

## **“BRIDGE “Going Public” Summary**

### **Course Details**

The focus of my project was upper-level courses in psychology, though the project would easily apply to lower-level courses as well. The courses I teach typically include juniors and seniors who double-major in Psychology and Education. Courses in Psychological Tests (PSY315) and Developmental Disabilities (PSY330) are required for students with this double major and a minor in Special Education. The upper-level laboratory course includes second-semester juniors and seniors.

### **Problem Addressed**

The problem addressed was that of making student note taking more efficient and generative. I had found that students were not selective in their note taking, often trying to write down every word spoken or presented on slides. The latter is particularly perplexing given that slides are posted immediately following class. This approach contrasts with the likely more fruitful approach of listening more and only writing down the most critical information for later review and study. This skill of listening and thinking critically about the information as it is presented seems to be lacking in the approaches of many students. Thus a critical opportunity for conceptual thinking is being lost, which likely decreases the long-term retention of the material.

### **Methods Employed**

The main change made for students was a restructuring of the process of providing outlines of course material. In the past I had provided outlines a week prior to each exam. My idea for this project was to provide the outlines piecemeal as each new topic was raised in class. Thus the outlines were being systematically constructed throughout the semester by the students rather than distributed by me just prior to the exam. In addition, rather than providing completed outlines, I used empty outlines (see Appendix A). Outlines provided topical areas and numbers of sub-topics, but subtopics were left blank and had to be gleaned from slides and lecture. This made student engagement with the material more generative and thoughtful. It was hoped that students would review the outline prior to lecture then fill it in as the topics were discussed, thus having them think more carefully about the information and which points were of greatest importance and relevance. Prior to each exam, the outlines were reviewed and correct answers were provided so that students had the correct material to study just prior to the exam. Feedback was not provided on a daily basis.

In addition, a second methodology was employed in the lab course based on the same psychological principles. This course involved only a single final exam during the semester. All other grading was writings and presentation based. To again promote engagement with the course material an outlining assignment was created. In this iteration students were given a long list of topics and concepts in a mixed arrangement (see Appendix B). They were given several days to construct a logical outline of topics, subtopics, etc. that included all concepts listed. This was an intensive assignment that required much conceptual evaluation of the material. Again, a correct outline was distributed prior to the final exam so students had access to the same and proper information.

### **Student Responses & Evidence**

Outlines were collected once or twice throughout the semester but were returned to students. Students' reactions were reviewed on the course evaluations at the end of the semester. Students were asked to rate the “educational value” of the outlines. Of the 23 students, the average rating on the 5-point scale (1 = no value, 5 = extremely valuable) was 4.61. One student gave a rating of 3, seven students a rating of 4, and 15 a rating of 5. In addition several students wrote comments on the course reviews about the outlines in response to the question, “What suggestions would you make to future students in the course about how best to succeed?” Example comments were “definitely use the outlines to study, incredibly beneficial”, “make sure you go over

the outlines because they are a great study tool”, “complete the outlines and study them prior to exams”, “take notes, pay attention, and fill in those blank outlines! They are so helpful”.

For the lab course, examples of student performance were collected. Examples of good and poor outlines produced by students are shown in Appendices C and D.

## **Basis in Theory**

The two concepts from cognitive psychology that guided my project were the generation effect and the testing effect. The generation effect refers to the finding that memory is better for produced material than provided material. This was instantiated in the use of incomplete outlines, which required the students to produce the content rather than simply having it provided by the instructor. The testing effect refers to the finding that memory is better for tested material than for untested material. The logic behind the testing effect is that the test serves as an additional learning opportunity to “stamp in” the material. The empty outlines and the lab outline assignment were designed to serve as informal tests for the students. They provided opportunities for the students to engage more conceptually with the material, hopefully resulting in better long-term retention.

