

Project: Do You Hear Classical Or Popular Music?

You have already done most of the technical work for this project, in HW09. I hope you saved all of your work from HW09, including the parts you didn't submit for grading! This will be most of your technical appendix.

IDMRAD Paper

For the project itself, you should write a high-quality IDMRAD paper with a technical appendix, based on HW09. The grading rubric is on p. 6 below, and some additional suggestions appear on pp. 3–5. In addition, you should review the guidelines and reference materials from earlier in the semester for writing an IDMRAD paper.

The project description is already in HW09. Please answer the following questions, based on your best linear regression and multi-level models from HW09, and other analyses (including EDA) if needed:

- What experimental factor, or combination of factors, has the strongest influence on ratings?
 - Does **Instrument** exert the strongest influence among the three design factors (**Instrument**, **Harmonic Motion**, **Voice Leading**), as the researchers suspect?
 - Among the levels of **Harmonic Motion** does *I-V-vi* have a strong association (the strongest?) with classical ratings? Does it seem to matter whether the respondent is familiar with one or the other (or both) of the Pachelbel rants/comedy bits?
 - Among the levels of **Voice Leading**, does *contrary motion* have a strong (the strongest?) association with classical ratings?
- Are there differences in the way that musicians and non-musicians identify classical music?
- Are there differences in the things that drive classical, vs. popular, ratings?

If you had to change the raw data in any way (e.g. deleting cases or variables, performing imputation, correcting mistyped data, deleting cases with crazy data, etc.), please describe what you did and provide justifications, as part of the **Data** section. *However*, put any EDA and variable transformations in the **Results** section. It may also be the case that you used different versions of the data set for different questions. Please describe and justify this in the **Data** section too, if you did so.

Collaboration

- You have already been able to collaborate on HW09, which forms the technical basis of your paper. That's fine!
 - If you want to correct or improve your technical work for the technical appendix of the paper (e.g. you realized you made a mistake in your analysis for HW09, or you want to incorporate some ideas from the solutions to HW09 in your technical appendix). that is also fine!
 - However, you should make these adjustments on your own, without discussing with others in the class (besides the TA and me). You are free to use any written materials (textbooks, lecture notes, etc.) static web resources, but please do not interact with any "live" people, post questions to stackexchange, etc. If you are unsure whether you are allowed to use something, please ask me.

- Please keep track of the resources you’ve used, since you’ll have to list them in your final paper.
- You are not allowed to collaborate on writing the rough draft or final draft of your paper. You must organize the paper and write it on your own!
- One form of collaboration will be allowed: your rough draft will be reviewed by approximately 3 people in the class, and
 - It is fine for peer reviewers to make any and all helpful suggestions to improve the paper they are reading
 - It is fine for you to use any of the comments that peer reviewers make on your rough draft, to improve it for the final draft

Aside from the peer review process, all of the organizing, writing and formatting of your paper should be your own. (You are welcome to talk to the TA or me, to make use of static resources like books, papers and handouts on IMRAD/IDMRAD, etc.)

Schedule

I am sorry, but I had to jam your work up a bit in weeks 11 and 12, so that you would have enough time to do peer reviews and write a good final paper by the end of week 14 for the class.

HW09: Due Friday Nov 18, 11:59pm. This is very soon after HW08, so I am extending my usual two-hour grace period to a day and a half: no penalty for late papers turned in by 5pm Sunday Nov 20.

Rough IDMRAD paper draft: Due Wednesday Nov 23, 11:59pm. Extended grace period to Friday Nov 25.

Peer Reviews: Due Friday Dec 2, 11:59pm.

Final IDMRAD paper: Due Friday Dec 9, 11:59pm.

Writing The Paper

You should follow this general approach:

- First, write the technical appendix showing all of the work that you need to do (R code, output, graphs, tables, and comments explaining what you did and why) to answer the questions below. This should not contain false starts and side-tracks, but should contain all the work in R you need to justify your results/answers for the questions below.
 - Remember to organize the appendix into logical sections that you can refer the reader to, for detailed analyses supporting the data and results sections of the paper. It is a good idea to have *at least* one section each for each of the main research questions.
 - Remember to put some text before and after each chunk of R code and/or R output, helping the reader see why you are doing that analysis, and how the results relate to some part of the project.
- Then, write the Results section, listing each research question, and the highlights from the technical appendix that are needed to answer the question. It is a good idea to have *at least* one section each for each of the main research questions.

