

ggformula/lattice Comparison

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Introduction

This document is intended to help users of the `mosaic` package migrate their `lattice` package graphics to `ggformula`. The `mosaic` package provides a simplified and systematic introduction to the core functionality related to descriptive statistics, visualization, modeling, and simulation-based inference required in first and second courses in statistics. Originally, the `mosaic` package used `lattice` graphics but now support is also available for the improved `ggformula` system.

References

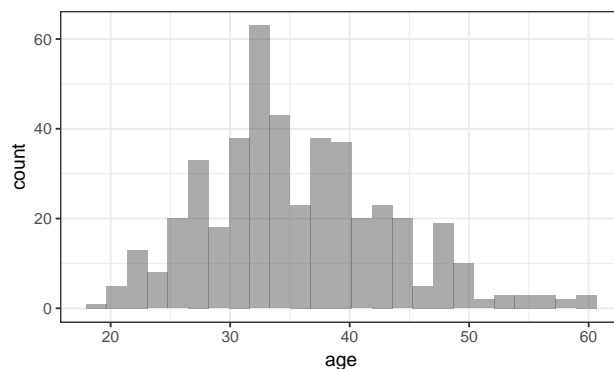
More information about `ggformula` can be found at <https://github.com/ProjectMOSAIC/ggformula>.

More information regarding Project MOSAIC (Kaplan, Pruim, and Horton) can be found at <http://www.mosaic-web.org>. Further information regarding the `mosaic` package can be found at <https://github.com/ProjectMOSAIC/mosaic> and <https://journal.r-project.org/archive/2017/RJ-2017-02>.

Examples of how to bring multidimensional graphics into day one of an introductory statistics course can be found at <http://escholarship.org/uc/item/84v3774z>.

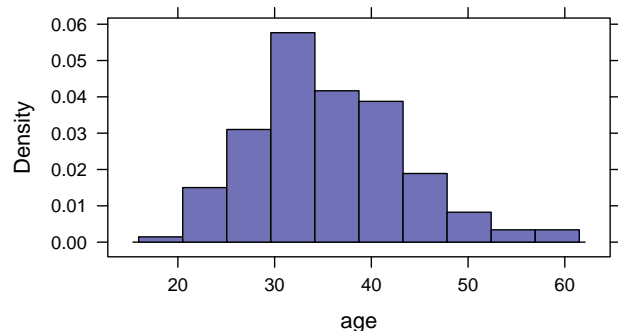
Histograms (ggformula)

```
library(mosaic) # also loads ggformula
gf_histogram(~ age, data = HELPrct)
```



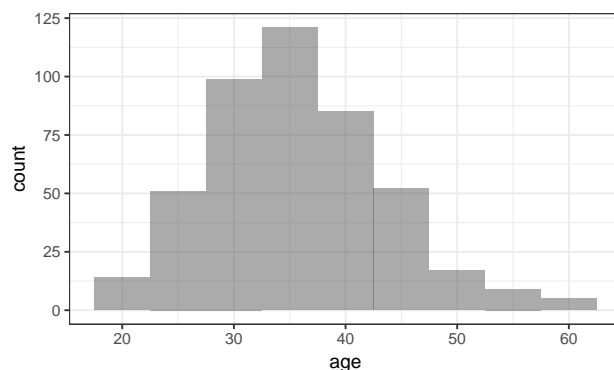
Histograms (lattice)

```
library(mosaic) # also loads lattice
histogram(~ age, data = HELPrct)
```



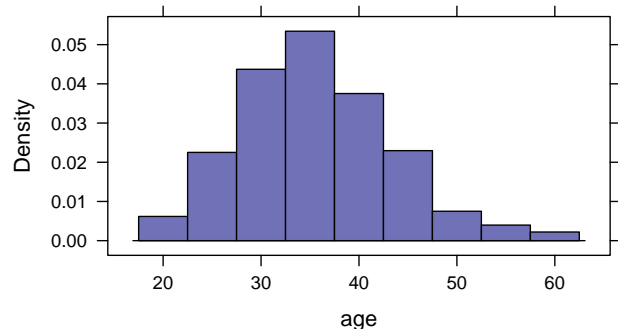
Histogram options (ggformula)

```
gf_histogram(~ age, data = HELPrct,
             binwidth = 5)
```



