

## PSYCHOLOGY 300A (A01) First Term (CRN 12791)

### Statistical Methods in Psychology

#### Professor

Dr. Michael Masson  
Office: Cornett A183 (enter through A177)  
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Phone: 250-721-7536  
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#### Teaching Assistant

Myles Maillet (maillet1@uvic.ca)

#### Lectures

Monday & Thursday 11:30 AM - 12:50 PM  
Cornett B143

#### Text Books

Required:  
Mlodinow, L. (2009). *The drunkard's walk: How randomness rules our lives*. New York: Vintage Books.

Optional:  
Howell, D. C. (2017). *Fundamental statistics for the behavioral sciences* (9th ed.). Boston: Cengage Learning.

#### Course Objectives

The purpose of this course is to provide an understanding of some of the basic statistical analyses applied in psychological research. For each type of analysis that is discussed, students will be expected to develop an understanding of the logic underlying the analysis, its computational procedures, the circumstances in which it is appropriate to apply the analysis, and the correct interpretation of the results of the analysis. Evaluation techniques reflect these objectives.

#### Registration

Students are responsible for checking their registration status before the add deadline of September 23. Students will not be added to the course after that date. Students **will not** automatically be dropped for non-attendance of classes, so students deciding to drop the course must do so themselves.

#### Evaluation

##### (a) Examinations (85%)

You are responsible for attending examinations *as scheduled*, including the December final examination, so **DO NOT** plan your December travel until the exam schedule is final. If you miss one midterm exam for a valid, documented reason (e.g., illness, accident) you will be assigned a score based on the class average for that midterm and on how well you do, relative to the rest of the class, on the remaining examinations. No make-up exam will be given. Unexcused missed examinations will be assigned a score of zero. If you miss both midterms, you will be dropped from the course at the professor's discretion. If you miss the final examination, you must apply to write a deferred examination (see the on-line UVic Calendar). The final examination is cumulative with emphasis on the most recent material.

*Exam writing contract.* When you enter the classroom to write any of the exams, you are to be mentally and physically able to write the exam. If any condition exists that prevents you from writing the exam, you are to report to UVic Health Services to document the problem, and you are not to come to the exam site. If you write an exam, you are in effect stating that you are physically and mentally able to write the exam. You then forfeit the right to make any claim after the exam is over that you were not able to write it.

Scheduled dates for the examinations and their contributions to the final course grade:

Examination 1:	Monday, Oct. 3	(20%)
Examination 2:	Thursday, Nov. 3	(25%)
Final examination:	December 5–19	(40%)

##### (b) Research Report (5%)

Your task will be to select a research article that reports a statistically significant correlation between two variables and to prepare a report that describes the two variables and the nature of the relationship between them. Detailed instructions are attached to this syllabus. Note that this assignment is similar to a take-home examination, in that the professor will answer

questions to clarify the assignment, but will not give feedback on correctness of the selection of the article or identification of the variables, etc. The report is due in class on *Monday, October 24*. The report must be submitted in printed form. Electronic submissions will not be accepted. Reports not submitted by the end of class time on Oct. 24 will be penalized 15% and will not be accepted after 4:30 PM, October 31.

*(c) Application of Concepts Report (10%)*

For this report you are to select a concept described in the Mlodinow book (*The drunkard's walk*) and describe how it can be applied to a domain that is of specific interest to you. The domain might be something as simple as a favorite hobby or as grand as what you expect to accomplish in your planned career. Your description must include information that illustrates that you understand the concept that you have chosen to discuss. Detailed instructions are attached to this

syllabus. This report is also treated like a take-home examination, so although the professor will not provide feedback on drafts of what you write, clarification of concepts will be provided as needed. The report is due in class on *Monday, November 21*. The report must be submitted in printed form. Electronic submissions will not be accepted. Reports not submitted by the end of class time on Nov. 21 will be penalized 15% and will not be accepted after 4:30 PM, November 28.

**Calculators**

If you are contemplating the purchase of an electronic calculator, find one that has at least one memory and a square root key. You will be allowed to use a calculator during exams. You also are encouraged to bring your calculator to each class so that newly learned techniques can be applied during class demonstrations.

