Working Title

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Section 1

Introduction

Who am I

Who am I

- Lab Manager / Data Scientist @ Uni Konstanz

Who am I

- Lab Manager / Data Scientist @ Uni Konstanz
- PhD in Linguistics @ Uni of Manchester

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- MSc Forensic Speech Science @ Uni of York

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Who am I

Interested in R, experimental design, reproducibility, open science

Once Upon a Time... in Hollywood

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Planning a (linguistics) experiment and filming a Hollywood movie are not as far apart as you would think:

- Write a script

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- Set a production budget

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- Press, festivals

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- Data wrangling, analaysis and visualisation

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- Data wrangling, analaysis and visualisation
- Paper, conferences

Once Upon a Time… in Hollywood

Just like when shooting a film. Plan ahead.

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Just like when shooting a film. Plan ahead.

The more things you can accurately predict and plan, the more solid your design and experiment will be. That's pretty much all there is to it.

Thank you!

Questions?

Just kidding

Just kidding

Important: Starting now, most of the advice in this presentation is based on personal experience. As often is the case, there are many ways one can reach a destination. I am simply presenting some of the tips that helped me along the way.

Section 2

Pre-Production

Research Questions

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- What method is best to answer the question?
- How many experiments?
- What experimental design?
- How are variables going to be coded?

Methods

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Choosing an experimental method is equivalent to choosing the **resolution** of your study.

Experiment Number

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- Helps limit the design of the study
- Follow-up studies allow for clarification

Experimental design

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- Know your goals!
- Choose a balanced design

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- Know your limits!
- Know your goals!
- Choose a balanced design
- Register your report

Section 3

Production

Finding your balance

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Things to consider:

- Location of the experiment (e.g. lab, online)

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- Number of items

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- Number of items
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- Location of the experiment (e.g. lab, online)
- Number of items
- Number of participants
- What sample?

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- ...

Section 4

Post-Production

Pre-processing and Analysis

Know your data!

Pre-processing and Analysis

Let's have a look at some R code

Pre-processing and Analysis

Pre-processing and Analysis

Welcome back!

Pre-processing and Analysis

Welcome back!

Some references:

- Baayen, R. H., & Milin, P. (2010). Analyzing reaction times. International Journal of Psychological Research, 3(2), 12-28.
- Leys, C., Ley, C., Klein, O., Bernard, P., & Licata, L. (2013). Detecting outliers: Do not use standard deviation around the mean, use absolute deviation around the median. Journal of experimental social psychology, 49(4), 764-766.

Pre-processing and Analysis

Pre-processing and Analysis

Sometimes, it's not as straightforward i.e. the story of event-related potentials (ERP)

Reporting results

Reporting results

- Standardisation

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- Standardisation
- Supporting material

Reporting results

- Standardisation
- Supporting material
- package `report`

Reporting results

We fitted a linear mixed model (estimated using REML and nloptwrap optimizer) to predict rt with condition, fricative and participant_device_type (formula: rt ~ condition * fricative + participant_device_type). The model included condition, participant_private_id and item as random effects (formula: list(~condition | participant_private_id, ~1 | item)). The model's total explanatory power is substantial (conditional R2 = 0.41) and the part related to the fixed effects alone (marginal R2) is of 0.08. The model's intercept, corresponding to condition = NM, fricative = FF and participant_device_type = computer, is at 6.89 (95% CI [6.81, 6.97], t(11044) = 171.01, p < .001). Within this model:

- The effect of condition [WM] is statistically non-significant and positive (beta = 4.10e-03, 95% CI [-0.04, 0.05], t(11044) = 0.17, p = 0.867; Std. beta = 7.57e-03, 95% CI [-0.08, 0.10])
- The effect of fricative [SH] is statistically significant and negative (beta = -0.22, 95% CI [-0.30, -0.15], t(11044) = -5.52, p < .001; Std. beta = -0.41, 95% CI [-0.56, -0.27]) …

Reporting results

Analyses were conducted using the R Statistical language (version 4.0.3; R Core Team, 2020) on macOS Big Sur 10.16, using the packages ggpubr (version 0.4.0; Alboukadel Kassambara, 2020), Matrix (version 1.3.2; Douglas Bates and Martin Maechler, 2021), lme4 (version 1.1.26; Douglas Bates et al., 2015), ggplot2 (version 3.3.5; Wickham. ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York, 2016.), stringr (version 1.4.0; Hadley Wickham, 2019), tidyr (version 1.1.2; Hadley Wickham, 2020), forcats (version 0.5.1; Hadley Wickham, 2021), readr (version 1.4.0; Hadley Wickham and Jim Hester, 2020), dplyr (version 1.0.4; Hadley Wickham et al., 2021), tibble (version 3.1.5; Kirill Müller and Hadley Wickham, 2021), lmerTest (version 3.1.3; Kuznetsova A et al., 2017), purrr (version 0.3.4; Lionel Henry and Hadley Wickham, 2020), sjPlot (version 2.8.9; Lüdecke D, 2021), viridis (version 0.5.1; Simon Garnier, 2018), viridisLite (version 0.4.0; Simon Garnier et al., 2021) and tidyverse (version 1.3.0; Wickham et al., 2019).