

## Introduction to Cognitive Psychology: PSY 200

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### **Study Guide for Final Exam**

*Exam Date: Monday, May 5, 8:00 - 10:00 am*

*Exam Location: Wetherhill Hall, Room 200*

This exam makes up 15% of your class grade. The exam is given in a classroom during the final exam week. If the exam ends up being scheduled for late in the final exam week, it will consist of 100 multiple choice questions each worth 1 point. If the exam ends up being scheduled for early in the final exam week, it will consist of 25 multiple choice questions each worth 2 points and 5 short answer questions worth 10 points each.

University policy allows you to reschedule a final exam of your choosing if you have more than two exams on the same day or if there is a direct conflict for two final exams. If you are in this situation, please contact Dr. Francis soon to arrange for an alternative day/time.

The final exam covers all the material in the class, so the following study guide questions largely repeat what was presented earlier for the section exams. If you understand all of the following topics well, then you should be able to answer a variety of questions on the topics. If a researcher's name is given here, you should be certain that you know the name and the associated experiment or theory.

#### **Lecture 2: Brain parts**

1. Know the difference between the fore-brain and hind-brain. Know the parts of the hind-brain that are related to cognition.
2. Know what contralateral processing refers to in the brain. Be sure to be able to describe contralateral processing of visual perception.
3. Be able to describe the effects of cutting the corpus callosum between the left and right brain hemispheres. Be able to describe both the general behavior and the experiment that reveals the fundamental differences between the hemispheres.
4. Be able to describe the key stimuli, methods, and data from the CogLab Brain Asymmetry experiment. Be able to explain why left-handed and right-handed people were expected to have different data.
5. Know the basic anatomical structure of the cortex. Be able to list the lobes of cortex and describe some of their properties related to cognition.
6. Be able to describe the properties of the primary sensory area.
7. Know what Brodmann's areas are.

### **Lecture 3: Brain scans**

1. Understand the terms spatial and temporal resolution as they relate to brain scans. How does poorer resolution limit the use of a tool? Be able to describe the advantages and disadvantages of EEG and fMRI in terms of spatial and temporal resolution.
2. Be able to describe what is measured with EEG brain scans.
3. Be able to describe (in general terms) how an MRI operates and what information it provides about the brain.
4. Be able to describe (in general terms) how a fMRI operates and what information it provides about the brain and cognition.
5. Know what the BOLD signal is in fMRI (in general terms).
6. Be able to explain why the difference map is important for identifying the function of brain areas. Be to explain why one must contrast the right types of scans.
7. What is the relationship between the colors drawn on a fMRI scan result and brain activation?
8. Be able to describe some of the limitations and misconceptions about brain scanning techniques.
9. Be able to discuss some misconceptions about brain scans that you may hear in the popular press.

### **Lecture 4: Brain scans**

1. Be able to describe (in general terms) how a brain scan is used to identify the relationship between cognitive events and brain events.
2. Understand how a difference in brain activity (as measured by fMRI, for example), may not actually correspond to cognitive differences.
3. Be able to describe the basic properties of the tongue display unit (TDU) and how it is used. What does a brain scan tell us about its use?
4. Be able to describe (in general terms) the method of reading the mind of someone who adds or subtracts numbers. What are some limitations to this method?
5. Be able to describe (in general terms) the method of thought reconstruction. Be able to describe the limits of all the brain scan mind reading techniques.
6. Be able to describe (in general terms) the difficulties with statistics in brain scans.
7. Know the basic anatomy of a neuron: dendrite, soma, axon, myelin sheath. Know the basic role of each part in the neuron's purpose.

### **Lecture 5: Neurons and Neurotransmitters**

1. Be able to describe, in general terms, an action potential. Be able to describe the relationship between the chemical (sodium and potassium) and electrical characteristics of an action potential.

