Shiny Apps for building intuitions about stats concepts:
Psych 45: dprime demo: https://suppsych.shinyapps.io/sdt_concept/
Psych 10/252: Co-developed with Michael Waskom:
https://suppsych.shinyapps.io/sampling_and_stderr/
Psych 10: https://suppsych.shinyapps.io/visualize_rho/
Psych 10: https://suppsych.shinyapps.io/anova/
Psych 252: https://suppsych.shinyapps.io/chisq_dist/
Psych 253: https://suppsych.shinyapps.io/lmer_simulation/
Psych 253: https://suppsych.shinyapps.io/icc_demo/

Class Websites (created in collaboration w/other course TAs/instructors, including Michael Waskom, Lauren Howe (Psych 252, 2013), Dan Hawthorne (Psych 253), Karen LaRocque, Jim Sorenson, Ellie Chestnut (Psych 45), Karen LaRocque (Psych 136S), and Dan Birman, Robert Hawkins (Psych 252, Fall 2015)):
http://stanford.edu/class/psych252/index.html (over 1032 unique visitors, 384 from Stanford, 57 countries)
http://stanford.edu/class/psych253/index.html (over 3537 unique visitors, 32 from Stanford, 94 countries
http://stanford.edu/class/psych45/index.html (over 3882 unique visitors, 170 from Stanford, 93 countries)
http://stanford.edu/class/psych136s/ (over 2415 unique visitors, 47 from Stanford, 82 countries)

Some example website material:
Psych 253: Multinomial logistic regression

Psych 253: Structural equation modeling
http://www.stanford.edu/class/psych253/section/section_8/section8.html

Psych 253: Signal Detection Theory & Logistic Regression (embedded Shiny App)
https://suppsych.shinyapps.io/section6b/

Psych 252: An intro to linear mixed models
http://web.stanford.edu/class/psych252/section/Mixed_models_tutorial.html

Psych 136S: How can we apply memory & neuroscience in the courtroom?
http://www.stanford.edu/class/psych136s/slides/P136S_Week8_Lec2.pdf
**Example communications w/students:**

**Psych 10:**
Approximately 700 Psych 10 emails as of (3/1/16), ~300 sent, ~400 received

**Psych 45 (Spring 2015)**
Piazza - 115 posts/replies

**Psych 45 (Spring 2014)**
Piazza - 45 posts/replies

---

**Examples from Piazza (Psych 45, 2013 & 2014):**

**Student Question:**
I have two quick questions -
For contextual fear, why does the context such as the color of the room in which a rat is conditioned not function as a CS (in that damage to the hippocampus impairs fear response to the context but not the CS)? Also, for the emotional Stroop task, how does an emotional word succeed in calling up that emotion in people? This makes me wonder about how reading literature physiologically affects people...

Thank you!

**Response:**
Great questions!

1. For contextual fear conditioning, you can think of the context-US pairing as similar to a CS-US pairing (in that context is similar to a CS), but that hippocampal lesions selectively impair the context-US association (without much influence on the CS-US associations), while central nucleus/amygdala lesions impair a more general ability to make a CR (e.g., freezing is reduced to both the CS and context). So, there's something about the associations between "context" (but not CS) and US that requires hippocampus -- perhaps that "context" has many different attributes (e.g., spatial relations, multiple objects, etc.) rather than just one stimulus.

2. Just to reiterate, data from the emotional stroop task shows that it's more difficult (i.e., takes longer) to name the ink color of emotional vs. neutral words. The explanation for this effect is that emotional words capture attention more than neutral words, so when an emotional word appears you take longer to respond to the ink color because you are busy looking at/attending to the emotional word. So, in order to complete the task, you have to suppress your response to attend to the distracting word info, and instead pay attention to the color of the word. That is, seeing the word doesn't necessarily have to invoke the particular emotion in a person, but it's just that the emotional word captures attention more than the neutral ones. On the other hand, there is some evidence (like this paper) in the embodiment cognition literature suggesting that reading emotional words might call up that emotion in people -- maybe that does have some influence
on the slower RTs in the emotional stroop, if when attention is captured by the emotional word, people engage in extra processing!

