Starlin Castro

> summary(swing\_gam)

Family: binomial

Link function: logit

Formula:

swing ~ s(start\_speed, bs = "ts", k = 30) + te(px, pz, pfx\_x,

pfx\_z, bs = "ts", d = c(2, 2), k = c(15, 15)) + as.factor(count)

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -1.70541 0.07674 -22.222 < 2e-16 \*\*\*

as.factor(count)0-1 1.60723 0.12073 13.313 < 2e-16 \*\*\*

as.factor(count)0-2 2.87544 0.16543 17.381 < 2e-16 \*\*\*

as.factor(count)1-0 0.95735 0.12451 7.689 1.48e-14 \*\*\*

as.factor(count)1-1 1.82812 0.13028 14.032 < 2e-16 \*\*\*

as.factor(count)1-2 3.39543 0.15933 21.311 < 2e-16 \*\*\*

as.factor(count)2-0 0.72325 0.18609 3.887 0.000102 \*\*\*

as.factor(count)2-1 2.05943 0.17496 11.771 < 2e-16 \*\*\*

as.factor(count)2-2 3.38385 0.18544 18.248 < 2e-16 \*\*\*

as.factor(count)3-0 -2.69684 0.74281 -3.631 0.000283 \*\*\*

as.factor(count)3-1 2.20441 0.28288 7.793 6.56e-15 \*\*\*

as.factor(count)3-2 4.33002 0.30434 14.227 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 3.201 29 13.73 0.00125 \*\*

te(px,pz,pfx\_x,pfx\_z) 66.255 224 1121.64 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.423 Deviance explained = 37.5%

UBRE = -0.10332 Scale est. = 1 n = 5314

> anova(swing\_gam)

Family: binomial

Link function: logit

Formula:

swing ~ s(start\_speed, bs = "ts", k = 30) + te(px, pz, pfx\_x,

pfx\_z, bs = "ts", d = c(2, 2), k = c(15, 15)) + as.factor(count)

Parametric Terms:

df Chi.sq p-value

as.factor(count) 11 836.9 <2e-16

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 3.201 29.000 13.73 0.00125

te(px,pz,pfx\_x,pfx\_z) 66.255 224.000 1121.64 < 2e-16

> summary(whiff\_gam)

Family: binomial

Link function: logit

Formula:

whiff ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count\_alt) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -1.6334 0.1543 -10.586 <2e-16 \*\*\*

as.factor(count\_alt)0-1 0.0408 0.2167 0.188 0.8506

as.factor(count\_alt)0-2 -0.5729 0.2566 -2.233 0.0256 \*

as.factor(count\_alt)1-0 0.3392 0.2322 1.461 0.1441

as.factor(count\_alt)1-1 -0.1061 0.2283 -0.464 0.6423

as.factor(count\_alt)1-2 -0.3192 0.2214 -1.442 0.1493

as.factor(count\_alt)2-0 0.1488 0.3531 0.421 0.6734

as.factor(count\_alt)2-1 -0.4339 0.2919 -1.487 0.1371

as.factor(count\_alt)2-2 -0.4150 0.2409 -1.723 0.0849 .

as.factor(count\_alt)3-1 -0.7269 0.5035 -1.444 0.1488

as.factor(count\_alt)3-2 -0.4408 0.3096 -1.424 0.1545

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 2.855 29 2.814 0.386

te(px,pz,pfx\_x,pfx\_z) 30.560 224 394.168 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.25 Deviance explained = 23.6%

UBRE = -0.22341 Scale est. = 1 n = 2601

> anova(whiff\_gam)

Family: binomial

Link function: logit

Formula:

whiff ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count\_alt) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count\_alt) 10 21.21 0.0197

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 2.855 29.000 2.814 0.386

te(px,pz,pfx\_x,pfx\_z) 30.560 224.000 394.168 <2e-16

> summary(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count\_alt) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.21738 0.11764 -1.848 0.0646 .

