# *Cognitive Psychology 3rd edition Goldstein Solutions Manual*

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# Chapter 1: Introduction to Cognitive Psychology

## *Chapter Outline*

1. COGNITIVE PSYCHOLOGY: STUDYING THE MIND
    a. What is the mind?
    b. Studying the mind: Pioneering studies
        i. 1868: Donders's pioneering experiment: How long does it take to make a decision?
        ii. 1879: Wundt's psychology laboratory: Structuralism and analytic introspection
        iii. 1885: Ebbinghaus's memory experiment: What is the time-course of forgetting?
        iv. 1890: William James's *Principles of Psychology*
2. ABANDONING THE STUDY OF THE MIND
    a. 1913: Watson founds behaviourism
    b. 1838: Skinner's operant conditioning
    c. Setting the stage for the re-emergence of the mind in psychology
3. THE REBIRTH OF THE STUDY OF THE MIND
    a. Introduction of the digital computer
        i. Flow diagrams for computers
        ii. Flow diagrams for the mind
    b. Artificial intelligence and information theory
    c. The cognitive "revolution" took a while
    d. Looking ahead
4. MODERN RESEARCH IN COGNITIVE PSYCHOLOGY
    a. The role of models in cognitive psychology
        i. Structural models
        ii. Process models
5. SOMETHING TO CONSIDER
    a. Benefits for science, society, and you!
        i. Cognitive strategies in enhancing learning

    TEST YOURSELF 1.1

**CogLabs: Simple Detection**

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## *General teaching resources*

**Psychology Teaching resources**
Great collection of tips and practical exercises to liven up your cognitive psychology class
www.psychlotron.org.uk

**Go Cognitive (from APA)**
Free educational materials for teachers to use in cognitive psychology classes, including many videos of famous modern Cognitive Psychologists.
www.gocognitive.net

**Teaching Top 40 playlist (from APA)**
A nice collection of resources (organized around several topics) ready for teachers to plug into course materials and student assignments.
www.psychologicalscience.org/members/teaching/top-40

**Research digest from the British Psychological Society (BPS)**
Searchable database of accessible blog posts on those psychology studies that make an important, thought-provoking and novel contribution to the field of Psychology. Many of the blogs are about cognitive psychology topics and may form a nice starting point for starting a class (discussion).
https://www.bps.org.uk/collections/research-digest

**MIT portal for the brain sciences.**
An essential resource for those interested in cutting-edge primary research across the range of fields that study the nature of the human mind.
cognet.mit.edu

**PsyBlog**
This site is about scientific research into how the mind works, written by British psychologist and author, Dr Jeremy Dean.
www.spring.org.uk/get-the-latest-from-psyblog

## *Web Links*

**Classics in the History of Psychology**
Resource for students interested in the history of psychology.
psychclassics.yorku.ca

**Milestones in Psychology**
https://www.learner.org/series/discovering-psychology/explorations/history-of- psychology-contemporary-foundations/

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**From Philosophy to multiple approaches in Psychology**
In this e-text the history of psychology is reviewed with a focus on the important questions that psychologists ask(ed) and the major approaches (or schools) of psychological inquiry.
open.lib.umn.edu/intropsyc/chapter/1-2-the-evolution-of-psychology-history-approaches-and-questions

**Cognitive Science Dictionary**
A site available for those who may be unfamiliar with the many unique terms found in the related fields of cognitive psychology, cognitive science, and cognitive neuroscience.
www.bcp.psych.ualberta.ca/~mike/Pearl_Street/Dictionary/dictionary.html

**Encyclopedia of Psychology**
Interactive encyclopedia of topics and terms related to psychology.
https://psychcentral.com/encyclopedia/

## *Videos*

**TED talks for Psychology**
https://www.ted.com/talks?topics%5B%5D=psychology

**The History of Cognitive Psychology (Time: 18:32)**
Chronological history of cognitive psychology organized around some famous psychologists who are also mentioned in the textbook.
https://www.youtube.com/watch?v=ls0AvPIPiyc

