

INSTITUTE OF COGNITIVE SCIENCE



*Technical Report*

University of Colorado, Boulder

# **Cognitive Walkthroughs: Instructions, Forms, and Examples**

Cathleen Wharton

Institute of Cognitive Science  
University of Colorado  
Boulder, Colorado 80309-0344

Technical Report #92-17

18

# Cognitive Walkthroughs: Instructions, Forms, and Examples

*Cathleen Wharton*

University of Colorado at Boulder  
Department of Computer Science  
and Institute of Cognitive Science  
Boulder, CO 80303-0430  
(cwharton@cs.colorado.edu)

## Overview

During the summer of 1990 several of us at Hewlett-Packard Laboratories and Corporate Engineering in Palo Alto, California designed and completed a study to compare a variety of usability evaluation techniques. Specifically, we compared the four techniques of standard usability testing, heuristic evaluation, Cognitive Walkthrough, and the application of guidelines. This work was later written up and published in the CHI 1991 Proceedings (Jeffries, Miller, Wharton, and Uyeda, 1991). For this comparative study, the Cognitive Walkthrough methodology was refined in an effort to resolve some of the problems we had encountered with our initial version of the method (Lewis, Polson, Wharton, and Rieman, 1990). For example, untrained analysts experienced difficulty when using the method due to an unfamiliarity with cognitive science terminology.

As part of this refinement, the method's forms were modified and expanded by C. Wharton at Hewlett-Packard. Specifically, some of the questions on the previous forms were split into subparts and detailed instructions for the questions were also added. At this same time, the Walkthrough originators made additional changes to the original form. Thus, it is important to note that two efforts were going on concurrently; one was the Hewlett-Packard effort (as described in this technical report), and the other was by the originators of the Cognitive Walkthrough method generally (Lewis, Polson, and Rieman, 1991; Polson, Lewis, Rieman, and Wharton, 1992).

The Hewlett-Packard effort also made changes to the overall process so that it included training of the analysts and developed additional materials such as a Glossary of Terminology. These materials created and used at Hewlett-Packard for the Jeffries, et al. study and used by others in later work (Bradford, 1991) are presented herein.

For more information about the Cognitive Walkthrough method, including its uses and various versions, refer to the following. Consult one of the method's originators for new or updated materials and papers.

- Overview of Method  
Lewis, Polson, Wharton, and Rieman, 1990  
Polson, Lewis, Rieman, and Wharton, 1992  
Polson, Rieman, Wharton, and Olson, 1992  
Wharton, Rieman, Polson, and Lewis, 1993
- History of Method  
Wharton, Rieman, Polson, and Lewis, 1993
- Experiences with Method  
Jeffries, Miller, Wharton, and Uyeda, 1991  
Wharton, Bradford, Jeffries, and Franzke, 1992  
Wharton, Rieman, Polson, and Lewis, 1993
- Current Version  
Lewis, P. Polson, Rieman, Wharton, and Wilde, 1992  
Wharton, Rieman, Polson, and Lewis, 1993
- Assorted Forms and Training Materials  
Lewis, Polson, Wharton, and Rieman, 1990  
C. Lewis and P. Polson, 1991  
Lewis, Polson, and Rieman, 1991  
This Technical Report
- Related Information  
Wharton and Lewis, 1993