as.factor(count\_alt)0-1 0.14229 0.17315 0.822 0.4112

as.factor(count\_alt)0-2 0.18067 0.20941 0.863 0.3883

as.factor(count\_alt)1-0 0.21283 0.19087 1.115 0.2648

as.factor(count\_alt)1-1 0.09209 0.17250 0.534 0.5934

as.factor(count\_alt)1-2 -0.02774 0.18009 -0.154 0.8776

as.factor(count\_alt)2-0 -0.24030 0.27304 -0.880 0.3788

as.factor(count\_alt)2-1 -0.18353 0.20811 -0.882 0.3778

as.factor(count\_alt)2-2 -0.18522 0.19255 -0.962 0.3361

as.factor(count\_alt)3-1 0.07966 0.27953 0.285 0.7757

as.factor(count\_alt)3-2 -0.10718 0.22071 -0.486 0.6272

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.8254 29 7.031 0.00278 \*\*

te(px,pz,pfx\_x,pfx\_z) 30.6556 224 125.658 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0841 Deviance explained = 7.63%

UBRE = 0.31225 Scale est. = 1 n = 2107

> anova(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count\_alt) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count\_alt) 10 8.69 0.562

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.8254 29.0000 7.031 0.00278

te(px,pz,pfx\_x,pfx\_z) 30.6556 224.0000 125.658 < 2e-16

> summary(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.17334 0.08764 -1.978 0.0479 \*

as.factor(strikecount)1 0.01051 0.11520 0.091 0.9273

as.factor(strikecount)2 -0.08665 0.12090 -0.717 0.4736

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.8143 29 6.421 0.00402 \*\*

te(px,pz,pfx\_x,pfx\_z) 31.3384 224 128.220 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0843 Deviance explained = 7.41%

UBRE = 0.30826 Scale est. = 1 n = 2107

> anova(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(strikecount) 2 0.854 0.652

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.8143 29.0000 6.421 0.00402

te(px,pz,pfx\_x,pfx\_z) 31.3384 224.0000 128.220 < 2e-16

> summary(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.129284 0.076508 -1.690 0.0911 .

as.factor(ballcount)1 -0.006337 0.109361 -0.058 0.9538

as.factor(ballcount)2 -0.281683 0.129034 -2.183 0.0290 \*

as.factor(ballcount)3 -0.127795 0.169436 -0.754 0.4507

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.8114 29 6.585 0.00352 \*\*

te(px,pz,pfx\_x,pfx\_z) 30.7494 224 127.479 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0859 Deviance explained = 7.53%

UBRE = 0.30706 Scale est. = 1 n = 2107

> anova(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(ballcount) 3 5.806 0.121

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.8114 29.0000 6.585 0.00352

te(px,pz,pfx\_x,pfx\_z) 30.7494 224.0000 127.479 < 2e-16

> summary(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(fullcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.19260 0.04712 -4.087 4.37e-05 \*\*\*

as.factor(fullcount)1 -0.12423 0.19206 -0.647 0.518

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.8056 29 6.276 0.00426 \*\*

te(px,pz,pfx\_x,pfx\_z) 30.8609 224 126.935 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0841 Deviance explained = 7.35%

UBRE = 0.30775 Scale est. = 1 n = 2107

> summary(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count\_alt) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.819835 0.163168 -5.024 5.05e-07 \*\*\*

as.factor(count\_alt)0-1 0.303716 0.240205 1.264 0.206

as.factor(count\_alt)0-2 0.229192 0.297587 0.770 0.441

as.factor(count\_alt)1-0 -0.070636 0.277862 -0.254 0.799

as.factor(count\_alt)1-1 0.028741 0.242943 0.118 0.906

as.factor(count\_alt)1-2 -0.034203 0.255514 -0.134 0.894

as.factor(count\_alt)2-0 -0.291631 0.380270 -0.767 0.443

as.factor(count\_alt)2-1 0.334895 0.274083 1.222 0.222

as.factor(count\_alt)2-2 0.100286 0.259935 0.386 0.700

as.factor(count\_alt)3-1 0.004683 0.405823 0.012 0.991

as.factor(count\_alt)3-2 0.374753 0.297015 1.262 0.207

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.000288 29 0.00 0.7479

te(px,pz,pfx\_x,pfx\_z) 29.677102 224 43.93 0.0143 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0252 Deviance explained = 4.79%