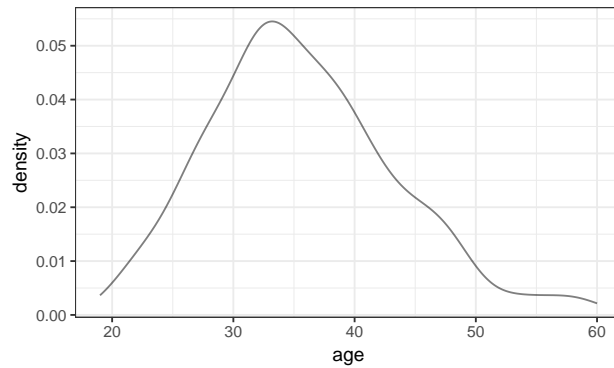
Histogram options (lattice)

```
histogram(~ age, width = 5, data = HELPrct)
```



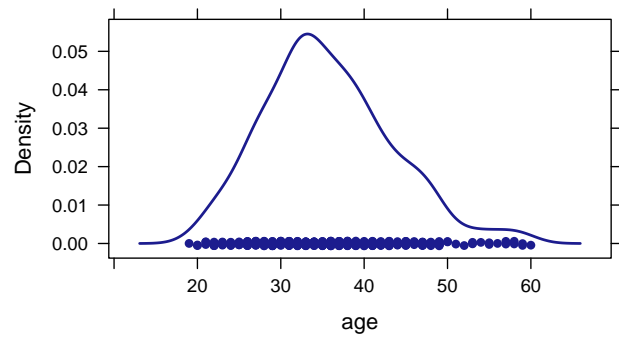
Density plots (ggformula)

```
gf_dens(~ age, data = HELPrct)
```



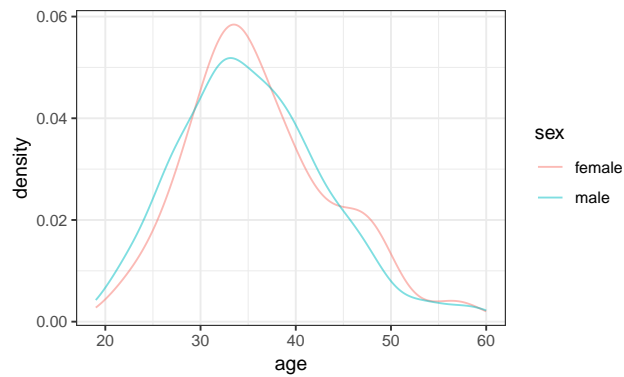
Density plots (lattice)

```
densityplot(~ age, data = HELPrct)
```



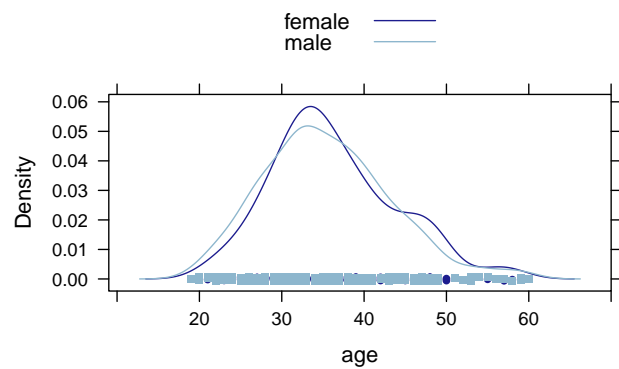
Overlaid density plots (ggformula)

```
gf_dens(~ age, data = HELPrct,
        color = ~ sex)
```



Overlaid density plots (lattice)

```
densityplot(~ age, data = HELPrct,
            groups = sex, auto.key = TRUE)
```