2. Be able to explain the difference between excitatory and inhibitory inputs to a neuron. Know how the different types of input affect the likelihood of the neuron having an action potential.
3. Be able to explain (in general terms) why inhibitory cells are necessary in the brain. Reference to epilepsy might be useful here.
4. Be able to describe a synapse: axon, dendrites, synaptic cleft, neurotransmitters, receptors. Be able to explain what happens when an action potential comes to the end of an axon.
5. Understand how a receptor–neurotransmitter pair are linked by molecular shape(s).
6. Understand how the neurotransmitter *dopamine* is related to brain diseases like Tourette’s syndrome and Parkinson’s disease. Understand, in general, how drugs like Haldol and L-DOPA help treat these diseases by affecting dopamine.
7. Be able to explain what Prozac does to the brain at the neurotransmitter level.
8. Know how LSD, curare, cocaine and morphine affect certain neurotransmitters. For curare, cocaine, and morphine be able to explain why this affects behavior like it does.

### **Lecture 6: Receptive fields**

1. Understand the term *firing rate*. Understanding why firing rate is more important than a single action potential.
2. Know the definition of a *receptive field*. Understand why it is defined as *changes*.
3. Be able to describe the CogLab Blind Spot experiment and results.
4. Be able to describe an experiment that would demonstrate the presence of an inhibitory surround for the on-center, off-surround cells.
5. Be able to explain the properties of on-center, off-surround receptive fields of neurons found near the retina of the eye.
6. Understand what kinds of spatial patterns of light will produce a good response for an on-center, off-surround cell.
7. Understand the receptive field of “simple cells”. Understand what kinds of spatial patterns of light will produce a good response for a particular simple cell.
8. Understand, in general, how more complex receptive fields are built up from less complex receptive fields. (e.g. simple cells from center-surround cells, or complex cells from simple cells). This is sometimes called a receptive field hierarchy.
9. Know the properties of complex cells and how they are created by combinations of simple cells.
10. Be able to describe the properties of the receptive field of neurons in the inferior temporal cortex of monkeys.
11. Be able to argue against the idea that there is a *single* cell that exclusively responds to the presence of your grandmother’s face.

### **Lecture 7: Neural networks**

1. Be able to explain the resonance hypothesis. What does it mean in terms of the relationship between neural behavior and cognition?
2. Understand the terms: activation, connection weight, update. Know what they are most closely associated with in real neural systems.
3. Understand the update rule for the network we discussed in class. You do not have to memorize the mathematical equation, but be able to describe the basic mechanisms of the rule.
4. Understand what it means for the network activities to “settle down.”
5. Understand how a network can have “error correction capabilities.”
6. Understand how a network can “tolerate the loss of some cells.”
7. Understand how feedback in the network is related to expectation through the pattern of connection weights.
8. Understand how network behavior creates illusory contours.

### **Lecture 8: Neural learning**

1. Understand that learning in a neural network corresponds to changing connection weights.
2. Understand the concept behind Hebb’s rule for neural learning.
3. Understand how Hebb’s rule is applied to the neural network discussed in class.
4. Be able to explain how a network that learns can *remember* things it has previously experienced.
5. Understand why this type of learning might be important for things like implicit learning or eye-hand coordination.
6. Understand how some aspects of virtual reality may demonstrate this type of learning.

### **Lecture 9: Visual perception**

1. Understand that we do not always see the world as it really is. Understand the role of illusions in drawing this conclusion. How can we measure perceptual experience with the psychometric function?
2. Be able to explain why the inability of on-center, off-surround neurons to respond to homogeneous fields of light means our percepts of brightness are based on edges.
3. Be able to explain how the center-surround cells behave in the brightness contrast illusion. You need to be able to explain the behavior of cells in at least two different positions and for two different stimuli
4. Be able to explain how the center-surround cells behave in the Hermann grid illusion. Be able to relate the cells’ behavior to the perceptual experience of the illusion.