**Course Outline**

<b>Topic</b>	<b>Howell book</b>	<b>Mlodinow book</b>
Review of algebra	Appendix A	
Review of research design and measurement	Chp. 1, 2	pp. 7-8
Distributions of data	Chp. 3	
Averages	Chp. 4	
Variability	Chp. 5	
Normal distribution	Chp. 6	Chp. 7
*** Examination 1 about here ***		
Probability	Chp. 7	Chp. 2, 4
Relationships between variables: Correlation	Chp. 9	
Relationships between variables: Prediction	Chp. 10	
*** Examination 2 about here ***		
Sampling distributions, hypothesis testing, and Bayesian methods	Chp. 8	
Testing hypotheses about a single population mean	Chp. 12	
Testing hypotheses about the effect of a variable	Chp. 13	

## Research Report – Assignment details

Your task is to select from a psychology journal one article that reports at least one **correlation coefficient**. The correlation must be between two naturally occurring variables or between a manipulated variable and a dependent variable. You must select a different article than the one used for the sample report shown below. Remember, the article must report at least one correlation coefficient ( $r$  value). Many studies report other types of statistics, but those that do not report a correlation coefficient between two variables are *not* eligible. Watch out for papers that report multiple regression analyses, where multiple variables are used to predict scores on a single target variable. These are eligible only if they report individual correlations between each predictor variable and the target variable.

Once you have selected your article, identify **one specific** correlation between **two** particular variables. Note that many articles will measure more than just two variables and will report more than just one correlation. Your task is to **pick just two variables for which a correlation coefficient is reported**. If you cannot do this with the article you have chosen, then select a different article. Finally, write a brief report about the correlation between these two variables that contains the following information. Your report (excluding selected pages from the original article and the required figure and table) is to be no longer than 2 double-spaced pages, not including a cover page that provides your name and student number.

Here is a summary of the steps to follow.

1. Describe each variable in one or two sentences. What psychological variable is being measured in each case and how is it measured?
2. Using the information provided in the article and whatever reasonable inferences are necessary on your part, provide **your best estimate** of what were the lowest and highest (minimum and maximum) scores that subjects could obtain on each variable. You do not have to be perfectly precise. A reasonable estimate is all that is needed.
3. Report the size of the correlation between the two variables that was given in the article.
4. Construct a *hypothetical* set of data for about 8 subjects measured on the two variables you have identified. Each subject will have a score on each variable. Construct the scores so that the data for this set of hypothetical subjects is similar to the correlation reported in the article (your small data set does not have to produce exactly the same correlation as in the article, it just has to be similar; there is no formula or calculation for doing this--it is just an approximation). List your pairs of scores in a table. Use R to compute the correlation between your pairs of scores and to plot a scatterplot based on those scores. **Attach to your report a printout from R of the computation of the correlation and of the scatterplot.**
5. At the end of your report provide an APA style reference for the article you used.
6. Make a printed copy of the page or pages of the introduction, method, or results sections of your selected article on which the two variables are described and the correlation between them is reported. Use a highlighter to indicate where this information is mentioned in the article. This information will assist us when evaluating your report.
7. You must submit a printed copy of your report (electronic versions are not acceptable) in class no later than **Monday, October 24**. Be sure to put your name and student number at the top of the first page of the report. Reports submitted late will be penalized 15% and will not be accepted after 4:30 PM, October 31.

## Sample Report

One variable was perceived size of a softball and was measured by having subjects select one of a number of different-sized circles. The other variable was the subject's batting average in one or two softball games that he or she had just finished playing. Perceived size was measured as which one of the eight different-sized circles was selected. The sizes were ordered from 1 to 8, with 8 representing the largest size. The minimum score, then, was 1 and the maximum score was 8. For the batting average variable, the minimum score possible is .000 (no hits) and the maximum possible is 1.000 (a hit every time). The reported correlation between these two variables was .29.

