



THINKER
An Interactive CD-ROM for Cognitive Psychology
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Design Document

Executive Summary

THINKER is a CD-ROM intended to assist students with their mastery and appreciation for the field of cognitive psychology through interactive exercises that illustrate principles from that may be contained in their textbook, while also demonstrating and applying concepts beyond what may be covered there or in class.

Statement of Purpose

THINKER meets two primary goals, for both instructors and junior- or senior-level students of cognitive psychology. THINKER is designed to make cognitive psychology more interesting to students and to improve academic performance in a cognitive psychology course and other endeavors. For the instructor, THINKER will assist in enhancing class time through demonstrations designed to illustrate points and to break up the class period.

For the student, THINKER will reinforce concepts and therefore contribute to more thorough mastery of the sometimes complex concepts in cognitive psychology. Designed to supplement, rather than replace, a standard textbook, THINKER will provide students with an opportunity to break occasionally away from the reading and reinforce material through activities and demonstrations. As a result, a deeper understanding and appreciation for the field will develop (demonstrating the cognitive concept of *depth of processing*). As a result, THINKER will serve to bring the material "to life" in a novel way.

In addition to exercises within the CD-ROM, THINKER will also direct students to web sites and other resources to broaden their experience. As a result, they will apply the information as they acquire it, allowing them to see where they may be struggling with a concept, such as if an interactive exercise is difficult for them to comprehend. The user may re-visit any activity in order to master and gain a greater perspective on the concepts illustrated.

Content Outline

- I. **History of Cognitive Psychology: Timeline & Overview (~6 demos) INTERACTIVE TEXT DEMO:** Pictures of each of the following individuals, with text to describe his or her contribution to the discipline. Click the name to see the picture and the text. For nested categories (e.g., Cognitive Revolution; Recent Tech. Advances), an expanded section in a different color will clarify the level where the activity is located.
 - A. **Aristotle**
 - B. **Descartes**
 - C. **Wundt**
 - D. **Ebbinghaus** *TEXT ENTRY DEMO: Exercise illustrating acquisition and forgetting with nonsense syllables.* A series of 20 3-letter consonant-vowel-consonant items will appear, each for a duration of 1 second, and participant will type them into a text box. Trials will repeat until participant has learned all of the syllables, and a graph will be presented showing the number of trials needed for mastery. Participant will be instructed to return to the demo later to test retention. Results for that demo will take the form of a graph, in which memory loss will be assessed.
 - E. **Calkins**
 - F. **James**
 - G. **Watson**
 - H. **Gestalt Movement** *VIDEO DEMO: Video clip of a step show illustrating Gestalt principles.* At various points during the step show video, the video will stop, and participants will be asked to assess what Gestalt principle is currently being displayed.
 - I. **Bartlett**
 - J. **Cognitive Revolution** *Continuation of the timeline, with an expansion of the names because they're more condensed*
 1. **Miller**
 2. **Neisser**
 3. **Chomsky**
 4. **Piaget**
 5. **Information Processing Approach** *ANIMATION DEMO: Illustration of the computer metaphor, showing input, processing, and output.* An animation will show a computer being fed mathematical information, conducting a calculation, and producing the answer to the problem. Then, a person will be shown reading the same problem, at which point the brain will show activity, and then the person will write the answer down.
 6. **Atkinson-Shiffrin Memory Model**
 7. **Parallel Distributed Processing**
 - K. **Evolving Perspectives and Techniques** *These items will be set aside in the timeline as a group, illustrating the different techniques that current researchers have*

1. **Trephining**
2. **Phrenology**
3. **Brain lesions**
4. **Brain-Imaging** *A brief discussion of how imaging has gotten researchers closer to the process, rather than having to infer the cognitive processes involved in different activities*
 - a. **PET Scans** *INTERACTIVE IMAGE DEMO: Images of PET scans showing different cognitive activities.* Images of PET scans, labeled according to the activity the person was executing when the image was taken. The idea is to show the regions of the brain active when particular cognitive tasks are underway. Ideal images would be during a straight recall memory task, a speaking task, and a spatial task. Although many students have seen pictures of these images, most have not had the opportunity to compare them from different cognitive activities, and seeing different brain regions activated should prove enlightening.
 - b. **fMRI** *INTERACTIVE IMAGE DEMO: Images of fMRI work showing different cognitive activities.* For the purposes of contrasting with the PET scans, the fMRI images would be for similar tasks as above.

II. *Perceptual Processes (~10 demos)* *IMAGE DEMO: A discussion of the distinction between sensation and perception, with a few optical illusions thrown in just for effect and interest*

A. Theories of Object Recognition *INTERACTIVE ILLUSTRATION DEMO: Brain map introduced at this point.* This image will recur throughout THINKER, and all of the major parts of the brain will be marked, including indications of the four major lobes, and specific relevant sections within those lobes. Currently relevant brain parts will be illuminated for use with that particular demo. For object recognition and attention processes, on this demo, the visual and inferotemporal cortexes will be emphasized

1. **Template Matching** *ANIMATION DEMO: Illustration of a template match and non-match.* An animation will show a person seeing an object and, by comparing the object to pictures in her mind, deciding on what the object is. Because the object most closely matches her mental image for a similar object, she identifies it. Seeing a dog for example, she would compare it to a variety of objects in mind (shown as a collection of mental images) and select the closest match, which is labeled dog.
2. **Feature-Analysis (or Feature-Detection)** *ANIMATION DEMO: Illustration of features.* Here the perceiver will identify an object by the arrangements of lines and contours that constitute its features. As a result, the arrangement leads the perceiver to conclude, for example, that the object is a chair, by virtue of the vertical back, horizontal plane in the middle, and the vertical legs stemming down.