5. Understand the role of filling-in in illusions like the water color effect, the Craik-O'Brien-Cornsweet effect, and the disappearing pink circle.
6. Be able to describe the color-competition (gated dipole) circuit that produces color afterimages.
7. Be able to predict what color of afterimage you would see after looking at certain colors (e.g., red, blue, green, black).
8. Be able to describe the orientation-competition gated dipole circuit that produces oriented afterimages.

### **Lecture 10: Visual dynamics**

1. Understand what the critical flicker frequency is. Be able to explain how it relates to the characteristics of some electronic devices (lights, computer screens).
2. Understand what is meant by persistence. Be able to describe an experiment (Bowen, Pola, & Matin, 1973) that would measure persistence. Be able to summarize the findings of the experiment, especially as the duration and intensity of the stimulus increases.
3. Be able to explain how excitatory feedback in a neural network could be responsible for persistence. Be able to explain how after-responses could shorten this persistence and how this relationship might explain the findings of the persistence experiment involving the duration and intensity of the stimulus.
4. Be able to explain what is meant by *masking* and how masking effects are related to persistence and performance for detecting very brief stimuli.
5. Be able to describe the properties and behavior of a Reichardt motion detector. Be able to explain why a given Reichardt detector is sensitive only to motion of the proper direction and speed.
6. Know what apparent motion is and how it differs from real motion. Be able to describe Korte's laws of apparent motion.
7. Be able to describe the circuit responsible for producing a motion aftereffect. Be able to describe a motion aftereffect.

### **Lecture 11: Attention**

1. Understand how attention is related to information processing and processing resources. Be able to explain how not processing information is the same as ignoring it, in some contexts.
2. Be able to explain the CogLab Simon effect: stimuli, task, findings, and interpretation.
3. Understand how some stimulus properties automatically draw attention. Be able to describe the Simon effect (CogLab) results in these terms.
4. Know the basic properties of the field of human factors.

5. Be able to describe one of the demos in class (magic trick, flashing images) and explain how it tells us something about attention.
6. Be able to describe a situation where attention *does* change perceptual experience, and understand what that is interesting/surprising.

### **Lecture 12: Attention**

1. Be able to describe the CogLab attentional blink experiment, the expected data, and the conclusions.
2. Understand how the attentional blink is related to information processing and processing resources.
3. Be able to describe the CogLab visual search experiment, the expected data, and the conclusions. Be able to discuss what pattern of results indicates the use of attention. What varies as the number of distracters is increased?
4. Be able to explain the results of a visual search experiment in terms of feature maps.
5. Be able to explain why search for a target absent with conjunctive stimuli has a slope twice as steep as for target present.
6. Understand the idea of automaticity.
7. Understand the Stroop task and the basic explanation.

### **Lecture 13: Sensory memory**

1. Understand the methods of the whole-report and partial-report experiments. Understand the key differences between the partial-report and whole-report experiments. Understand why the partial-report method indicates that more items are stored by some sensory memory than the whole-report method indicates.
2. Be able to explain the iconic memory experiment that can be used for both adults and infants.
3. Be able to explain how masking effects influence iconic and echoic memory.
4. Know what is involved in an immediate serial recall experiment.
5. Know the different properties of iconic and echoic memory.
6. Be able to explain the hypothesized role of iconic and echoic memory on the serial position curves produced under immediate serial recall (modality effect).
7. Be able to describe the suffix effect and explain how the properties of echoic memory account for the suffix effect. Be able to explain how phone operators avoid the problems of the suffix effect.

### **Lecture 14: Two-store model**

1. Be able to describe Ebbinghaus' experiment and results.
2. Understand how Ebbinghaus' results suggest the existence of a long-term memory (LTM) system. Know the properties of the LTM system.

3. Be able to describe the Peterson & Peterson (also called the Brown-Peterson experiment) memory experiment. Know the general findings of the study. Know how it suggests a short-term memory (STM) system with certain properties.
4. Know the procedure and results of Miller's memory span study. Know how it suggests a short-term memory (STM) system with certain properties.
5. Be able to explain why the properties of STM make it challenging to win a pizza.
6. Be able to describe the modal model of memory.
7. Be able to explain how the STM and LTM system might offer an account of the u-shaped serial position curve that is seen in some memory experiments.

