A

Probability

Value of x_1 (coffee cups)

Value of x_2: Non-smoker x=0, Smoker x=1

$$\log_e(odds) = \beta_0 + \beta_1 x_1 + \beta_2 x_2$$

Intercept: log-odds of event when xs all zero

$exp(\beta_2)$ odds ratio associated with smoking

Event occurred in these people but not in these people

$exp(\beta_1)$ odds ratio associated with 1 cup increase in coffee consumption

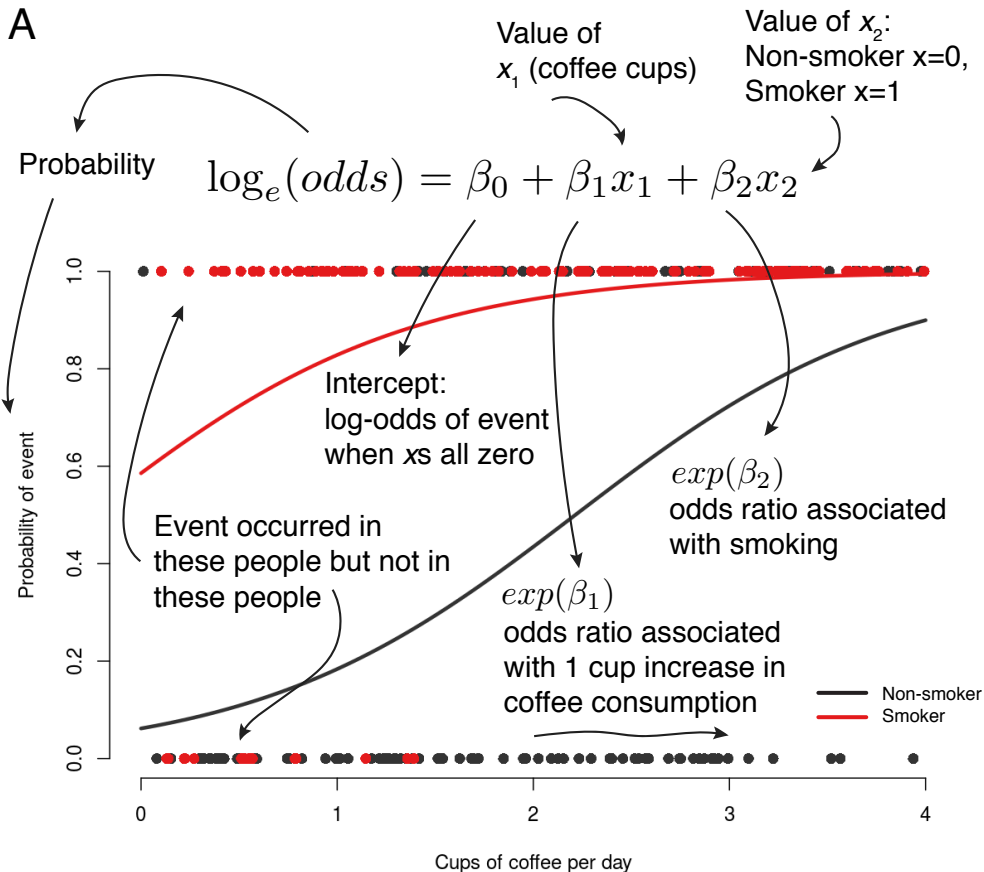Probability of event

Cups of coffee per day

— Non-smoker
— Smoker

B Logistic regression (`glm`) output

```
Call:
glm(formula = y ~ coffee + smoking, family = "binomial", data = df)

Deviance Residuals:
    Min      1Q   Median      3Q     Max
-2.1121  -0.5552   0.2567   0.6571   2.3538

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -2.7197     0.4398  -6.184 6.24e-10 ***
coffee        1.2284     0.1816   6.765 1.33e-11 ***
smoking       3.0658     0.4066   7.540 4.71e-14 ***
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 377.61  on 299  degrees of freedom
Residual deviance: 247.10  on 297  degrees of freedom
AIC: 253.1
```

Function call

Distribution of residuals

Results

Coffee:
OR = exp(1.23)
   = 3.42

Smoking
OR = exp(3.07)
   = 21.50

$$\log_e(odds[event]) = \beta_0 + \beta_{coffee} x_{coffee} + \beta_{smoking} x_{smoking}$$