ISC 4244C

Computer Applications in Psychology with Lab

Dennis E. Slice

The Instructor

- Name: Gordon Erlebacher
- Department: Scientific Computing (http://www.sc.fsu.edu)
- Course site: Blackboard (http://campus.fsu.edu (grades) and http://www.sc.fsu.edu/~gerlebacher/psych (lectures and assignments)
- Background:
  - Fluid Dynamics
  - Computer Simulations
  - Visualization
  - Gaming
  - Morphometrics (shape analysis)
    - Alternate instructor: Dennis Slice)

Teaching Assistants

- The class has one section
- Class: HWC, room 2401
  T-R (9:30-10:45 am)
- Labs: PDB A0105
  Wed. (3:35-5:30)
- TA (graduate student in SciComp):
  - Danial Smith, das10c@my.fsu.edu

Our Society

- Driven by technology
- Rate of change is increasing
- The rate of the rate of change is increasing
- In "Future Shock", (1970) Toffler predicts the accelerating rate of technological innovation and the increasing inability of human beings to cope, leading to depression, and other problems.
  - http://en.wikipedia.org/wiki/Future_Shock
- The ability to adapt to technological change will increase marketability

Eunice Mae Boland

(1889-1988)

- Household electricity
- Automobile
- Air travel
- Telephone
- Television
- Space travel

Jesse Irvin and Eunice Boland

Our Society

- Current unemployment: 7.8%
  (http://www.bls.gov)
- Bachelor's degree or higher: 4.1%
  (http://www.bls.gov)
- Students with computer skills also have better job prospects

Assignments

Assignments consist of (approximately) weekly lab reports, which include abstract, statement of work, questions posed, results, and conclusions. The report also includes graphs, explanations, and source code, as necessary for clarity. Using the web for examples and tutorials is fine, as is seeking conceptual help from each other. However, credit to other people's work is mandatory, and copying from a classmate or other source is strictly prohibited! Students should expect to spend **3-5 hours per week** outside of class for assignments.

Course Objectives

At the end of this class, the student will

- be able to use the internet (e.g., Google) to perform complex searches
- be able to work with typical datasets from animals and humans used in the field of psychology.
- be able to input and output datasets using R.
- be able to restructure, and extract subsets from, datasets using R.
- be able to combine multiple datasets and extract information for analysis using R
- be able to read and write data files to a storage device
- be able to backup critical files on their computers and restore the data

Attendance Policy

Students are strongly encouraged to **attend all classes** (both lectures and labs). Successive weeks build upon one another; thus, catching up on missed work becomes increasingly difficult. Students who do not attend regularly will have a hard time making good grades. Unannounced, in-class quizzes are designed to encourage study and attendance.

Lab reports must be submitted on the stated due date, unless the absence is excused. Points will be removed from late assignments as indicated in syllabus section on grading.

Consistent with University policy, excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness. Documented attendance at scientific conferences also is excused.

When absences occur for any reason (excused or otherwise), it is the student's responsibility to get notes and other pertinent information from another student as soon as possible, carefully go over the notes, and then come to the instructor and/or TA to discuss anything that is at all unclear. It also is the student's responsibility to complete missed homework assignments in a timely fashion.

Collect the names, phone, and email of four people who are sitting by you so you can exchange notes if necessary. (If you came in late on the first day of this semester, or you added this class after the first day of classes, be sure to get this information from 4 people as soon as possible.) If you are absent for any reason, you will need to have classmates you can contact for notes and information about what you missed. You do not have the option of sending a mass email to the class to ask for

Courtesy

Students should be punctual, and remain in class until dismissed. If you must leave class early, please let the instructor know before class begins.

No phone calls or texting during class - turn phones off!

Grading

The course grade will be based on the laboratory component of the class and in-class quizzes. There will be no formal exams. Each week (give or take), there will be a new lab assignment, part of it done during the scheduled lab, part at home. The lab work supports the coursework given during the class lectures. All homework is to be returned by email. All files are to be in .pdf format.