### **Lecture 15: Working memory**

1. Be able to describe the three types of hypothetical searches of STM considered by Sternberg. Be able to describe the predicted pattern of experimental results for the different search types.
2. Be able to describe Sternberg's experiment on the search of memory. Be able to describe the details of the experiment (e.g., as on CogLab). Be able to describe the results found by Sternberg and what the results mean.
3. Be able to explain why it might make sense for search of memory to be serial exhaustive instead of serial self-terminating.
4. Be able to describe the procedure and general findings of the study by Brooks. Understand how the existence of separate visuo-spatial sketchpad and phonological loop systems is consistent with the results.
5. Understand the similarities and differences between STM and working memory.

### **Lecture 16: Working memory**

1. Know the two subsystems of the phonological loop: articulatory control process and phonological store. Know the characteristics of each.
2. Understand how loop capacity is related to both the time needed for items to decay from the phonological store and the rate at which the articulatory control process can rehearse items.
3. What aspect of the phonological loop seems to vary with development?
4. Know the word-length effect. Understand the explanation provided by working memory. Understand why the rate of rehearsal is very important for this explanation.
5. Understand how the properties of working memory explain some aspects of digit span for different languages. Understand how these properties may affect measured IQ scores.
6. Know what the subject must do in a study of articulatory suppression. Understand why the articulatory suppression reduces memory performance. (What happens to the articulatory control process?)

7. Know the basic effect of phonological similarity on memory performance. Know how the working memory theory accounts for the data. Understand what subsystem of the phonological loop is hypothesized to be involved in the effect (you have to understand articulatory suppression effects).
8. Know the basic results of the irrelevant speech effect. Understand how the phonological loop accounts for those results. Why does the model say that even foreign languages can cause an irrelevant speech effect?

### **Lecture 17: Encoding specificity**

1. Understand the procedure and typical results of a part-set cuing experiment. Be able to explain why it is important.
2. Be able to explain how discrimination makes memory (in some ways) similar to visual search.
3. Know what the *encoding specificity principle* is. Be able to describe (in detail) at least two experiments (general procedures and general results) demonstrating this principle. Know the basic properties and findings of all of the encoding specificity type of experiments.
4. Be able to describe the CogLab encoding specificity experiment.
5. Be able to explain why the encoding specificity principle makes it very difficult to determine if something is forgotten.
6. Be able to explain why the encoding specificity experiments imply that forgetting is often a retrieval problem. Why must forgetting (or memory) be defined relative to a particular task?
7. Be able to describe the effect of classrooms on memory.

### **Lecture 18: Memory discrimination**

1. Be able to describe the CogLab False memory experiment, the expected results, and the conclusions. Be able to explain how the effect is related to memory discrimination and source monitoring.
2. Know the meaning of the terms “retroactive” and “proactive” interference. Be able to give at least one example of each.
3. Understand how proactive interference (PI) might cause subjects in a memory experiment to do worse on later trials. Be able to explain how this would be shown in the data and also why it might happen.
4. Know what release from PI is. Be able to give at least one example.
5. Be able to explain what kind of interferences operate in the phonological loop and whether the influence storage or retrieval.
6. Be able to describe the experiment (indoor vs. outdoor sports) that demonstrates that proactive interference operates at memory recall rather than memory storage.



### **Lecture 19: Constructive memory**

1. Be able to explain some of the difficulties of eye-witness testimony. Why is memory on such tasks constructive?
2. Be able to describe the memory reports from studies by Penfield (1959). Be able to describe the problems with this line of research.
3. Know the characteristics of “flashbulb” memories. Know some of their limitations as indications of really good memory. Be able to describe the experimental study of flashbulb memories compared to memories of ordinary events.
4. Understand the characteristics of memory misattribution in the case of Donald Thomson.
5. Be able to describe the Loftus & Palmer (1974) experiment that shows how easily memories can be influenced by subsequent questions. Understand the significance of these studies for trusting eye-witness testimony.
6. Understand, in general, how memory misattribution can allow for memory “implants” and potentially cause problems for patients undergoing therapy.