**The History of Cognitive Psychology Documentary (2011) (Time: 43:34)**
A very detailed overview of cognitive psychology throughout history as seen and explained by some currently respected Cognitive Psychologists. It is long but nice for students to watch at home in preparation for class.
https://www.youtube.com/watch?v=39yxGbqrvms

**Structuralism v. Functionalism (Time: 5:11)**
An exploration of Wundt's Structuralism and Introspection as contrasted to James's Functionalism (with a little Evolutionary Psychology at the end). Also included are a quiz over the video as well as a transcript of the video.
education-portal.com/academy/lesson/two-early-approaches-functionalism-and-structuralism.html#lesson

**Early Reaction Time Research in Psychology (Time: 5:48)**
Exploring the history of reaction time experiments and different methods and instruments used to measure time. The experiment by Donders is included about half way the video.
www.youtube.com/watch?v=8UhQoYBPfpQ

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**Noam Chomsky v. B. F. Skinner (Time: 58:04)**
A compilation of short video segments of Chomsky and Skinner and their thoughts on psychology. www.youtube.com/watch?v=FlyU_M20hMk
Or if you want **a summary (Time 9:08)**: www.youtube.com/watch?v=zobBTuX03D8

**How to study effectively (Time 5:25)**
Top tips from memory researchers about how to study best
vimeo.com/169193980

## *Apps and/or Software*

**Reaction Test Pro (Free)**
A simple reaction time App with timing to the millionths of a second.
itunes.apple.com/us/app/reaction-test-pro/id493360516?mt=8%20reaction%20time

**Dual Music ($0.99)**
Though a little different than the experiment of Cherry (1953) cited in the text, the following app allows for simultaneous playing of non-DRM (Digital Rights Management) protected files which can give the listener some insights into the difficulty of processing simultaneous signals from different sources.
itunes.apple.com/us/app/dual-music-listening-background/id658408034?mt=8

**PsychGuide (Free)**
An app designed for psychology students to easily access information about their discipline from history, to jobs, to classic studies.
itunes.apple.com/us/app/psychguide/id440790994?mt=8

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## *Discussion Questions*

1. To introduce the nature of the course, ask students to answer a simple question that the instructor writes on the board. (Many general knowledge questions will work well. An example might be, "What is the capital of Australia?")

   Ask students to indicate what cognitive/mental processes are necessary to answer the question. They will likely overlook many processes. The instructor can outline a variety of the processes, both explicit and implicit, including perception of "lines" into familiar patterns/letters, memory and language comprehension processes, and judgment making (including ideas relevant to the context but beyond the answer we seek, such as "Why is the instructor asking us this silly question in a cognition course?"). Point out to students some of the ways in which our knowledge guides us effortlessly toward the answers we seek, even when the information we're working with could be considered ambiguous (e.g., a possible answer to the sample question above is "the letter A!").

   The instructor can highlight how unconscious and complex so much of cognition is and ask students to discuss the challenges these aspects of cognition pose for cognitive researchers. How can cognition be studied "indirectly"?

2. To reinforce the impact of the invention of the computer on the start of the "Cognitive Revolution," have students generate/diagram ideas about a human/computer analogy in terms of information processing. Ask students to generate ideas about how humans and computers are both similar and different in how they process information. How does the analogy suggest ways for cognitive psychologists to study the mind? What are the limitations of this analogy and, thus, the challenges that will be faced when studying cognition of the mind?

3. Discuss the concept that mental responses cannot be measured directly but rather must be inferred from behavioural measures. Briefly discuss Donders's decision-making experiment. Ask students to generate basic ideas about how humans read letters or familiar words. Ask students to extrapolate from Donders's methodology to design a simple experiment to study the time course of reading.

4. Along the way in this book students will encounter many different theoretical models used to help simplify complex concepts and phenomenon. Ask students to create a model of a complex concept (e.g., an automobile) that emphasizes either the structural aspects (e.g., the different parts of the automobile) or process aspects (e.g., what processes occur to actually make the car move) of the model. Then lead the discussion to preview some of the models found in the textbook.

5. Although a main goal of Cognitive Psychology is to understand our mind in a theoretical sense, its discoveries also have an important impact in applied areas, such as traffic

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psychology, forensic psychology, product design, etc. Discuss with your students how knowledge obtained in cognitive psychology can contribute to solving certain “problems” in society.