3. **Recognition-by-Components** *ANIMATION DEMO: Illustration of components and geons.* The perceiver will be depicted identifying the different geons from a collection of them shown in a mental “legend” and will assemble them in a way that approximates the shape of, for example, the chair in #2. The perceiver will then identify the object as a chair because it possesses those geons in that arrangement.
 4. **Viewer-Centered** *ANIMATION DEMO: Illustration of different views of an object.* The perceiver sees an object and compares it to a number of different perspectives on the same object. She recognizes it as a chair by noting the similarity to the several views of the chair held in memory.
- B. Change blindness** *ANIMATION DEMO: Demonstrations of the effect of mudsplashes and masking.* User will see a still image, followed by a flash of white, and then the image again, with one alteration. The task is to identify the change. After several repetitions, the change will be shown without the flash, and will be obvious.
- C. Attention** *Discussion of the difference between effortful and automatic attentional processes*
1. **Divided attention task** *REACTION TIME DEMO: A distraction task, whereby viewers are given two tasks at once, then just one, and show their performance (e.g., speed in making judgments) change.* While tracking a moving ball to try to identify what shape it is making, the user will also be asked to determine whether a geometric shape matches a target shape (and will respond “yes” or “no”). The two tasks will later be separated to show increased performance.
 2. **Stroop Effect** *REACTION TIME DEMO: A demonstration designed to illustrate the Stroop effect, in which visual judgments are affected by words.* User will mouse-click the appropriate button on the monitor for to indicate the color in which the word is written. The word is the name of the color, and people have difficulty resisting the inclination to read the word first. As a result, users will tend to be slower on incongruent trials than on congruent trials, and the demo will report their different reaction times.
 3. **Ironic Effects of Thought Control** *INTERACTIVE TEXT DEMO: A white bear-type of illustration.* The user will be instructed not to think about a red sports car for the duration of the following exercise. However, the user should press the space bar whenever the thought of the car does enter his mind. The user will then read rather complex essay about an irrelevant topic (e.g., deforestation). At the end, the computer will tell the user how many times he or she pressed the bar. Some users may not press the bar at all, and they will receive a message that they did not demonstrate the ironic effects.
- III. Working Memory (~3 demos)** *Page opens with a description and illustration of Baddeley’s model, with ANIMATION DEMO of process of the working memory model.* The animation will show the working memory as a collection of 3 components—phonological loop, visuospatial sketchpad, and the central executive.

The animation will show information coming in from sensory memory and coming in from long-term memory, being processed in WM, and then placed back into LTM.

- A. Biology of Working Memory** *INTERACTIVE ILLUSTRATION DEMO (Brain map 2): The brain map, with indications of where different components of working memory are governed. The frontal lobe and auditory and visual cortexes will be illuminated.*
- B. Serial Position Effect** *TEXT ENTRY DEMO: Memory test showing better memory for items at beginning and end of the list. The user will read a list of 20 items and then write as many as possible. Feedback from the program will indicate which items he or she remembered, and their position in the list, with early items showing the primacy effect and late items showing the recency effect.*

IV. Long-Term Memory (~5 demos) *Text will describe the relatively permanent and limitless nature of LTM, along with links to the demos below*

- A. The Effect of Context** *A page devoted to context, will provide links to the following context effects*
 - 1. Encoding Specificity** *TEXT ENTRY DEMO: Memory test illustrating effect of context on memory. Participants will be tested first for memory when the computer background and setup are different than when words were presented, and again when they are the same. The user should do better with consistency than inconsistency.*
 - 2. Mood-Congruence** *TEXT ENTRY DEMO: Memory test illustrating mood-congruence. After writing about 3 good things that happened that week, participants will be tested for memory for words, and the user should show better performance for “happy” words than for sad ones.*
 - 3. Mood-Dependent/State-Dependent Memory** *ANIMATION DEMO: Cartoon demonstrating state-dependent memory. Here the user will see a cartoon target who is shown very nervous while learning material (he will have anxiety-provoking thoughts such as a looming test in a thought balloon). The target then is shown failing to remember the information when he is calm, but remember it when he is nervous again.*
- B. Eyewitness testimony** *A series of exercises illustrating the persuasive literature on misinformation, perhaps after an initial setup at the beginning of the CD (or semester)*
 - 1. Accuracy of Eyewitness Testimony** *MULTIPLE CHOICE DEMO: Presentation of street scene, with cues as to details. A series of digital photographs of a complex street scene will be presented, and the user will be asked a series of questions about the scene through multiple choice questions. The user will judge how many people were present, colors of cars, and so on. After about 10 questions, the user will be shown the scene again and will assess his or her accuracy. The demo will indicate that many people lose details from a visual scene more quickly than they might expect. Also, despite having high confidence in some elements of the picture, memories are quickly altered in the mind. Furthermore, the interference of subsequent pictures will mimic real life, in which memories are usually not immediately assessed.*

2. **Misinformation Effect** *MULTIPLE CHOICE DEMO: Plant misleading information to cloud judgment.* Through a different set of pictures, the user will respond to questions about the scene, but this time the questions will be leading. For example, in a restaurant scene, the user will be told that it is morning and asked what the person was eating. The correct answer might be a hamburger, but the user will be more likely to remember it as being breakfast food based on the misleading detail.

