for example, when the norming population is increased or any smoothing or other statistical work is done (as indicated in the latest version of the T.O.V.A. Professional Manual).
- Be aware that the T.O.V.A. rounds its data for the human-readable report, while this conversion file keeps many more significant figures since they may be used in future calculations.
- In the T.O.V.A. report, all analysis variables using are marked “< 0” and “> 160” for all standard scores below 0 SS and above 160 SS respectively. In this conversion file, the *directly calculated* standard scores are given and thus *no* limits are placed on the numeric values. In extreme cases, this leads to unlikely numbers in the analysis variables, e.g., negative standard scores and huge standard deviations. *It is up to the researcher to decide if any of the analysis variables should be numerically limited.*
- **There are many reasons why an analysis may be considered “invalid”, in the sense that a clinician should use caution when interpreting the data. It is up to the researcher to decide if an invalid analysis variable should be used in their research study. Note that validity can be checked using the validation variables (see Part 14 below).**

Header	Description	Range & Units
VARSSxx	Standard score of response time variability	Floating point [std score]
RTMSSxx	Standard score of mean response time	Floating point [std score]
COMSSxx	Standard score of commission errors	Floating point [std score]
OMSSxx	Standard score of omission errors	Floating point [std score]
DPRSSxx	Standard score of D prime	Floating point [std score]

Header	Description	Range & Units
VARZxx	Z score (standard deviation) of response time variability	Floating point [std dev]
RTMZxx	Z score (standard deviation) of mean response Time	Floating point [std dev]
COMZxx	Z score (standard deviation) of commission errors	Floating point [std dev]
OMZxx	Z score (standard deviation) of omission errors	Floating point [std dev]
DPRZxx	Z score (standard deviation) of D prime	Floating point [std dev]

Part 11: Performance Validity (PV)

Performance validity is a flag for unusual performance on the T.O.V.A., such as poor effort, malingering, and fake bad.

Note that the Symptom Exaggeration Index (SEI) from T.O.V.A. 8.0 and 8.1 has been deprecated in favor of Performance Validity (PV) in the T.O.V.A. 8.2 and later.

PV is only valid for visual T.O.V.A. tests given to subjects ages 17 and up.

Header	Description	Range & Units
SEI1	<i>Deprecated:</i> SEI Rule 1: If $(O(T) < -4 \text{ SD})$ OR $(C(T) < -4 \text{ SD})$	Boolean, 0,1
SEI2	<i>Deprecated:</i> SEI Rule 2: If $(V(T) > 180 \text{ ms})$	Boolean, 0,1
SEI3	<i>Deprecated:</i> SEI Rule 3: If $(C\#(T) > 6)$ and $(CERT(T) \geq RT(T))$	Boolean, 0,1
SEI4	<i>Deprecated:</i> SEI Rule 4: If $(PC\#(T) > 6)$ and $(PCRT(T) \leq RT(T))$	Boolean, 0,1
SEITOTAL	<i>Deprecated:</i> SEI Score: the addition of rules SEI1 through SEI4	Integer, 0-4
SEISTATE	<i>Deprecated:</i> SEI State: See "PV and SEI State" table below.	Fixed string (255 char max)
PV1	PV Rule 1: If number of omission errors (total) > 30	Boolean, 0,1
PV2	PV Rule 2: If number of commission errors (total) > 10	Boolean, 0,1
PV3	PV Rule 3: If response time skew (half 2) is > 150 ms	Boolean, 0,1
PV4	PV Rule 4: If number of commission errors (half 2) > 6 and commission error response time (CERT) (half 2) - mean response time (half 2) is > 75 ms	Boolean, 0,1
PVSTATE	PV State: See "PV and SEI State" table below.	Fixed string (255 char max)

Possible outcome states for the SEI and PV are:

PV (and SEI) State	Description
NA-AGE	The PV (and SEI) is not applicable to subjects younger than 17 years old.
NA-NORMAL	The PV (and SEI) is not applicable to normal T.O.V.A. results.
NA-AUDITORY	The PV (and SEI) is not yet applicable to auditory tests.
OK	The PV score was 0: No unusual pattern of performance.
CAUTION	The PV score was ≥ 1 : An unusual pattern of performance was detected.
OK	The SEI score was 0 or 1: "No evidence" of possible symptom exaggeration.
NOTE	The SEI score was 2: "Some evidence" of possible symptom exaggeration.
CAUTION	The SEI score was 3: "Strong evidence" of possible symptom exaggeration.
WARNING	The SEI score was 4: "Very strong evidence" of possible symptom exaggeration.