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## *Demonstrations*

1. Ask students to identify one cognitive activity they engage in during the day (e.g., studying for a test; using various apps on their phone; navigating using a GPS system; cycling through a busy street) and then have them identify the different processes (e.g., pattern identification, short-term/working memory, attention) that must occur for them to successfully engage in that process. Suggest for them to use the different chapters to identify possible processes they may use.

2. Develop an analytical introspection experiment to be conducted by the students. Give students a paired-associate learning task. Instruct students that they will learn words in pairs (e.g., tree – boat). During the recall portion of the experiment, they will be presented with one of the words from each pair, and they will be asked to report the other word of each pair. Then, have students perform their own individual "analytical introspection experiment" in which they each describe their experiences and thought processes about how they tried to remember the word pairs. Discuss the students' results from this introspection procedure. Highlight major points of introspection obtained, such as how self-report experiments generate variable results from one person to another.

3. Describe a simple semantic priming experiment to demonstrate mental chronometry. Describe mental chronometry and reaction time measures. Explain how showing one word can facilitate the processing of another associated word. Explain the concepts of prime stimulus (e.g., "dog") and the target stimulus (e.g., "cat"). Explain how the participant in a priming experiment makes some response to the target stimulus (you might introduce either naming or lexical decision here). Explain that, to measure the time course of the priming effect, we use a comparative (subtraction) technique. You could present (or ask students to predict) sample reaction times across "related" (e.g., dog-cat) and "unrelated" (e.g., fog-cat) trials and show that people typically respond faster on related trials, relative to unrelated trials. Finally, you can ask students to generate cognitive explanations for why the priming effect occurs.

4. Students are often surprised at how much information about human cognition is determined by using very "simple" tasks. Demonstrate a simple memory experiment such as a delayed recognition task. At the beginning of class, present to the class a series of 20 common nouns (e.g., pot, bike). Tell the class that you will explain the "experiment" further at a later point in the lecture. Sometime later during the class, distribute a recognition test of 40 words (20 that had been presented earlier and 20 that had not). Instruct students to circle only the words they remember as having been presented earlier. Then, present students with an answer key showing the 20 words that should have been circled and ask them to score their tests. You can calculate a mean accuracy for the class. Discuss how accuracy, in addition to reaction time, is used as a measure of cognition.

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(Note: You have a great deal of flexibility in what specific properties of memory to incorporate into your demo. For instance, you might create a recognition test where some of the distracters are synonyms of words that were actually presented (e.g., pan included in recognition test, instead of pot) to show how recognition errors are more likely to occur with “associated” items.)

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**CogLab Instructor's Material:**

# Simple Detection

## Introduction

One of the most basic processes in cognitive psychology is the ability of an individual to detect a stimulus and execute a response. In the simplest detection paradigm, like the one in the Simple Detection CogLab, participants are presented a simple stimulus and must respond when the stimulus is detected. Reaction time for detecting the stimulus and responding is generally the dependent variable with responses ranging between 200-300 milliseconds (ms).

## Part I

**Student Projects and Critical Thinking Exercises**

1) As a critical thinking project, have students design their own simple detection experiment where the type of the stimulus (e.g., other modalities like taste, hearing, touch, and smell) and response (e.g., different types of manual responses, vocal response, etc).
    a. Students could perform mini-experiments using other members of the class as participants. Students could record the speed of responding for different pairings of stimulus and response and discuss why different pairings produced differential results.
    b. Results could be calculated and compared for fun or as an intro to an APA-formatted paper. Students could use 1-2 articles as references for their paper.

2) For a critical research topic, have students look through the literature on how simple detection may influence game playing. Students could explore how practice might influence the speed of responding not only in a simple detection task, but also in more complex tasks (e.g., complex decisions in video games).
    a. Have students write a short APA-formatted paper on this topic or another example (e.g., driving a car and braking or other complex decisions in driving).