V. **Memory Strategies & Metacognition (~4 demos).** *A brief description of what mnemonics are and how they work, with links to the demos illustrating how they can work*

A. **Memory Improvement** *A menu of the different types of mnemonics, with links to them*

1. **Method of Loci** *ILLUSTRATION DEMO: A depiction of a room, with concepts to be learned scattered around in a way that demonstrates the method.* The room will have various items located in different parts of the room, to be used for visualization purposes. For example, a pizza hanging over a lampshade would help to remember that pizza was an item in the list.
2. **Chunking** *TEXT ENTRY DEMO: Grouping the items according to some meaningful structure.* User is presented with a list of items, then asked combine some of them into meaningful sets, then tested for recall. Text entry should show higher than expected (5-9) performance.
3. **First-Letter Technique** *TEXT ENTRY DEMO: Acronym construction from the list of concepts.* User is presented with a list of items to remember and asked to create an acronym with them. He or she is then asked to recall all of the items, and the assistance of the first letter will be highlighted.

B. **Metacognition** *VIDEO DEMO: A clip of a young kid being asked to take a message, which she doesn't write down; then an older kid who does, demonstrating the enhanced metacognitive capacity.* As inspired by Candid Camera, the two children will be asked to take the message, and the older child will do better not just because of the age, but because of the metacognitive differences between the two.

VI. **Imagery (~4 demos).** *Overview of the intricacies of imagery, utilization of the visuospatial sketchpad. Emphasis on the impressive ability of our mind to manipulate imagined objects. There will also be a link to Baddeley's model in III.*

A. **Evidence of Imagery** *Description of how researchers typically study imagery in the lab*

1. **Shepard & Metzler's classic study** *REACTION TIME DEMO: A couple of tasks of mental rotation of geometric objects, and a depiction of the rotation that the mind does.* Users will be given a trial object and a target object and asked to indicate, as quickly as possible through clicking a button on the monitor, whether the shapes match. They will

receive reaction time feedback as they move along. Reaction times should be higher for greater (e.g., 180) than for smaller (e.g., 10) degrees of rotation necessary.

2. Size Comparison: Thresholds of Distinction REACTION TIME

DEMO: Reaction time measure of various tasks in which size is manipulated. Users will be given 5 separate pairs of objects and asked to indicate, as quickly as possible through keystrokes, which is the larger object. Reaction times should be higher for smaller differences (e.g., a shark and an alligator) than for larger differences (e.g., a mouse and an elephant).

3. Shape Comparison: Angle Distinctions REACTION TIME DEMO:

Clock decisions to decide on the angle, again using reaction time as a measure. Users will be presented with various pairs of times on clocks and asked to indicate, as quickly as possible through keystrokes, which angle of the hands is larger. Reaction times should be higher for small differences (e.g., 4:15 and 5:27) than for large differences (e.g., 4:15 and 6:00).

B. Cognitive Maps & Judgmental Heuristics *Description of what heuristics are, and then relation to cognitive maps. ILLUSTRATION DEMO: Instructions to draw a familiar geographic element, and then compare to the actual thing.* Users will be instructed to draw a map of the United States, as accurately as possible. They then will be shown an accurate map and asked to look for the following heuristics:

1. **Symmetry** *Map should show some greater regularity than reality—generalizations*
2. **Rotation:** *Map should show elements that are more vertical than reality*
3. **Alignment:** *Across some border or gap, objects will be rotated to fit a mental set*

VII. General Knowledge (~3 demos). *Introduction of the notion of general knowledge, from semantic memory to beliefs and schemas*

A. Network Models *Two examples of network models will illustrate the current thinking about how ideas are organized and maintained in the mind*

1. **Basic Network Model ANIMATION DEMO:** *Present a general network, with which user will interact for the following exercises.* A potential network, built around the category “college student,” will demonstrate the connections between this main node and associated nodes. Activation will begin with illumination of the central node, and the animation will show the spread to other nodes.
2. **Collins & Loftus TEXT ENTRY DEMO:** *Indicate the node that user is marking, and then the links between nodes.* User selects a category, types it in the central node position, and then types in associated nodes. User then takes the association to another level for some of the associations.

B. Schemas & Memory *Description of schemas, with examples of how they can be helpful or problematic, with IMAGE DEMO showing Incidental Learning*

(*Brewer & Tryeyen's office, missing schema-inconsistent information*), *Intentional Learning* (priming for memory task leads to noticing schema-inconsistent items), and *Boundary Extension* (re-drawing the picture to extend boundaries). User will see a digital picture for 10 seconds, and then will be asked to re-draw it. The image will be shown again, and areas in which the above tendencies are likely will be illuminated.

VIII. Language & the Brain (~3 demos). *INTERACTIVE ILLUSTRATION DEMO: The brain map returns (3) with speech-based areas highlighted, specifically within Broca's and Wernicke's area in the left hemisphere.* These two areas will be illuminated, with links to explain their roles, that Broca's guides speech production and Wernicke's speech comprehension.