UBRE = 0.28021 Scale est. = 1 n = 1155

> anova(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count\_alt) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count\_alt) 10 6.949 0.73

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 2.880e-04 2.900e+01 0.00 0.7479

te(px,pz,pfx\_x,pfx\_z) 2.968e+01 2.240e+02 43.93 0.0143

> summary(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.8786 0.1243 -7.069 1.56e-12 \*\*\*

as.factor(strikecount)1 0.2507 0.1615 1.552 0.121

as.factor(strikecount)2 0.1933 0.1686 1.146 0.252

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.000189 29 0.00 0.7523

te(px,pz,pfx\_x,pfx\_z) 26.880493 224 39.57 0.0198 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0259 Deviance explained = 4.06%

UBRE = 0.27071 Scale est. = 1 n = 1155

> anova(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(strikecount) 2 2.518 0.284

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 1.890e-04 2.900e+01 0.00 0.7523

te(px,pz,pfx\_x,pfx\_z) 2.688e+01 2.240e+02 39.57 0.0198

> summary(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.66438 0.10661 -6.232 4.61e-10 \*\*\*

as.factor(ballcount)1 -0.17093 0.15542 -1.100 0.271

as.factor(ballcount)2 -0.03212 0.17359 -0.185 0.853

as.factor(ballcount)3 0.10659 0.23281 0.458 0.647

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 4.362e-04 29 0.00 0.6731

te(px,pz,pfx\_x,pfx\_z) 2.768e+01 224 39.56 0.0266 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0246 Deviance explained = 4.13%

UBRE = 0.27295 Scale est. = 1 n = 1155

> anova(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(ballcount) 3 1.972 0.578

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 4.362e-04 2.900e+01 0.00 0.6731

te(px,pz,pfx\_x,pfx\_z) 2.768e+01 2.240e+02 39.56 0.0266

> summary(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(fullcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.73606 0.06571 -11.202 <2e-16 \*\*\*

as.factor(fullcount)1 0.29373 0.25567 1.149 0.251

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 1.968e-04 29 0.00 0.6788

te(px,pz,pfx\_x,pfx\_z) 2.710e+01 224 38.44 0.0305 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0253 Deviance explained = 4%

UBRE = 0.27016 Scale est. = 1 n = 1155

> summary(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count\_alt) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.74244 0.10592 -7.009 2.39e-12 \*\*\*

as.factor(count\_alt)0-1 -0.08166 0.16244 -0.503 0.615

as.factor(count\_alt)0-2 0.19842 0.19241 1.031 0.302

as.factor(count\_alt)1-0 -0.25399 0.18813 -1.350 0.177

as.factor(count\_alt)1-1 -0.19022 0.16204 -1.174 0.240

as.factor(count\_alt)1-2 -0.18461 0.17639 -1.047 0.295

as.factor(count\_alt)2-0 -0.12194 0.24199 -0.504 0.614

as.factor(count\_alt)2-1 0.05373 0.18012 0.298 0.765

as.factor(count\_alt)2-2 -0.12364 0.17515 -0.706 0.480

as.factor(count\_alt)3-1 -0.22201 0.28292 -0.785 0.433

as.factor(count\_alt)3-2 0.15302 0.19156 0.799 0.424

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 1.562 29 4.167 0.058 .

te(px,pz,pfx\_x,pfx\_z) 68.773 224 146.489 5.85e-10 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.061 Deviance explained = 14.2%