3) Have students write a paper or at least think about and discuss how manipulating stimulus characteristics (e.g., size, shape, location, or intensity of the stimulus) may affect detection.
    a. Have students think about how other variables outside of the stimulus might affect performance. For example, what if the participant needed to complete 100 trials versus 1000 trials? Or, how would the natural arousal levels affect performance?

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**Part II**

**Possible Test Questions**

**Basic or Introductory Questions**

1) What is simple about simple detection?

**Answer:** In a simple detection paradigm the simple denotes that there is only a single stimulus that must be detected and responded to. The participant does not need to decide which of multiple stimuli were presented.

2) If a participant responds slowly in a standard simple detection task like that found in CogLab, is it possible to distinguish whether the slowed response is related to detection of the stimulus or related to the response.

**Answer:** In a standard simple detection task like that found in CogLab, it is NOT possible to distinguish whether the slowed response is related to detection of the stimulus or related to the response. One would need to have additional conditions or stimuli to start to be able to distinguish between slowed responses due to detection versus responding.

**Research/Cognition-Based Questions**

1) The dependent measure in the simple detection experiment was reaction time to respond. What other dependent variable could be measured?

**Answer:** Another possible measure could be the number of trials on which the participant responded prior to presentation of the stimulus.

2) What might happen to reaction times on trials following a trial that the participant had responded prior to the stimulus being presented?

**Answer:** If the participant is truly engaged in the task, it may be that they become more conservative on the following trial and therefore their reaction time might slow down.

**Advanced Questions**

1) In major league baseball, the pitcher may throw the ball at 95 mph. This means that it takes about 400 milliseconds for the ball to leave the pitcher's hand and arrive at the plate. Given what you know about response times from this lab, speculate on how a major league hitter might be able to hit the ball.

**Answer:** The lab indicates that often it takes around 250 milliseconds to make a simple detection response. To swing a bat at a particular place must take at least this long, so the hitter must start the swing when the ball is no further than half way to the plate. An effective hitter must be able to read the pitcher's wind up and release and know where the ball is going to be before they see it.

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**Discussion Questions**

1) If one were to compare simple detection performance in college-age and elderly participants, one would likely find that responses for elderly participants are slower than the college-age participants in the detection task. Discuss some of the possible reasons why such a pattern of results would obtain.

**Answer:** It is likely that the elderly participants are slower at both detection of the stimulus (i.e., decreased visual processing) and executing the motor response. One possible method would be to create comparable conditions by creating age-equivalent (and visual system equivalent) visual stimuli (e.g., degrading the stimulus for college-age students to make it similar to what an elderly person may see). By using age-equivalent stimuli, one could then see whether there are any response differences.

**Part III**

**Group or Online Projects**

1) Have your students consider specific situations or occupations where having a quick simple detection time would be an (dis)advantage (e.g., drag racer, waiting too long after the traffic light turns green, video games, detecting warning light on automobile dashboard).
    a. This can be done in groups in the classroom or as an online discussion assignment.

**Part IV**

**Multiple Choice Questions**

1) Imagine a simple detection study where on 90% of the trials the stimulus is presented at the fixation point, but on 10% of the trials the stimulus would appear in one of the four corners of the screen. What result would you expect on those 10% of the trials relative to the other 90% of trials?
    a. Reaction times would likely be **faster** on the 10% trials than the 90% trials.
    b. Reaction times would likely be **slower** on the 10% trials than the 90% trials.
    c. Reaction times would likely be **the same** on the 10% trials as on the 90% trials.
    d. Reaction time would likely be **the same** on the **first** 10% trial as on the 90% trials.

(b)

2) Student A has an average reaction time of 450 ms in the simple detection study. Which conclusion is most likely?
    a. The student's reaction times appear to be much **faster** than one would expect in such a simple detection task.
    b. The student's reaction times appear to be much **slower** than one would expect in such a simple detection task.
    c. The student's reaction times appear to be about the **average** of what one would expect in such a simple detection task
    d. All of the above

(b)

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3) In a simple detection study, a participant must
   a. detect and respond to a single stimulus.
   b. detect which of several stimuli were presented on a single trial.
   c. make either a simple or complex response.
   d. detect a single stimulus, but make a complex response.

(a)

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