

Tornado Plots

Tornado plots display the range of parameter under a variety of conditions, *e.g.*, *post hoc* estimates or the impact of a particular covariate on that parameter. An example is displayed in **Figure 1**. **PLT Tools** can create tornado plots. However, the user needs to provide information regarding the content and appearance of the graphic. This information is provided by the user in the form of a text file named `TornadoCommands.txt` that is located in the folder `POSTPROCESSING/TORNADO.SCRIPT`.

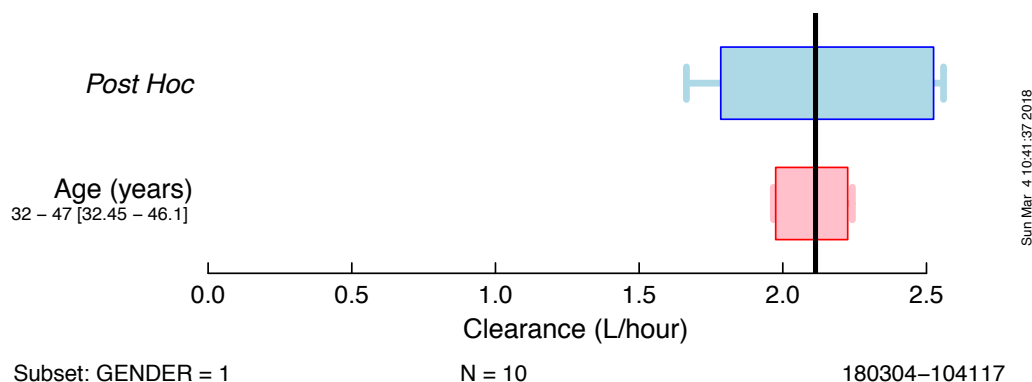


Figure 1. A sample tornado plot.

Creating the tornado graphic requires that the user do all of the following:

1. A Graphics Script must exist and it must contain the parameters and covariates relevant to this graphic
2. A `FirstRecords` file must exist for that run and it must contain several elements that might not normally exist. For example, consider a `$PK` block containing the following code:

```
AGEFACTOR = 1 + (AGE - MEDIANAGE) * THETA(2)
TVCL      = THETA(1)
CL        = TVCL * AGEFACTOR * EXP(ETA(1))
```

The `FirstRecords` file must contain each of the following:

```
TVCL      # population value
CL        # post hoc values
AGEFACTOR # effect of age on CL
```

Note that both TV (typical value) of clearance (*i.e.*, before incorporation of ETA) and clearance (after incorporation of ETA) must appear in the `FirstRecords` file.

The contents of `TornadoCommands.txt` are:

TAG	Required	Refers to File	Column or Context
TV	yes	<code>FirstRecords</code>	population value, in this case TVCL
POSTHOC	yes	<code>FirstRecords</code>	<i>post hoc</i> values, in this case CL
COVAR	yes	Covariate/ <code>FirstRecords</code>	First entry: covariate values Second entry: effect of covariate Third entry: Label for covariate

SUBSET	no	Covariate	First entry: covariate to select a subset Second entry: covariate value to apply
LABEL	yes	—	Label to appear in graphic (text)
PLUS	no	—	If the covariates are entered into the model by addition rather than multiplication, <i>e.g.</i> , $CL = (TVCL + AGEFACTOR + WTFACOR) * EXP(ETA(1))$
KEEP.NEG	no	Covariate	Do not replace covariates values < 0 with median of the remaining values
PERCENTILE	no	—	Calculate a confidence interval other than 5-95

A sample file contains the following:

```
PERCENTILE  2.5           ; calculate CI from 2.5-97.5 (rather than 5-95)
SUBSET                               ; subset includes all subjects
SUBSET      PLTGENDER      1       ; contains subjects with gender=1
SUBSET      PLTGENDER      2       ; contains subjects with gender=2
TV          TVCL           ; column containing typical value
POSTHOC     CL             ; column containing post hoc values
LABEL Clearance (L/hour)
COVAR PLTAGE      CLAGE Age (years) ; see footnote
```

Footnote: COVAR tags are followed by three entries:

1. Column name in the Covariates file that contains the covariate, *e.g.*, the subjects' weight
2. Column name in the FirstRecords file that contains the effect of that covariate on the typical value, *e.g.*, WTFCTR (see sample NONMEM code above).
3. The label that appears in the graphic

Note that **PLT Tools** converts the names of "reserved" covariates in the covariates file (but only if a covariates file is created by **PLT Tools**). For example, if the FirstRecords file contains SEX and the Graphics Script identifies this as Gender (in the Covariates tab), it is necessary to use PLTGENDER rather than SEX in the TornadoCommands.txt file. Other reserved covariate names are age (PLTAGE), weight (PLTWT), height (PLTHT), and race (PLTRACE).

Covariate values less than 0: Some data analysts code missing covariate values with a negative number, *e.g.*, -1 or -99. **PLT Tools** recognizes these as missing values and does not include them in certain analyses. The default for the tornado plot is to exclude these values, replacing them with the median of the remaining values. If the negative values should be preserved, add "KEEP.NEG" (without quotes) in the TornadoCommands.txt file.

The following rules **must** be followed in the creation of the TornadoCommands.txt file:

1. Field separators: Each of the entries must be separated by a single tab. No spaces or tabs should appear to the left of the tag.
2. If a semicolon (;) appears on any row, the semicolon and all text that follows is deleted. Therefore, semicolons cannot should be used only in comments.

Labels are on y-axis are:

1. *Post hoc* appears first

2. For each covariate, the names of the covariate appears above numeric values. The numeric values are range, followed by percentile values for that covariate (*e.g.*, percentile 5 — percentile 95, unless the user has selected other percentiles using the `PERCENTILE` command in the `TornadoCommands.txt` file).

Tornado graphics are created under two different circumstances:

1. Once a `TornadoCommands.txt` file exists, every time NONMEM is run, **PLT Tools** attempts to create the graphic.
2. The user can request that a tornado plot be created by clicking on the `Tornado Plot` button in the "Prepare a Report" tab.

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