UBRE = 0.20083 Scale est. = 1 n = 1155

> anova(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count\_alt) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count\_alt) 10 9.597 0.477

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 1.562 29.000 4.167 0.058

te(px,pz,pfx\_x,pfx\_z) 68.773 224.000 146.489 5.85e-10

> summary(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.836945 0.084516 -9.903 <2e-16 \*\*\*

as.factor(strikecount)1 0.006771 0.109275 0.062 0.951

as.factor(strikecount)2 0.070726 0.114368 0.618 0.536

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 11.15 29 19.46 0.0307 \*

te(px,pz,pfx\_x,pfx\_z) 61.95 224 123.72 5.09e-08 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0628 Deviance explained = 13.9%

UBRE = 0.19556 Scale est. = 1 n = 1155

> anova(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(strikecount) 2 0.485 0.785

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 11.15 29.00 19.46 0.0307

te(px,pz,pfx\_x,pfx\_z) 61.95 224.00 123.72 5.09e-08

> summary(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.72412 0.07192 -10.068 <2e-16 \*\*\*

as.factor(ballcount)1 -0.21455 0.10588 -2.026 0.0427 \*

as.factor(ballcount)2 -0.07104 0.11645 -0.610 0.5418

as.factor(ballcount)3 0.02372 0.15542 0.153 0.8787

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 1.57 29 4.297 0.0538 .

te(px,pz,pfx\_x,pfx\_z) 65.84 224 141.030 7.92e-10 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0608 Deviance explained = 13.4%

UBRE = 0.19313 Scale est. = 1 n = 1155

> anova(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(ballcount) 3 4.793 0.188

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 1.57 29.00 4.297 0.0538

te(px,pz,pfx\_x,pfx\_z) 65.84 224.00 141.030 7.92e-10

> summary(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(fullcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.82697 0.04747 -17.422 <2e-16 \*\*\*

as.factor(fullcount)1 0.21242 0.16793 1.265 0.206

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 11.08 29 19.16 0.0332 \*

te(px,pz,pfx\_x,pfx\_z) 64.38 224 127.40 5.19e-08 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.066 Deviance explained = 14.3%

UBRE = 0.19278 Scale est. = 1 n = 1155

> summary(strike\_gam)

Family: binomial

Link function: logit

Formula:

called\_strike ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -2.59717 0.37446 -6.936 4.04e-12 \*\*\*

as.factor(count)0-1 -0.69857 0.28552 -2.447 0.0144 \*

as.factor(count)0-2 -1.25159 0.55557 -2.253 0.0243 \*

as.factor(count)1-0 0.39637 0.23842 1.663 0.0964 .

as.factor(count)1-1 0.10264 0.29296 0.350 0.7261

as.factor(count)1-2 -0.35212 0.60451 -0.582 0.5602

as.factor(count)2-0 0.25283 0.35968 0.703 0.4821

as.factor(count)2-1 0.01415 0.42539 0.033 0.9735

as.factor(count)2-2 -0.04362 0.51962 -0.084 0.9331

as.factor(count)3-0 1.29367 0.60019 2.155 0.0311 \*

as.factor(count)3-1 0.41306 0.65105 0.634 0.5258

as.factor(count)3-2 -1.64731 1.26091 -1.306 0.1914

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.0547 29 0.059 0.293

te(px,pz,pfx\_x,pfx\_z) 36.1813 224 516.440 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.753 Deviance explained = 72.6%

UBRE = -0.60942 Scale est. = 1 n = 2713

> anova(strike\_gam)

Family: binomial

Link function: logit

Formula:

called\_strike ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count) 11 23.85 0.0134

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.0547 29.0000 0.059 0.293

te(px,pz,pfx\_x,pfx\_z) 36.1813 224.0000 516.440 <2e-16

Andrew McCutchen

> summary(swing\_gam)

