CIs on mxAlgebra

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Multiplied by 2: slight differences on both `lbound` and `ubound`

```
library(OpenMx)
```

```
## To take full advantage of multiple cores, use:
##   mxOption(NULL, 'Number of Threads', parallel::detectCores()) #now
##   Sys.setenv(OMP_NUM_THREADS=parallel::detectCores()) #before library(OpenMx)
```

```
set.seed(1000)

my.df <- data.frame(x=rnorm(100, mean=0, sd=1))

mu <- mxMatrix(type="Full", nrow=1, ncol=1,
               free=TRUE, values=0, labels="mean", name="mu")
sigma <- mxMatrix(type="Symm", nrow=1, ncol=1,
                  free=TRUE, values=1, labels="variance", name="sigma")

expectation <- mxExpectationNormal(covariance="sigma", means="mu", dimnames = "x")

model2 <- mxModel("Two", mxData(my.df, type="raw"), expectation,
                  mxFitFunctionML(), mu, sigma,
                  mxAlgebra(variance*2, "two_variance"),
                  mxCI(c("variance", "two_variance")))
fit2 <- mxRun(model2, intervals = TRUE)
```

```
## Running Two with 2 parameters
```

```
CI2 <- summary(fit2)$CI

CI2.diff <- data.frame(t(CI2[, 1:3]))
CI2.diff$variance_x2 <- 2*CI2.diff[, 1]
CI2.diff$diff <- CI2.diff[, 2] - CI2.diff[, 3]
CI2.diff
```

```
##           variance Two.two_variance.1.1. variance_x2          diff
## lbound   0.7693044              1.537972    1.538609 -0.0006373491
## estimate 1.0030992              2.006198    2.006198  0.0000000000
## ubound   1.3427832              2.688370    2.685566  0.0028032732
```

Multiplied by 5: slight difference on the `lbound` and `NA` on the `ubound`

```
model5 <- mxModel("Five", mxData(my.df, type="raw"), expectation,
                  mxFitFunctionML(), mu, sigma,
                  mxAlgebra(variance*5, "five_variance"),
```

```
                  mxCI(c("variance", "five_variance")))
fit5 <- mxRun(model5, intervals = TRUE)
```

```
## Running Five with 2 parameters
```

```
CI5 <- summary(fit5)$CI

CI5.diff <- data.frame(t(CI5[, 1:3]))
CI5.diff$variance_x5 <- 5*CI5.diff[, 1]
CI5.diff$diff <- CI5.diff[, 2] - CI5.diff[, 3]
CI5.diff
```

```
##           variance Five.five_variance.1.1. variance_x5         diff
## lbound   0.7693044                3.840211    3.846522 -0.006311445
## estimate 1.0030992                5.015496    5.015496  0.000000000
## ubound   1.3427832                      NA    6.713916           NA
```

Multiplied by 10: `NA` in both `lbound` and `ubound`

```
model10 <- mxModel("Ten", mxData(my.df, type="raw"), expectation,
                  mxFitFunctionML(), mu, sigma,
                  mxAlgebra(variance*10, "ten_variance"),
                  mxCI(c("variance", "ten_variance")))
fit10 <- mxRun(model10, intervals = TRUE)
```

```
## Running Ten with 2 parameters
```

```
CI10 <- summary(fit10)$CI

CI10.diff <- data.frame(t(CI10[, 1:3]))
CI10.diff$variance_x10 <- 10*CI10.diff[, 1]
CI10.diff$diff <- CI10.diff[, 2] - CI10.diff[, 3]
CI10.diff
```

```
##           variance Ten.ten_variance.1.1. variance_x10 diff
## lbound   0.7693044                    NA     7.693044   NA
## estimate 1.0030992              10.03099    10.030992    0
## ubound   1.3427832                    NA    13.427832   NA
```

```
sessionInfo()
```

```
## R version 3.6.0 (2019-04-26)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Ubuntu 18.04.2 LTS
##
## Matrix products: default
## BLAS:   /usr/lib/x86_64-linux-gnu/blas/libblas.so.3.7.1
## LAPACK: /usr/lib/x86_64-linux-gnu/lapack/liblapack.so.3.7.1
##
## locale:
##  [1] LC_CTYPE=en_SG.UTF-8       LC_NUMERIC=C
##  [3] LC_TIME=en_SG.UTF-8        LC_COLLATE=en_SG.UTF-8
##  [5] LC_MONETARY=en_SG.UTF-8    LC_MESSAGES=en_SG.UTF-8
##  [7] LC_PAPER=en_SG.UTF-8       LC_NAME=C
##  [9] LC_ADDRESS=C               LC_TELEPHONE=C
```

```
## [11] LC_MEASUREMENT=en_SG.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] OpenMx_2.12.2
##
## loaded via a namespace (and not attached):
##  [1] Rcpp_1.0.1      lattice_0.20-38 digest_0.6.18   MASS_7.3-51.1
##  [5] grid_3.6.0      magrittr_1.5    evaluate_0.13   stringi_1.4.3
##  [9] Matrix_1.2-17   rmarkdown_1.12  tools_3.6.0     stringr_1.4.0
## [13] xfun_0.7        yaml_2.2.0      parallel_3.6.0  compiler_3.6.0
## [17] htmltools_0.3.6 knitr_1.22
```