MoTrPAC power calculations

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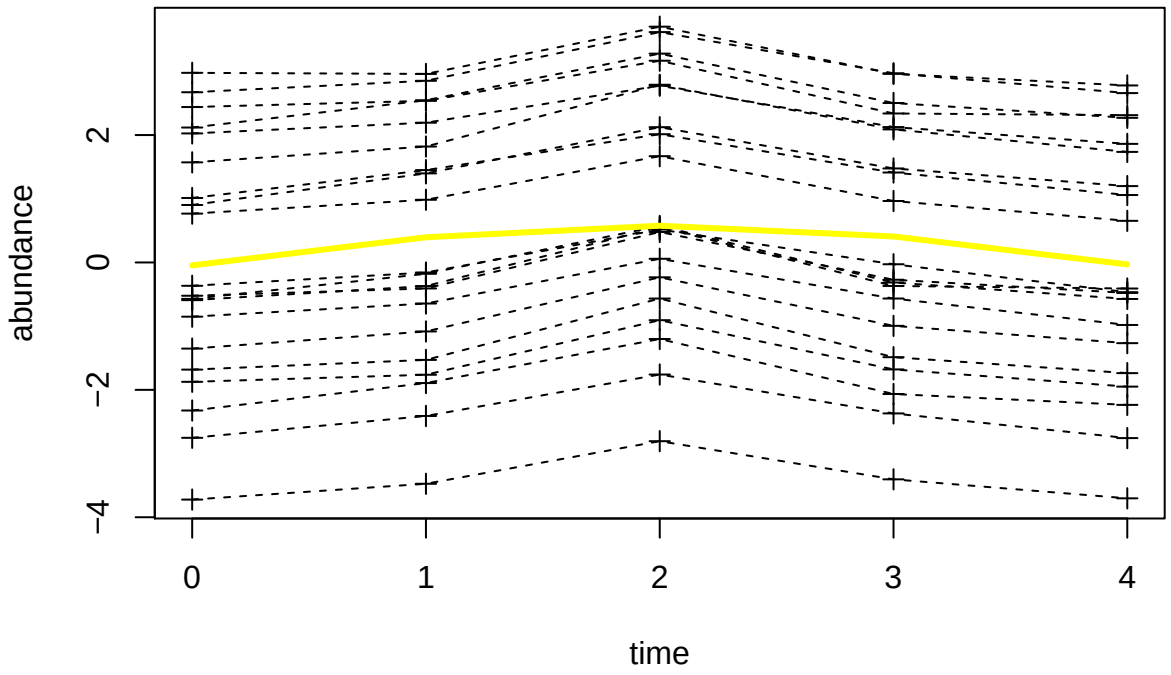
The underlying model

We simulate a linear mixed effects models with a random intercept model, where each subject (g) has its own intercept but the subjects share a common trend. We use the lme4 and simr packages to calculate the detection power for different parameters.

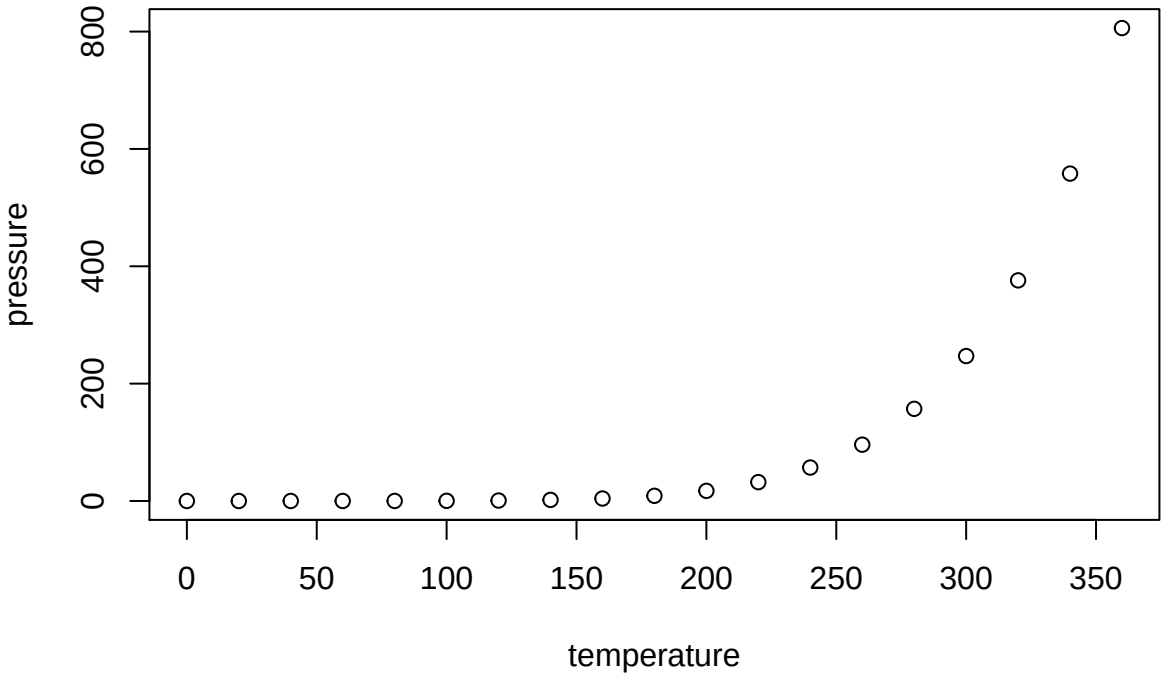
```
# Helper functions
# Simulate a linear mixed effects dataset
simulate_data<-function(n_t,sigma_between,sigma_within,effects_vec,n_subjects,effect_size,use_arima=F,a
  intecepts = rnorm(n_subjects,sd = sigma_between)
  y = c()
  g = c()
  tp = c()
  for(j in 1:n_subjects){
    errs = rnorm(n_t,sd=sigma_within)
    if(use_arima){
      errs = arima.sim(list(order = c(1,0,0), ar = arima_rho), n = n_t,sd = sigma_within)
    }
    effs = effect_size * effects_vec
    y = c(y,intecepts[j]+errs+effs)
    g = c(g,rep(j,n_t))
    tp = c(tp,0:(n_t-1))
  }
  d = data.frame(y,g,t=tp)
  return(d)
}
# Plot the trajectories of the subjects
plot_longi<-function(d){
  plot(y=d$y,d$t,type="n",ylab="abundance",xlab="time")
  points(y=d$y,d$t,type="p",pch=3)
  for(i in unique(d$g)){lines(y=d$y[d$g==i],d$t[d$g==i],type="l",lty=2)}
  lines(lowess(y=d$y,d$t),lwd=3,col="yellow")
}

# Example dataset:
n_t = 5 # one for pre and then four time points
sigma_between = 2 # random effect standard deviation
n_subjects = 20
effects_vec = c(0,0.25,1,0.25,0)
sigma_within = 0.1
effect_size = 1
d = simulate_data(n_t,sigma_between,sigma_within ,effects_vec,n_subjects,effect_size)
plot_longi(d)
```



Power calculations

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.