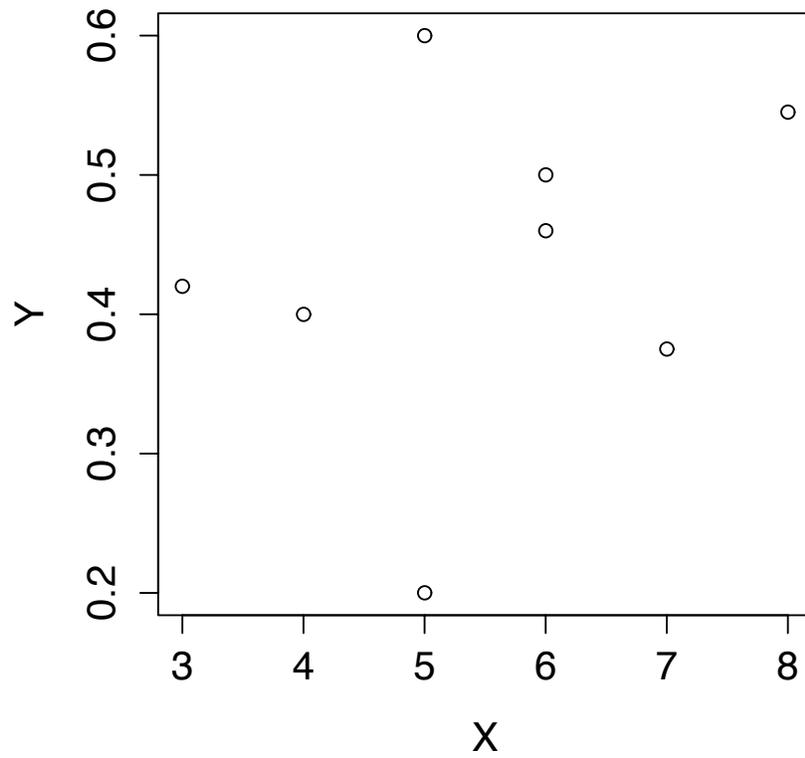
Hypothetical set of  
data for 8 subjects

Subject	Size	Avg.
1	6	.460
2	3	.420
3	5	.600
4	8	.545
5	5	.200
6	7	.375
7	6	.500
8	4	.400

## Reference

Witt, J. K., & Proffitt, D. R. (2005). See the ball, hit the ball: Apparent ball size is correlated with batting average. *Psychological Science, 16*, 937-938.