A. Speech Perception *AUDIO DEMO: Sound file with word boundaries unclear; demonstrating adaptability of the brain to comprehend word breaks.* User will hear the sound of a person talking along with a sound meter showing the frequency variations. The file will play again, this time slower, and the user will be told to listen for breaks between words. The demo should make it clear that sound breaks are difficult to notice, and yet people are capable early in life to distinguish between words. A text explanation should reinforce this point, showing that although we have no trouble understanding the words, there is no clear break in sound between words.

B. Reading with Fixations & Saccadic Eye Movement *VIDEO DEMO: Video of a person's eyes reading two passages, showing the stops and starts of the activity.* A clip will show only a person's eyes as he or she reads an unfamiliar passage and then a more familiar passage, both labeled as such. The tight screen should make it easy to see the less-fluid nature of eye movement and the jumping and skipping that some people do as they read unfamiliar text, as compared to familiar text.

IX. Problem Solving Approaches (~3 demos). *This module will consist of games and riddles designed to demonstrate the user's problem solving abilities and tendencies*

A. Algorithm *TEXT ENTRY DEMO: An algebra-based puzzle, where a formula is the best route to solution.* The user will be presented with a problem in which some development and use of an equation leads to the solution. The user will write in his or her solution when it is discovered and will compare it to the solution the demo offers.

B. Heuristics *TEXT ENTRY DEMO: An example where a heuristic works, and where it doesn't, including hill-climbing, means-ends.* In one example, continuing to work toward the solution directly will be successful; that is, each logical step will move the user closer to the solution and will eventually lead to success. In the other example, the solution can only be reached if the user retreats in one or two steps. The wrapup statement will illustrate how the use of the heuristic speeds things up and may help, but sometimes leads to failure.

C. Analogy *TEXT ENTRY DEMO: Application of analogy, leading to success and to failure.* Luchins' water-jar problem will demonstrate this tendency. In the problem, the user is told to imagine jars of different capacities with the task of producing different amounts of water from only those jars. The demo will apply

analogy by creating a mental set, in which the user will apply the same approach—to initial success. In later trials, however, the approach will break down, showing that the analogy was not always successful and can inhibit identification of the correct solution. The user will write the solution into a text box.

- X. **Decision Making & Heuristics (~6 demos).** *A number of factors affect the decision making and judging process, and examples will illustrate each of them*
- A. **Representativeness Heuristic** *RANKING DEMO: Presentation of a situation in which the user misjudges frequency of an event based on representativeness and schemas; explanation will incorporate the small-sample fallacy, illusory correlations, and components of Bayes' Theorem.* User will be asked to rank the likelihood that a target belongs to a particular category. For example, a target will be described as having glasses, smoking a pipe, and reading a lot, and the user will be asked to rank the likelihood that he is a truck driver, philosophy professor, a professional skier, and so on. The ranks will then show the base rates for these categories, for demonstration of the use of the heuristic in making such judgments.
- B. **Availability Heuristic: Salience** *MULTIPLE CHOICE DEMO: An example in which the user has a particular issue made salient and responds by adjusting judgments to be consistent.* The program will present a stimulus to prime mental associations and then ask a series of questions. One example will involve reading information about the number of shark attacks and then asking the user how likely he or she would be to go swimming in the ocean. Users who are presented with a smaller number of shark attacks should be more likely to consider swimming in the ocean. Participants may bring their condition and response information to class to discuss the effect.
- C. **Simulation Heuristic: Counterfactual Thinking** *MULTIPLE CHOICE DEMO: An example in which the user imagines a particular outcome and estimates emotional reaction to it, showing that the easier the opposite outcome is to imagine, the more emotional the reaction.* The user will be asked to imagine a closely fought basketball game in which the user's team wins the game on a last second basket. The user will rate his or her level of excitement at winning the game. The user will then imagine a game in which his or her team led all the way through and the game ended with the user's team ahead by 40 points. Most users will report more excitement at having one on the last-second shot because of the ease of "simulating" the reverse outcome. In the blowout example, on the other hand, too many things would have to have occurred in order for the reverse outcome to occur, and so the emotion level will be lower.
- D. **Anchoring & Adjustment Heuristic** *MULTIPLE CHOICE DEMO: By giving the user different anchors for estimation, estimations of frequency will be affected.* The user will respond to questions in which the anchors differ, and responses should differ as well. One example will include projecting the income the user expects after graduation. The options with which the user is presented will differ between trials, such that it will be low for one user and high for another. When the options are higher, users' projected income should be higher.