Each lab report has a maximum grade of 100. Late reports are subject to grade reduction. Each report: 1 day late = -10 pts; 2 days = -15 pts; 3 days late = -30 pts; one week late = -40 pts; beyond one week = grade of 0.

There will be **up to ten unannounced, in-class quizzes**. Each worth 10 points. Full credit will be given for any quizzes not given in class, and the cumulative total will be counted as a single lab report (100 pts).

The scale for the grades will be A (90-100%), A- (87-89%), B+ (83-86%), B (77-82%), B- (73-76%), C+ (69-72%), C (63-68%), C- (59-62%), D+ (56-58%), D (53-55%), D- (50-54%) and F (<50%).

Academic Honor Policy

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at http://dof.fsu.edu/honorpolicy.htm.)

American with Disability Act

Students with disabilities needing academic accommodations should: 1) register with and provide documentation to the Student Disability Resource Center (SDRC); 2) bring a letter to the instructor from SDRC indicating you need academic accommodations. This should be done within the first week of class. This and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the:
Student Disability Resource Center
874 Traditions Way
108 Student Services Building
Florida State University
Tallahassee, FL 32306-4167
(850) 644-9566 (voice)
(850) 644-8504 (TDD)
sdrc@admin.fsu.edu
http://www.disabilitycenter.fsu.edu/

Free Tutoring from FSU

For tutoring and writing help in almost any course at Florida State University, visit the Academic Center for Excellence (ACE) Tutoring Services' comprehensive list of tutoring options - see http://ace.fsu.edu/tutoring or contact tutor@fsu.edu for more information. High-quality tutoring is available by appointment and on a walk-in basis. These services are offered by tutors trained to encourage the highest level of individual academic success while upholding personal academic integrity.

Syllabus Change Policy

Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.

Course Content

Each week is dedicated to one topic related to programming. Topics were selected to provide psychology students with practical skills and tools that can help them in their research, as well as make them more competitive for graduate/professional school and/or jobs. All topics will be studied with the help of the language "R." Topics include (one or two weeks per topic):

- internet searching
- concepts of the language R
- data protection and backup
- reading and writing datasets
- preparing data for analysis, data restructuring
- signal and image manipulation

Course Description

This course gives the students practical knowledge of a powerful programming language, "R", with application to computational and research elements important to the field of psychology. Topics include data manipulation and analysis, image and audio manipulation, etc. all in the context of using a variety of software tools and packages.

Textbook

- No required book. Resources are available on the internet. Recommended book: R in a Nutshell, a Desktop Reference, by Joseph Adler, ISBN-13: 978-0596801700, Publ: O'Reilly Media, 614 pp., 2010.

- There are many tutorials on the Web. Links will be provided throughout the course.

Our Society

- At the moment, unemployment is around 7.8%
  - does not count those who are no longer searching for jobs
- Jobs are biased to those
  - with computer skills
  - technological skills
  - mathematical and engineering skills
- More and more, we are becoming a push-button society

Course Objectives

- Gain an appreciation of the multitude of software packages (much of it free) to help in a variety of tasks
  - graphical, audio, presentation, database (might not be covered)
- Learn to manipulate data with a very powerful computer language called "R"
  - perform statistical analyses of experiments
  - visualize data
  - input and output your data from these programs in a variety of formats
- generally gain an appreciation of the diversity of tools at your disposal to accomplish a variety of tasks related to your psychology research

What we will not do

- Learn the theoretical intricacies of computer program
  - The programming will be developed slowly and remain practical
- Make use of mathematics to illustrate our points
  - Instead, we will strive to develop intuition, practical know-how to help achieve precise research objectives

Expected Difficulties

- R is a language that requires typing
- R is not menu-driven
- R requires a **new way of thinking** that is very empowering (the language can be extended)
- R is very powerful

- We will take it slow
- I expect continuous feedback from the students, in-class questions, and discussion, for best results

Data

- Psychology is a discipline that covers many facets of our lives
  - social, sports, mental, education, etc.
- Data collection is ubiquitous. Serves to provide information against which experiments are performed to learn about what makes us tick
- This data takes many forms (files, tables, sound, images) and comes from many sources (databases, Excel files, the internet, regular files)
- These files have many formats (csv, regular text, binary, proprietary formats)

