Psychology 5136
Human Abilities

Prof. Nathan R. Kuncel
Department of Psychology
kunce001@umn.edu
612-624-1651

Required Text:

Course Objectives:
The goal of this course is to teach you a lot about the study of human abilities in general and intelligence or cognitive abilities in particular. I expect you to learn a HUGE amount in this course. Lucky for you, I have done my best to create materials, lectures, and exercises to help you meet my lofty expectations. We’re in this together. Of course, no set of materials will be ideal for everyone, so let me know if you need help with something or want supplementary information.

Evaluation:
Students will be evaluated on the basis of two examinations and performance on exercises and in class participation (most will be done in class). All students will be required to write a term paper of no more than 20 pages.

Exam Format:
Exams will be closed book and closed notes. At least 50% of the total examination points will be based on short essay questions that will be handed out in advance. These cover material from the lectures and readings. Much of the examinations will be based on figures and tables we discuss during lectures (these are included in your reading packet). A subset of items will be sampled for each examination and students will have some limited choice about which essay questions to answer (e.g., 6 out of 7). For each exam, short essay questions will be reproduced verbatim from the lists. Students who prepare correct answers for these questions in advance are far more likely to do well on the exam. The remainder of the exam will be based on a mixture of item types (e.g., multiple choice, true/false, matching, fill in the blank, definitions) as well as at least one longer integrative essay. Some topics build on other topics (especially the discussion of psychometrics and statistics), however, the exams are meant to be non-cumulative. During the course we will do a few in class activities and assignments and group discussion of a paper. These will count toward your grade.
Lecture Notes:

Lecture notes are posted on the Moodle page for you. Print them out, bring them to class, and actively take notes on them (I have included space for notes). Not doing this is a very big mistake. The notes are fairly detailed and comprehensive but you will need to write information down and include details if you want to be well prepared for class.

Term Paper:

This course has a term paper which you may write on one of the following topics.
- Nature of expertise: Is 10,000 Hours Nonsense?
- Alternate Intelligence Constructs: Is Anything Intelligent Out There?
- Will the Real Creativity Please Stand Up?
- Book Critique of *The Blank Slate, The Bell Curve, or The Mismeasure of Man.*

The term paper will be *no more* than 20 pages but no less than 10 pages with 1 inch margins, 12 point font, double spaced is due at the end of the final exam. Page limits do not include citations. You will be expected to critique the arguments put forth, identify strengths and limitations, or propose future directions for research on unanswered questions.

In Class Assignments and Participation

We will have a few in class assignments that I will hand out or ask you to do on plain paper. These will be turned in for a score. Also, we will have a few sessions where there will be a discussion paper (Labeled DISCUSS! in the reading list). You will need to comment, question, observe a couple times during our discussion to get credit (which I will note on my class list).

The Student Conduct Code for the University of Minnesota is included on the Moodle site for this course. Academic dishonesty in general and plagiarism in particular are serious issues. The Conduct Code states that “Plagiarism shall mean representing the words, creative work, or ideas of another person as one’s own without providing proper documentation of source” (p.1).

Grading:

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<td>Paper</td>
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<td>Assignments and participation</td>
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Class Content:

There are a couple textbooks that might have been good had they not been out of date and out of print or very expensive. The mini-book by Deary is a good general
review of some key concepts. It is also inexpensive. I have selected some readings to round out the course. The structure of the class falls somewhere between a traditional college course and a graduate school course. In other words, it is a tough class as has been rated as such by previous students. I have focused my lectures on providing background and key concepts that will allow you to better understand the readings. I know how difficult it is to take perfect notes so I have bundled my overhead slides.

Since I do not view teaching courses as a static thing to be regurgitated each year, it is quite likely I will have new slides for a number of lectures. I will bring copies to class for you. It is to your advantage to bring your course materials along so you can note where the new slides fall. Please note that you will have a difficult time if you don’t come to class and try to rely on the overhead slide handouts. Taking notes on the slides will make a huge difference. The exams draw most heavily from the lectures. It is, after all, my job to teach you what is important. This does not mean that you can forget about the “textbooks” or readings, many figures and tables come from them and the book provides additional information.

If you do not understand something the process for dealing with this problem is very simple. First, tell me. Second, I will help you. If a few students mention that something does not make sense I will prepare supplementary materials for the class to help everyone learn the concept.

For students with a documented need that requires accommodation for instruction or evaluation please let me know and I would be happy to do so.

