University of Nevada, Reno

THESIS TITLE: SOME CATCHY LINE

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Statistics and Data Science

by

WHAT'S YOUR NAME

May/August/December, 20XX

Copyright page (optional)

Committee Aproval Page

Abstract

Big Idea: making contributions to and gaining mastery of state of the art statistical computing tools and Bayesian modeling/probabilistic programming.

Dedication (optional)

Acknowledgments (optional)

Contents

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Chapter 1

Introduction

example of r plot

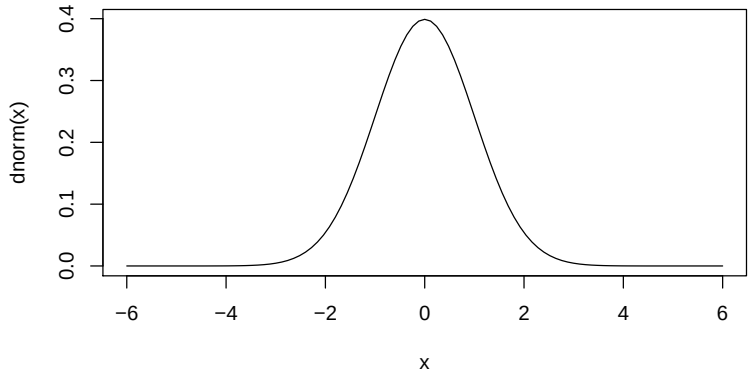

Figure 1.1: My first figure

example of ggplot

example of included graphics

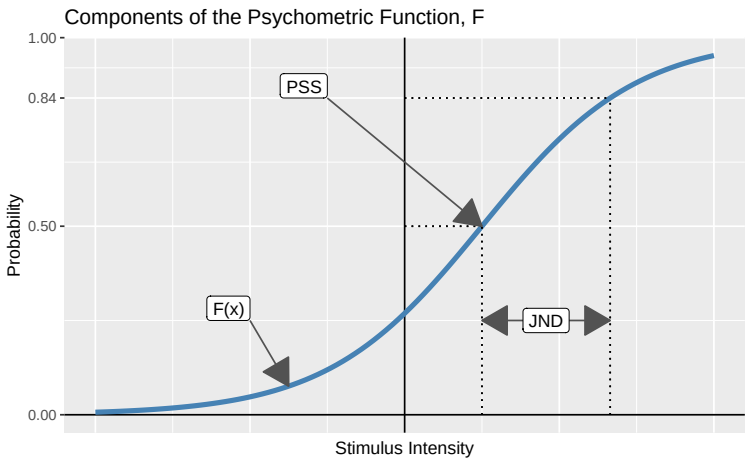

Figure 1.2: My second figure

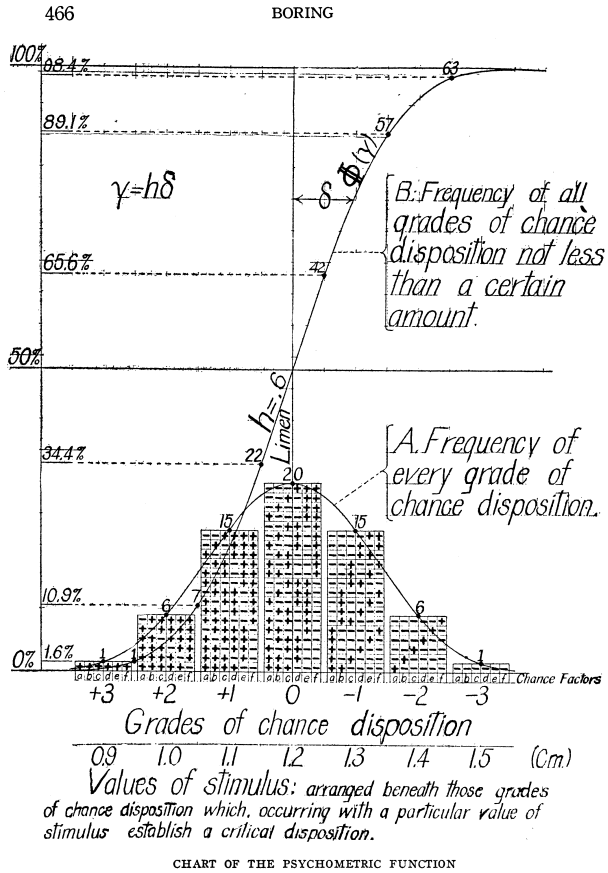

CHART OF THE PSYCHOMETRIC FUNCTION

Figure 1.3: My third figure

Chapter 2

Using Tables

example of a reference (Britannica, 2014).

example of display math

$$\frac{\Delta I}{I} = k$$

Example of inline math $\Delta I = 0.2$

2.1 Level 2 Heading

example of a table and reference (table 2.1)

Table 2.1: THIS IS MY TABLE!

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.5	2.5	4.0	1.3	versicolor
5.7	2.6	3.5	1.0	versicolor
5.5	2.6	4.4	1.2	versicolor
6.2	2.2	4.5	1.5	versicolor
5.5	4.2	1.4	0.2	setosa
7.7	3.0	6.1	2.3	virginica
6.5	3.0	5.2	2.0	virginica
5.5	2.4	3.7	1.0	versicolor
6.7	3.3	5.7	2.1	virginica
6.9	3.2	5.7	2.3	virginica

Chapter 3

Using Equations

Example of equations

$$Y \sim \text{Bernoulli}(\pi) \tag{3.1}$$

$$\pi = P(Y = 1|x; \theta) = F(x; \theta) \tag{3.2}$$

$$P(Y = y|x; \theta) = F(x; \theta)^y (1 - F(x; \theta))^{1-y} \tag{3.3}$$