## References

- J. Bradford. 1991. Personal Communication.
- R. Jeffries, J. Miller, C. Wharton, and K. Uyeda. 1991. "User interface evaluation in the real world: A comparison of four techniques." In *Proceedings of CHI 1991* (New Orleans, Louisiana, April 28 - May 2, 1991), Association for Computing Machinery, New York, 119-124.
- C. Lewis and P. Polson. 1991. "Cognitive walkthroughs: A method for theory-based evaluation of user interfaces." Tutorial Notes for *CHI 1991* ((New Orleans, Louisiana, April 28 - May 2, 1991), Association for Computing Machinery, New York, 1991.
- C. Lewis, P. Polson, and J. Rieman. 1991. "Cognitive walkthrough forms and instructions." University of Colorado at Boulder, Institute of Cognitive Science, Technical Report #91-14. October 22, 1991.
- C. Lewis, P. Polson, J. Rieman, C. Wharton, and N. Wilde. 1992. "Cognitive walkthroughs: A method for theory-based evaluation of user interfaces." *Tutorial Notes for CHI 1992* (Monterey, California, May 4, 1992), Association for Computing Machinery, New York, 1992.
- C. Lewis, P. Polson, C. Wharton, and J. Rieman. 1990. "Testing a walkthrough methodology for theory-based design of walk-up-and-use interfaces." In *Proceedings of CHI 1990* (Seattle, Washington, April 1-5, 1990), Association for Computing Machinery, New York, 1990, 235-242.
- P. Polson, C. Lewis, J. Rieman, and C. Wharton. 1992. "Cognitive walkthroughs: A method for theory-based evaluation of user interfaces." *International Journal of Man-Machine Studies*. Volume 36, May, 1992, 741-773.
- P. Polson, J. Rieman, C. Wharton, and J. Olson. 1992. "Usability inspection methods: Rationale and examples." In *Proceedings of Eighth Symposium on Human Interface* (Kawasaki, Japan, October 21-23, 1992), 377-384.
- C. Wharton, J. Bradford, R. Jeffries, and M. Franzke. 1992. "Applying cognitive walkthroughs to more complex user interfaces: Experiences, issues, and recommendations." In *Proceedings of CHI 1992* (Monterey, California, May 3-7, 1992), Association for Computing Machinery, New York, 1992, 381-388.
- C. Wharton and C. Lewis. 1993. "The Role of Psychological Theory in Usability Inspection Methods." In J. Nielsen and R. L. Mack (Editors), *Usability Inspection Methods*, John Wiley & Sons, New York. In press. (Also available as ICS Technical Report #CU-ICS-93-06.)
- C. Wharton, J. Rieman, P. Polson, and C. Lewis. 1993. "The Cognitive Walkthrough Method: A Practitioner's Guide." In J. Nielsen and R. L. Mack (Editors), *Usability Inspection Methods*, John Wiley & Sons, New York. In press. (Also available as ICS Technical Report #CU-ICS-93-07.)

# **Cognitive Walkthrough Glossary**

Cathleen Wharton, August 1990  
Hewlett-Packard Laboratories and  
University of Colorado at Boulder

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Cognitive Walkthrough Glossary

### ENVIRONMENTS, KNOWLEDGE AND SYSTEM STATE CHECKPOINTS:

#### environment (real world)

This is where the interface is actually used. Example: An audio interface used in noisy surroundings.

#### knowledge checkpoint

When this reminder is encountered during a Walkthrough you should think about what the user needs to know at this step. This knowledge is what is assumed of the user and such knowledge is to be placed on the USER ASSUMPTION FORM. Examples of what a user must know: the meaning of the term "Checking Balance", how to double click the mouse, what the blue colored button means, etc.

#### system state checkpoint

When this reminder is encountered during a Walkthrough you should think about the system state and how it may have influenced what the user did. Write down any pertinent state information (visible or hidden) which may have influenced the user on the SYSTEM STATE FORM. Examples of system state knowledge: must be in directory \$HOME, \$PATH must be set to include directory /X/Y/Z, the window named ABC123 must be up, etc.

### ACTIONS, TASKS, AND SEQUENCES:

#### task

A task is what the user desires to accomplish when he sets out to use a particular device or interact with an interface. Examples: "Balance my check book" and "Revise my resume".

#### simple tasks (or single goal tasks)

A task which has only one principal goal. Example: "Find out the balance of my checking account."

#### compound tasks (or multi-goal tasks)

A task which has more than one principal goal that may be combined via a conjunction. Example: "Determine the balance of my checking account, and if it less than \$100.00, then transfer \$50.00 from savings to cover the check I just wrote at the grocery store." Here the two principal goals are "get checking balance" and "transfer funds".

#### action

This is a specific physical movement that the user must do. This physical movement defines the form of physical interaction that the user has with the device. A sequence of actions is called an action sequence.

#### action sequence (designer based)

The list of (implicitly ordered) actions that must be performed by the user in order to accomplish the designated task. These action sequences are defined by and hence a product of the designer of the interface.

## **GOALS AND GOAL STRUCTURES:**

### **mental model**

The model the user has of the system which often allows for prediction or explanatory understanding of a device.

### **goal (or subgoal or supergoal)**

These terms are used interchangeably. The term used is dependent upon the role a goal plays within a goal structure. In general, a goal is defined to be an "objective" that the user typically has when using any device to accomplish a task. For example, "Get checking account balance."

### **subgoal**

A goal which plays a subordinate role in a goal structure. Typically doing several subgoals will accomplish a larger goal (i.e. supergoal).

### **supergoal**

A goal which plays a superordinate role in a goal structure. Typically a supergoal can be accomplished by doing several subgoals.

### **initial goal structure**

The goal structure that the "average" user is expected to have when he first comes to the system. This does not mean the very first time he uses the system, rather when he simply goes to use the system.

### **active goals**

An active goal is the one currently being focussed on (i.e. worked on) by the user. In a goal structure more than one goal may be active, however, only one goal within any one level of nesting within the hierarchy may be active. That is multiple parallel goals (with respect to indentation, and hence meaning and accomplishment) cannot be active.