### **Lecture 20: Amnesia**

1. Be able to discuss how memory and memory confidence are *cognitive events*, and why this matters when judging properties of memory.
2. Know what amnesia is. Know the terms *anterograde* and *retrograde* amnesia.
3. Know the general scope and duration of retrograde amnesia (for most cases). Understand some of the difficulties in studying retrograde amnesia.
4. Be able to describe the difference between declarative (explicit) and nondeclarative (implicit) memory systems in LTM.
5. Know the type of amnesia suffered by patient HM. Know the basic limitations of his amnesia, and understand the studies that show he (and other amnesics like him) could learn some new information.
6. Be able to discuss the behavior of anterograde amnesiacs on tasks like the memory span experiment or a recall task that produces a serial position curve.
7. Know what *infantile amnesia* is. Know the basic explanation of it.
8. Know what *repression* is. Understand why memory researchers are skeptical of the evidence used by clinicians to support the idea of memory repression.
9. Be able to describe the CogLab Forgot It All Along experiment and its implications.

### **Lecture 21: Improving memory**

1. Be able to describe the methods (in general) and results of studying in different contexts and how it affects memory of recall in a neutral context. Understand that similar effects exist for temporal context.

2. Understand how level of processing affects memory recall.
3. Be able to describe the CogLab Levels of Processing experiment.
4. Understand the study that shows that level of processing is more important than intent to learn. Why is this important when studying material that you know will be tested?
5. Understand what is meant by a judgment of learning (JOL) and how to make it more accurate.
6. Understand the role of recall practice on memory. Be able to describe the experiment that demonstrates this effect.
7. Understand the findings about learning styles. Be able to explain what kind of data is needed as evidence that different students have different learning styles.

### **Lecture 22: Improving memory**

1. Be able to describe, in general terms, how subject SF increased his memory span to 79 digits. Know the limitations of this approach.
2. Understand the method of loci for improving memory. Be sure to understand the role imagery plays in this method.
3. Understand the peg word and link word methods for improving memory. Be sure to understand the role imagery plays in these methods.
4. Understand, in general, why S had an excellent memory and how it was related to his synesthesia.
5. Understand the claims about brain training techniques and the warnings about these claims.
6. Understand the importance of sleep for certain types of memory. Be able to describe the experiment that demonstrates this importance.

### **Lecture 23: Mental representation**

1. Understand why the *definition* approach to concepts has problems.
2. Understand the prototype theory of concepts.
3. Be able to describe the CogLab version of the Posner & Keele (1968) experiment on concept formation. Know the methods and typical experimental results. Also be able to discuss how the typical results suggest the existence of a prototype.
4. Be able to explain why the prototype theory has difficulties with some concepts (e.g., *ad hoc* concepts).
5. Understand the exemplar theory of concepts.
6. How do prototypicality effects appear in an exemplar model?
7. Understand the properties and characteristics of propositions.

8. Understand the graphical (network) representation of propositions.
9. Understand the methods and results of the study by Ratcliff & McKoon (1978). (Within proposition priming.)

#### **Lecture 24: Mental imagery**

1. Understand the conflict between memories of perceptual events being represented as propositions or concepts or as some kind of imagery.
2. How do the limitations of what we can do with mental images imply that mental images are not identical to real images?
3. How does the demo that asked you to identify relative positions of cities indicate that propositional information influences mental images?
4. Be able to describe Kosslyn's (1976) experiment on size effects in mental images. Why does this suggest that mental images are not only propositions?
5. Be able to describe the CogLab version of the mental rotation experiment. Be able to describe the typical results and to explain how the typical results indicate that mental images are (at least somewhat) like real images.