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> X = c(6,3,5,8,5,7,6,4)
> Y = c(.460,.420,.600,.545,.200,.375,.500,.400)
> cor(X,Y)
[1] 0.2589655
> plot(X,Y)
>
```



Marking Sheet for Research Report

Description of variables:	___ / 8
Description of min and max values:	___ / 4
Report of $r$ value (based on information in article):	___ / 4
Scatterplot of hypothetical data using R:	___ / 4
Computation of $r$ from hypothetical data using R:	___ / 4
Reference:	___ / 2
Marking of relevant information in article:	___ / 4
Total:	___ / 30 = _____ %
Late penalty [15% if applied]:	___

## Short Report

## See the Ball, Hit the Ball

## Apparent Ball Size Is Correlated With Batting Average

Jessica K. Witt and Dennis R. Proffitt

University of Virginia

Baseball players frequently say that the ball appears bigger when they are hitting well. In describing a mammoth 565-ft home run, Mickey Mantle said, “I never really could explain it. I just saw the ball as big as a grapefruit” (Early, n.d.). George Scott of the Boston Red Sox said, “When you’re hitting the ball [well], it comes at you looking like a grapefruit. When you’re not, it looks like a blackeyed pea” (Baseball Almanac, n.d.). During a slump, Joe “Ducky” Medwick of the St. Louis Cardinals said he felt like he was “swinging at aspirins” (Bradley, 2003). Similar comments have been made by such Hall of Famers as Ted Williams (Bicknell, 2000), “Wee” Willie Keeler (Bradley, 2003), George Brett (Langill, n.d.), and more.

This phenomenon is not limited to baseball. When playing well, tennis players report that the ball looks huge, golfers say that the cup looks bigger, and basketball players say that the hoop looks enormous. All of these people report perceptions that are modulated by performance efficacy. Our experiment confirms that this phenomenon is a psychological reality.

## METHOD

We recruited 47 players (37 male, 10 female) from men’s and coed intramural and city softball leagues. Ages ranged from 21 through 56. All participants gave informed consent.

We set up a table near the local softball fields in Charlottesville, Virginia, and advertised free sports drinks. Players who had just finished competing in one or two games were offered a drink and asked if they would like to participate in a 1-min psychology experiment. First, participants were shown a 32-cm × 42-cm poster displaying eight black circles, ranging (unsystematically) from 9 cm to 11.8 cm in diameter, and were asked to select the circle that they thought best corresponded to the size of a softball. The actual size of a softball is 10 cm.<sup>1</sup> After selecting a circle, participants reported how many times they had been at bat, their number of hits and walks, and how many

times they had gotten on base because of an error. Batting average was computed as the number of hits divided by the number of times at bat that did not result in a walk or an error. We also got information on participants’ age and sex and whether their team won or lost.

## RESULTS

The purpose of the experiment was to investigate whether there is a relationship between recent success at hitting and the perceived size of the ball. As is apparent in Figure 1, batters who hit well perceived the ball to be bigger than did participants with less success at bat. A Spearman rank-order correlation with circle size (1 being the smallest, 8 being the biggest) as the dependent measure confirmed that there was a relation between batting average and perceived size of the ball ( $r = .29, p < .05$ ). Age was not significantly correlated with perceived size ( $r > .64$ ). An analysis of variance with perceived size as the dependent variable revealed a significant effect of sex,  $F(1, 45) = 10.09, p_{\text{rep}} = .97, d = 0.18$ .<sup>2</sup> Males ( $M = 5.38, SD = 2.07$ ) perceived the ball to be bigger than did females ( $M = 3.00, SD = 2.21$ ), although there was no difference in batting average between the sexes ( $M_s = .65$  and  $.64$ , respectively). Whether the participant’s team won or lost the game did not have a significant effect on perceived size of the ball,  $F(1, 45) = 0.14$ .

## DISCUSSION

Many athletes report perceptions that are influenced by their current level of performance. For example, baseball players say that the ball looks bigger when they are hitting well and smaller when they are in a slump. Our results confirm this phenomenon: Players who had just had success at hitting recalled the ball to be bigger than players whose recent batting average was lower.

This finding is consistent with previous research showing that other perceived dimensions of the environment are affected by the perceiver’s behavioral potential. Targets beyond hand’s reach look closer to people when they hold a tool and can reach to the target with it than when they are not holding the tool (Witt,

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<sup>1</sup>The mean size of the stimuli was larger than the size of an actual softball because pilot data revealed that pictures of objects look smaller than the objects themselves.

<sup>2</sup>For an explanation of the  $p_{\text{rep}}$  statistic, see Killeen (2005).

## Application of Concepts Report – Assignment details

Your task is to select a concept (or set of concepts) described in the Mlodinow book and describe how it can be applied to a domain that is of specific interest to you. The choice of application domain is completely up to you, but you must show how the concept from Mlodinow's book can usefully and even creatively be applied to that domain. In your report, begin by making clear which concept from the book you are working with and where in the book the concept is explained (mention relevant page numbers from the book). Show that you understand the concept by providing a brief explanation in your own words of how it works.

Next, describe the domain to which your chosen concept is to be applied. Then show how the concept you have learned about allows you to improve your understanding of, or effectiveness in, the target domain. Try to be creative in your selection of a target domain and the way in which the concept can be applied there.

Your report is to be no longer than 5 double-spaced pages, not including a cover page that provides your name and student number. You can include figures or tables as needed and these will not count toward the length limit. Your report will be evaluated on how well you explain the selected concept, the complexity of that concept (a simple concept will receive a lower mark), how well the concept fits with the domain you selected, the clarity of your explanation of how the concept can be applied in the selected domain, and the creativity shown in the selection of the domain and in the application of the concept to that domain.