### **goal structure**

A list of goals that are all related to the user's task. The list is often hierarchical in that goals will often have subgoals, which themselves may have subgoals, and so on. Such a hierarchy (or level of goal nesting) may be to an arbitrary level of nesting. The meaning behind such a structure is that in order to accomplish a particular goal, one must first perform its parts (i.e. subgoals). Correspondingly, when all subgoals have been accomplished, the associated parent goal (i.e. supergoal) is also accomplished. For a Cognitive Walkthrough, the convention used to demarcate the relationship between supergoals and subgoals is indentation. Finally, goal and subgoal ordering is implicit. When two or more subgoals are listed beneath another goal (in order) it's an AND-THEN structure.

### **AND-THEN structure**

An AND-THEN structure is simply a portion of a goal structure which has two or more goals that are connected with the conjunction "AND". Recall that all goals are implicitly ordered in a goal structure and consequently this ordering implies such a conjunctive connection. To say that goals X, Y, and Z constitute an AND-THEN structure means that goal X is done before goal Y, and Y is done before goal Z. When the last of these is accomplished, then their supergoal is also completed.

### **final goal structure**

This is the goal structure arrived at when the Walkthrough is over. Typically this will be more detailed than the initial structure.



**Cognitive Walkthrough Forms #0-7**

**General Information and Instructions**

Cathleen Wharton, August 1990  
Hewlett-Packard Laboratories and  
University of Colorado at Boulder

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## **Cognitive Walkthrough Form #0 (General Information)**

The Cognitive Walkthrough method requires the use of a set of 7 forms, numbered 1 through 7. Each form serves a different purpose. The forms should be used in the order and manner as specified below.

### **Form #1: INITIAL SPECIFICATION FORM (SYSTEM LEVEL)**

This form is designed to keep track of general information about the interface (i.e. system) under evaluation. The form is primarily aimed at Walkthrough evaluators who are not actual members of the interface design team. The design team will also find this form useful if they intend to archive any of the information obtained during the Walkthrough. Because this form is a SYSTEM LEVEL form, only one copy of this form is needed for each system evaluated. This particular form needs to be filled out only once, before any Walkthroughs are performed; with the exception being any significant changes in the interface content or purpose during the project's lifecycle.

### **Form #2: USER ASSUMPTION FORM (SYSTEM LEVEL) \*\*\* CUMULATIVE \*\*\***

This form is used to record all of the assumptions the team makes about the user's knowledge or experience. This form is cumulative. Consequently, every task evaluated during the Walkthrough should have its assumptions placed here. You may add the team's assumptions to this form at any time during the Walkthrough. However, at various stages of the Walkthrough the team will be explicitly reminded to update this USER ASSUMPTION FORM. When the Walkthrough is completed, it is this form will contain all of the assumptions about the user for all system tasks evaluated.

### **Form #3: GOAL STRUCTURE FORM (TASK LEVEL) \*\*\* CUMULATIVE \*\*\***

This form is used to keep track of the user's goals which may determine or influence how the user both approaches and performs the task. This form is a TASK LEVEL form, which means that one copy of this form is needed for each new task evaluated. Unlike the USER ASSUMPTION FORM, this form should only be added to when explicitly requested. Such requests will specify which segments of the goal structure should be modified and how to modify them.

### **Form #4: SYSTEM STATE FORM (TASK LEVEL) \*\*\* CUMULATIVE \*\*\***

This form is used to keep track of system state information which may influence how the user performs the task. It also used to record issues concerning the real world environment where the system is to be placed. This form is to be done at the TASK LEVEL, however, some of this information is also SYSTEM LEVEL information. When the Walkthrough is completed, this form will contain all information about the assumptions made about the system's state.

### **Form #5: TASK EVALUATION FORM (TASK LEVEL)**

This form is designed to capture some general information about the task selected for evaluation. The information logged is a necessary precursor to the most detailed part of the Walkthrough process. One copy of this form is needed for each task evaluated.

### **Form #6: ACTION EVALUATION FORM (ACTION LEVEL)**

This form is crucial to the Walkthrough process, embodying detailed questions that evaluate every user action required for accomplishment of the user task. This is an ACTION LEVEL form, which means that one copy of this form is needed for each user action evaluated for every task.

### **Form #7: WALKTHROUGH SUMMARY FORM (TASK OR SYSTEM LEVEL)**

This form is used to summarize the key results produced by the Walkthrough. It can be used at either the TASK OR SYSTEM LEVEL, depending upon the evaluators' need. Thus, one copy of this form is needed for each task or system evaluated.

**Cognitive Walkthrough Form #1**  
**(Instructions for INITIAL SPECIFICATION FORM)**

**[1] BRIEF DESCRIPTION OF THE INTERFACE:** Describe the interface under examination. Include any information necessary to distinguish the interface from others being worked on. If it is convenient, make a diagram or a screen dump of the core part(s) of the interface.