How we Proceed

- In this class, we develop the basics of R and apply it to solve various problems of interest to Psychologists
- Very important: we will program on a computer in class, "on the fly".
  - This will demonstrate how to proceed when the instructor makes errors
  - Students will be encouraged to ask questions, suggest experiments
  - You will get to witness internet searches on topics not known to the instructor

Structure of the Course

- Tuesdays/Thursdays
  - 12:30 pm - 1:45 pm
  - lecturing
- Monday or Thursday
  - 2 hours of lab, leading to a lab report
  - the lab might require up to 3-5 additional hours of work to complete
  - some topics will have labs over a period of two or more weeks (we will remain flexible since this is a relatively new course)

Grading

- No midterm
- No final
- Unannounced, in-class quizzes – **grades summed and counted as one lab report.**
- 100% of the grade is based on the lab reports.
  - each lab report will count equally and will be graded on a maximum score of 100
  - at the end of class, these grades will be averaged

Prerequisites

- General Psychology
- One statistics course

Research Methods in Psychology (useful course, not required.)

- Learned to pose questions
- Learned to set up an SPSS analysis
- Learned some the tools in SPSS to accomplish tasks
- Learned about
  - Probability, statistics, hypothesis testing, regression, ANOVA
  - What else was learned?
- The examples used were probably manufactured, and simplistic to help learn the concepts

In this course ...

- We will use "real" datasets used by the faculty in the Psychology department
- We will learn to (using R)
  - read the data sets
  - clean up, transform, and work with the data
  - compute statistics with the data
- Use graphics, image analysis, audio analysis to help develop a broader picture of what is "out there" to help analyze data

At the end of the course ...

- You will have used a variety of "free" software to accomplish a range of tasks
- Essentially, you will have acquired "practical" experience
- You will be more aware of what is available and where and how to find it
- You will have learned the basics of accomplishing tasks with a powerful programming language such as R

First Task (first Lab)

- Install RStudio on your laptops
  - Mac: http://cran.r-project.org/bin/macosx/
  - Windows: http://cran.r-project.org/bin/windows64/
  - Window: http://cran.r-project.org/bin/windows/
  - Linux: http://cran.r-project.org/bin/linux/
- Throughout the course, you will be installing a variety of software

Software

- R: programming language, extremely powerful, but not super fast
- Audacity: program to manipulate sound
- ImageJ: program to manipulate images
- There may be more at a later stage of the class, depending on our progression

Datasets used in this course

- We have chosen datasets of three types:
  - textual
  - audio
  - graphical
- The labs will operate on the various datasets obtained from ongoing research in the Psychology Department to make them relevant

Location of Datasets

- Datasets (and other files) will be made available on the course website
  - http://www.sc.fsu.edu/~gerlebacher/psych

Next Lessons

- Internet Queries
  - Search engines
  - Boolean searches
  - Google, Bing, etc.
- Basics of R
  - the command line