- Divide the Results section up into subsections that correspond to the research questions / analyses that you will list in the Introduction.
 - The Results section should be more than just text, for example it might contain a very few well-chosen figures, tables of estimated coefficients and SE's, and/or displayed equations, etc. Not too many, though! Just enough to show or illustrate results. Refer reader often to specific pages in the technical appendix for more details.
 - However, it should focus on results, and not process. Graphs and tables (if any) should display models and results, not diagnostics. Process, diagnostic graphs, etc., can go in the appropriate section(s) of the appendix. Be sure to refer to specific pages or sections in the appendix at each place in the Results section where the reader may want more detail.
- Then write the rest of the IDMRAD paper (**Title, Author/Email, Abstract, Introduction, Data, Methods, Results, Discussion, References, Technical Appendix**). Remember that the Introduction should list all of the research questions for the paper. Write the Title and Abstract *last*.

Suggestions

The formal grading rubric for your paper appears on the previous page. Here are some suggestions to help you get maximum points for your paper:

Title: Clear, interesting, focused.

- *The title should articulate the central question, or the central finding, of the paper, and should also draw the reader in.*

Abstract: Summarizes I, D, M, R, D in 5–7 clear sentences.

- *Make sure you hit the high points of all five sections in the Abstract.*

Introduction: Brief, clear, to the point; context for the problem; What is the problem/aim of the study? What research questions will be answered?

- *Most of the material for the introduction for your IDMRAD paper will come from the material in the problem description for HW09.*

Data: Study design; how was the data collected, and/or where did it come from? Definition of variables & outcome measure(s)

- *The data section **should be** about **naming** and identifying: what is the data and where did it come from; what are the definitions of the variables, what are some simple summaries of the data.*
- *Please put all discussion of EDA and transformations in the Results section, not here.*

Methods: Statistical methods; any other considerations such as funding, ethical considerations, etc. (if any).

- *The methods section **should be** about **naming** and identifying: the names of the methods you will be using in the results section, etc.*
- *There **should not be** any actual **doing** of statistics in the methods section.*
- *It is useful to organize the Methods section into separate subsections, one for each research question.*

Results: Statistical analyses, results *and interpretations* in order parallel to Intro & Methods; no new methods or data; no big picture discussion.

- *Put EDA and/or variable transformations here.*
- *Every method that is used here should be named in the Methods section.*
- *Divide into subsections, one for each research question.*
- *Put enough technical detail (well-chosen graphs, tables and the occasional model equation, for example) that a reader will know you're not faking it and can follow your work at a high level. Any details that get in the way of the story can stay in the Appendix (but make sure I can easily find these details, by referring to the specific page I can go to find each detail!).*
- *Cite specific pages in the Appendix that support each thing that you do in the Results section.*

Discussion: Recap findings, discuss big picture; address main problem/research questions; strengths & weaknesses; discuss implications, unanswered questions, future research.

- *No new statistical analysis in this section. All statistical analysis belongs in the Results section.*
- *The point of “recap findings, discuss big picture” is to help the skim reader see what you've done and why it might be important.*
- *Feel free to re-use material from the last question in HW09 as (part of) the discussion section.*

References: At the end of the paper, before the technical appendix there should be a section for references. The references should be all the books, papers, people, websites, etc. that you used in your work. The style of the references should be the American Statistical Association (ASA) style, described at <https://citationsty.com/styles/american-statistical-association>. A few typical examples follow:

Axis of Awesome (2011), *Four Chords*. Video streamed on Nov 20, 2022 from <http://www.youtube.com/watch?v=oO1DewpCfZQ>.

Junker, B. (2022a), *Homework 9*. Assignment sheet, 36-617 Applied Linear Regression, Nov 11, 2022. Department of Statistics and Data Science, Carnegie Mellon University.

Junker, B. (2022b), Personal Communication, November 14, 2022.

Junker, B. (2022c), *Estimation and Model Selection*. Lecture notes, 36-617 Applied Linear Regression, Nov 16, 2022. Department of Statistics and Data Science, Carnegie Mellon University.

Paravonian, R. (2006), *Pachelbel Rant*. Video streamed on Nov 20, 2022 from <https://www.youtube.com/watch?v=JdxkVQy7QLM>.

R Core Team (2017), *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

RStudio Team (2020), *R Studio: Integrated Development Environment for R*. RStudio, PBC, Boston MA. URL <http://www.rstudio.com/>.

Sheather, S.J. (2009), *A Modern Approach to Regression with R*. New York: Springer Science + Business Media LLC.