**[2] INTERFACE VERSION AND STATUS:** Specify the version of the interface under evaluation. Include any comments about the status of the interface as it currently exists or operates. In addition, if a mockup or paper prototype is being used, give the date of the design being considered.

**[3] SUITE OF USER TASKS:** Which user tasks are to be analyzed? You should ensure that there is a variety in both type and difficulty. That is, not only should different types of functionality be evaluated, but both simple (i.e. single goal) and compound (i.e. multi-goal) tasks should be attempted. For instance, suppose you are evaluating the design of an ATM. A simple task might be "Determine the balance of my checking account", while a compound task might be "Determine the balance of my checking account, and if it less than \$100.00, then transfer \$50.00 from savings to cover the check I just wrote at the grocery store." Additionally, the Walkthrough should investigate the most common and important tasks first, because if the system fails to accommodate these major tasks, the evaluation of less common tasks may be meaningless. It is important to note that the number of tasks evaluated is not solely dependent upon the number of tasks listed here. Instead, the number of actual tasks evaluated is dependent upon the number of "best ways" in which a task can be performed; where each "best way" corresponds to one sequence of user actions, e.g. a sequence of button presses. Since many interfaces offer a variety of action sequences for performing some task (each of which may have different semantics), each action sequence must be evaluated separately.

**Cognitive Walkthrough Form #2**  
**(Instructions for USER ASSUMPTION FORM)**

[1] **ASSUMPTIONS ABOUT THE USER POPULATION:** Who are the anticipated users of this system? Do they fall into user classes such as novice or expert? What background knowledge or prior experience must be assumed of the users so that they can successfully perform the suite of tasks selected above? Are the answers different for each user class? The answers given should reflect the assumptions for an "average" user within each anticipated user class. If it is assumed that the user has background knowledge that is specific to the interface, then an indication of how the user will have attained such knowledge should be given. Note that this portion of the form can be added to at any time during the Walkthrough. Even though specific questions have been added to remind you to add to the form, you do not have to wait until you have reached these questions to make comments. They are merely provided to remind you to update the form. Remember that this form is cumulative. Consequently, across tasks and task steps there may be redundant information placed on this form. Choose a convention to handle this type of information; one which still allows for each task to be clearly demarcated.

**Cognitive Walkthrough Form #3**  
**(Instructions for GOAL STRUCTURE FORM)**

[1] **USER'S GOAL STRUCTURE:** Use this form to keep track of the user's goal structure for this task. For any modifications made to the goal structure during the Walkthrough (e.g. goal additions and deletions), clearly indicate which step and action of the evaluation process is responsible for this modification. Next to each modification there should also be a reason as to why this goal was formed.

## **Cognitive Walkthrough Form #4** **(Instructions for SYSTEM STATE FORM)**

[1] **ASSUMPTIONS ABOUT CURRENT STATE OF THE SYSTEM AND USER'S ENVIRONMENT:** This form is designed to capture the visible and hidden state information which may influence how the user performs the task. For instance, in Unix when you issue a command, the directory containing that command must be fully qualified or specified as part of the user's PATH. Without doing so, the command will not work. The user may or may not have to know about such state information, but if it influences the user's actions (either directly or indirectly), then such information would be recorded here. It is suggested that you update this form as deemed necessary. In particular, you should put information on this form about the system state before the task is begun, and as the various actions are performed. Also be sure to clearly indicate at which stage of the Walkthrough this information is being added. Finally, on this form you need to describe the real world environment within which the system will be placed, and possible influences it too may have upon the user's ability to use the system to accomplish the task. For example, if a user was accustomed to using an ATM inside of his local grocery store, would he react differently to the same interface while using it in a dark alley?

## Cognitive Walkthrough Form #5 (Instructions for TASK EVALUATION FORM)

**[1] TASK CONSIDERED FROM THE USER'S VIEWPOINT:** Specify which task (from the initial list given in Form #1, Part [3]) is being evaluated and describe the task from the viewpoint of the user. This description should thus be at the level of the user's desires and intentions, not at the level of the actual user actions used to accomplish the task. For instance, when using an ATM, the task from the user's point of view is to "Find out the balance of my checking account," NOT "First I need to insert my card. Then I need to press the #5 key. Then I need to..." etc.

**[2] USER'S INITIAL GOALS:** List the goals the user is likely to form when beginning the task. The granularity of the goals should not be too large nor too small. For example, consider the ATM example again. If the user wants to find out the balance of his checking account, he would probably not come to the ATM with the vague goal "Do some banking transaction". Similarly, one would not expect him to walk up to the ATM with highly detailed goals which include specific key presses, like "Press the #5 key." Instead, one would expect a goal of intermediate granularity. For instance, "Get my checking account balance". Typically, however, people do not come to the system with only a single goal such as this. Instead, they come with a more complex goal structure, based on the task they have set out to do. The goal structure usually consists of a main goal and several subgoals. (These collectively define an AND-THEN structure, because all of them must be done, and done in order.) Thus, the ATM example might give something like:

OVERALL GOAL: Use the ATM to find out the balance of my checking account.