Face to Face

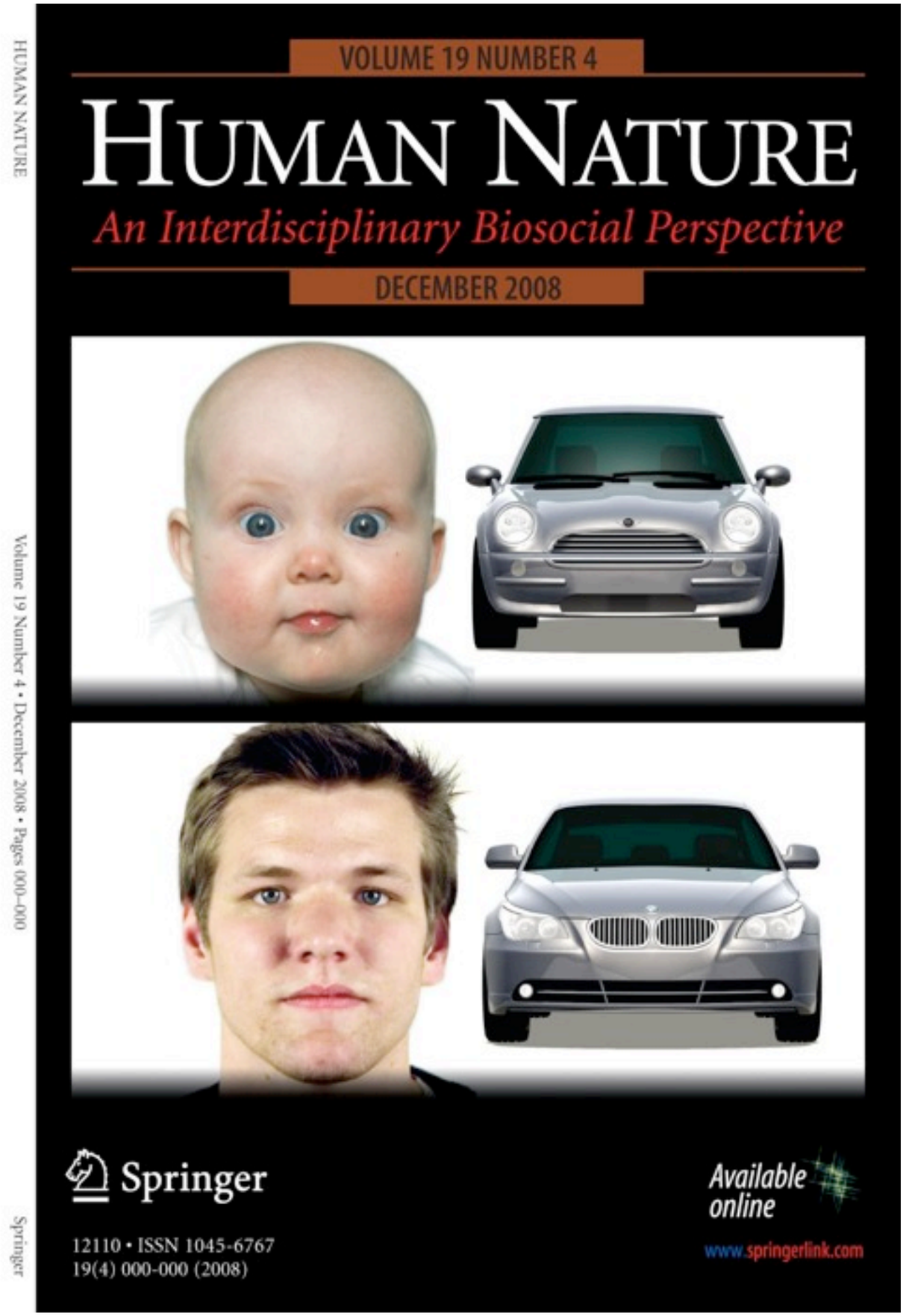
The Perception of Automotive Design

S. Windhager, D. E. Slice, K. Schaefer,

E. Oberzaucher, T. Thorstensen,

and K. Grammer

From the work of Dennis Slice in the Department of Scientific Computing



Evolutionary Sensitivity for

Faces in Cars?