You must submit a printed copy of your report (electronic versions are not acceptable) in class no later than **Monday, November 21**. Be sure to put your name and student number on a cover page for the report. Reports submitted late will be penalized 15% and will not be accepted after 4:30 PM, November 28.

## Marking Sheet for Application of Concepts Report

Explanation of concept from Mlodinow book:	___ / 5
Complexity of concept:	___ / 5
Fit between concept and domain:	___ / 5
Clarity of explanation of the application:	___ /10
Creativity in selection of domain and in the application of the concept to it:	___ / 5
Total:	___ /30 = _____ %
Late penalty [15% if applied]:	___

UNIVERSITY OF VICTORIA  
Department of Psychology

**Important Course Policy Information**  
**Winter 2016-2017**

***Prerequisites***

Students who remain in courses for which they do not have the prerequisites do so at their own risk. Students who complete courses without prerequisites ARE NOT exempt from having to complete the prerequisite course(s) if such courses are required for the degree program.

***Program Requirements***

For more information see pages 383-386 of the UVic Calendar 2016-17.

***Registration Status***

Students are responsible for verifying their registration status. Registration status may be verified using My Page, View Schedule. Course adds and drops will not be processed after the deadlines set out in the current UVic Calendar.

***Commitment to Inclusivity and Diversity***

The University of Victoria is committed to promoting, providing and protecting a positive and supportive and safe learning and working environment for all its members.

***In the Event of Illness, Accident or Family Affliction (See UVic Calendar, 2016-17, p. 59-60)***

- ***What to do if you miss an exam other than one scheduled during the formal examination period***

Do not apply at Records Services for a “Request for Academic Concession”. Instead submit documentation of the illness, accident or family affliction directly to your course instructor (or designated teaching assistant).

- ***What to do if you miss an exam scheduled during the formal exam period***

Apply at Records Services for a “Request for Academic Concession”, normally within 10 working days of the end of the formal examination period. Records Services will forward the form to the instructor. If the concession is granted the instructor will determine how to deal with the situation (for example, a deferred exam). Where a concession is not applied for or where such application is denied, an N grade will be entered on the student’s academic record.

OR, you can download the Request for Academic Concession form here:  
<http://www.uvic.ca/registrar/assets/docs/record-forms/rac.pdf>

- ***What to do if you require additional time to complete course requirements***

Apply at Records Services for a “Request for Academic Concession”, normally within 10 working days of the end of the formal examination period. Records Services will forward the form to the instructor. If the concession is granted the instructor will determine how to deal with the situation. Where a concession is not applied for or where such application is denied, an N grade will be entered on the student’s academic record.

OR, you can download the Request for Academic Concession form here:  
<http://www.uvic.ca/registrar/assets/docs/record-forms/rac.pdf>

### ***Policy on Academic Integrity including Plagiarism and Cheating***

The Department of Psychology fully endorses and intends to enforce rigorously the Senate Policy on Academic integrity (<http://web.uvic.ca/calendar2016-09/undergrad/info/regulations/academic-integrity.html> , p. 55-58, UVic Calendar 2016-17). It is of utmost importance that students who do their work honestly be protected from those who do not. Because this policy is in place to ensure that students carry out and benefit from the learning activities assigned in each course, it is expected that students will cooperate in its implementation.

The offences defined by the policy can be summarized briefly as follows:

1. **Plagiarism.** You must make sure that the work you submit is your work and not someone else's. There are proper procedures for citing the works of others. The student is responsible for being aware of and using these procedures.
2. **Multiple Submission.** Only under exceptional circumstances may a work submitted to fulfill an academic requirement be used to satisfy another similar requirement. The student is responsible for clarifying this with the instructor(s) involved.
3. **Falsifying Materials Subject to Academic Evaluation.** This includes falsification of data, use of commercially prepared essays, using information from the Internet without proper citation, citing sources from which material is not actually obtained, etc.
4. **Cheating on Assignments, Tests, and Examinations.** You may not copy the work of others in or out of class; you may not give your work to others for the purpose of copying; you may not use unauthorized material or equipment during examinations or tests; and you may not impersonate or allow yourself to be impersonated by another at an examination. The Department of Psychology has a policy of not making old examinations available for study purposes. Therefore, use of old exams without the express written permission of the instructor constitutes cheating by the user, and abetting of cheating by the person who provided the exam.
5. **Being an Accessory to Offences.** This means that helping another student to cheat (for instance, by showing or communicating to them answers to an assignment, or by allowing them to view answers on an exam) is an academic offence.

Instructors are expected to make every effort to prevent cheating and plagiarism. This may include the assignment of seating for examinations, asking students to move during examinations, requests to see student identification cards, and other measures as appropriate. Instructors also have available to them a variety of tools and procedures to check for Internet and electronic media-based cheating. In instances of suspected or actual plagiarism or cheating, instructors, following prescribed procedures, are authorized to take steps consistent with the degree of the offence. These measures will range from a zero on the test or assignment or a failing grade for the course, probation within a program to temporary or even permanent suspension from the University.

Rights of Appeal are described in the Policy on Academic Integrity in the University calendar (on p. 55-58 in 2016-17).

**The definitive source** for information on Academic Integrity is the University Calendar (p. 55-58 in 2016-17) (<http://web.uvic.ca/calendar2016-09/undergrad/info/regulations/academic-integrity.html>)

**Other useful resources on Plagiarism and Cheating include:**

1. The Learning Skills program: <http://www.coun.uvic.ca/learning/index.html>
2. The Ombudsperson's office: <http://www.uvss.uvic.ca/ombudsperson/pubsguides/plagiarism.pdf>