SUBGOAL: Activate the ATM.

SUBGOAL: Identify myself to the ATM.

SUBGOAL: Get my checking account balance.

SUBGOAL: Deactivate the ATM.

Such a goal structure may be common to someone who has previously used the ATM. On the other hand, an ATM novice may only approach the system with a less developed goal structure, e.g. one comprised only of the OVERALL GOAL. The difference between the two goal structures and their "reasonableness" being based on the user's mental model or experience with the system. In this discussion, "reasonableness" is defined as something you feel you could both justify and expect of the "average" user for the intended user population. Such reasonableness is also determined by both user experience and the information or prompts provided by the interface. To justify this goal structure, next to each goal within it indicate whether its formation is based on the task description, cues initially presented on the screen, or user background knowledge. After deciding upon this initial structure, decide whether there are other likely goal structures. If so, then also list them. Next, estimate for each the percentage of users likely to have them. Finally, out of this collection pick the one goal structure that is most representative of the average user and justify the choice. Place this goal structure on the GOAL STRUCTURE FORM (Form #3). It is this structure that will be used throughout the rest of the Walkthrough.

**[3] DESIGNER'S ACTION SEQUENCE FOR THE TASK:** Make a numbered list of the atomic actions that the user should perform to accomplish the task. These user actions should be at the granularity level of "Left click on OK button", "Press the #5 key", "Insert card", "Type your name", etc. Annotate each action listed with a note specifying what purpose the action serves. Finally, if there are other "best ways", i.e. other equally valid and reasonable action sequences, then briefly describe them. Justify why the main action sequence selected should be used for the Walkthrough over the possible others.



**Cognitive Walkthrough Form #6**  
**(Instructions for ACTION EVALUATION FORM)**

**[A] SPECIFYING THE CURRENT GOAL STRUCTURE:** This section is concerned with what the user's current goal structure should be before the next action is chosen or executed.

**[A.1] CORRECT GOALS:** What goals should the user have at this point in the interaction? To answer this you will need to do the following three things.

**[A.1.a] DELETION OF INAPPROPRIATE GOALS:** Now examine the new goal structure. Delete all inappropriate goals. An inappropriate goal is one which is ill formed, extraneous, or incorrect at this step. Don't erase the goals to delete them. Instead adopt a convention for making them less salient than any appropriate goals. The reason inappropriate goals are deleted at this juncture is that the evaluation of the next action is based on the assumption that the user now has a correct goal structure. Also list the goals deleted for this step below.

**[A.1.b] ACTIVATION GOALS:** You should now have a correct goal structure. Given this, decide what goals should now be active. Activate any any old and new goals as appropriate. List the activated goals for this step below.

**[A.1.c] NEW GOALS FORMED DUE TO THIS ACTION:** Consider the new action to be taken at this step. Does this action suggest other new goals? If so, add them to the GOAL STRUCTURE FORM (Form #3) and next to each indicate why it was formed. Also make sure to activate them as necessary.

**[A.2] MISMATCH WITH LIKELY GOALS:** What percentage of users will not have this goal structure based on the analysis at the end of the previous form (% 100 75 50 25 10 5 0)? Be sure to check over each goal in the structure to ensure that is appropriate for this step and to take into account the possibility of any ill formed, dropped, or extraneous goals.

**[B] CHOOSING THE NEXT CORRECT ACTION:** This section concentrates on how the user chooses the next correct action.

**[B.1] CORRECT ACTION:** Describe the action that the user should take at this step in the task sequence.

**[B.2] KNOWLEDGE CHECKPOINT:** Is there any knowledge or experience you have assumed on the part of the user? If so, add this information to the USER ASSUMPTION FORM (Form #2).

**[B.3] SYSTEM STATE CHECKPOINT:** Is there anything about the system state (visible or hidden) that will influence the user? If so, add this information to the SYSTEM STATE FORM (Form #4).

**[B.4] ACTION AVAILABILITY:** Is it obvious to the user that this action is a possible choice here? If not, indicate why. Give the percentage of users which might miss this action because of this availability factor (% 100 75 50 25 10 5 0).

**[B.5] ACTION IDENTIFIABILITY:** These questions are concerned with the type and form of the identifier that the system associates with this action. An identifier is something (e.g. a label, prompt, or description) that the interface uses to indicate to the user that a particular action should be taken. The three most common identifiers used are labels, prompts, and descriptions. A label is the wording that appears on a key or button A prompt is an instruction given in the form of a message on a screen A description is more general than a prompt, commonly being any text or picture found elsewhere on the interface that informs the user about what should be done next.