Cars

• • •

Ratings

open

content

aroused

disgusted

extroverted

sad

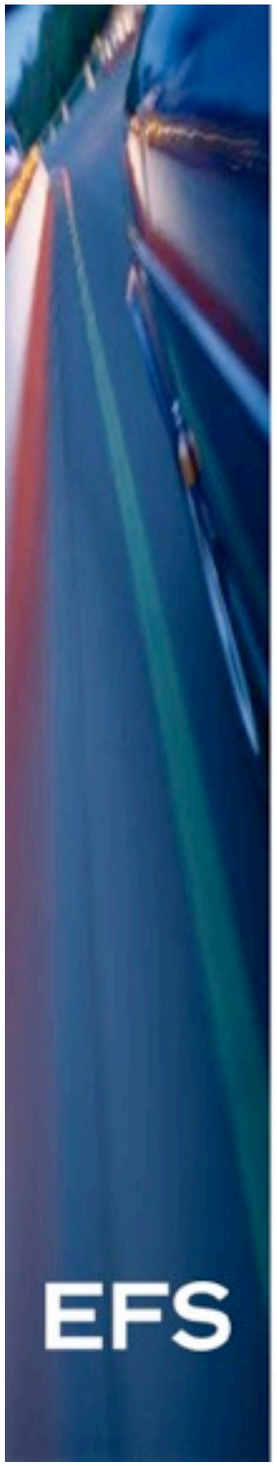
neurotic

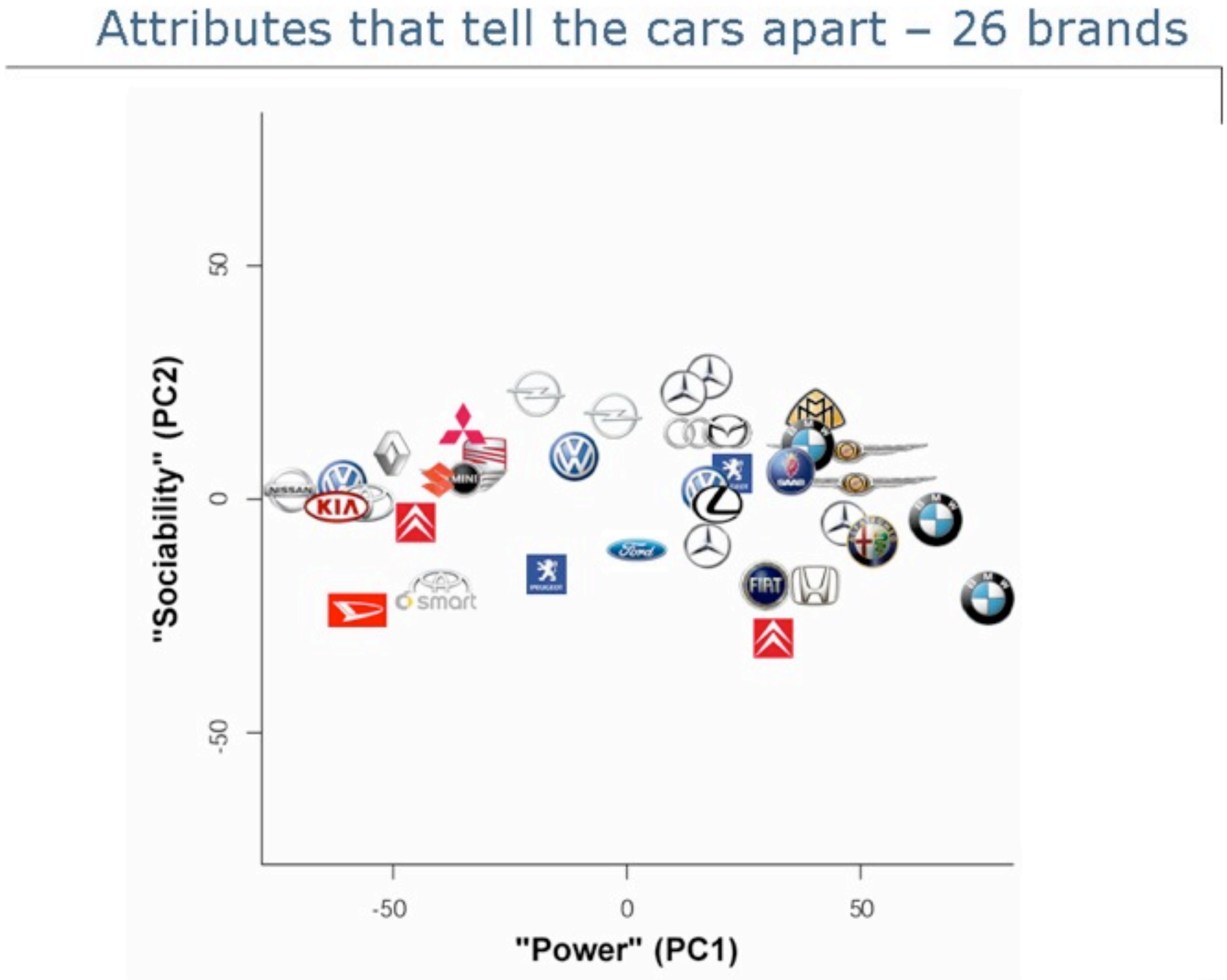
conscientious

I like the car

Does this car have a face?