## **What Was Learned & Future Plans**

These initial attempts to institute generative learning activities seemed successful given student feedback and performance. However, definitive evidence for the utility of the procedures is lacking at this point. The students reported that the empty outlines were very helpful for studying and learning but there was not a well-controlled manipulation of the variable to determine its effect on test and course grades. In forthcoming semesters I plan to continue the use of the empty outlines because they were so well received by the students. To increase their impact I plan to formalize their usage and increase the motivation for all students to complete them at regular intervals. I plan to collect and grade the outlines periodically to ensure students are completing them and are receiving accurate feedback so they can be used for periodic study. I also plan to expand their usage to other courses.

The lab course assignment involving generation of a complete outline from a list of concepts was a much more difficult task for the students and should probably be reserved for upper-level courses. Though I believe it to be a task requiring deep (conceptual) processing of the material and structuring the material into an effective format for study, most students seemed to struggle to complete the assignment. I may try to use this approach again but with a smaller set of concepts. It may even be possible to begin with a combination of the two techniques. I may present early versions of empty outlines with the concepts for the blank spaces listed at the bottom. The students would then have to properly place the concepts into the skeletal structure of the empty outline. Perhaps over time the structural guidance could be reduced to the point at which students produce the full outline from the list of concepts.

In summary, I found the use of these techniques to be of some benefit for students. Formalization of their usage through attachment of grades for their completion would increase the quality of their usage by students and likely their impact on learning. These alterations will be pursued in future semesters.

*Appendix A: Example Empty Outline*

**PSYCHOLOGICAL TESTS OUTLINE 1**

A) Basic Concepts

1) Construct

a)

b)

2) Test Score = Construct + Error

a) Level of Construct (what you intend to measure)

b) Error (things you don't want to measure)

1.

2.

3.

4.

5. Test Anxiety (e.g., )

a.

b.

c.

c) Sources of Error in Multiple-Choice Testing

1.

2.

3.

4. Scoring/Feedback

a.

b.

c.

B) Key Concepts

1) Test

a) Types

1.

2.

3.

4.

5.

b) Assumptions

1.

2.

3.

4.

5. Score = Construct + Error

a.

b.

c.

d.

2) Assessment

3) Standardization

C) Statistical Issues

1) External Validity

a) (norming) sample representative of population

1. well-defined population

2. \_\_\_\_\_ sampling

3. \_\_\_\_\_ sampling
4. representation  $\neq$  N
- b) establishing comparison distribution
- 2) Descriptive Statistics (Norms)
  - a) Central Tendency
    - 1.
    - 2.
    - 3.
  - b) Variability
    - 1.
    - 2.
    3. "n"-tiles
      - a.
      - b.
    - 4.
    - 5.
  - c) Distribution Shape
    1. normal
    2. skewed
      - a.
      - b.
- 3) Scales of Measurement
  - a) NOIR
  - b) types of information
    1. frequency
    - 2.
    - 3.
    4. ratio (e.g., 2x, 3x)
- 4) Standard Scores
  - a) converting raw scores to common scale for easier comparison
  - b) Types:
    1. z
      - a.  $\mu = \underline{\hspace{1cm}}$ ,  $\sigma = \underline{\hspace{1cm}}$
      - b. #SDs from Mean (- = below M, + = above M)
    2. Percentile:
    3. T
      - a.  $\mu = \underline{\hspace{1cm}}$ ,  $\sigma = \underline{\hspace{1cm}}$
      - b. Converting z to T:  $T = 50 + (z)(10)$
    3. Stanines
      - a. dividing distribution into 9 areas
      - b. CUTOFFS
        - 1) middle stanine: -0.25 to +0.25
        - 2) stanine width: 0.5 SDs
    4. Normal Curve Equivalents (NCE)
      - a. attempt to create a standardized scale with a scale of  $\sim$  0-100
      - b.  $\mu = \underline{\hspace{1cm}}$ ,  $\sigma = \underline{\hspace{1cm}}$
- 5) Correlation
  - a) Uses in testing:
    - 1.
    - 2.
    - 3.

- 4.
- b) direction (+, -) and magnitude (\_\_\_\_ TO \_\_\_\_ ) of relationship
- c) Magnitude reflects preservation of:

- 1.

- 2.