- E. Framing Effects** *MULTIPLE CHOICE DEMO: Using Kahneman-&-Tversky-like scenarios, the user will respond differently to a problem based on its frame. Users will be presented with two options and pick which option sounds more appealing. One option will be framed in the positive (e.g., “a 40% chance of success” and the other in the negative (“a 60% chance of failure”). Users will be more likely to prefer the positively-framed option, despite their obvious equality.*
- F. Gambler’s Fallacy** *TEXT ENTRY DEMO: By predicting the outcome of a coming event (e.g., a coin flip), the user will be led to expect a change or improved luck, despite the constancy of the probability. After seeing several coin flips of the same outcome (e.g., 4 consecutive heads flips), users will be asked to predict the next flip and to estimate his or her level of confidence in that prediction. Although many people may be tempted to anticipate one flip or another, prior outcomes have no bearing on the next flip, meaning that the probability of head remains .50.*
- XI. Language Development (~5 demos). Basic components of cognitive development will be discussed, with video to illustrate points**
- A. Infants** *Through video footage, illustrate the following infant speech concepts*
- 1. Speech Perception** *VIDEO DEMO: Infant understanding, before being able to produce speech. A video will show a child who clearly cannot speak, following directions given by an adult.*
 - 2. Babbling** *VIDEO DEMO: Video of infant babbling. A video will show a child in the earliest speech production phase.*
 - 3. Motherese** *VIDEO DEMO: Video of a mother interacting with infant using motherese. A video of a mother communicating with her child in “motherese,” with reactions by the child as well.*
- B. Children** *More video footage, illustrating the following childhood speech concepts*
- 1. Overregularization** *VIDEO DEMO: Video of a child overregularizing (e.g., “mouses”). A young child will be interviewed and will illustrate the overregularization in speech. The appropriate age of the child (~4) should allow enough opportunities to see the simplistic language view.*
 - 2. Telegraphic Speech** *VIDEO DEMO: Video of a child showing telegraphic speech (e.g., “Baby eat”). A video of a child at the telegraphic stage of language development, in which unnecessary articles and so on are omitted.*

Summary of Demo types

| Demo Type | Number |
|--------------------------|----------------------|
| Text Entry | 11 |
| Video | 8 |
| Animation | 9 |
| Multiple Choice | 6 |
| Image | 2 |
| Reaction Time | 5 |
| Illustration | 2 |
| Interactive Illustration | 3 incl. 3 brain maps |
| Interactive Text | 2 |
| Audio | 1 |
| Ranking | 1 |
| Interactive Image | 2 |
| TOTAL DEMOS | 52 |

Media Inventory

Text: For 51 demos, concept introduction and demonstration explanation text will be required.

These will be short (<1 paragraph) for most, although some more general concepts will require further elaboration. In addition, text will be required in most cases for the higher level in the hierarchy. For example, text at IV.A. (from the content outline) will introduce the topics to be explored in more detail in IV.A.1, 2, & 3.

Images: Although only 3 demos are explicitly Image demos, we will need approximately 19 images for those and other purposes, primarily in the timeline in I. Bart will create the necessary images that can be digital creations except for the brain map images. We will take original digital photographs of photograph images. These images will be of the following types:

- **Historical Concept Images:** Images of the following 4 concepts illustrating the advancement of the technology in the field: Gestalt principles; trephining; phrenology; and brain lesions (lobotomy)
- **Digital Images of Brain Maps:** 2 sets of images of the brain—one of PET scans and one of fMRI images—for demonstration of technological advances. Elliott will pursue assistance in these images from researchers who possess the equipment.
- **Street Scene:** 1 photograph of a street scene for the purposes of demonstrating the application of schemas on memory

Animations: Eight animations will be used for demonstration purposes. Bart will be in charge of the artistic side of this component. We will strive for consistency in the appearance of these animations. Each will be approximately one minute long and will generally illustrate movement of information, so that a sequence of events in a cognitive process can be made clearer. For example, an animation will show how working memory integrates information by extracting information from long-term memory, as well as by mediating long-term memory and the environment. The motion of the animation will make this process clearer than a static illustration would.

Video: Nine videos will be needed, most in the language development section. Elliott will arrange and shoot those sessions, which take the following form:

- Five language development videos, showing children at different ages and with different levels of language development
- Step show footage illustrating Gestalt principles
- Several change blindness illustrations
- Video of a child lacking metacognitive savvy
- Video of a reader's eyes, illustrating reading and saccadic eye movement

Audio: One audio file of speech, at regular speed and slowed-down, will be needed to illustrate the subtlety of word boundaries.

Copyright: We intend to create original images for all components, eliminating the need for copyright permissions.

Programming: Scripting will be required to create the pages, as well as a number of other demo types. Some of the code will be recurring, such as reaction time, text entry, and multiple choice demos, as well as the overall layout of the screens.

Statement of Aesthetic Principles

The CD will be easy to navigate, with consistency of design throughout variations in content. From the home page, the user will be able to access any of the modules. Once the user has gone to that module's page, he or she will be able to access the demos for that module. We will pay special attention to the flow of the pages and the ways in which we integrate them. For most of the demonstrations, and for the general tone of the program, colors will not be especially important or restricted. However, consistency between the modules will be important in order to lend consistency between the modules. A code-scanning type of font, like the kind at the bottom of checks for machine recognition, will be consistent with the computer metaphors discussed in the program and thus will be consistent with other ideas covered. An image of Rodin's Thinker will be a recurring icon, as will an image of a brain, generally as a link button.

Skills Assessment

The following skills will be required for implementation of the CD.

Elliott can...

- Conduct literature search for support materials
- Write text
- Secure digital images of brain maps

Bart can...

- Write code
- Create animations
- Create illustrations

Together we can...

- Plan and implement layout
- Create video
- Record audio file
- Secure copyright information

Elliott has an interest in learning about the programming process, with the goal of understanding it, rather than conducting it himself. To that end, he will passively observe some of Bart's activities.

Implementation Plan

Narrative

Phase II will mainly involve production of the demos and composition of the text for inclusion in the CD. One module will be completed at a time, so that one module will not be produced until another is finished. In some cases, however, similarity will allow for adaptation of a prior module to speed up the process. Other activities include acquisition of media that will not be produced in-house (such as brain images), and pilot evaluations by several individuals. Elliott also will conduct library research to support the demos, and he will compose the text to accompany the pages and demos.