**[B.5.a] IDENTIFIER LOCATION, TYPE, WORDING, AND MEANING:** If there is an associated identifier, describe both its "type" and "wording". "Type" is meant to denote the kind of identifier, e.g. label or prompt, while "wording" is meant to denote the wording, layout, or format of the actual text or picture presented, e.g. "Checking Balance" as an actual key label. Also indicate if problems arise when the user is trying to find the identifier. For example, can the user easily locate the identifier and read/interpret it without having to contort the human body? If there is not an identifier then skip to Subpart [d] below.

**[B.5.b] LINK BETWEEN IDENTIFIER AND ACTION:** Is the meaning of the identifier obvious? Is the identifier clearly linked with this action? If not, indicate why. Give the percentage of users that might have trouble making a connection between the identifier and the action (% 100 75 50 25 10 5 0).

**[B.5.c] LINK BETWEEN IDENTIFIER AND GOAL:** Is the identifier clearly linked with one of the active goals? If not, indicate why. Give the percentage of users that might have trouble making a connection between the identifier and an active goal (% 100 75 50 25 10 5 0).

**[B.5.d] NO CORRESPONDING IDENTIFIER:** If there is no label or description associated with the action, how will users relate this action to an active goal? Indicate the percentage of users that might have trouble doing so (% 100 75 50 25 10 5 0).

**[B.6] INCORRECT ACTION CHOICES:** Are there other actions that also seem appropriate to an active goal? If so, specify what they are and why they might seem appropriate to the user. Give the percentage of users that might choose one or another of these incorrect action choices (% 100 75 50 25 10 5 0).

**[B.7] KNOWLEDGE CHECKPOINT:** Is there any knowledge or experience you have assumed on the part of the user? If so, add this information to the USER ASSUMPTION FORM (Form #2).

**[C] EXECUTING THE ACTION:** This section is focussed on how the user executes the chosen action.

**[C.1] TIME-OUTS:** If there is a time-out in the interface at this step, does it allow enough time for the user to select and perform the correct action? Indicate how many users might have trouble (% 100 75 50 25 10 5 0). Also note how users will know how to and be able to recover from the time out or if they will not know or be able to do so, explain why. Estimate how many users will not be able to recover (% 100 75 50 25 10 5 0).

**[C.2] HARD TO DO ACTIONS:** Is there anything physically tricky or difficult about executing the action? If so, specify exactly how the action must be executed. Give the percentage of users that may have trouble (% 100 75 50 25 10 5 0).

**[C.3] SYSTEM STATE CHECKPOINT:** Is there anything about the system state (visible or hidden) which will influence the user? If so, add this information to the SYSTEM STATE FORM (Form #4).

**[C.4] SYSTEM RESPONSE TO EXECUTED ACTION:** Now assume the correct action has been taken (or perform it) and describe the system's response.

[D] **DETERMINING PROGRESS:** This section is concerned with how the user determines if progress has been made toward the goal.

[D.1] **QUIT OR BACKUP:** After executing the action, will users see that they have made progress toward a current goal? If so, what will indicate this progress to them? If not, indicate why. Give the percentage of users that will not notice progress and thus try to quit or backup (% 100 75 50 25 10 5 0).

[D.2] **KNOWLEDGE CHECKPOINT:** Is there any knowledge or experience you have assumed on the part of the user? If so, add this information to the USER ASSUMPTION FORM (Form #2).

[D.3] **COMPLETE AND INCOMPLETE GOALS:** How the user determines if progress is made depends greatly upon his goal structure. The following questions examine how the goal structure interacts with the belief that goals are either complete or incomplete.

[D.3.a] **GOALS THAT LOOK COMPLETE:** Based on the system response, which goals will the user think he has completed? How many of these are false completions (i.e. should not be complete) and how many are proper completions (i.e. should be complete)? Next to each goal which is properly completed indicate what within the system response informs the user that it is complete. (Place this information on the GOAL STRUCTURE FORM, Form #3.) For the false completions, list each falsely completed goal (below) and next to it indicate what caused the user to believe it was complete. What percentage of users will have mistakenly completed goals that they should not have (% 100 75 50 25 10 5 0)?

[D.3.b] **GOALS THAT LOOK INCOMPLETE:** Based on the system response, which goals will the user think he has NOT yet completed? How many of these goals should actually be complete? Assume that the user has completed those goals he views as incomplete and mark them as complete on the GOAL STRUCTURE FORM (Form #3). Then next to each of these goals make a note indicating why the user did not actually recognize that the goal was complete. Finally, give the percentage of users that will mistakenly view these goals as incomplete (% 100 75 50 25 10 5 0). (Note, the reason that you want to assume that these goals are now complete is because when you evaluate the next action you want to evaluate it based on the premise that the user has a good and proper goal structure.)