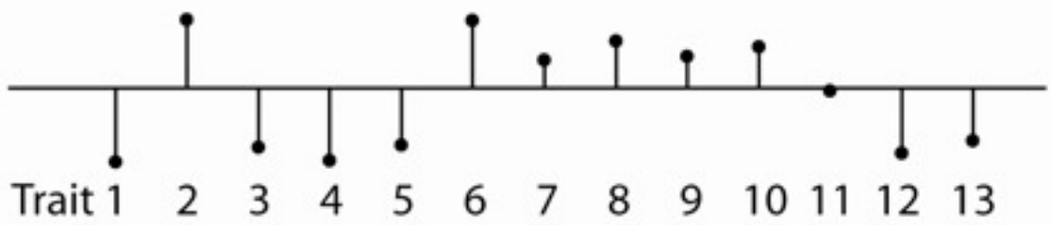
PC Plot

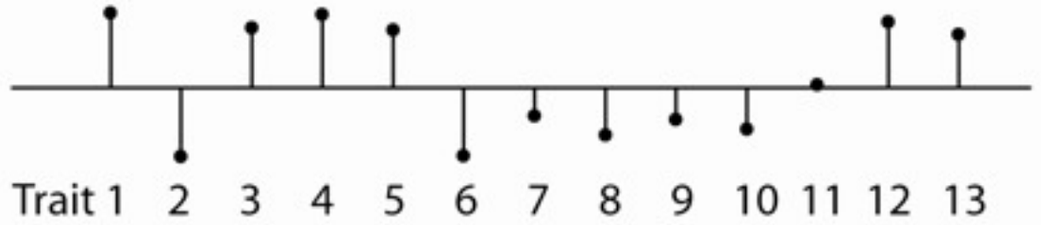

EFS

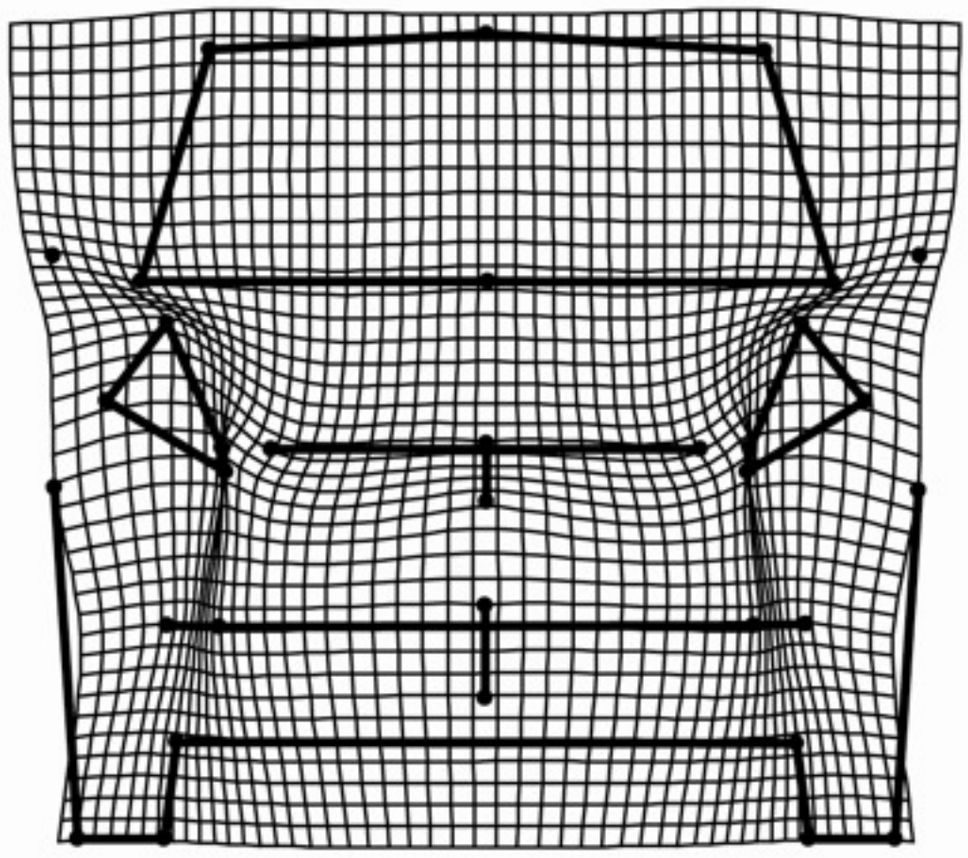

Attributes that tell the cars apart – 26 brands
"Sociability" (PC2)
50
0
-50
-50
0
50
"Power" (PC1)