Timeline

| <u>Date</u> | <u>Bart's Tasks</u> | <u>Elliott's Tasks</u> |
|------------------------|--|--|
| Sep 03 | Create page template, with navigation features and other aspects to recur throughout | Write text for Module II |
| Oct 03 | Create Module II demos: Perceptual Processes <ul style="list-style-type: none"> • Brain map illustration demo (template for later use) • Animations on 1) template matching, 2) feature-analysis, 3) recognition-by-components, and 4) viewer-centered • Change blindness video • Divided attention multiple choice demo (template for later use) • Stroop effect demo (template for reaction time coding) • Ironic effects of thought control text demo | Write text for Module III |
| Nov 03 | Create Module III demos: Working Memory <ul style="list-style-type: none"> • Animation of Baddeley's model • Biology of working memory (brain map 2) • Serial position effect text entry demo | Write text for Module IV Test early beta version Revise timeline |
| Dec/ Jan 03 | Create Module IV demos: Long-Term Memory <ul style="list-style-type: none"> • Encoding specificity text entry demo • Mood-congruence text-entry demo • Mood-/State-dependent memory demo • Eyewitness testimony MC demo • Misinformation effect MC demo | Write text for Module V |
| Feb 04 | Create Module V demos: Memory Strategies & Metacognition <ul style="list-style-type: none"> • Method of loci illustration demo • Chunking text entry demo • First-letter technique text entry demo • Metacognition video demo | Write text for Module VI |
| Mar 04 | Create Module VI demos: Imagery <ul style="list-style-type: none"> • Shepard & Metzler RT demo • Size comparison RT demo • Shape comparison RT demo • Cognitive map illustration demo | Write text for Module VII |

Implementation Timeline continued

| | | |
|---------------------------|---|---|
| Apr 04 | Create Module VII demos: General Knowledge <ul style="list-style-type: none"> • Network animation • Collins & Loftus text entry demo • Schemas & memory image demo | Write text for Module VIII |
| May/ Jun 04 | Create Module VIII demos: Language & the Brain <ul style="list-style-type: none"> • Language interactive illustration demo • Speech perception audio demo • Reading fixations video | Write text for Module IX |
| Jul 04 | Create Module IX demos: Problem Solving Approaches <ul style="list-style-type: none"> • Algorithm text entry demo • Heuristic text entry demo • Analogy text entry demo | Write text for Module X |
| Aug/ Sep 04 | Create Module X demos: Decision Making and Heuristics <ul style="list-style-type: none"> • Representativeness ranking demo • Availability MC demo • Simulation MC demo • Anchoring & Adjustment MC demo • Framing MC demo • Gambler's fallacy text entry demo | Write text for Module XI |
| Oct 04 | Create Module XI demos: Language Development <ul style="list-style-type: none"> • Infant speech perception video • Infant babbling video • Motherese video • Children overregularization video • Telegraphic speech video | Write text for Module I |
| Nov 04 | Create Module I demos: Introduction and History of Cognitive Psychology <ul style="list-style-type: none"> • Overall timeline interactive text demo • Ebbinghaus text entry demo • Gestalt video demo • Information processing animation demo • PET and fMRI images | Contact professional evaluators Complete construction of full-version evaluation forms |
| Dec 04/ Jan 05 | Final Revisions | Burn onto CDs Distribute to professionals for evaluation |

Budget

| <u>Item</u> | <u>Cost/Source</u> |
|--|--------------------|
| Copy of Flash for Elliott | \$100 online |
| Approximately 20 blank CDR disks for copy and pilot distribution | CAT provides |
| Digital video tapes for language development videos | CAT provides |
| Audio tapes for sound demos | CAT provides |

Evaluation Plan

Narrative

Evaluation will be based upon the responses from a variety of qualified individuals: Joe Etherton, Loyola University; Lonnie Yandell, Belmont University; and Margaret Matlin, SUNY Geneseo. We will solicit constructive feedback from these individuals with the goal of improving the usability and relevance of the CD. Elliott will also use whatever demos are ready for use in the spring 2004 semester, as he teaches the course again. If response is favorable, then we will ask Dr. Matlin if she is interested in packaging the CD with her textbook.

Timeline

| <u>Date</u> | <u>Task</u> |
|---------------------------|--|
| Nov/ Dec 03 | Conduct test of early beta version of initial modules (see evaluation form in Appendix A) |
| Dec 04/ Jan 04 | Complete production of the CD Send final version to professional evaluators (see evaluation form in Appendix B) |
| Feb 05 | Begin thorough testing and evaluation with PSYC 3030 students to assess ease of use, enjoyability, and effectiveness. Four methods of evaluation will take place: <ol style="list-style-type: none"> 1. Experimentation, whereby students will be randomly assigned to a module or non-module condition, and mastery of the relevant content will be assessed. We will analyze differences in performance for evidence of the module's effectiveness. 2. Written evaluation forms (see Appendix B), on which students can evaluate the effectiveness and desirability of modules within the CD. 3. Observation, whereby some students will be observed using the CD, so that we can assess their ease of navigation and module completion. 4. Verbal feedback sessions, wherein students will participate in an oral discussion session to get more spontaneous comments about the CD. |
| Mar 05 | Analyze results of initial module experimentation Continue evaluation with PSYC 3030 students Deadline for return of professional evaluations |
| Apr 05 | Complete module evaluation with PSYC 3030 students Complete analysis of results from student evaluations |
| May/ June 05 | Final revisions based upon professional and student feedback Begin marketing the CD-ROM, as deemed appropriate |

Budget

| <u>Item</u> | <u>Cost/Source</u> |
|--|--------------------|
| Photocopy expenses for evaluation forms | CAT provides |
| Forty blank CD-Rs for distribution to professional evaluators and students | CAT provides |
| Shipping fees with return postage | \$30 |

Appendix A

Thinker Beta Version Evaluation Form

We are interested in your experiences using the Thinker CD-ROM, which is still in development. Please give us your honest feedback regarding your using it, and let us know any ways that we might improve upon the product. Thank you for your time.