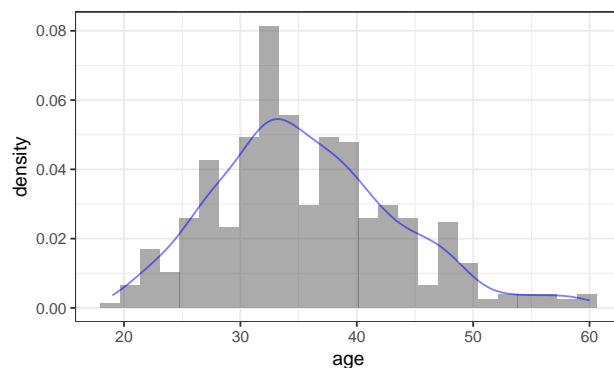


Density over histograms (ggformula)

We can use stacked layers to add a density curve based on a maximum likelihood fit or a kernel density estimate (see also `gf_dist()`)

```
gf_dhistogram( ~ age, data = HELPrct,
               alpha = 0.5) %>%
  gf_fitdistr(color = "red",
              dist = dnorm) %>% # MLE
  gf_dens(color = "blue")      # KDE
```

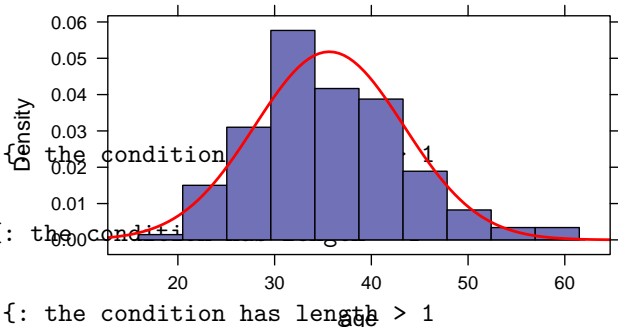
```
## Warning in if (grepl("^pois", dist_name)) {
## and only the first element will be used
## Warning in if (!grepl("^d", ddist_name)) {: the condition
## and only the first element will be used
## Warning in if (distname %in% c("dlnorm")) {: the condition has length > 1
## and only the first element will be used
## Warning in if (distname == "dnorm") {: the condition has length > 1 and
## only the first element will be used
## Warning in if (distname == "poisson") {: the condition has length > 1 and
## only the first element will be used
## Warning in if (distname == "dexp") {: the condition has length > 1 and only
## the first element will be used
## Warning in if (distname == "dgeom") {: the condition has length > 1 and
## only the first element will be used
## Warning: Computation failed in `stat_fitdistr()`:
## EXPR must be a length 1 vector
```



Density over histograms (lattice)

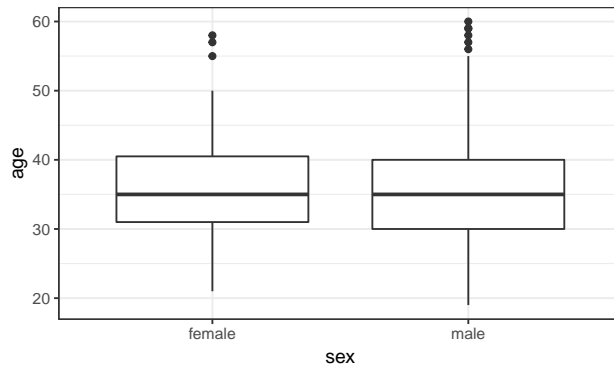
`mosaic` makes it easy to add a fitted distribution to a histogram.

```
histogram(~ age, data = HELPrct,
          fit = "normal", dcol = "red")
```