Student Question:
According to Lecture 8, Slide 40, Standard Consolidation Theory states that MTL holds memories for consolidation. However, if MTL is damaged, the memories undergoing consolidation are impaired but not the consolidated memories. But then what is MTL holding? It is not holding short term memory, which is held in the PFC, nor the non-declarative memories, but it's also not holding declarative memories since if it did, the patient would be able to remember things (semantic/episodic memories).

What role does the cortex play in memory consolidation if the MTL is already holding those memories?

Response:
For understanding Standard Consolidation Theory (SCT), looking at the collection of slides from Slide 32-40 might help. Try thinking about it like this: at any one point in time, you've got memories from a long time ago (e.g., in middle school), and memories from a shorter time ago (e.g., yesterday). The more recent memories are retained in hippocampus (i.e., are hippocampal-dependent), and require hippocampus to reactivate the relevant areas out in cortex; the hippocampus is sort of "teaching" the regions in cortex about the components of the memory (e.g., that for your memory of class, region Z in auditory cortex holds information about Prof Carr's voice, and region X in visual cortex holds information about the slides, etc.). Over time, the connections between areas in cortex are strengthened (e.g., between regions Z and X), making that memory hippocampal-independent -- that is, you can now remember that memory without hippocampus, just relying off of the cortical regions. So, according to SCT, right now your memories from middle school would be stored in cortex, and independent of the hippocampus, whereas you would need hippocampus to access memories acquired a few days ago. That's why HM would remember events from a long time ago, but would have temporally-graded retrograde amnesia for the memories that were not yet fully consolidated in cortex.

Student question:
Please can you explain the dot prob task and its significance in the emotion+attention lecture?

Response:
The dot probe task basically demonstrates that people tend to attend more to emotional images. In the task, subjects are presented with images on the left (L) and right (R) side of the monitor, one of those images is fear-relevant (FR; e.g., a spider), and the other neutral (e.g., a flower). Then, the pictures disappear and a dot appears on one side of the monitor, and the subject has to indicate which side of the screen a dot is on as quickly as they can. Even though subjects are instructed to look at the fixation in the center of the screen, if subjects are attending more to the FR image, then they should be faster to find the dot that's on the same side of the monitor as the FR image. That's what the results show! When the FR image was on the left side of the screen (black bars), they're faster to detect the probe on the left side of the screen; however, when the FR image was on the right side of the screen (white bars), they're faster to detect the probe on the right side of the screen.

Student question:
In the lecture from Tuesday, Professor Wagner said that working memory remains relatively intact based on the experiment that showed a retention in digit span over time, but the book says (on page 472) that working memory is one of the first types of memory to go. I was wondering if you could clarify if working memory is retained over age, or if it in fact also declines significantly.
**Response:**
Great question! One thing to note is that the WM tasks that don't tend to show age related decline (such as the digit span that you noted), are pretty "simple" WM tasks, in that they just require passive maintenance of some stimuli. However, some WM tasks are more complex and require executive control mechanisms to manipulate things in WM (for instance, instead of just maintaining a series of numbers in mind, they might have to recite the numbers backward), and these types of tasks might be more vulnerable to age related decline (perhaps due to PFC-related changes).

---

**Example emails from Psych 252:**

Hi Steph,

I wrote Lauren about some quibbles I had with the grading, and regarding question C she said that you graded these. So, you're now the happy owner of my quibbles :)

---

**QC**
item 1 and 4, you deducted points for using lm instead of glm. I'm not completely sure why the distinction matters since in this case glm and lm give the same results exactly. I know because I checked both while running them. Why? Because Michael remarked to me in HW1 to use lm() where possible rather than glm() so i kept that in mind. Either way, the only time we distinctly covered this anywhere in section or class was in this week's section, where Michael showed us how to use lm() with categorical variables, so I'm thoroughly confused.

