

```
> qqmath(ranef(ggamlmer, condVar = TRUE)) # see Bates book page
```

```
> library(lattice) # now make Bates plot
> df <- coef(ggamlmer)
> fclow <- subset(df, `(Intercept)` < 0.01177957)
> fchigh <- subset(df, `(Intercept)` > 0.01177957)
> ccl <- as.data.frame(coef(ggamlmer)$school)
> names(ccl) <- c("A", "B")
> df <- cbind(df, ccl)
> ff <- fixef(ggamlmer)
> with(df,
+   print(xyplot(`(Intercept)` ~ sexM, aspect = 1,
+               x1 = B, y1 = A,
+               panel = function(x, y, x1, y1, subscripts, ...) {
+                 panel.grid(h = -1, v = -1)
+                 x1 <- x1[subscripts]
+                 y1 <- y1[subscripts]
+                 larrows(x, y, x1, y1, type = "closed", length = 0.1,
+                       angle = 15, ...)
+                 lpoints(x, y,
+                       pch = trellis.par.get("superpose.symbol")$pch[2],
+                       col = trellis.par.get("superpose.symbol")$col[2])
+                 lpoints(x1, y1,
+                       pch = trellis.par.get("superpose.symbol")$pch[1],
+                       col = trellis.par.get("superpose.symbol")$col[1])
+                 lpoints(ff[2], ff[1],
+                       pch = trellis.par.get("superpose.symbol")$pch[3],
+                       col = trellis.par.get("superpose.symbol")$col[3])
+                 ltext(fclow[,2], fclow[,1], row.names(fclow),
+                      adj = c(0.5, 1.7))
+                 ltext(fchigh[,2], fchigh[,1], row.names(fchigh),
+                      adj = c(0.5, -0.6))
+               },
+   key = list(space = "top", columns = 3,
+   text = list(c("Mixed model", "Within-group", "Population")),
+   points = list(col = trellis.par.get("superpose.symbol")$col[1:3],
+   pch = trellis.par.get("superpose.symbol")$pch[1:3]))
+ ))
>
```

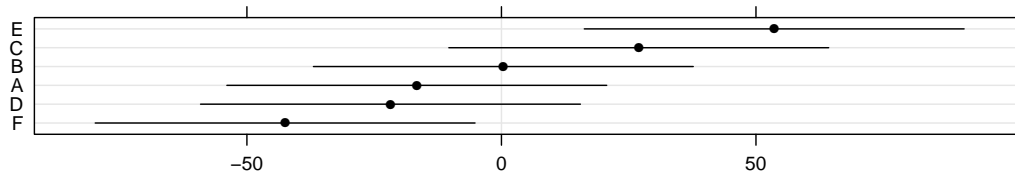
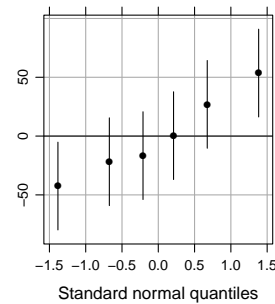


Fig. 1.10 95% prediction intervals on the random effects in `fm1ML`, shown as a dotplot.

Fig. 1.11 95% prediction intervals on the random effects in `fm1ML` versus quantiles of the standard normal distribution.



interval. The `ranef` extractor takes an optional argument, `postVar = TRUE`, which adds these dispersion measures as an attribute of the result. (The name stands for “posterior variance”, which is a misnomer that had become established as an argument name before I realized that it wasn’t the correct term.)