#### **Lecture 25: Language instinct**

1. Be able to describe (in general terms) the influence of culture on language. Be able to give some examples of how the Norman invasion of Britain continues to influence modern spoken English. Understand that this influence is different from the issue of how people have the ability to work with language at all.
2. Understand what it means (and does not mean) to say that language is an instinct.
3. Understand why the way children learn language suggests that they are not simply mimicking other speakers.
4. Know what a pidgin is. Know what a creole is. Know their properties relative to languages. Understand how the development of a creole from a pidgin suggests that language is *re-invented* by children.
5. Understand the relation between dialects and languages.
6. Be able to explain word dropping in AAVE and its relationship to contractions in SAE.
7. Understand why there is really no "correct" English speech.

#### **Lecture 26: Phrase trees**

1. Know the two key aspects of language: symbols and grammar.
2. Understand what a grammar is.
3. Understand why there are an infinite number of possible sentences and essentially no limit to the length of sentences. Understand why this is important.

4. Understand what we mean when we say we can *recognize* a grammatically correct nonsense sentence.
5. Understand what it means to say that knowledge of grammar is distinct from meaning and understanding. How can we be sure that they are distinct?
6. Be able to explain what a *long-term dependency* is. How do long-term dependencies cause problems for statistical learning of language?
7. Know what *re-write rules* are. Understand how a phrase tree corresponds to re-write rules.
8. Understand how a phrase tree produces grammatically correct sentences (even non-sense sentences).
9. Recognize the advantage of learning phrases versus learning multiple uses of a word.
10. Understand, in general, how phrase trees deal with long-term dependencies.
11. Understand, in general, what is involved in language universals. Be able to describe the two examples of language universals that were discussed in lecture.

### **Lecture 27: Words**

1. Recognize that while many words must be memorized, there are many rules for the creation of words.
2. In what sense are words arbitrary symbols for concepts?
3. Be able to describe the CogLab word superiority experiment, and explain the significance of the typical results.
4. Understand how the behavior of pre-schoolers with the *wug-test* demonstrates the existence of a rule for pluralizing nouns.
5. Know that *morphology* is the study of words. Know what *morphemes* are.
6. Be able to contrast English morphology of verbs with other languages. How does English discuss things that are treated by verb forms in other languages?
7. Know what suffixes and prefixes are, and how they relate to words in the lexicon.
8. Be able to describe some of the rules for word creation: e.g., compound nouns and pluralizing nouns. Be able to discuss the importance of a root for some suffixes.
9. Know what types of information must exist in the *lexicon*.
10. Understand how the exceptions to morphology rules usually derive from other languages. Be able to explain why only common words can be exceptions to the rules.
11. Understand, in general, how the *head* of a word indicates what the word is about. Know that in English it is the right-most morpheme.
12. Understand why **walkman** is a headless noun. Understand why this makes creating the plural form complicated.

## Lecture 28: Parsing

1. Know the basic characteristics of the Eliza example. Understand why we concluded that it does not really understand language.
2. Know how interpreting language corresponds, in part, to *parsing*. How does the phrase tree structure convey some information?
3. Understand how two different thoughts can give rise to the same sentence. Understand why this indicates that we do not think only by “speaking to ourselves.” What is mentalese?
4. Understand, in general, how a parser would go through a simple sentence to build up a phrase tree.
5. Know the two basic problems of parsing: word order, multiple meanings.
6. Understand how difficulty in parsing corresponds to difficulty in understanding sentences with complex word order.
7. Understand the problems of word ambiguity for a parser.
8. Be able to generally describe the experiment that demonstrates the parser initially preserves the ambiguity of words (it depends on the lexical decision task).
9. Be able to describe the effect of ambiguity for the *Time flies like an arrow.* sentence.
10. Be able to describe the properties and significance of the *Buffalo buffalo...* sentence.
11. Understand why the problems with parsing indicate that words and grammar are not enough to always ensure communication.
12. Understand, in general, how schemas help us understand language. Understand why it is difficult to provide computers with schemas.