Anyway, thanks for taking the time to read. It's a small enough of a difference overall, but a penny saved is a penny earned, etc. :) 

Hi XXX,

The distinction between lm() and glm() is an important conceptual one; lm() is used when your DV is continuous, and glm() is used when your DV is categorical. One way to think about glm() is that it should be used for *classification* problems, where you're trying to classify/categorize something based on your IVs. In the case of C(1), we're trying to predict a categorical variable (i.e., the treatment group someone is in; either (a) acupuncture, or (b) traditional), based off of our IVs (time, exercise, etc.); in C(4), the reasoning is similar, but in this case our "outcome" variable is OTC (i.e., (a) patient takes more than a minimum amount of OTC meds, or (b) patient does not). Since in both cases our DV is categorical (and thus, not related linearly), we must use glm().

In fact, glm() and lm() give different results; here, when using glm() you must make sure you specify that the "family" of distribution we're modeling is binomial (i.e., the treatment groups take on a label of 0 or 1, where we're modeling the probability that someone is in acupuncture ("1") group or the traditional ("0") group. Here, you might first recode treatment as:

```r
> ap_data$treatment[ap_data$treatment==2] = 0
```

So that acupuncture will be = 1, traditional = 0. Then, you can run the glm() with this line:

```r
> res_glm = glm(treatment~exercise + time, family=binomial, data = ap_data)
```

You can see that glm() w/a binomial distribution gives different results from lm (though, qualitatively similar):

```r
> summary(res_glm)
```
Call:
glm(formula = treatment ~ exercise + time, family = binomial, 
    data = ap_data)

Deviance Residuals:
         Min          1Q    Median          3Q         Max
-2.42100 -0.79350 -0.15090  0.72880  2.04180

Coefficients:  
             Estimate Std. Error z value Pr(>|z|)
(Intercept)  -5.6288   1.3123  -4.289  1.79e-05 ***
exercise     -0.7394   0.1150  -6.430  1.27e-10 ***
time         1.4274    0.2562   5.571  2.54e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 415.41  on 299  degrees of freedom
Residual deviance: 285.90  on 297  degrees of freedom
AIC: 291.9

Number of Fisher Scoring iterations: 5

Another way to interpret this would be: given some background information about patients (e.g., time, and exercise), and knowledge about their treatment group, we want to be able to find some line/hyperplane to separate them based on their background information into their respective treatment groups. The glm() essentially finds this separation boundary. I attached a .R script so you can visualize this w/your data if you're interested (plot also attached, if you just want to see what it looks like).

For more conceptual info on glm(), including how to interpret the output, try checking out the tutorial we posted on the class website. One key difference between lm() and glm() is that w/glm() since we're modeling the event of something happening (i.e., the probability of being assigned to the acupuncture group, or the traditional group), our predicted values should always be between 0 and 1, regardless of the input; in order to accomplish this, glm() w/the binomial family does this w/the sigmoid function.

Anyway, it's important that you understand glm()/logistic regression is use when your DV is categorical, and lm() when your DV is continuous. For both, you can have categorical and/or continuous IVs.

Hope that helps!

Steph

# Run glm()
res_glm = glm(treatment~ time + exercise, family=binomial, data = ap_data)

# Calculate decision boundary using glm,
# separating the region where treatment > 0.5 from where treatment < 0.5
Example emails from Psych 253:

Hi Steph and Dan,

First, I'm so sorry I'm bothering you with questions on your day off.

I am working on finishing up HW#6, and I am stuck on the last question. For the glm part, are we supposed to just create different models and test the variables for significance using glm? If this is the case, how do we decide which of the 32 traits to include in the model? I started by using the predictors from the previous questions, but I only find one significant predictor and 2 marginally significant predictors. Do you have any tips or suggestions about how to go about doing this?

Also, I'm not really sure what I am supposed to do with the backwards stepwise regression. Do you know of any examples of step() either in a script or in the slides that might be useful? I've been searching around and haven't been able to find any examples of this from class. Based on what I read in the help menu of R, it looks like I have to have an initial model (which I think might be the glm I produce in the first part of the model). Any guidance on this would be very appreciated!

