Frequentist book. Comments:

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- p. 12: explain where the 1.96 comes from (i.e., critical t-value)
**this is too early to explain**
- p. 13, bottom: 695 —> change to 696
- p. 14: were does this come from?
```
probs <- attr(f, "p")
```
- p. 18, bottom: equation (1.9) and (1.11) are duplicates? consider removing one
- p. 22+23: „with a positive correlation of -0.6“ —> change to „negative“ correlation, same for Figure 1.8
- p. 29: „If we differentiate the CDF, we get the PDF back:

$d(F(y))/dy = f(y)$“ —> this may not be clear to some readers, possibly explain better?
- p. 29, equation (1.25): change F(a) to F(b)
- p. 32, 1.7.5 Maximum likelihood estimation 2 —> shouldn’t that be a part of the chapter rather than an exercise? It’s quite important! (similarly fo 1.7.3). or if you want to have it as an exercise, maybe it’s possible to move the exercise inside the chapter (rather than at its end) to make sure all readers work on it? (i.e., MacKay - style)

- p. 35, top: The key idea IF that of —> IS that of

- p. 36, R-chunk: define n —> n <— 1000
- p. 38, equation (2.3) —> is the second line correct? is this the same as the third line of the equation?
- nice derivation of the expectation and variance of the sample distributions of the sample means! —> explicitly say afterwards (i.e., after equation (2.5)) that this means that we can estimate the expectation of ¥bar{Y} and the variance of ¥bar{Y} from an individual sample!!
- p. 43: „round(table(CIs)[2]/sum(table(CIs)), 2)“ —> why not simply write: „mean(CIs)“?

- Figure 2.3: formatting error
- p. 43: „The confidence interval is widely misinterpreted in a Bayesian way“ —> maybe explain in more detail/length why the CI is not representing the range of plausible values of the mu parameter? i.e., that it only describes the sampling distribution of the mean, i.e., the distribution under repeated sampling, but not the probability of the parameter given the data.
- p. 45, R chunk: replace rnorm(1000, …) by rnorm(n, …)
- Figure 2.6: say that the t-distribution has dashed lines and the normal has solid lines
- Figure 2.7: say that the rejection region is the region on

the x-axis below the grey area under the curve
- p. 51, „The choice of 2 is purely conventional“ —> maybe say that it corresponds to a p < .05?
**I don’t want them to think about the p-value yet, just distance in terms of t.**
- p. 55-56: write ¥mu_0 instead of ¥mu? also at other places, e.g., p. 61
**I think I really mean mu here. It’s different from whatever mu_0 is.**
- Figure 2.10: y-label should be „power“ instead of „effect size“ - right?
- p. 62: „That said, in their scientific career, none of the authors of this book have ever

had occasion to use a one-sided test.“ —> at the Charite, I have used one-sided tests; thus this sentence is not correct
- p. 63: „then Z ~ Uniform(0,1)“ —> repeat this paragraph in non-mathematical words?
- p. 64: would it make sense to demonstrate the uniform distribution of the p-value under the H0 using simulations? To make this a bit more concrete for readers that are not so much into math?
- p. 69: simplify „round(table(pvals < 0.05)[2]/nsim, 2)“ —> to „mean(pvals < 0.05)“; same p. 70

- Figure 2.13: add x-label „t-value“
- p. 71: „Shown below are F1 formant data (in Herz), productions of different vowels by male and female speakers of different languages.“ —> many psych readers will not understand this / know what this means. Please explain a bit more; i.e., what an F1 formant is.
- p. 72: why are female and male data points paired? I don’t understand this. Isn’t gender fixed for each person, and data are from different people? Is this averaged across male versus female subjects? And is it paired because these are responses to the same vowel in

the same language?
**yes, the last point you mention.**
I.e., in an item-based analysis, gender is a dependent variable? That is not a very intuitive concept for psychologists, who may not even know about item-based statistics - many psych people do not need these. This needs to be explained, or use an example with subject-based statistics.
**not seeing the problem, but maybe we can talk about it later and change the example. I opened an issue.**
**—> I think it's difficult for psych-people to understand item-based (F2) analyses. If**

**we use them to introduce a concept, there is risk psych people don't understand the concept, and we have to take care to explain clearly what item-based analyses are or use an example with subject-based analyses. Yes, we can discuss later.**

- p. 75-76: „If the pairing (the same vowel and language in each row) is unlikely to create a dependency between the two data points in a row (here, domain knowledge is required), we can treat this as unpaired data." —> I would formulate this more strongly: „If there is no pairing, we can treat this as

unpaired data.“ I think simply saying that pairing is „unlikely“ is not strong enough. If there is a chance for pairing, then we need to use a paired t-test. Only if there is no chance for pairing, only then we can use the two-sample t-test

- p. 77: maybe say one more sentence about what object relatives are. may just „object versus subject relatives are a linguistic manipulation of sentence reading.“ or something similar. Just assume many psych people will have no idea what we are talking about. and we want to avoid loosing them on the example.