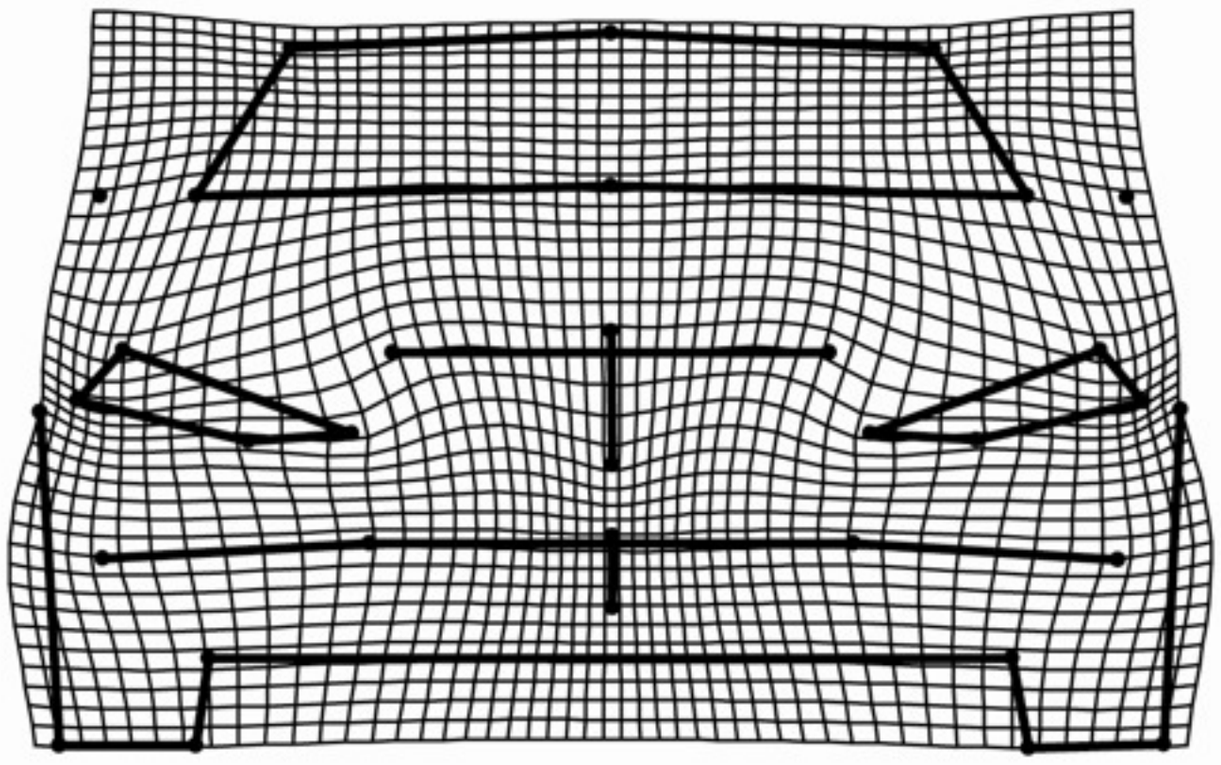
Morphometrics

Partial Least-Squares





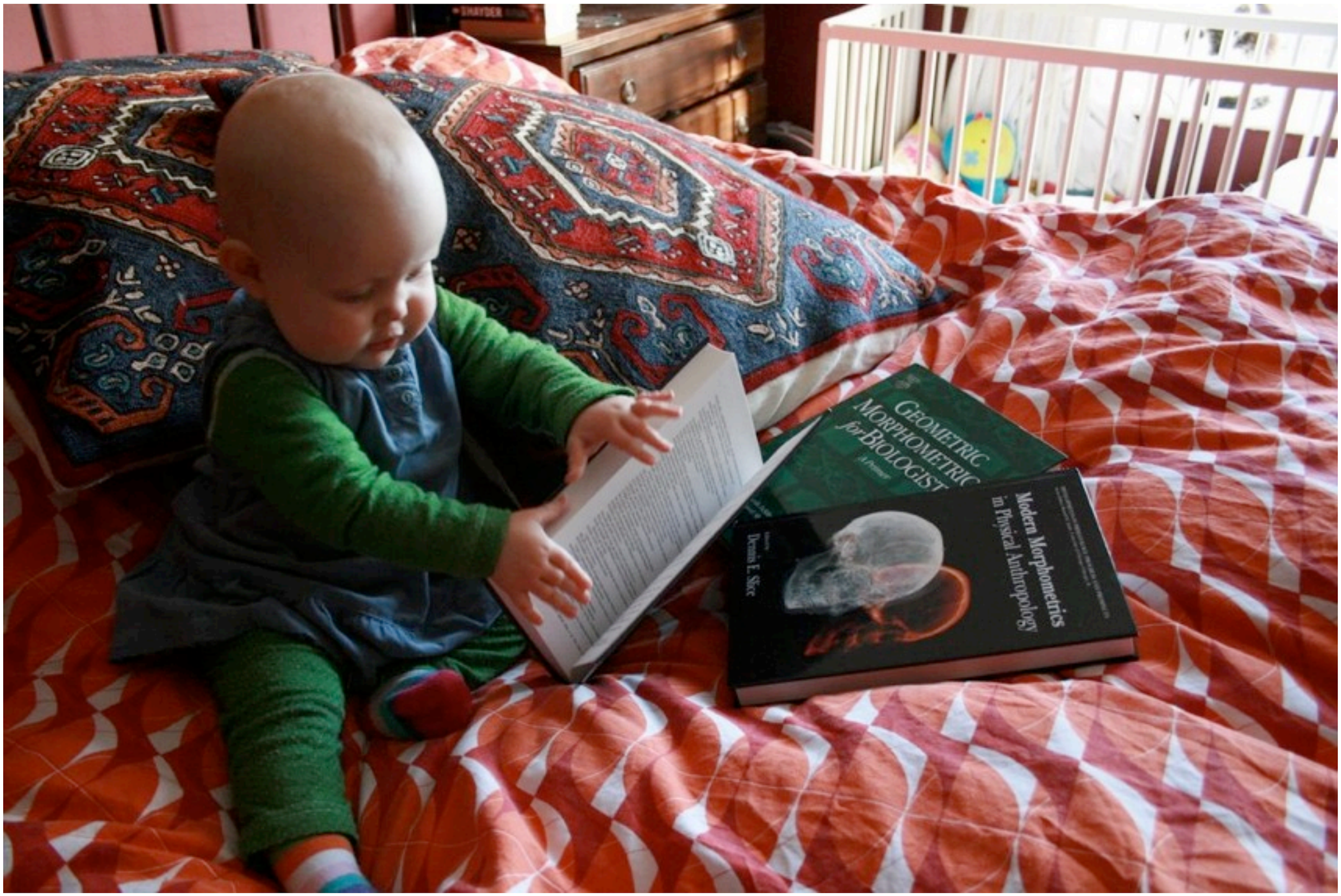




child-adult, male-female, friendly-hostile, submissive-dominant, angry, afraid

Let's Face It

Approved Reading



The Other Extreme