Family: binomial

Link function: logit

Formula:

swing ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -1.59799 0.07958 -20.079 < 2e-16 \*\*\*

as.factor(count)0-1 1.02222 0.11887 8.599 < 2e-16 \*\*\*

as.factor(count)0-2 2.43269 0.18362 13.248 < 2e-16 \*\*\*

as.factor(count)1-0 0.30506 0.12101 2.521 0.0117 \*

as.factor(count)1-1 1.22336 0.12509 9.780 < 2e-16 \*\*\*

as.factor(count)1-2 2.33392 0.14819 15.749 < 2e-16 \*\*\*

as.factor(count)2-0 0.41626 0.17217 2.418 0.0156 \*

as.factor(count)2-1 1.20765 0.14872 8.120 4.65e-16 \*\*\*

as.factor(count)2-2 2.40055 0.15011 15.992 < 2e-16 \*\*\*

as.factor(count)3-0 -0.41514 0.33157 -1.252 0.2106

as.factor(count)3-1 0.56919 0.20915 2.721 0.0065 \*\*

as.factor(count)3-2 2.91332 0.18214 15.995 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 3.566 29 19 9.64e-05 \*\*\*

te(px,pz,pfx\_x,pfx\_z) 77.137 224 1475 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.44 Deviance explained = 39.1%

UBRE = -0.13035 Scale est. = 1 n = 6205

> anova(swing\_gam)

Family: binomial

Link function: logit

Formula:

swing ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count) 11 605 <2e-16

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 3.566 29.000 19 9.64e-05

te(px,pz,pfx\_x,pfx\_z) 77.137 224.000 1475 < 2e-16

> summary(whiff\_gam)

Family: binomial

Link function: logit

Formula:

whiff ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.9670 0.1124 -8.603 < 2e-16 \*\*\*

as.factor(count)0-1 -0.6325 0.1951 -3.243 0.001184 \*\*

as.factor(count)0-2 -0.4875 0.2326 -2.096 0.036102 \*

as.factor(count)1-0 -0.2194 0.2018 -1.087 0.276878

as.factor(count)1-1 -0.5000 0.1926 -2.597 0.009412 \*\*

as.factor(count)1-2 -0.6569 0.1971 -3.332 0.000861 \*\*\*

as.factor(count)2-0 -0.4142 0.2966 -1.396 0.162660

as.factor(count)2-1 -0.4932 0.2303 -2.142 0.032226 \*

as.factor(count)2-2 -0.7220 0.1928 -3.744 0.000181 \*\*\*

as.factor(count)3-0 -0.9488 0.8298 -1.143 0.252864

as.factor(count)3-1 -0.6137 0.3787 -1.621 0.105123

as.factor(count)3-2 -0.9872 0.2173 -4.542 5.57e-06 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 9.341 29 40.93 4.76e-07 \*\*\*

te(px,pz,pfx\_x,pfx\_z) 57.175 224 377.68 < 2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.218 Deviance explained = 20.9%

UBRE = -0.098025 Scale est. = 1 n = 2839

> anova(whiff\_gam)

Family: binomial

Link function: logit

Formula:

whiff ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count) 11 31.75 0.000835

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 9.341 29.000 40.93 4.76e-07

te(px,pz,pfx\_x,pfx\_z) 57.175 224.000 377.68 < 2e-16

> summary(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) 0.10645 0.10611 1.003 0.31577

as.factor(count)0-1 -0.01916 0.16760 -0.114 0.90897

as.factor(count)0-2 -0.56990 0.21934 -2.598 0.00937 \*\*

as.factor(count)1-0 -0.01755 0.18430 -0.095 0.92413

as.factor(count)1-1 -0.13099 0.16963 -0.772 0.43998

as.factor(count)1-2 0.01625 0.18074 0.090 0.92837

as.factor(count)2-0 -0.42826 0.24867 -1.722 0.08504 .