Using the following scale, indicate your level of agreement with items below.

| | | | | | | |
|----------------------|---|---|---|---|---|-------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Strongly Disagree | | | | | | Strongly Agree |

- _____ 1) The CD was easy to use.
- _____ 2) The material in this module was interesting.
- _____ 3) The demos helped me understand the material.
- _____ 4) The module was fun to use.

Please take a minute to respond in your own words to the items below:

What did you find to be especially enjoyable or informative in this module?

What did you find to be less useful in this module?

What suggestions would you make for improving this module?

Appendix B

Professional Evaluation Form—to be completed for each module

We are interested in your experiences using the Thinker CD-ROM. Please give us your honest feedback regarding your using it, and let us know any ways that we might improve upon the product. Thank you for your time.

Module # being evaluated:

Using the following scale, indicate your level of agreement with items below.

| | | | | | | |
|----------------------|---|---|---|---|---|-------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Strongly Disagree | | | | | | Strongly Agree |

- _____ 1) It was easy to find what I needed on the CD.
- _____ 2) The material in this module was delivered in a compelling way.
- _____ 3) The demos on this module made the material more clear.
- _____ 4) Students will enjoy using this module.
- _____ 5) This module should be kept on the CD-ROM

Please take a minute to respond in your own words to the items below:

What components or demos did you find to be especially enjoyable or informative in this module?

What did you find to be less useful in this module?

What suggestions would you make for improving this module?

Appendix C

Student Evaluation Form—for comparison between those who did the module and those who did not

10 multiple choice problems relating to the material—administered at the end of the day the material is covered in class—that everyone will answer. Those who did the module will then respond to the following items:

We are interested in your experiences using the Thinker CD-ROM. Please give us your honest feedback regarding your using it, and let us know any ways that we might improve upon the product. Thank you for your time.

Module # being evaluated:

Using the following scale, indicate your level of agreement with items below.

| | | | | | | |
|----------------------|---|---|---|---|---|-------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Strongly Disagree | | | | | | Strongly Agree |

- _____ 1) It was easy to find what I needed on the CD.
- _____ 2) The material in this module was interesting.
- _____ 3) The demos on this module made the material more clear.
- _____ 4) This module was fun to use.
- _____ 5) This module should be kept on the CD-ROM

Please take a minute to respond in your own words to the items below:

What did you find to be especially enjoyable or informative in this module?

What did you find to be less useful in this module?

What suggestions would you make for improving this module?

Experiential Flowchart
This chart depicts the user's experience -- how he or she can navigate from screen to screen within the CD-ROM.

Home

II. Perceptual Processes

- A. Theories of Object Recognition
 - 1. Template Matching
 - 2. Feature Analysis
 - 3. Recognition by Components
 - 4. Viewer-centered
- B. Change Blindness
- C. Attention
 - 1. Divided Attention Task
 - 2. Stroop Effect
 - 3. Ironic Effects of Thought Control

III-V. Memory

- A. Biology of Working Memory
- B. Serial Position Effect
- A. Effect of Context
 - 1. Encoding Specificity
 - 2. Mood Congruence
 - 3. Mood-Dependent Memory
- B. Eyewitness Testimony
 - 1. Accuracy of Eyewitness Testimony
 - 2. Misinformation Effect
- A. Memory Improvement
 - 1. Method of Loci
 - 2. Chunking
 - 3. First-Letter Technique
- B. Metacognition

VI. Imagery

- A. Evidence of Imagery
 - 1. Shepard & Metzler
 - 2. Size Comparison
 - 3. Shape Comparison
- B. Cognitive Maps & Judgemental Heuristics
 - 1. Symmetry
 - 2. Rotation
 - 3. Alignment

VII. General Knowledge

- A. Network Models
- B. Schemas & Memory

IX-X. Problem-Solving & Decision-Making

- A. Algorithm
- B. Heuristics
 - A. Representativeness Heuristic
 - B. Availability Heuristic
 - C. Simulation Heuristic
 - D. Anchoring & Adjustment Heuristic
 - E. Framing Effects
 - F. Gambler's Fallacy
- C. Analogy

VIII & XI. Language

- A. Speech Perception
- B. Reading with Fixations & Saccadic Eye Movement
- A. Infants
 - 1. Speech Perception
 - 2. Babbling
 - 3. Motherese
- B. Children
 - 1. Overregulization
 - 2. Telegraphic Speech

- A. Aristotle
- B. Descartes
- C. Wundt
- D. Ebbinghaus
- E. Calkins
- F. James
- G. Watson
- H. Gestalt
- I. Bartlett
- J. Cognitive Revolution
- K. Evolving Perspectives & Techniques

I. Timeline

Thinker

A Cognitive Psychology Resource

Interface Mockup

This is a sketch of what the main screen might look like.