Part 12: Experimental Indices

This section contains experimental statistics and indices used in research. Please contact us for more information if you're interested in adding more scores to the T.O.V.A. CSV export.

Header	Description	Range & Units
IMPINDxx	Impulsivity Index: standard score of mean response time divided by the standard score of commission errors (experimental)	FP

Part 13: Comparison Summaries and States

These columns are the conclusions of the T.O.V.A.'s interpretation algorithms for each block, as well as a summary of the state of the entire test.

Variables with the 'xx' suffix are tabulated into seven blocks: Quarters 1 to 4, Half 1 and 2, and the Total, indicated by the suffixes Q1, Q2, Q3, Q4, H1, H2 or T. For example, NRMSTxx becomes NRMSTQ1, NRMSTQ2, NRMSTQ3, NRMSTQ4, NRMSTH1, NRMSTH2, and NRMSTT.

Header	Description	Range & Units
NRMSTxx	Norming study comparison state: Interpretation of the subject's performance with the T.O.V.A. normative study. Possible values are: NORMAL, BORDERLINE, and NWNL (not within normal limits).	Fixed string (255 char max)
MAXNRMST	Summary, or "worst case", value across all blocks of the norming state: Possible values are: NORMAL, BORDERLINE, and NWNL (not within normal limits).	Fixed string (255 char max)
ACS	Attention Comparison Score: a composite cutoff score comparing the subject's performance to a study of independently diagnosed ADHD individuals (was called the Attention Performance Index, or API, in previous T.O.V.A. versions).	Floating point [sum of std devs]
ACSTATE	ACS state: Interpretation of the ACS. Possible values are: NORMAL, NWNL (not within normal limits), NA-TYPE (Not applicable because of an auditory session), and NA-DATA (not applicable because of lack of data)	Fixed string (255 char max)
COMPSUM	Summary of the Comparison Analysis: combines "worst case" values of the norming study comparison state and the ACS. Possible values are: WNL (within normal limits) or NWNL (not within normal limits)	Fixed string (255 char max)

Part 14: Session and Response Validity

This section gives session and response validity flags for T.O.V.A. test and its blocks (quarters, halves and total). These validity indicators allow you to prune out T.O.V.A. sessions that may not be valid. Deciding on exactly which validity states to accept is highly dependent on what population you are studying and the goals of your research.; we strongly encourage you to contact us to discuss what might be best for your study.

Variables with the 'xx' suffix are tabulated into seven blocks: Quarters 1 to 4, Half 1 and 2, and the Total, indicated by the suffixes Q1, Q2, Q3, Q4, H1, H2 or T. For example, BLKVALxx becomes BLKVALQ1, BLKVALQ2, BLKVALQ3, BLKVALQ4, BLKVALH1, BLKVALH2, and BLKVALT.

Header	Description	Range & Units
BLKVALxx	Block Validity: the validity of the data in each block See "Block Validity" table below.	String (255 char max)
RSPVALxx	Subject response validity: the validity of the subject's response data in each block. See "Response Validity" table below.	String (255 char max)
MAXRSPVL	Maximum value ("worst case") of the Response validity across all blocks. See "Response Validity" table below.	String (255 char max)
SESSVAL	T.O.V.A. session validity: the validity of the test administration compared to the norming study. See "Session validity" table below.	String (255 char max)

Block Validity can be:

Block Validity	Description
OK	There are no block validity issues with this session.
INTERRUPTED	There are serious validity issues with this block because of one or more test interruptions. This block has all of its trials, and may be used for analysis.
INCOMPLETE	There are serious validity issues with this block because the test was interrupted and trial data is missing. Because this block has greater than 50 % of the trials, it may be used for analysis.
UNUSABLE	This block is unusable for analysis because less than 50 % of the trials in this block have data (the block was interrupted and not restarted).
EMPTY	This block is unusable for analysis because there are no trial data in this block (this block was never started).

Response Validity can be:

Response Validity	Description
OK	There are no subject response validity issues with this block.
CAUTION	The subject's responses may be invalid: either the anticipatory response rate is uncharacteristically high (> 10 %) or there were less than 25 % correct responses in this block.

Session Validity can be:

Session Validity	Description
OK	There are no validity issues with this session.
CAUTION	There are serious validity issues with this session compared to the norms. This state is caused by test interruptions, such as a user interrupt or hardware error interrupt.
SCORED.DATA.ONLY	Only raw scores and tabulated data are available; no comparison to the norms or ADHD study is possible. This state is caused by invalid test parameters, such as the wrong test format for a given age, different ISI timing, etc.