## Lecture 29: Speech

1. Recognize that human speech is much more blurred than we usually perceive. Understand how the properties of the ear require this blurring.
2. Know what a phoneme is.
3. Understand how we “hear” more than 20 phonemes per second. How is speech packed by the speaker and unpacked by the listener?
4. Understand, in general, how the shape of the vocal tract controls the sounds of speech.
5. Know why you can “hear” someone smile.
6. Know that every consonant can be described through three variables: voicing, manner of articulation, and place of articulation. Know what each variable refers to.
7. Know that all languages define consonants in the same way, but not all languages use the same consonants.

8. Be able to describe the rule that makes us say razzle-dazzle instead of dazzle-razzle.
9. Know what coarticulation is. Understand why it forces spelling to deviate from pronunciation.
10. How is coarticulation related to computer speech and to computers being able to understand human speech?
11. Be able to briefly explain how Korean hangul is a sensible written form of language.

### **Lecture 30: Language development**

1. Know what kinds of linguistic skills infants possess. Understand, in general, how to measure these skills.
2. Understand the importance of babbling for infants.
3. Know the stages a child goes through as it starts to learn language.
4. Understand the methods and conclusions of the CogLab Age of Acquisition experiment.
5. Understand how many of the mistakes made by children correspond to the most confusing parts of language. Be able to give at least one example. How do you know these are the most confusing parts?
6. Be able to explain the similarities and differences between children and adult over-generalizations.
7. Know the problem with trying to learn a second language when you are older.

### **Lecture 31: Language and Brain**

1. Know the basic characteristics of patients with Broca's aphasia, Wernicke's aphasia, and anomia. Know the corresponding neurophysiological problem for each of these conditions (which part of the brain is damaged).
2. Understand the characteristics and problems with the research that claimed to teach chimps language.
3. Understand why the limitations of chimp language do not argue against the evolution of language in humans.

### **Lecture 32: Consciousness**

1. Understand the basic issues of Cartesian dualism and materialism. Know what the mind-body problem refers to.
2. Understand the implications of distributed processing in the brain for theories of consciousness. In particular be able to explain how distributed processing makes the concept of a place or moment of consciousness meaningless.
3. Be able to describe the Turing test for consciousness/intelligence. Be able to discuss its adequacy at determining whether a machine (or a person) is intelligent.

4. Understand the Chinese room problem. Be able to describe my objection to the problem.
5. Basically understand the issues around qualia.

### **Lecture 33: Decision Making**

1. Understand some of the general problems involved in making decisions (utilities, alternatives, challenges with probability).
2. Understand the CogLab Monty Hall lab and what it demonstrates about probabilities and decisions.
3. Know that the way a set of choices is presented has a big impact on the decisions people make (framing effect).
4. Understand the difference between a risky choice and a non-risky (certain) choice. Know that people generally are risk averse when contemplating gains and are risk seeking when contemplating losses. Understand what these terms mean.
5. Know that rarely picked alternatives can strongly affect your choices of other options. Know why it should matter to a consumer.
6. Know what loss aversion is, and how it can affect decision making.

### **Lecture 34: Problem Solving**

1. Be able to describe the CogLab Wason Selection task and explain what it concludes about logic.
2. Be able to explain how the difference between an expert problem solver and a novice problem solver is mostly one of knowledge and methods of describing problems.
3. Be able to describe the methods and results of the Chase & Simon (1973) study of expert chess players. How can you explain the results in terms of expert schemas?
4. Know that analogies are rarely used to solve problems. Understand why this might be so.
5. Know what a “set effect” is. Be able to give at least one example of an experiment demonstrating a set effect.
6. Know what functional fixedness is.
7. Know that the “aha” feeling during problem solving is real, but doesn’t seem to correspond to true insight into a problem. Be able to describe the experiment that shows this.