[D.3.c] **"AND-THEN" SUPERGOAL COMPLETION:** Is there an "AND-THEN" structure which has its LAST subgoal completed? If so, will the users realize that the supergoal is also complete? If not, indicate why. Also, mark the supergoal as complete on the GOAL STRUCTURE FORM (Form #3). Give the percentage of user's that will not realize that they have also completed the supergoal (% 100 75 50 25 10 5 0).

[D.3.d] **THE SUPERGOAL KILLOFF PHENOMENON:** Is there an "AND-THEN" structure which has a completed subgoal which is NOT the LAST subgoal in that structure? If so, is the subgoal similar enough to the supergoal that the user may think that the supergoal is also complete? For instance, suppose that the user is required to enter his identification number followed by the pound sign in response to a prompt which requested him to enter his identification number. Would the user forget to type in the pound sign? If so, the user has killed off his supergoal before completing his last subgoal (to press the pound sign). If premature supergoal killoff is occurring, indicate why. Estimate the percentage of users that will prematurely kill off this supergoal (% 100 75 50 25 10 5 0).

[D.4] **KNOWLEDGE CHECKPOINT:** Is there any knowledge or experience you have assumed on the part of the user? If so, add this information to the USER ASSUMPTION FORM (Form #2).

**[E] MODIFYING THE USER'S CURRENT GOAL STRUCTURE:** This section is concerned with how the user's goal structure is modified after the action is executed.

**[E.1] FORMATION OF NEW GOALS:** At this point the user is likely to form new goals. The following questions indicate how new goals can be formed.

**[E.1.a] NEW GOALS FORMED FROM SYSTEM RESPONSE:** Does the system response suggest a new goal to the user? If so, modify the goal structure so that it contains this new goal. Again, the modification should be on the structure on the GOAL STRUCTURE FORM, Form #3. Next to the newly formed goal (whether it is correct or not), indicate its cause.

**[E.1.b] OTHER NEW GOALS:** Are there any other new goals that users should form given their current goals, the state of the interface, or their background knowledge? Note that correct or incorrect goals may be formed. Add all newly formed goals to the current goal structure (on the GOAL STRUCTURE FORM, Form #3) and next to each indicate why it was formed.

**[E.2] KNOWLEDGE CHECKPOINT:** Is there any knowledge or experience you have assumed on the part of the user? If so, add this information to the USER ASSUMPTION FORM (Form #2).

**[F] MISCELLANEOUS:** This section allows the evaluators to summarize any outstanding issues or thoughts that they might have.

**[F.1] ADDITIONAL DESIGN INFORMATION:** Would it have been helpful if more information from the designer or information about the design rationale had been made available before or during the evaluation process? Indicate why such knowledge would have been helpful and cite any open issues or problems it might have helped to resolve.

**[F.2] OTHER:** Make any comments that you feel would be beneficial to either the designer or later reviewers of this written evaluation.

**Cognitive Walkthrough Form #7**  
**(Instructions for WALKTHROUGH SUMMARY FORM)**

**[1] SUMMARY:** After the Walkthrough is completed summarize the findings. In particular, reflect on whether the user's goals ended up matching the designer's action sequence, the reasonableness of the assumptions about the user's background, the final goal structure (along with the number and severity of any incorrectly formed goals), and those aspects of the interface that seem to be most weak or strong at accommodating the user's needs. Next to these findings indicate any initial thoughts on how problematic issues might be remedied.

## **Cognitive Walkthrough Forms #0-7**

### **Actual Forms**

Cathleen Wharton, August 1990  
Hewlett-Packard Laboratories and  
University of Colorado at Boulder



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date(s) of Walkthrough: \_\_\_\_\_

Walkthrough Evaluators: \_\_\_\_\_

---

**[1] BRIEF DESCRIPTION OF THE INTERFACE:**

Describe or diagram the interface.

**[2] INTERFACE VERSION AND STATUS:**

Which version of the interface is under evaluation? If evaluating a mockup or paper prototype, also give the date of the design.

What is the status of the interface as it currently exists or operates?

**[3] SUITE OF USER TASKS:**

List the suite of user tasks to be evaluated.

\*\*\* CUMULATIVE FOR THE SYSTEM \*\*\*

---

**[1] ASSUMPTIONS ABOUT THE USER POPULATION:**

List and define the anticipated classes of user types for the system.

What background knowledge or prior experience do you assume the average member of each user class must have to successfully perform the task? Indicate how such knowledge or experience is gained.