as.factor(count)2-1 0.12534 0.19372 0.647 0.51762

as.factor(count)2-2 -0.15906 0.16760 -0.949 0.34262

as.factor(count)3-0 0.84165 0.55038 1.529 0.12621

as.factor(count)3-1 0.15504 0.28413 0.546 0.58528

as.factor(count)3-2 -0.19727 0.17183 -1.148 0.25097

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 12.18 29 18.15 0.09 .

te(px,pz,pfx\_x,pfx\_z) 18.89 224 63.46 1.59e-08 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0356 Deviance explained = 4.05%

UBRE = 0.36924 Scale est. = 1 n = 2195

> anova(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count) 11 16.83 0.113

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 12.18 29.00 18.15 0.09

te(px,pz,pfx\_x,pfx\_z) 18.89 224.00 63.46 1.59e-08

> anova(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(strikecount) 2 3.107 0.211

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 12.37 29.00 18.38 0.0903

te(px,pz,pfx\_x,pfx\_z) 19.50 224.00 63.82 2.14e-08

> anova(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(ballcount) 3 0.369 0.947

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 12.35 29.00 17.55 0.116

te(px,pz,pfx\_x,pfx\_z) 18.64 224.00 61.13 4.09e-08

> anova(foul\_gam)

Family: binomial

Link function: logit

Formula:

foul ~ s(start\_speed, bs = "ts", k = 30) + as.factor(fullcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(fullcount) 1 0.784 0.376

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 12.38 29.00 17.68 0.112

te(px,pz,pfx\_x,pfx\_z) 18.90 224.00 61.72 3.76e-08

> summary(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.53187 0.15489 -3.434 0.000595 \*\*\*

as.factor(count)0-1 0.35754 0.24273 1.473 0.140756

as.factor(count)0-2 -0.21980 0.30267 -0.726 0.467718

as.factor(count)1-0 0.25853 0.26448 0.977 0.328323

as.factor(count)1-1 0.23512 0.24199 0.972 0.331245

as.factor(count)1-2 0.27873 0.26444 1.054 0.291865

as.factor(count)2-0 -0.28792 0.34257 -0.840 0.400650

as.factor(count)2-1 -0.28154 0.29878 -0.942 0.346046

as.factor(count)2-2 0.23612 0.23924 0.987 0.323672

as.factor(count)3-0 1.65103 1.13376 1.456 0.145323

as.factor(count)3-1 -0.10753 0.42985 -0.250 0.802466

as.factor(count)3-2 -0.03852 0.24688 -0.156 0.876018

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 5.005 29 10.79 0.0276 \*

te(px,pz,pfx\_x,pfx\_z) 6.269 224 10.78 0.0410 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0217 Deviance explained = 3.17%

UBRE = 0.34226 Scale est. = 1 n = 1086

> anova(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count) 11 12.64 0.317

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 5.005 29.000 10.79 0.0276

te(px,pz,pfx\_x,pfx\_z) 6.269 224.000 10.78 0.0410

> anova(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(strikecount) 2 0.349 0.84

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.839 29.000 5.099 0.00559

te(px,pz,pfx\_x,pfx\_z) 5.847 224.000 9.949 0.04141

> anova(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(ballcount) 3 2.664 0.446

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.86 29.00 5.783 0.0036

te(px,pz,pfx\_x,pfx\_z) 6.42 224.00 11.419 0.0285

> anova(hit\_gam)

Family: binomial

Link function: logit

Formula:

hit\_safe ~ s(start\_speed, bs = "ts", k = 30) + as.factor(fullcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(fullcount) 1 0.546 0.46