Zagat (2001), *Zagat survey 2001 New York City Restaurants*. New York: Author.

The list of reference should be alphabetized, and it is a good idea to cite each reference at least once in the main body of the paper. The two main ways to cite a reference in ASA style are

- *Using the citation as a noun phrase:* Parvonian (2006) shows us many places where the “Pachelbel” chord sequence appears in modern popular music.
- *Using the citation to give credit to an idea:* The Pachelbel chord sequence appears in many places in modern popular music (Parvonian, 2006).

Appendix: All of the technical details.

- *Most of your technical appendix is already done. It is your HW09!*
- *You may want to add a couple of things, and/or correct mistakes in your HW09. That is fine. (And if you don't need to add or correct anything, that's great too.)*
- *You may need to lightly reformat or reorganize your solutions to HW09 so that they better tell the story of your technical analyses. That is fine too. (And if you don't need to reformat, that's great too.)*

Figures, Tables and References: Each figure or table in the main paper, and each reference in the reference section, should be cited at least once in the body of the paper.

In addition you should use good mechanics throughout the paper. This means: clear easy to read sentences and paragraphs, using subsections and other devices to make each phase of your work obvious to the reader, checking for grammar and typos, making the paper as easy to follow as possible, etc.

Grading

On the next page is a summary of what I will be looking for.

The percentages in the table on the next page assume that all parts of the paper are there. If one or more parts is missing, it may result in a much lower grade than the percentages suggest.

Part	Looking For...	Percent
Title	<u>Clear, interesting, focused.</u>	5%
Author/Contact Info	<u>Your name & email addr!</u>	∞!!
Abstract	<u>Summarize I, D, M R and D sections of the paper</u> (typically one sentence each).	5%
Introduction	Brief, clear, to the point; context for the problem; What is the problem/aim of the study? <u>Why would anyone want to read this paper?</u> <u>What research questions will be addressed?</u>	10%
Data	<u>What data set was used in this study?</u> Typically, include how the data was collected (and/or the source of the data), variable definitions, sample size, quick numerical summaries of the variables and <i>maybe</i> initial EDA (though EDA is often better moved to the Results section!). There is <i>no model fitting or analysis</i> in the Data section.	5%
Methods	<u>What did you do, to address these questions?</u> List the methods and/or analyses that will be used to answer each question stated in the Introduction . <i>No data analysis, graphing, model fitting, etc. appears here</i> ; you just say what methods and analyses you will use with which variables, to answer each question. Make a separate subsection for each research question listed in the Introduction .	5%
Results	<u>Statistical analysis & results</u> in order parallel to Introduction and Methods sections. Here you <i>finally</i> get to show the data analyses (model fitting, graphics, etc.) that you did, and what the results were. Don't overload the reader: put the highlights here so the reader understands what you did and why, and refer the reader to specific pages or sections of the Technical Appendix for more details. It should be clear which data analyses and results go with which question from the Introduction . <i>Every analysis that is presented here should have been mentioned in the Methods section.</i> Make a separate subsection for each research question listed in the Introduction .	10%
Discussion	<u>What does it all mean? Recap findings; address main problem/question; strengths & weaknesses; implications, unanswered questions, future research.</u> Typically you will say, for each question from the Introduction , how the analyses that you did the Results section answers that question. You might also refer to EDA from earlier in the paper if that makes clearer to the reader what answers you found for one (or more) of the questions. Then you will talk about the big picture, what future work or generalizations of your work might look like, and any limitations of your study. But <i>there should be no additional analyses or results in this section; just use the analyses you did for the Results section (and possibly the Data section).</i>	10%
Mechanics	Clear, easy to follow sentences, paragraphs & sections; <u>Grammar, spelling, no overly fussy word choice, sentence structure, etc.</u>	5%
Statistical Content	<u>Correctly and appropriately uses technical and non-technical material</u> we have learned in class. Easy to follow; Analyses makes sense/not crazy (roughly 10% per research question)	40%
References & Citations	<u>Follow ASA guide; see Suggestions above.</u> <u>Follow ASA guide; see Suggestions above.</u> Be sure to cite all sources!	5%
Technical Appendix	<u>Contains complete versions of the analyses listed in the Methods section and presented in the Results section:</u> R code, output, graphs, tables, and comments explaining what you did and why. There may be additional analyses here (e.g. to support the Data section of the paper, or to show why the methods and analyses that you chose for the paper were the right ones). Make it easy for me to follow.	0%