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library(checkpoint)
library(dplyr)
library(ggplot2)
library(lme4)
library(lmerTest)

#This file contains the code for Fig. 3.

checkpoint("2017-06-07") #reproducibility package

distance <- read.csv("savs_treatment_full_dataset.csv")
distance <- filter(distance,
                    recap == FALSE) #only use data from first capture/at original banding

distance <- select(distance,
                   band_num,
                   noise_dist,
                   delta_cort,
                   treatment,
                   cap_effort,
                   day,
                   year)
distance$noise_dist_km <- distance$noise_dist/1000

distance$diff.s.c<-scale(distance$delta_cort,
                          center=TRUE,
                          scale=TRUE)

distance <- na.omit(distance)

distance.cort.model.diff.alltimes<-lm(diff.s.c~treatment*noise_dist_km,
                                     data=distance)

summary(distance.cort.model.diff.alltimes)
#plot(distance.cort.model.diff.alltimes)
hist(resid(distance.cort.model.diff.alltimes))

#plot

prediction.function.distance2<-function(behaviorobject,
                                       data,
                                       infrastructuretype) {
  nd<-data.frame("noise_dist_km"=seq(min(data$noise_dist_km[data$treatment==infrastructuretype],
                                       na.rm=TRUE),
                                       max(data$noise_dist_km[data$treatment==infrastructuretype],
                                       na.rm=TRUE),
                                       length.out=length(data$noise_dist_km)),
                 "treatment"=infrastructuretype)
  predicted<-data.frame("y"=predict(behaviorobject,
                                   newdata=nd,
                                   type="response"),
                       nd)
}

predict.distance.cort.c<-prediction.function.distance2(distance.cort.model.diff.alltimes,
                                                    distance,
                                                    "control")
predict.distance.cort.ppj<-prediction.function.distance2(distance.cort.model.diff.alltimes,
                                                       distance,
                                                       "pumpjack")
predict.distance.cort.psp<-prediction.function.distance2(distance.cort.model.diff.alltimes,
                                                       distance,
                                                       "screwump")
predicts.distance.cort<-dplyr::bind_rows(predict.distance.cort.c,
                                         predict.distance.cort.ppj,
                                         predict.distance.cort.psp
)

svg(file = "Figure_3.svg",
    width = 90*0.0393701,
    height = 90*0.0393701)
ggplot(data = distance)+
  geom_jitter(mapping = aes(x = noise_dist_km,
                           y = diff.s.c,
                           shape = treatment,
                           color = treatment),
             size = 3)+
  theme_classic ()+
  geom_line (
    data=predicts.distance.cort,
    mapping = aes (y = y,
                  x = noise_dist_km,
                  lty = treatment,
                  color = treatment)
  )+
  theme(legend.position = "none")+
  scale_color_manual(values = c("black",
                                "orange",
                                "blue"))+
  labs(x="Distance to infrastructure or plot centre (km)",
       y="Scaled and centred CORT (acute-basal)")

dev.off()

#capture effort
delta_cort ~ cap_effort + day + (1 | year)

capeffort <- lmer(diff.s.c ~ cap_effort + day + (1|year), data = distance)
summary(capeffort)

```