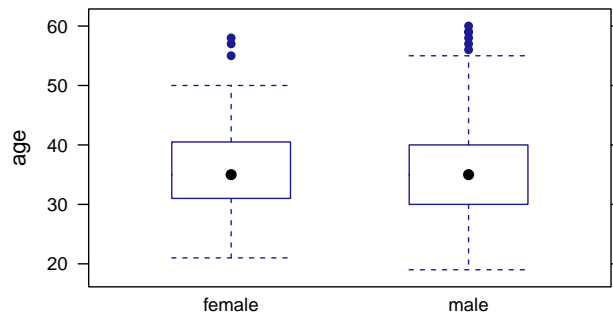
Side by side box plots (ggformula)

```
gf_boxplot(age ~ sex, data = HELPrct)
```



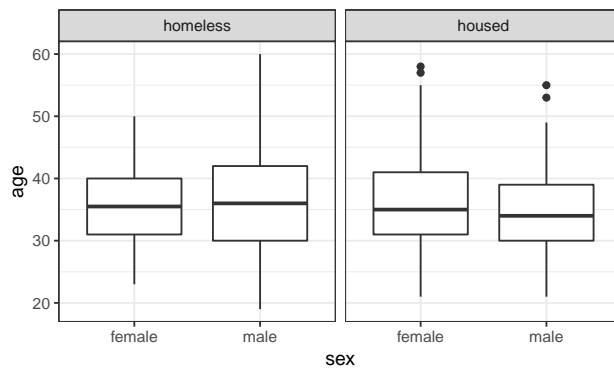
Side by side plots (lattice)

```
bwplot(age ~ sex, data = HELPrct)
```



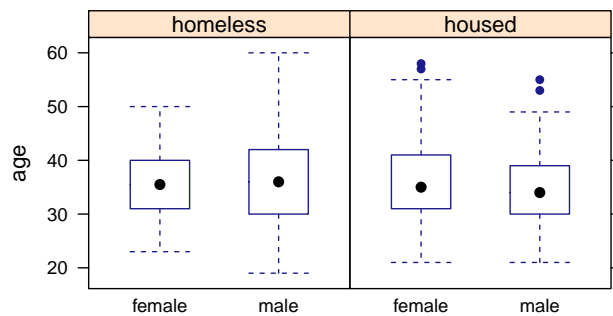
Faceted side by side box plots (ggformula)

```
gf_boxplot(age ~ sex | homeless, data = HELPrct)
```



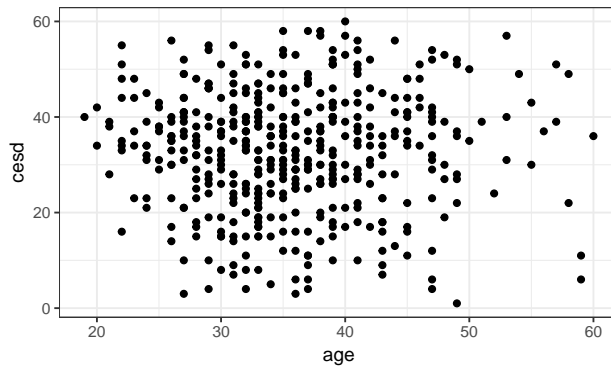
Faceted side by side plots (lattice)

```
bwplot(age ~ sex | homeless, data = HELPrct)
```



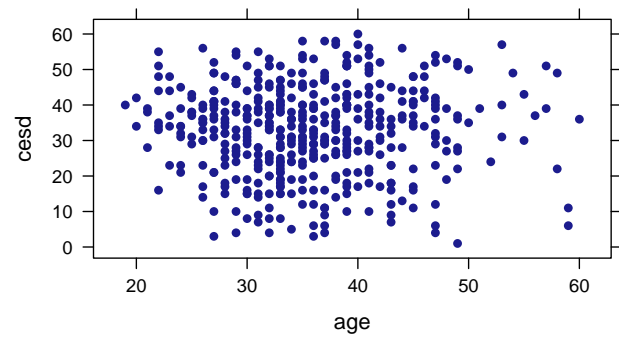
Scatterplot (ggformula)

```
gf_point(cesd ~ age, data = HELPrct)
```