We can plot these prediction intervals using

```
> dotplot(ranef(fm1ML, postVar = TRUE))
```

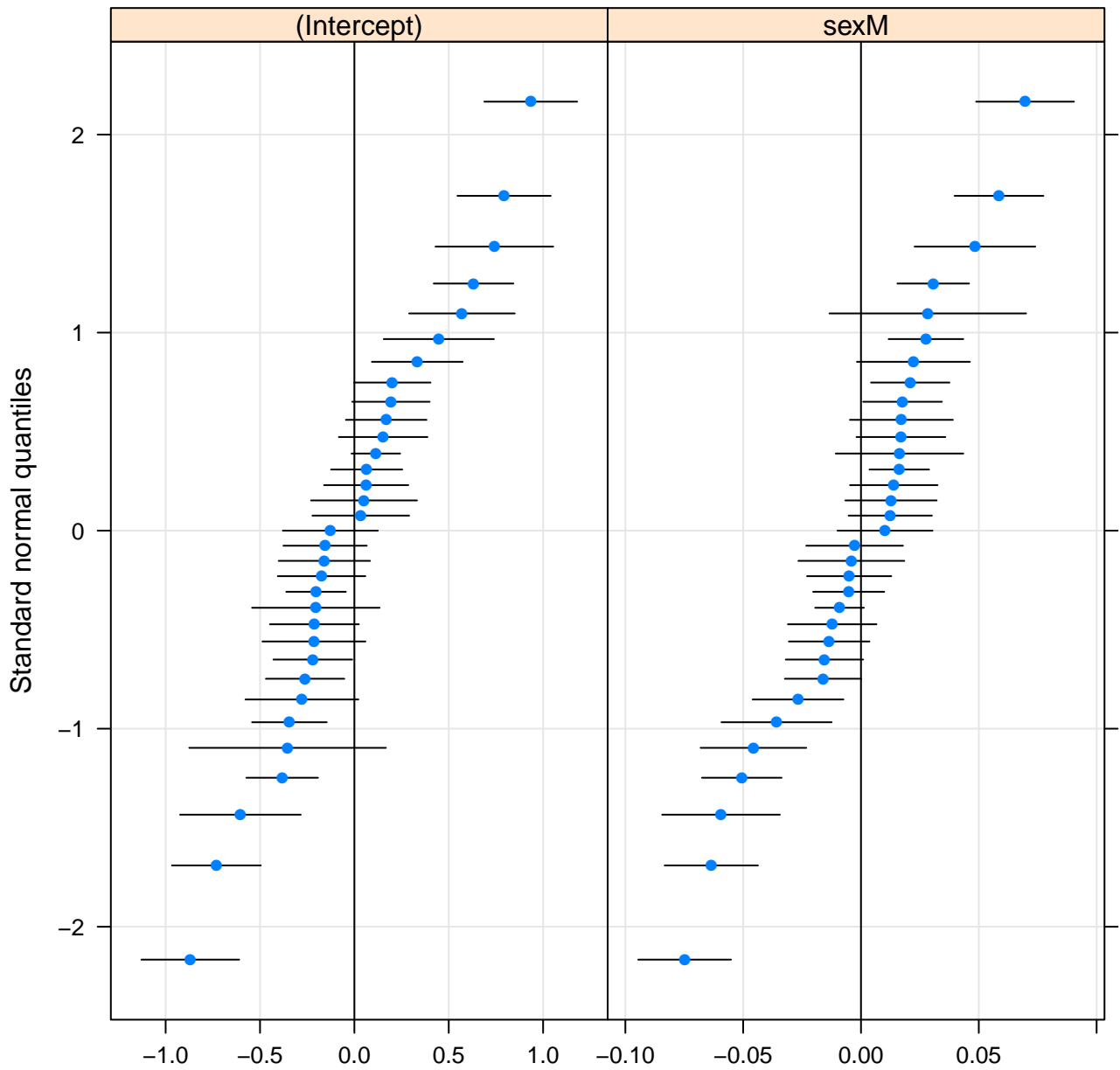
(Fig. 1.10), which provides linear spacing of the levels on the y axis, or using

```
> qqmath(ranef(fm1ML, postVar=TRUE))
```

(Fig. 1.11), where the intervals are plotted versus quantiles of the standard normal.

The dotplot is preferred when there are only a few levels of the grouping factor, as in this case. When there are hundreds or thousands of random effects the `qqmath` form is preferred because it focuses attention on the “important few” at the extremes and de-emphasizes the “trivial many” that are close to zero.

school



Mixed model



Within-group



Population