The likelihood function $\mathcal{L}$ can be determined using equation (3.3)

$$\begin{aligned}\mathcal{L}(\theta|y,x) &= \prod_{i}^{N} P(y_i|x_i;\theta) \\ &= \prod_{i}^{N} F(x_i;\theta)^{y_i}(1-F(x_i;\theta))^{1-y_i}\end{aligned} \tag{3.4}$$

Equation (3.4) is commonly expressed in terms of its logarithm.

$$\ln \mathcal{L}(\theta|y,x) = \sum_{i}^{N} y_i \ln\left(F(x_i;\theta)\right) + (1-y_i)\ln\left(F(x_i;\theta)\right)) \tag{3.5}$$

Appendix A

Supplementary Code

One model, Three Implementations. There are a few ways to specify a hierarchical model in R. Below I describe three common frameworks that require varying levels of mathematical and programmatic competence. Frameworks with lower barriers for entry are great for researchers in many fields, but they lack fine control over the parameters in a model. As the framework complexity increases, so too does the ability to generate complex models that are typically not possible.

Novice

```
library(rstanarm)
stan_glmer(cbind(k, n-k) ~ 1 + x + (1 + x | G1) + (1 + x | G2),
           family = binomial(link = "logit"),
           data = dat)
```

Intermediate

```
library(rethinking)
ulam(alist(
  k ~ binomial(n, pi)
  logit(pi) <- (a + aG1[G1] + aG2[G2]) + (b + bG1[G1] + bG2[G2]) * x,

  a ~ normal(0, 10),
```

```
  aG1[G1] ~ normal(0, sd_aG1),
  aG2[G2] ~ normal(0, sd_aG2),
  c(sd_aG1, sd_aG2) ~ half_cauchy(0, 10),

  b ~ normal(0, 10),
  bG1[G1] ~ normal(0, sd_bG1),
  bG2[G2] ~ normal(0, sd_bG2),
  c(sd_bG1, sd_bG2) ~ half_cauchy(0, 10)
), data = dat, log_lik = TRUE)
```

Bibliography

Britannica, E. (2014). The editors of encyclopaedia britannica.