#### 6) Regression

a) using knowledge about relationship(s) to increase accuracy of \_\_\_\_\_

b) Statistics:

1. slope

2. Y-intercept

3. Regression Equation:  $Y'$  (predicted score) = Y-intercept + (slope)(X-score)

4. \_\_\_\_\_ ( shared, predictable variability)

c) Types:

1. Simple

- a.

- b.

2. Multiple

- a.

- b. each additional predictor should "explain" more of the criterion variance (i.e., increase  $R^2$ )

3. Logistic

- a.

- b. criterion = \_\_\_\_\_

- c. result = p(outcome) rather than predicted score ( $Y'$ )

d) Studies:

1. \_\_\_\_\_ (construct an equation)

2. \_\_\_\_\_ (test equation accuracy on new sample)

#### D) Reliability

1. consistency of scoring (\_\_\_\_\_ and \_\_\_\_\_), not absolute value

2. Test Score = Construct + Error

3. low reliability = \_\_\_\_\_ error component

4. Measure =

5. Assessment of Reliability:

- a. Test-Retest

- 1.

2. stable constructs

3. Concern:

- b. Parallel-Forms

- 1.

2. Concerns:

- a. resource limitations

- b. stability

- c. Internal Consistency

1. Types:

- a.

- b.

- c.

2. Reliability underestimation

3. Accurate Estimation: \_\_\_\_\_ formula

6. Increasing Reliability of a test

- a. increase # items
  - 1. Spearman Brown
  - 2. new items must be of equal quality
- b. increase quality of items (measure construct)

E) Validity

1. Face Validity

- a. initial step in test validation
- b. judgment of \_\_\_\_\_
- c. subjective

2. Content Validity

- a.
- b. sampling issue
- c. based on experienced judgment and empirical work

3. Construct Validity

- a. establishing test as "pure" measure of a construct

1. \_\_\_\_\_ (measuring intended construct)

2. \_\_\_\_\_ (not measuring other constructs)

b. Multitrait-Multimethod Matrix (MTMM)

1. reliability (\_\_\_\_\_ construct/\_\_\_\_\_ method; r \_\_\_\_\_)

2. convergent validity (\_\_\_\_\_ construct/\_\_\_\_\_ method; r \_\_\_\_\_)

3. discriminant validity (\_\_\_\_\_ construct/\_\_\_\_\_ method; r \_\_\_\_\_)

4. 0 correlations (different construct/different method)

4. Criterion Validity

- a. establishing applied value of test
- b. compare individuals' scores on test to well-defined criteria
  - 1. future (prediction): *Predictive Validity*

2. immediate differentiation of subgroups: \_\_\_\_\_ *Validity*

## ***Appendix B: Outline Generation Assignment***

### **Cognition Lab (PSY302) Final Exam Concepts**

Below is a listing of the concepts discussed during the course. The concepts are divided into three sets: general methods, sensation-perception-attention, and memory. You are to construct an outline that includes all concepts listed. The process of constructing the outline and the final product are designed to help you prepare for the final exam. Some of the concepts are more general and will serve as headings, whereas others will fall under each heading. Example headings for the first set are shown below. You should submit the final outline by April 20th.

#### **TOPICS: General Methods**

##### **Creativity & Discovery**

##### **Ethics**

##### **Experimental Design**

Informed Consent	Debriefing	File Drawer Problem	Publication Bias
Concealment	Deception	Fabricating	“Aha”
Assent	Preparation Phase	Double Blind	Counterbalance
Trimming	Novelty Seeking	Perseverance	Serendipity
Verification Phase	External Validity	Internal Validity	Concealment
Latin Square	Matching	Mindtraps/Mind Sets	Incubation Phase
Generalization	Group Composition Bias	Random Sampling	Order Effect
Experimenter Effect	Subject Reactivity	History	Mortality
Measurement Scale (NOIR)	Cross-Sectional	Longitudinal	Cohort Effect
Random Assignment	Consider Multiple Perspectives/Solutions		