Thank you,

XXX

Hey XXX,
For #4 on HW6, the basic idea is for you to compare results from regularized logistic regression (with glmpath) to those obtained using regular logistic regression (i.e., not using regularization) and from stepwise regression, to see how the different approaches give different results.

If you run glm like this: glm(rating2 ~ ., data = d0_scale, family = binomial) (where d0_scale = data.frame(cbind(scale(d0[, 1:32]), rating2 = d0[, 33])) you'll basically be entering the same predictors as with glmpath (i.e., ALL 32 predictors will be included as IVs), except you won't be using regularization (i.e., forcing coefficients to be small/sparse).

Here, just note what predictors are now significant with this basic glm model, and how this compares to glmpath (which are the best predictors in both models, what values do the other coefficients take?). Then, using step() (or stepAIC() also works), where your input to step() is your full glm model w/32 predictors -- i.e., whatever you save the output of glm() as), you can basically derive the model with the lowest AIC (this model will have a subset of the predictors, since it basically goes backward from the original model w/all 32 predictors, and iteratively removes predictors to arrive at the best/simples model with the lowest AIC -- note that the AIC drops every model, and every successive model has fewer predictors), and you can note which predictors "survived", which of those are significant, and how this compares to running the analysis with regular glm, and with regularized logistic regression (glmpath).

Hope that helps!
Steph

Steph,
That was incredibly helpful! I should be good now to finish up. Thank you so much for all of your help.
XXX

Hi Steph,

I have a quick clarification question regarding the hint for Question #2d - Ewart mentions that when you plot the (i) loadings on factor PC1, you see that there are 2 or 3 clusters of variables or (ii) the PCI scores for participants, you find there are 3 or 4 clusters of people. It is not clear to me how he distinguishes between the PCI scores for variables and for people - are these supposed to be different scores or are we supposed to interpret the same scores differently for variables vs people?

Also, XXX and I have been working together on the homework and have a few general questions - would you have 30 minute tomorrow to meet with us quickly and answer some questions? Our schedules are flexible between 12:15 and 3 pm.
Thanks in advance for your help!

Hey XXX,

Attached is an example [link here] that I think will help you see how to view clusters when plotting by loadings or by people. An explanation of how these “scores” are calculated is here: http://stats.stackexchange.com/questions/222/what-are-principal-component-scores

Hope that helps!

For tomorrow, I need to set up for a participant coming ~12:45 (and they probably won't finish til around 3), and need to eat lunch before that, but I could talk briefly after class? There's a slight chance the participant would be done by 2:30, in which case I'm happy to meet between then and 3, otherwise Dan might be available?

Best,
Steph

---

Here's an explanation in an .Rmd -- bottom line is that the variance of a scaled variable = 1, and $\beta = \frac{\text{cov}(x, y)}{\text{var}(x)}$ -- so when x and y are scaled, $\frac{\text{cov}(x, y)}{\text{var}(x)} = \frac{\text{cov}(x, y)}{\text{var}(y)}$, and $\beta_{x} = \frac{\beta_{y}}{\text{var}}$

Have a great weekend!

Steph

[link to attached file]

That makes sense.
Thanks Steph!

Hi Steph,

Thanks so much for taking the time to do that! I'm just a little confused how, if standardized betas correspond to a slope, changing the x and y axes does not invert the slope of a line equating x and y. In your example, if I move up 1 standard deviation in the predictor variable (Petal.Length), I move up .9 standard deviations in the predicted (Sepal.Length) variable. Therefore, in order to move up 1 instead of .9 standard deviations in the predicted variable (Sepal.Length), I'd need to move even further in my predictor variable, in particular, 1.11 standard deviations (1/.9) instead of just 1. Based on this, I would expect that when we flipped the predictor and predicted variables, moving up 1 standard deviation in what is now the predictor variable (Sepal.Length), would move me up 1.11 standard deviations in what is now the predicted (Petal.Length) variable, and the slope should be 1.11 not .9. I'm not sure where I'm making a mistake in my reasoning.