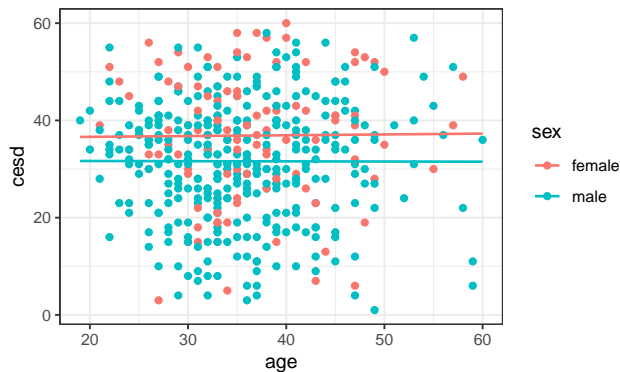
Scatterplot (lattice)

```
xyplot(cesd ~ age, data = HELPrct)
```



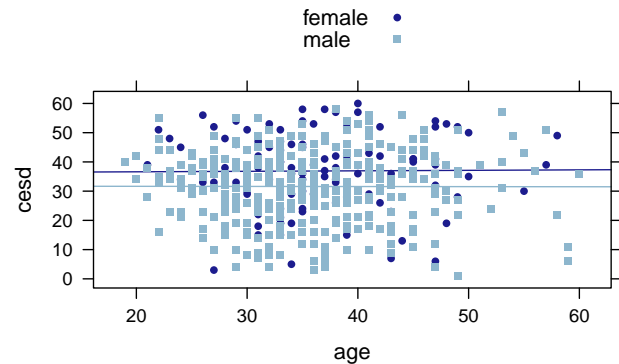
Overlaid scatterplot with linear fit (ggformula)

```
gf_point(cesd ~ age, data = HELPrct,
         color = ~ sex) %>%
  gf_lm()
```



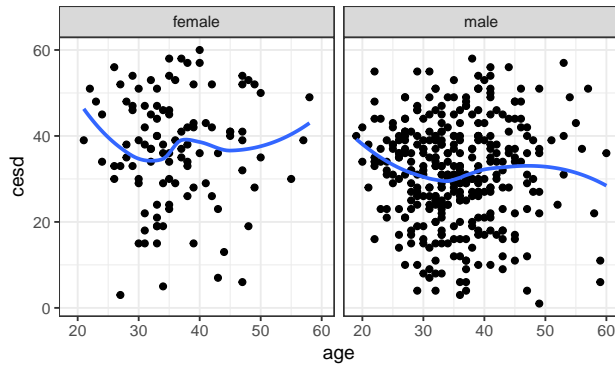
Overlaid scatterplot with linear fit (lattice)

```
xyplot(cesd ~ age, data = HELPrct,
       groups = sex,
       type = c("p", "r"),
       auto.key = TRUE)
```



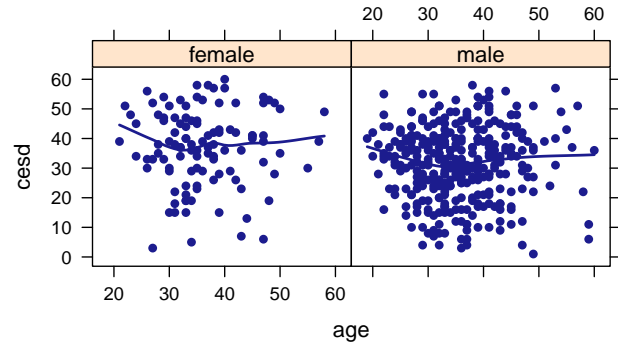
Faceted scatterplot with smooth fit (ggformula)

```
gf_point(cesd ~ age | sex,
         data = HELPrct) %>%
  gf_smooth(se = FALSE)
```



Faceted scatterplot with smooth fit (lattice)