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<thead>
<tr>
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<td>Sept 3</td>
<td>Introduction and Overview</td>
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<td>Psychometrics and Stats.</td>
<td>Fiction: Vonnegut – Harrison Bergeron</td>
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<td>Modern Models</td>
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<td>Ackerman (2014)</td>
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<td>Deary, Chap. 4</td>
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<td>Methods &amp; Findings</td>
<td>Plomin et al., Chap 5 &amp; 9</td>
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<td>Neisser et al. (1996) pp. 84-88</td>
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<td>Sept 24</td>
<td>Expertise</td>
<td>Ericsson &amp; Charness (1994)</td>
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<td>Plomin Shakeshaft et al. (2014)</td>
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<td>Hambrick Oswald et al. (2014) DISCUSS!</td>
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<td>Hambrick et al. rejoinder (2014)</td>
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<td>Sternberg Response *</td>
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Dec. 16  Final Exam  1:30 p.m.-3:30 p.m., Tuesday, Dec. 16

For Those Who Care, A Bit About Me:

Nathan R. Kuncel:

I was born in Chicago and grew up in the city until my family moved to a western suburb when I was in grade school. I went to college at the University of Minnesota because I knew that I wanted to be a psychologist but wanted to be a bit further from home than Illinois (pesky parents). I fell in love during college and stayed at Minnesota for my masters and doctorate to be close to the woman I ultimately married. I also stayed because Minnesota has one of the top 3 I/O psychology programs in the country and I wanted to be a Psychologist.

I was fortunate to obtain my first faculty position at the University of Illinois. They have one of the best psychology and I/O programs in the country. I was even more fortunate when, three years later, the U of MN asked me to leave and interview for a faculty position in the same program from which I graduated. My faculty office was only my graduate school office only now I don’t share it with 3 other students. I have done well at Minnesota and other people seem to think I know good stuff. I have been awarded 3 early career research awards (Anastasi, Cattell, & McKnight) and granted an endowed chair (Marvin D. Dunnette Distinguished Professor) at the U of MN. I am in nerd heaven.

I primarily study the prediction and structure of academic and job performance. My goal is to understand what behaviors constitute academic success (it is a lot more than good grades) as well as obtain a complete understanding of all of the characteristics of students that are related to their success in school including both cognitive and hard to measure characteristics like motivation and drive. I also do research on socially desirable responding on personality tests, parenting behaviors, vocational interests, personality effects on life outcomes, managerial selection, and basically anything else that seems interesting that has to do with human behavior. Being a professor is really cool.

My wife is also a psychologist and works as a research scientist for a research firm in town having tried faculty work at UIUC and deciding she wanted a different environment. At one point in time we lead an exciting and dynamic life including backpacking with our dog, going to the theater, reading books, watching football (she’s a Patriots fan, I am Bears fan) and playing games on our X-Box (she stinks and I’m ok). I had some hobbies including refinishing furniture, baking sourdough bread, and raising African Violets. This rock star like lifestyle came to an end when our son Benjamin was born. Now our major hobby (or fantasy) is uninterrupted sleep. We had our second, Nadine, and have slid even further into sleeplessness. Fortunately they are the greatest things I have ever done in my entire life and I don’t really miss the old days (except the sleeping part). I look forward to becoming even more eccentric as I become a middle-aged professor moving toward down right wacky as an old professor.
Item Sorting Assignment
Human Abilities

Rate yourself on them using the following scale:
   1 = Strongly disagree
   2 = Disagree
   3 = Slightly disagree
   4 = Slightly agree
   5 = Agree
   6 = Strongly agree

_____I enjoy attending parties.
_____In a group I tend to emerge as the leader.
_____People say I am very social.
_____I would rather spend time with other people more than anything else.
_____I would rather lead than follow.
_____People say I am a leader.

How would you organize these items? That is, which items seem to go together?

What would you call your category or categories?

If you have more than one category do you think that they are independent. In other words, if you knew that a person rated themselves high on one set of items, would you be able to predict how they would rate themselves on the other set of items? Why or why not?

Do you think men and women would provide the same ratings? Why or why not?
Correlation and Factor Analysis Demo

Cosmo Quiz: Is He Devoted to You?

Think about your answers to these questions and what items “go together” in your mind.

1) How often does your guy tell you you’re beautiful?
   i) Uh. Still waiting….
   ii) Daily – sometimes hourly!
   iii) Every so often, at random mushy moments when you’re wearing something he loves.