Choose a topic from the options to the left to get started.

Perceptual Processes

Memory

Imagery

General Knowledge

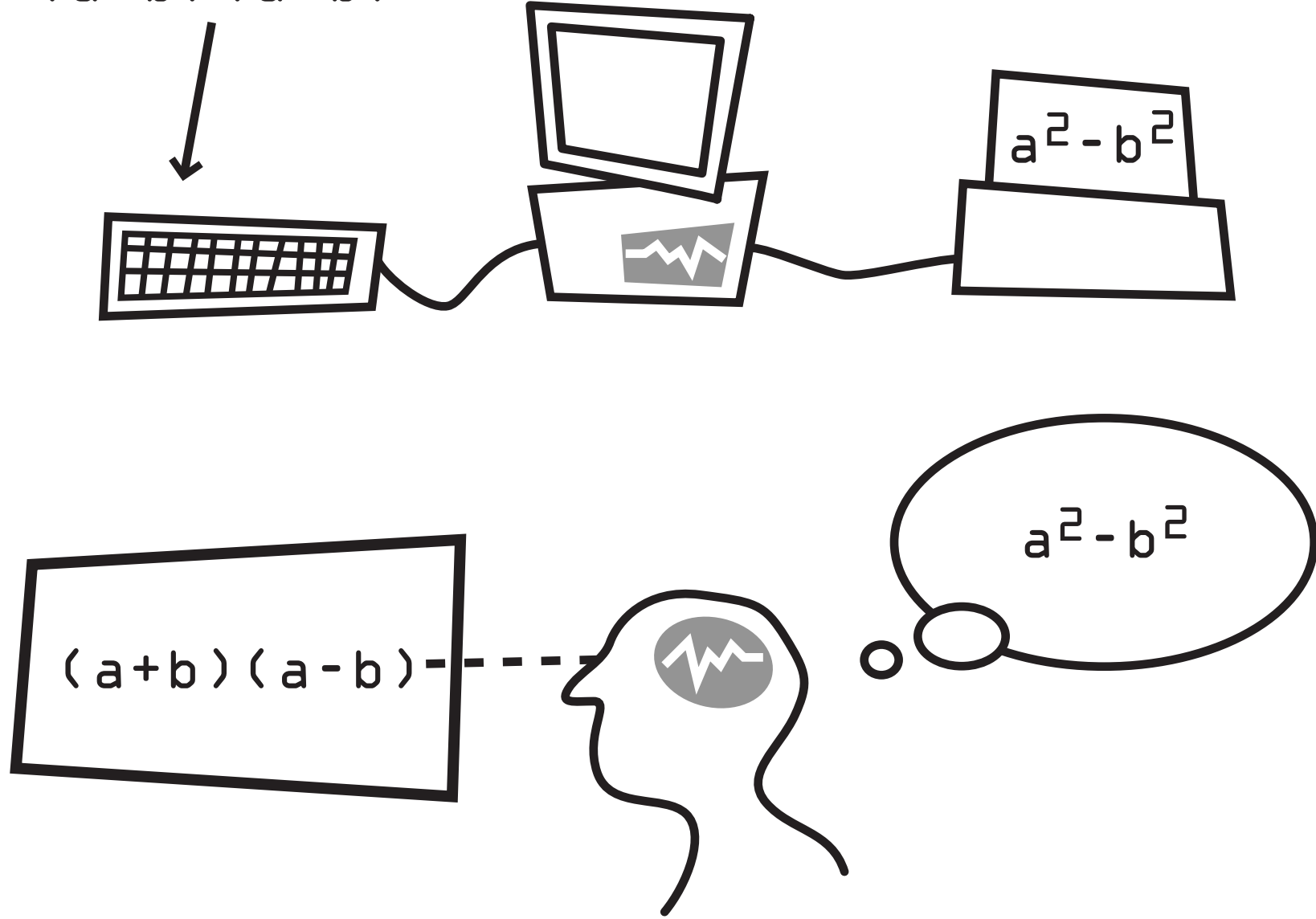
Solving Problems
Making Decisions

Language

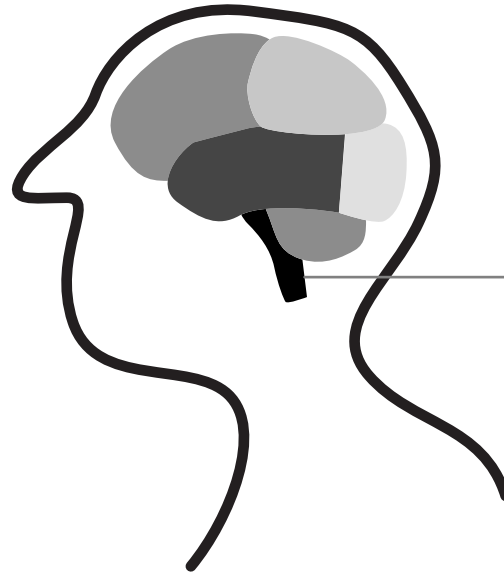
Timeline

Information Processing

$$(a+b)(a-b)$$



Brain Map



Brain Stem

The brain stem does stuff. That stuff will be described in this box. Maybe there will be a lot of text or maybe just a little.

Template Matching