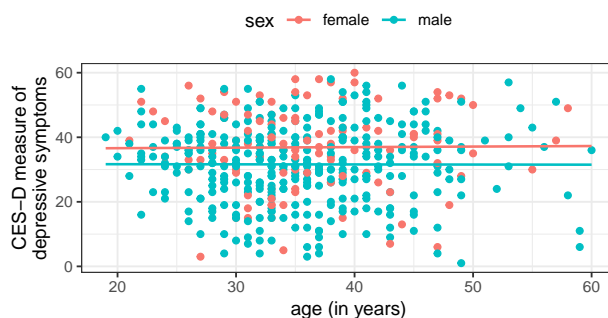
```
xyplot(cesd ~ age | sex, data = HELPrct,
       type = c("p", "smooth"),
       auto.key = TRUE)
```



More options for scatterplot with linear fit (ggformula)

```
gf_point(cesd ~ age, data = HELPrct,
         color = ~ sex) %>%
  gf_lm() %>%
  gf_theme(legend.position = "top") %>%
  gf_labs(title = "This is my ggformula plot",
         x = "age (in years)",
         y = "CES-D measure of
depressive symptoms")
```

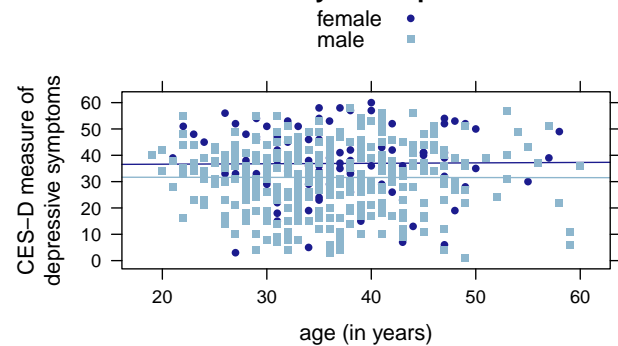
This is my ggformula plot



More options for scatterplot with linear fit (lattice)

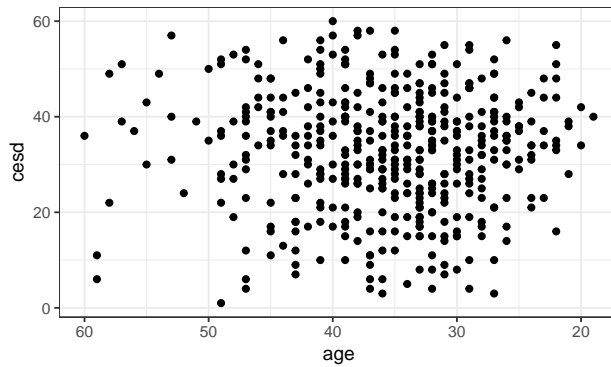
```
xyplot(cesd ~ age, groups = sex,
       type = c("p", "r"),
       auto.key = TRUE,
       main = "This is my lattice plot",
       xlab = "age (in years)",
       ylab = "CES-D measure of
depressive symptoms",
       data = HELPrct)
```

This is my lattice plot



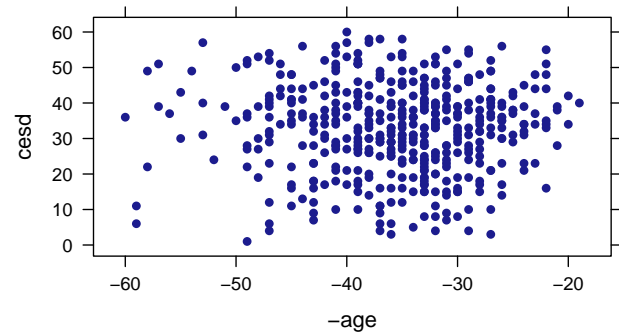
Refine graphs (ggformula)

```
gf_point(cesd ~ age, data = HELPrct) %>%  
  gf_refine(scale_x_reverse())
```



Refine graphs (lattice)

```
xyplot(cesd ~ -age, data = HELPrct)
```



Want to explore more?

Within RStudio, after loading the `mosaic` package, try running the command `mplot(ds)` where `ds` is a dataframe. This will open up an interactive visualizer that will output the code to generate the figure (using `lattice`, `ggplot2`, or `ggformula`) when you click on `Show Expression`.