2) When you introduced him to your closest friends, he said:
   i) “Hi”, then silence – he looked a bit bored.
   ii) “Nice to meet you”, with a big smile.
   iii) “I’ve heard so much about all of you! So, how’d you become friends?”

3) If you came down with a nasty cold, do you think he’d get his butt off the couch and come over to take care of you?
   i) Maybe he’d stop by – but he’d definitely give you checkup calls.
   ii) Absolutely – he’d be by your side in a flash, bearing soup and DVDs – you wouldn’t even have to ask.
   iii) Doubt it – he’d probably assume you could take care of yourself.

4) Which one of your winds up talking more about your job and career plans?
   i) It’s pretty split – whoever is going through more stress or upswings.
   ii) You – he always asks about your gig and listens patiently – even when you’re bitching about it for hours.
   iii) Him – whenever you mention your office, he gets a glazed look in his eyes.

5) How regularly does he say you look great?
   i) Really really close to never.
   ii) Every time I make the effort.
   iii) Daily – sometimes hourly!

6) You ask him to accompany you to a tedious activity (dinner with wacko relatives, apartment hunt). What’s his response?
   i) “Oh, uh, I think I have to work that day or, um, take my dog to the vet…”
   ii) “Just tell me when and where.”
   iii) “I’ll try.”

7) About how many days a week does he make time to hang out with you?
   i) Four – but if he had it his way, he’d be at your doorstep all seven.
   ii) Two or three, depending on how busy his schedule is.
   iii) One, and it’s usually you who plans it.
Behavioral Genetics: Exercise

Due to prior popular demand, I have created a practice exercise. This exercise is not required for the course. It is a supplemental exercise to help you learn the material. I first present the questions and then have included the answers with some brief discussion for the most difficult problems. You will probably learn the most if you try to do the questions without peeking.

Remember that the total variation is due to Unique Environment (U), Common Environment (C), and Genetic Effects (G). So $1 = G + C + U$

In this first section we are concerned with what is causing the correlation between pairs of people. Remember that the correlation measures similarity. Unique environment should cause children to be different, not the same. Therefore, U should not appear in any of the equations. Note: for clarity, lower case letters are for children apart from a sibling or parent, upper case are for children together or for biological parents.

Write the equations for the following scenarios:

1) Fraternal twins reared apart: $r_{ff}$

2) Fraternal twins reared together: $r_{FF}$

3) Adopted children reared together: $r_{AA}$

4) Biological mother and child (together): $r_{MC}$

5) Biological mother and child (apart): $r_{Mc}$

6) Siblings reared apart: $r_{ss}$

7) Siblings reared together: $r_{SS}$

8) Identical twins reared apart: $r_{ii}$

9) Adoptive mother and child: $r_{mc}$
Now we can move onto stage two. The previous equations are all valuable sources of information about genetic and environmental effects. Since many of the above equations have both genetic and environmental effects, we need to figure out how to estimate the effects in isolation. Therefore, our goal is to combine them together to isolate effects due to either Common, Unique, or Genetic effects. In some cases we can get a direct estimate of an effect without doing any special math.

10) List the design(s) that directly gives us an estimate of C:

11) List the design(s) that directly gives us an estimate of A:

Ok, these are nice and easy. Assuming other factors are messing up our data (similarity of adopting family, contact during separation) we can say that in the first design the correlation has to be due to common environment. Similarly in the second design, the correlation has to be due to genetics.

However, as good scientists we want to do two things. First, we want to see if we can get the same results across study designs. This tells us if our basic theory makes sense. Second, we don’t want to waste any data or information so we need to develop basic equations that allow us to mix and match study correlations to obtain many different estimates of G, C, and U (also sometimes call E).

Let’s start with a simple one.

Let’s isolate genetic effects using the fraternal twins reared apart.

12) Solve for A: \( r_{ft} = A/2 \)

Ok, now use the correlation between biological mother and child together \( (r_{MC} = A/2 + C) \) and biological mother and child apart \( (r_{Mc} = A/2) \). Subtract the mother child apart correlation from the mother child together correlation and solve for C.

13) Plug in and solve for C: \( r_{MC} - r_{Mc} = \)
Now for one last thing. Let’s use research results and our brand new equation to arrive at an estimate of common environment effects.

**Biological Mother and Child Apart:** \( r_{Mc} = .24 \)

**Biological Mother and Child Together:** \( r_{MC} = .42 \)

Plug these values into the proper equation. This is an estimate of the variability that is due to common environment.