#### ***Sensation, Perception, & Attention***

Choice Blindness	Dichotic Listening	Inattentive Blindness	Change Blindness
Attentional Blink	Tactile Insensitivity	Misperception	Divided Attention
Ambiguous Perception	Selective Attention	Sustained Attention	Gaze Orientation
Visual Search	Multisensory Perception	Vigilance	Inhibition
Top Down	Bottom Up	Parallel Search	Serial Search
Feature Saliency	Conjunctive Search	Attentional Capture	Automaticity
Joint Attention	Black Art/Contrast Sensitivity		

#### ***Memory***

Confabulation	Short-term Memory	Working Memory	Sensory Memory
Long-term Memory	Procedural Memory	Baddeley’s Model	Episodic Buffer
Overwriting	Decay	Span	Inner Scribe
Visuo-spatial Sketchpad	Central Executive	Visual Cache	Recognition
Executive Processing	Maintenance Rehearsal	Elaborative Rehearsal	Binding
Chunking	Articulatory Rehearsal	Semantic Memory	Episodic Memory
Phonological Loop	Retrieval	Encoding	Free Recall
Reminiscence Bump	Infantile Amnesia	Generation Effect	Cued Recall
Distributed Practice	Spreading Activation	Source Monitoring	Reality Monitoring
False Memory	Motivation to Remember	Levels of Processing	DRM Paradigm
Reconstructive Memory	Implicit	Explicit	Prospective Memory
Familiarity	Recollection	Transfer-Appropriate Processing	

## *Appendix C: Low Quality Student Outline*

### Final Outline

1. Creativity & Discovery
  - a. Creativity
    - i. Serendipity
    - ii. Novelty Seeking
    - iii. Perseverance
    - iv. Divergent Thinking
      1. Mindtraps/Mind sets
  - b. Discovery
    - i. Preparation Phase
    - ii. "Aha"
    - iii. Incubation Phase
    - iv. Verification Phase
2. Ethics
  - a. Informed Consent:
    - i. Concealment
    - ii. Deception
    - iii. Assent
    - iv. Debriefing
  - b. Data:
    - i. Trimming
    - ii. Fabricating
    - iii. File Drawer Problem
    - iv. Cross-Sectional
    - v. Measurement Scale (Nominal, Ordinal, Interval, Ratio)
3. Experimental Design
  - a. Group Composition Bias/cohort
    - i. Matching
    - ii. Random Assignment
  - b. Order
    - i. Counterbalancing
    - ii. Latin Square
  - c. Conditions
    - i. Subject Reactivity
    - ii. Double Blind
    - iii. Experimenter Bias
  - d. Time Passage
    - i. History
    - ii. Mortality
  - e. Sampling Issues
  - f. External Validity
  - g. Generalization
  - h. Random Sampling
  - i. Experiments- Longitudinal
4. Perception
  - a. Tactile Insensitivity
  - b. Misperception
  - c. Black Art
    - i. Top Down

- ii. Bottom Up
- iii. Attentional Blink
- iv. Divided Attention
- v. Ambiguous Perception
- vi. Sustained Attention
  - 1. Vigilance

- d. Blindness
  - i. Inattentional Blindness
  - ii. Change Blindness
  - iii. Choice Blindness

## 5. Attention

- a. Joint Attention
- b. Gaze Orientation
- c. Top Down
- d. Bottom Up
- e. Selective
- f. Divided
- g. Searches
  - i. Parallel Search
  - ii. Serial Search
  - iii. Visual Search
  - iv. Conjunctive Search
- h. Selective Attention
- i. Dichotic Listening
- j. Automaticity

## 6. Memory

- a. Distributed Practice
- b. Memory Span
- c. Executive Processing
- d. Prospective Memory
- e. Working/Short-Term Memory
- f. Maintenance Rehearsal
- g. Elaborative Rehearsal
- h. Chunking
- i. Encoding
- j. Free recall
- k. Generation effect
- l. Central Executive
- m. Visuo-spatial Sketchpad
- n. Visual Cache
- o. Phonological loop
- p. Articulatory Rehearsal
- q. Visuo-spatial Sketchpad
- r. Episodic Buffer
- s. Binding
- t. Central Executive
- u. Long-Term Memory Processes
- v. Spreading Activation
- w. Retrieval
- x. Cued Recall
- y. Source Monitoring
- z. Encoding