Best,
XXX

Hi XXX,

Basically, when you scale both IV and DV, the standardized beta can be interpreted as for an increase in 1 SD of DV, that should result in a change of beta*1SD of IV, regardless of which is the DV and which is the IV.

For instance, an increase in 1 SD of Sepal Length is an increase in sd(iris$Petal.Length)*.8718 Petal length (1.54 units). Similarly, an increase in 1 SD of Petal Length is an increase in sd(iris$Sepal.Length)*.8718 Sepal Length (0.72 units). It intuitively might be a little hard to think about, but another way to get these unit increases would be to scale the DV and see what the change in IV is; for instance lm(formula = Petal.Length ~ scale(Sepal.Length), data = iris) would give you the first estimate from above (for an increase in 1 SD of Sepal Length, an increase in 1.54 Petal Length). Similarly, lm(formula = Sepal.Length ~ scale(Petal.Length), data = iris) would give you the second estimate from above (for an increase in 1 SD of Petal Length, an increase in 0.72 Sepal Length). So, the increase in each IV isn't "the same" when its unscaled, but the increase in SD (and hence the beta) is the same when they're scaled.

Does that make sense?

Best,
Steph

Thanks Steph! That makes more sense. XXX and I found that this only occurs when you both center and standardize (as scale does by default) but not when you just center, which I thought was interesting.

Would the graphs of the regression line of x on y or y on x look the same since the intercept is basically 0 and the slope is the same?

Yeah, the reason it only occurs when you scale (i.e., center & make sd/var = 1) is that the variance of x and y are equal (i.e., 1), and thus both betas = cov(x,y)/1 (rather than cov(x,y)/var(x) and cov(x,y)/var(y)).

And yep! Equations are the same, the best fit lines look the same (see attached screen shot)

Example emails from Psych 10:

Hi Steph,

First, thanks, so much for the extra time you have given with me. It is so helpful! I do the problems on Thursday night, but many times I'm not understanding the concepts I'm applying with the computations.

As discussed yesterday, I couldn't get the answer for "s" of .0146 in question F on page 4. I did get the x-bar of .8875. For the formula I got 4.727 for the sum of x-squared minus 5.325 squared over 6 (28.35/6=4.726). This resulted in my answer for ss as .0010625. I plug this value in to get s which looks like - .0010625(5) = .0053125 then take square root to get s which results .072886899.
Can you see where I made an error with my math or set up the problem?

Thanks - and also do know what the schedule for last week of class will be? Is the Professor going to still have quiz 9 on a Tuesday or push it back to the last Friday of classes?

Thanks again for all your help! From a 48 year old vet who has had a lot of instructors in my life, i feel like you have a talent for teaching,
Best, XXX

Hi Steph,

Thank you so much for your advice. It really means a lot and is so helpful. I will definitely start working on the two handouts earlier this week and really utilizing the opportunity of office hours (more than just for the homework)! Depending on how this week's studying goes, I may take you up on that offer to work out some quiz taking strategies.

Thanks again for your help and reassurance! It really is appreciated.
XXX

---

**TA Evaluations**

**Psych 253**

- I couldn't attend the sections due to a conflict, but I have seriously never seen such helpful section materials (esp. the midterm review!) in my entire stanford career.
- Steph took the lectures and made them really come alive. I really loved that the section materials were done in R Markdown so you could see what it looks like to effectively (and in an aesthetically-pleasing way) present R code and output, and to walk someone through your analysis. Talk about leading by example!
- Steph's material was always very well organized for section and was a great supplement to lecture and homework assignments. In addition, her one-on-one instruction outside of class was always very helpful. She was able to break down and re-explain concepts to help my understanding.
- Excellent section notes - incredibly helpful for homework and understanding material.
- You put so much time into this section and we are all very grateful for it. The notes you put together saved us many times so thank you for going above and beyond!!!
- Steph's code and feedback for problem sets was excellent, and genuinely helpful. Section was also very helpful.
- Steph is one of the best TA I had. She is approachable in and outside of class. She is very knowledgeable, and always very well-prepared for section
- Steph is the best TA that I have ever had for a methods course. She has a a deep and sophisticated understanding of the material and is very good at making it accessible.
- I'm a HUGE fan of Steph (et al.)'s way of giving feedback on the homeworks. Linking to a google doc with the general comments that sum up what the students need to address, and pointing to which are applicable to you is very, very effective for me. If I ever TA a class, I will be using this system of grading feedback. It makes great sense, and it's easy to see not only how to fix what you DID do wrong, but how to fix what you could have done wrong too!
Steph was always available, answering questions via email is a very timely manner, even on weekends and holidays. She also was always willing to meet outside of class or stay after section to answer questions.