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.842 29.000 5.137 0.00552

te(px,pz,pfx\_x,pfx\_z) 6.094 224.000 10.602 0.03490

> summary(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -0.54130 0.09639 -5.616 1.95e-08 \*\*\*

as.factor(count)0-1 0.14480 0.14791 0.979 0.3276

as.factor(count)0-2 -0.26065 0.20635 -1.263 0.2065

as.factor(count)1-0 0.20540 0.15354 1.338 0.1810

as.factor(count)1-1 0.05784 0.15153 0.382 0.7027

as.factor(count)1-2 0.11334 0.16303 0.695 0.4869

as.factor(count)2-0 -0.17884 0.21295 -0.840 0.4010

as.factor(count)2-1 -0.29008 0.19738 -1.470 0.1417

as.factor(count)2-2 0.22269 0.14127 1.576 0.1149

as.factor(count)3-0 0.82240 0.39930 2.060 0.0394 \*

as.factor(count)3-1 -0.09224 0.26393 -0.349 0.7267

as.factor(count)3-2 0.03845 0.15297 0.251 0.8016

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.2203 29 0.393 0.172

te(px,pz,pfx\_x,pfx\_z) 49.7994 224 106.805 3.12e-08 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.0497 Deviance explained = 10.9%

UBRE = 0.39155 Scale est. = 1 n = 1086

> anova(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count) 11 18.02 0.0812

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.2203 29.0000 0.393 0.172

te(px,pz,pfx\_x,pfx\_z) 49.7994 224.0000 106.805 3.12e-08

> anova(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(strikecount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(strikecount) 2 0.492 0.782

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.1689 29.0000 0.274 0.194

te(px,pz,pfx\_x,pfx\_z) 49.3220 224.0000 105.412 4.34e-08

> anova(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(ballcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(ballcount) 3 1.666 0.644

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.3314 29.0000 0.689 0.141

te(px,pz,pfx\_x,pfx\_z) 48.2492 224.0000 101.739 1.04e-07

> anova(tb\_gam)

Family: poisson

Link function: log

Formula:

total\_bases ~ s(start\_speed, bs = "ts", k = 30) + as.factor(fullcount) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(fullcount) 1 0.006 0.939

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.2104 29.0000 0.362 0.18

te(px,pz,pfx\_x,pfx\_z) 49.3113 224.0000 104.571 6.02e-08

> summary(strike\_gam)

Family: binomial

Link function: logit

Formula:

called\_strike ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) -3.6905 0.4663 -7.915 2.48e-15 \*\*\*

as.factor(count)0-1 -0.3729 0.2659 -1.402 0.1608

as.factor(count)0-2 -1.6299 0.6771 -2.407 0.0161 \*

as.factor(count)1-0 0.5487 0.2312 2.374 0.0176 \*

as.factor(count)1-1 -0.3613 0.2684 -1.346 0.1783

as.factor(count)1-2 -0.3540 0.4231 -0.837 0.4028

as.factor(count)2-0 0.6167 0.3337 1.848 0.0646 .

as.factor(count)2-1 0.6095 0.3240 1.881 0.0599 .

as.factor(count)2-2 -0.2685 0.4481 -0.599 0.5490

as.factor(count)3-0 0.5355 0.5647 0.948 0.3430

as.factor(count)3-1 0.1628 0.4444 0.366 0.7141

as.factor(count)3-2 0.3853 0.5234 0.736 0.4617

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.833 28 5.595 0.00886 \*\*

te(px,pz,pfx\_x,pfx\_z) 32.594 224 596.270 < 2e-16 \*\*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.743 Deviance explained = 71.8%

UBRE = -0.63936 Scale est. = 1 n = 3366

> anova(strike\_gam)

Family: binomial

Link function: logit

Formula:

called\_strike ~ s(start\_speed, bs = "ts", k = 30) + as.factor(count) +

te(px, pz, pfx\_x, pfx\_z, bs = "ts", d = c(2, 2), k = c(15,

15))

Parametric Terms:

df Chi.sq p-value

as.factor(count) 11 28 0.00323

Approximate significance of smooth terms:

edf Ref.df Chi.sq p-value

s(start\_speed) 0.833 28.000 5.595 0.00886

te(px,pz,pfx\_x,pfx\_z) 32.594 224.000 596.270 < 2e-16