- aa. Free recall
- bb. Overwriting
- cc. Generation Effect
- dd. Transfer-Appropriate Processing
- ee. Long-term Memory types
- ff. Declarative
- gg. Explicit
- hh. Episodic
- ii. Reality Monitoring
- jj. Reminiscence Bump
- kk. Semantic
- ll. Procedural memory
- mm. Implicit
- nn. Confabulation
- oo. False Memory
- pp. DRM Paradigm
- qq. Recollection
- rr. Infantile Amnesia

## *Appendix D: Higher Quality Student Outline*

- A. Ethics
  - a. Informed Consent
  - b. Concealment
  - c. Assent
  - d. Debriefing
  - e. Deception
  - f. Publication Bias
  - g. File Drawer Problem
  - h. Fabricating
- B. Creativity and Discovery
  - a. Creativity
    - i. Consider Multiple Perspectives/Solutions
    - ii. Perseverance
    - iii. Mindtraps/Mind Sets
    - iv. Serendipity
    - v. Novelty Seeking
  - b. Discovery
    - i. Four phases
      - 1. Preparation Bias
      - 2. Incubation Phase
      - 3. "Aha"
      - 4. Verification Phase
- C. Experimental Design
  - a. Threats to IV
    - i. Group Composition Bias/Cohort Effect
      - 1. Control
        - a. Random assignment and matching
    - ii. Order effect
      - 1. Control
        - a. Counterbalancing and Latin Square
    - iii. Experimenter Effect
    - iv. Subject Reactivity
      - 1. Control
        - a. Double blinding
    - v. Longitudinal
      - 1. Threats
        - a. History
        - b. Mortality
          - i. Control
            - 1. Control Groups
  - b. Measurement Scale
    - i. NOIR
  - c. External Validity
    - i. Random sampling
    - ii. Generalization
- D. Attention
  - a. Divided Attention
    - i. Dichotic listening
    - ii. Tactile insensitivity
  - b. Joint/Shared Attention
  - c. Selective Attention
    - i. Top down
    - ii. Bottom up

- 1. Attentional capture
    - 2. Feature salience
  - iii. Visual Search
    - 1. Conjunctive search
    - 2. Parallel search
    - 3. Serial search
  - d. Sustained Attention/Vigilance
  - e. Gaze orientation
  - f. Multisensory Perception
  - g. Attentional blink
  - h. Automaticity
  - i. Black Art/contrast sensitivity
  - j. Ambiguous Perception
- E. Memory
  - a. Long Term Memory
    - i. Different types
      - 1. Reconstruct Memory
      - 2. Episodic Memory
      - 3. Semantic Memory
      - 4. Procedural Memory
      - 5. Prospective Memory
    - ii. Reminiscence Bump
    - iii. Motivation to Remember
    - iv. Spreading Activation
      - 1. DRM Paradigm
      - 2. False Memory
    - v. Infantile Amnesia
    - vi. Distributed Practice
    - vii. Processes
      - 1. Retrieval
      - 2. Source Monitoring
        - a. Reality Monitoring
    - viii. Memory Tests
      - 1. Explicit
      - 2. Free Recall
      - 3. Cued Recall
      - 4. Recognition
  - b. Working Memory/Short Term Memory
    - i. Maintenance
      - 1. Articulatory
    - ii. Elaborative
    - iii. Chunking
    - iv. Implicit
    - v. Baddeley's Model
      - 1. Visuo-Spatial Sketch Pad
        - a. Visual cache
          - i. Inner scribe
      - 2. Phonological loop
      - 3. Central executive
      - 4. Binding
    - vi. Digit span
    - vii. Encoding
      - 1. Transfer-Appropriate Processing
      - 2. Levels of Processing
      - 3. Generation Effect

- c. Sensory Memory
  - i. Overwriting
  - ii. Decoy
- F. Executive processing