Incredibly dedicated TA. She will undoubtedly make an incredible professor.

you were super available. Awesome, again!

She is also very responsive and helpful out of class and develops amazing tutorials that help to solidify the material.

Truly a marvelous TA/section leader. Goodness me -- honestly this subject would be uber intimidating to me normally, but I felt that Steph's presentation of the material made it very accessible, and helped you see what is actually going on so you get a good solid understanding of what you are being asked to do.

Steph was a great section leader who really went out of her way to make sure that students were successful in understanding the material. I credit most of my understanding with her presentations during section and help outside of class.

Seriously, the best TA ever!

She basically set a new standard for TAship! Great knowledge of the material. Fantastic level of grading with very detailed super helpful comments. And awesome presentation of the material at the section time.

Stephanie is one of the best TA's I've ever had! She has gone above and beyond for her students time and time again. I remember asking her a statistical question after class that was unrelated to the material we have been learning. She took the time to run analyses over the weekend that investigated the question and engaged in a long email discussion with me to make sure I understood the answer. I wish all TA's were this awesome!

**Psych136S**

- Thorough knowledge of material; helpful that she is currently a graduate student and intensely working in a lab studying certain topics we are also learning in class.
- I thought that the instructor's teaching was extremely effective, and she answered all questions thoroughly and thoughtfully during each class.
- Very good teacher, friendly.
- She is very nice. She always adjust her teaching based on students' feedback. Her teaching style is very vivid.

**Psych 252**

Suggested improvements:

- I like handouts!! She can make more handouts!!! They are very helpful for learning stats in general.
- Nothing. She was an amazing TA.
- At the beginning of the quarter, many students in the class were a little frantic about the workload/learning code in R. Early on, there seemed to be times when we got off topic in section because of some students (probably including me!) voicing worries or asking many, many questions, some of which weren't helpful to the section as a whole. However, I felt like Steph started taking better command of the classroom and keeping us on point by the middle of the quarter. So, just being confident and taking control of the class would be something to keep doing!
- I really don't think Stephanie can do much to improve.
- Very eager to answer question and very clear in answering questions
Aspects of teaching that were most helpful:

- explaining the concepts in a very organized way.
- Steph is pretty clear in terms of explaining stats ideas, and how that may apply to the dataset.
- Explains very well!
- Being able to provide multiple examples on a single idea
- Always answered my questions in a very clear way and the turn around time was super impressive.
- Her section instruction and materials.
- Steph was very good at coming up with concrete examples to communicate a concept, and teaching us through visualizing the data on the white board or with the shiny apps.
- Patience
- gave very helpful feedbacks
- Flexibility about meeting
- I appreciated that Stephanie reached out concerning my performance in the class - this helped me in turn seek out help.
- handouts are very helpful for me to go over what I have learned.
- Walking through R code and explaining what each line of code did
- Smart and super well prepared.
- Her extremely quick response to questions and willingness to provide additional resources that would help us.
- Steph was extremely available to answer questions through email or on the homework forum. She was also very helpful during office hours and spent extra time with us when necessary.
- Responsiveness
- was always ready to answer questions.
- Made expectations clear about coursework
- she provides great section materials
- Availability through office hours, section, and emails!
- Incredibly capable.
- Her knowledge and expertise - Steph has a very thorough knowledge of the material.
- Steph was able to answer questions in a clear and direct manner, and always had answers to my questions. She was good at using her experiences analyzing her own data to explain concepts to us.
- investment in my success skillful and experienced.
- her use of easy and concrete examples to explain statistical concepts was very helpful.
- Patient (gave material at an appropriate level)

What skills or knowledge did you learn or improve from this TA?