- p. 85: „As predicted by theory, object relatives (labeled objgap here) are read slower than subject relatives (labeled subjgap).“ —> possibly provide citation

- p. 87: „•

Objectrelative: $Normal(471-102\times0,\hat{\sigma})$

•

Subjectrelative: $Normal(471-102\times1,\hat{\sigma})$“ —> I think this is hard to grasp without knowing about treatment contrasts! Would it be ok to first show the two lines as:

„Objectrelative: $Normal(471, \hat{\sigma})$

Subjectrelative: $Normal(369, \hat{\sigma})$“? And then as $Normal(471-102\times0, \hat{\sigma})$ and $Normal(471-102\times1, \hat{\sigma})$?

- p. 87: „We saw earlier that this independence assumption of independence“ —> delete one „independence“

- p. 89: „We will discuss coding in detail in a later chapter“ —> „We will discuss CONTRAST coding in detail ..“

- p. 97: is it possible to remove the following output? ## [1] 37 33
(same on p. 96)

- p. 97: „• Estimated mean object relative reading time: $\beta_0 + \beta_1 = 5.9488 + 0.0843 = 6.0331$. • Estimated mean subject relative reading time: $\beta_0 - \beta_1 = 5.9488 - 0.0843 = 5.8645$.“ —> Is this necessary a second time? Similar info is given in the paragraph above.

- maybe write a brief intro to

central math concepts in the beginning, such as: what is an expectation? what is i.i.d.? ∀, matrix inversion, … (or provide a footnote with an explanation once the concept is first encountered)

- p. 103: why is it u0_i? what does the „0“ stand for? does this indicate the intercept? then the 0 should be sub-script, right?

- p. 107: add Figure number + caption (also missing for some other figures, e.g., p. 108)

- p. 108, Figure: what do the points represent? the raw data? there seems serious overfitting

**Those are the data-points from the RC expt. Sure, overfitting yes, but that's what the repeated measures regression model would require us to do. What is your objection here?**
**—> Sorry, my mistake. I meant overplotting. Not overfitting. Maybe remove data points?**

- p. 108: „Incidentally, this repeated measures regression model is now only of historical interest, and useful only for understanding the linear mixed model, which is the modern standard approach.“ —> maybe say „it is now MAINLY of

historical interest. rmMRA can still be relevant when the data don't follow a conventional distribution and cannot easily be transformed to follow a conventional distribution.
**But then you lose shrinkage! Isn't that a problem? Who uses this method today?**
**—> Yes, you lose shrinkage. If you just care about significance this is not a problem - right? I have used it for zero-inflated gamma distributed data, where there is not a nice parametric alternative.**

- p. 113: „To achieve this, assume now that each subject's slope is also adjusted

by subject:“ —> rephrase

- p. 113: „In particular, the model estimates the following standard devia- tions:

•$\hat{\sigma}$ =0.317 $u0$

•$\hat{\sigma}$ =0.110 $u0$

• $\hat{\sigma} = 0.365$.“ —> change u0 to u1

- p. 113: „the gray line shows the model with a single intercept and slope, i.e., our old model m0 “ —> the grey line is hardly visible!

- p. 124, Figure 3.1: Why show the data? I suggest removing it.

Also, the Figure should be made bigger. Also: Is there an example subject where shrinkage leads an increase in the slope? Might be good to include to avoid misunderstandings.

**Shrinkage can never lead to increase in slope I think. Maybe you can explain to me what you mean.**

**—> Let's say the fixed effect (average slope) is b = 0.5**

**- for a subject with a larger slope (e.g., from lmList: b = 1.2), shrinkage will reduce the slope, e.g., coef(lmer): b = 1.1.**

**- for a subject with a smaller slope (e.g., from lmList: b = 0.1), shrinkage**

**will INCREASE the slope, e.g., coef(lmer): b = 0.3.**
**I mean that the shrinkage-corrected slope from lmer can be larger than the lmList slope. This can happen. Every subject is „shrunken“ towards the group mean (fixed effect). For some subjects, the slope gets smaller, for some larger. Does that make sense?**

- Figure 3.2: again, remove the data points, they don’t contribute anything, do they? it’s hard to see the different lines, maybe better after removing the points. Also: is it possible to give the slopes in numbers; that might be easier

to judge

- p. 126: Possibly add some content here: discuss difference between BLUEs and BLUPs, which estimate is „more correct“? What is the reason why we want BLUPs? I.e., regression to the mean.

- p. 135, equation (4.14): I did not know this. Does this mean that -2l = t^2 = F? for this simple example?
**Yes.**
**cool**

- p. 140, pchisq —> update Chisq-value! it should be 6.15

- p. 142: oexperiments

- p. 164: „rowMeans(failed)“ —> output is not visible

- p. 167: „compute_power(b = 0.03, nsubjects = 28)“ —> output is not yet well formated

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Exercises
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Ch1Exercises
———————————

6. definition of Sigma —> first variance is 100^2 instead of 10^2 —> same in 7.

Ch2Exercises
———————————

7. @grodner is not shown —> also for other exercises, the bibtex doesn't seem to work, e.g. Ch4

Ch4Exercises

———————————

1. —> the linguistic example is not easy to follow for psych people

**What should I do here?**

**—> I guess it's ok as it is. It's clearly spelled out what the expectation for the analyses (negative effect) is; thus, no need that everyone understands the full story behind it.**

Ch5Exercises

— — — — — — — — — — —

1. + 2. —> The results of the power simulations are not properly formatted and difficult to read

**Can you fix it?**

**—> Ok, done**