

10: Model Output Can Deceive

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Ideas and issues illustrated by the graphs in this vignette

The issues noted here apply to all regression models, including regression models where the outcome variable is categorical. They will be discussed, however, mostly in the context of models with an outcome variable that is treated as continuous. We examine how errors in explanatory variables can skew results.

1 Code for the Figures

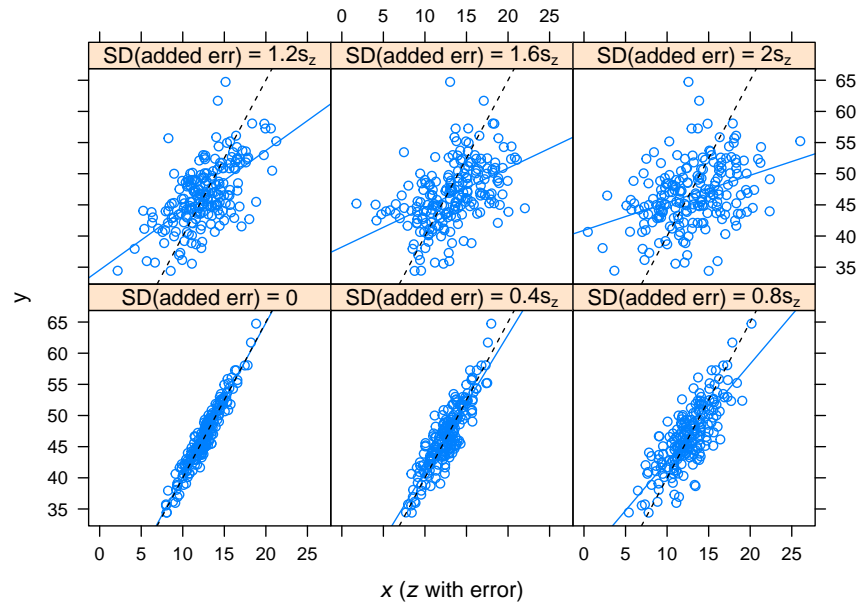
```
fig10.1 <- function(){  
  ## ---- xWITHerr ----  
  tau <- (0:5)/2.5; m <- length(tau); n <- 200; SD <- 2  
  x0 <- rnorm(n, mean=12.5, sd=SD) # Generate x-values  
  df <- data.frame(sapply(tau, function(xtau)x0+rnorm(n, sd=SD*xtau)))  
  # Columns after the first are x-values with added error  
  df$y = 15+2.5*x0 + rnorm(n, sd=1.5)  
  names(df) <- c(paste("X", tau, sep=""), "y")  
  lab <- c(list("0"),  
           lapply(tau[-1], function(x) substitute(A*s[z], list(A=x))))  
  form <- formula(paste("y ~ ", paste(paste("X", tau, sep=""),  
                                       collapse="+")))  
  
  library(latticeExtra)  
  xlabel <- expression(italic(x)*' ('*italic(z)*' with error)')  
  striplabel <- strip.custom(strip.names=TRUE,  
                             var.name="SD(added err)",  
                             sep=expression(" = "),  
                             factor.levels=as.expression(lab))  
  gph <- xyplot(form, data=df, outer=TRUE, xlab=xlabel, strip=striplabel,  
               type=c("p", "r"))  
  gph+layer(panel.abline(15, 2.5, lty=2))  
}
```

```
fig10.2 <- function(){
  set.seed(31)          # Reproduce graph shown
  ## Use function errorsINx(), from DAAG
  errorsINx(gpdiff=4, timesSDx=1.25, SDyerr=2.5, n=80, plotit=FALSE)[["gph"]]
}
```

```
if(!exists("doFigs")) doFigs <- TRUE
```

```
pkgs <- c("latticeExtra", "DAAG")
z <- sapply(pkgs, require, character.only=TRUE, warn.conflicts=FALSE)
if(any(!z)){
  notAvail <- paste(names(z)[!z], collapse=", ")
  print(paste("The following package requires to be installed:", notAvail))
}
```

```
if(doFigs)fig10.1()
```



```
if(doFigs)fig10.2()
```

	Intercept:ctl	Offset:trt	Slope
No error in x	14.61	-0.1483	1.5365
1.25sx	27.54	3.8331	0.5028