- She explains the basic concepts very well and that's exactly what I need.
- All the learning that I did in this course is from oh and sections.
- She helped with almost every concept we covered in class.
- I went to Steph's section almost every week and learned a lot from her. She was also very helpful in giving me one-on-one attention after I did poorly on the first in-class exam, and explained everything to me very patiently.
- How to choose and run statistical models. Creating R code for statistical models and data visualization. Underlying statistical theory.
- Learning R and learning when to use different approaches
- A lot of supplemental knowledge beyond course materials.
- R programming. Some R stuff, aspects of contrasts I learned how to approach the class and where to find resources; I also learned how to grapple the class material.
Psych 10

What skills or knowledge did you learn or improve from this TA?

- Steph helped me with every aspect of STATS 60. When I didn't do well on a quiz, she sent me pointers on how to do better. When I didn't understand material, she was extremely patient and helped me navigate through my confusion.
- I solidified my ability to solve problems and often also fortified my understanding of the meaning behind my calculations.
- To better apply statistical methods learned from lectures to given applications
- Steph did a great job going over the section handouts very clearly and providing little tips and tricks along the way. It helped a great deal to do the handouts before section.
- My reasoning skills, connecting statistical data to real-life concepts
- Studying techniques
- Steph taught me to approach problems in a formulaic way only after really working through the formulas to make sure I understand what they are used for.
- stephanie helped cement my understanding of the concepts covered in class on a weekly basis and explained confusing topics with ease
- Stephanie helped me understand concepts I was struggling to comprehend from class lectures
- she helped explain so much about stats to me and I learned way more about all the material covered in lectures!
- I only went to section once, and we reviewed the homework there.

How can this TA’s teaching be improved? (Please type one idea in each box below.)

- less filler words
- /
- n/a -- she is probably the best TA I have had at Stanford!
- N/A
- nothing! ;)
- more confidence
- /
- n/a
- N/A

What aspects of this TA’s teaching were most helpful to you? (Please type one idea in each box below.)

- Clear communication
- She is very patient and understands that students learn at different paces.
- Clearly writing all the relevant formulas at the top of the board.
- Very organized, patient, clear in instruction.
- Clear and easy to understand
- Patience
- Thoroughness
• Going through the PSET
• efficiency -- Steph always made sure she was prepared for section so she could cover as much material as possible in the amount of time we had
• Always well-prepared to cover important concepts
• Kindness and patience in helping me learn difficult concepts
• going over the handouts was so helpful and I learned so much
• Effective preparation
• She works through problems step by step and explains everything thoroughly.
• Explaining concepts as we went through problems.
• One of the best TA's I've had at Stanford. She's willing to go the extra mile for her students to ensure
they understand the learning objective.
• Organized
• Availability
• Accommodation
• Going over what we should put on the cheat sheet
• reliability -- Steph put herself in our shoes and explained difficult concepts with examples rather than
just throwing lots of formulas at us and hoping that we would understand them as quickly and
thoroughly as an upper-level Stats student would
• Presented sometimes difficult concepts with ease and with helpful explanations
• Very helpful in needing help dealing with the professor
• she went through every step! :)
• Open to questions and explaining concepts several times
• Drawing helpful graphs.
• Her dedication and professional nature were effective in presenting the material. Always
well-prepared!
• Approachable
• Clarity
• Being very open to students emailing her with questions and concerns regarding the class.
• clarity -- Steph always made sure the examples she gave were simple and clear so that we could
remember them and think back to them when struggling with problems on the weekly quizzes
• Readily available and open to answering any and all questions
• Very willing to make availability to help students even outside of office hours
• she was so nice and helpful!