Answer Key:

1) \( A/2 \)
2) \( A/2 + C \)
3) \( C \)
4) \( A/2 + C \)
5) \( A/2 \)
6) \( A/2 \)
7) \( A/2 + C \)
8) \( A \)
9) \( C \)
10) Adopted children reared together and Adoptive mother and child
11) Identical twins reared apart
12) Multiple both sides by 2 yielding: \( 2 \, rff = A \).

13) You should plug in \( (A/2 + C) – (A/2) \) since there is only one term to distribute the negative, we can just remove the parentheses which gives us: \( A/2 + C – A/2 \). We know that \( +A/2 – A/2 \) is equal to zero. So it equals \( C \). Therefore \( rmC – rmc = C \). Sweet.

14) We now know that \( rmC – rmc = C \). This should make some logical sense. The correlation in one case is due to mother and child genes and well common
environment while the other correlation is only due to genetics (because the child is being raised by someone else).

So $0.42 - 0.24 = 0.18$
Ageing and Intelligence

5. A scattergram graph that compares people’s scores on the Moray House Test in 1932 (at age 11) and in 1998 (at age 77). Some crosses represent more than one person.

What does the black dashed line represent?

What do you notice about the scores obtained from age 11 to age 77?

Do these data suggest that ability is stable over time? Why or why not?
In-Class Assignment
Birth Order Effects

On the next page is a figure showing the order of birth in families with 1 up to 9 children (j=1 to j=9). The y axis (upright axis) is IQ score and the X axis is birth order.

Note: There are effects for birth order AND size of family.

What might be the cause of the birth order effects?

Can you think of something that might alter the observed effect?

What might be the cause of family size effects?

Can you think of something that might alter the observed effect?
FIGURE 6.1 Birth order, family size, and intelligence. (Based on Zajonc & Markus, 1975.)
Predictor Bias Group Exercises

Here are some data for the X group and the O group. Plot their data and then answer the following questions. Remember, the predictor corresponds to the bottom while performance scores correspond to the sides of the grid.

<table>
<thead>
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<th>X Performance</th>
<th>O Predictor Score</th>
<th>O Performance</th>
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Is there a difference between the groups on the predictor (average score on predictor)?

Do the data suggest that there is differential validity?

Do the data suggest that there is test bias?

For the X group, what is the average performance for those people getting an 8 on the predictor?
For the O group, what is the average performance for those people getting an 8 on the predictor?

For the X group, what is the average performance for those people getting a 4 on the predictor?

For the O group, what is the average performance for those people getting a 4 on the predictor?

What do the comparisons between groups at scores 4 and 8 tell us?

### New Problem

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<thead>
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Is there a difference between the groups on the predictor?
Do the data suggest that there is differential validity?

Do the data suggest that there is test bias?

For the A group, what is the average performance for those people getting an 8 on the predictor?

For the B group, what is the average performance for those people getting an 8 on the predictor?

For the A group, what is the average performance for those people getting a 4 on the predictor?

For the B group, what is the average performance for those people getting a 4 on the predictor?

What do the comparisons between groups at scores 4 and 8 tell us?

Another definition of an unbiased predictor: “Given similar scores on selection procedures [selection systems], later job performance is similar regardless of group membership” (Schmidt & Hunter, 1998, p.272)

1. If the average score on a predictor is different for two groups, what can we conclude?
   a. There is no differential validity
   b. There is no test bias
   c. There is a group difference
   d. There is differential validity
   e. There is test bias

For each selection scenario, draw a picture of what the relationship would, more or less, look like. We are comparing the stripe group with the dot group. Put some stripes in the distribution for stripes and dots in the distribution for dots.

We did a study and found that a predictor was equally valid for both groups (r=.60) and there was a moderate difference between the groups in their average scores on the predictor. We also found that at all values of the predictor, the stripe group tends to perform the same as the dot group.
We did a study and found that a predictor was not valid for either the stripe group or the dot group. The stripe group also appears to do better (on the average) than the dot group on the predictor. Finally, both groups, on the average, perform equally well on the job.
Draw the case where the predictor overpredicts performance for the stripe group and there is a group difference on the predictor in favor of the dot group. Assume that the predictor has strong validity for both groups.

Draw the case where the predictor underpredicts performance for the dot group and there is a group difference on the predictor in favor of the dot group. Assume that the predictor has strong validity for both groups.