User Type/Class (if applicable)	Actual Knowledge or Experience Needed	How User Originally Obtains Such
------------------------------------	--	-------------------------------------

\*\*\* CUMULATIVE FOR THE TASK \*\*\*

User Task: \_\_\_\_\_

---

**[1] USER'S GOAL STRUCTURE:**

Keep track of the user's goal structure using this form. Next to all goals indicate what caused the goal to be formed or completed (e.g. task, prompt, background knowledge), as well as the step of the Walkthrough evaluation with the corresponding user action during which the goal was formed.

Step/Action When Formed	Why Formed	If Complete, Then Why	Goals
----------------------------	------------	--------------------------	-------

\*\*\* CUMULATIVE FOR THE TASK \*\*\*

---

**[1] ASSUMPTIONS ABOUT SYSTEM STATE AND USER'S ENVIRONMENT:**

What state is the system in when the user begins the task? Specify both visible and hidden state information which may influence the user.

When the system is placed into the real world, will there be anything about this environment that may influence how the user performs the task? If so, describe.

For each user action evaluated, list the pertinent state information (both hidden and visible) which may influence how the user performs the action.

Action	State Information	How Influences User
--------	-------------------	---------------------

User Task: \_\_\_\_\_

---

**[1] TASK CONSIDERED FROM THE USER'S VIEWPOINT:**

What is the task as considered from the viewpoint of the user?

**[2] USER'S INITIAL GOALS:**

Give the set of reasonable goal structures users will have when beginning the task. Next to each goal within the structure indicate whether its formation is based on the task, cues initially presented on the screen, or user background knowledge, etc. For each structure estimate the percentage of users likely to have it.

Now choose one goal structure from this set as the goal structure to be used throughout the Walkthrough. Justify your choice below and place this goal structure on the GOAL STRUCTURE FORM.

**[3] DESIGNER'S ACTION SEQUENCE FOR THE TASK:**

Make a numbered list of the atomic actions that the user should perform to accomplish the task. Annotate each action in your list with a note specifying what purpose the action serves.

Briefly describe the alternate ways to do this same task. Justify why you selected the above action sequence for use during the Walkthrough.

Task Sequence / User Action: \_\_\_\_\_

---

**[A] SPECIFYING THE CURRENT GOAL STRUCTURE:**

**[A.1] CORRECT GOALS:**

What goals should the user have at this point in the interaction? To answer this do the following steps.

**[A.1.a] DELETION OF INAPPROPRIATE GOALS:**

Delete all inappropriate goals from the goal structure on the GOAL STRUCTURE FORM and list each deleted goal below.

**[A.1.b] ACTIVATION OF GOALS:**

Activate any old and new goals as necessary (on the GOAL STRUCTURE FORM and list all activated goals below.

**[A.1.c] NEW GOALS FORMED DUE TO THIS ACTION:**

Does the next user action suggest other necessary goals? If so, add them to the GOAL STRUCTURE FORM and activate them as necessary. List all activated goals below.

**[A.2] MISMATCH WITH LIKELY GOALS:**

What percentage of users will not have this goal structure (% 100 75 50 25 10 5 0)?

Task Sequence / User Action: \_\_\_\_\_

**[B] CHOOSING THE NEXT CORRECT ACTION:**

**[B.1] CORRECT ACTION:**

Describe the action that the user should take at this step in the sequence.

**[B.2] KNOWLEDGE CHECKPOINT:**

If you have assumed user knowledge or experience, update the USER ASSUMPTION FORM.

**[B.3] SYSTEM STATE CHECKPOINT:**

If the system state may influence the user, update the SYSTEM STATE FORM.

**[B.4] ACTION AVAILABILITY:**

Is it obvious to the user that this action is a possible choice here? If not, indicate why.

\_\_\_ Yes, it is obvious.

How many users might miss this action (% 100 75 50 25 10 5 0)?

**[B.5] ACTION IDENTIFIABILITY:**

**[B.5.a] IDENTIFIER LOCATION, TYPE, WORDING, AND MEANING:**

\_\_\_ No identifier is provided. (Skip to subpart [B.5.d].)

Identifier Type: Label Prompt Description Other (Explain)

Identifier Wording: \_\_\_\_\_

Is the identifier's location obvious? If not, indicate why.

\_\_\_ Yes, the location is obvious.

**[B.5.b] LINK BETWEEN IDENTIFIER AND ACTION:**

Is the identifier clearly linked with this action? If not, indicate why.

\_\_\_ Yes, it is clearly linked.

How many users may not make this connection (% 100 75 50 25 10 5 0)?

**[B.5.c] LINK BETWEEN IDENTIFIER AND GOAL:**

Is the identifier easily linked with an active goal? If not, indicate why.

\_\_\_ Yes, it is clearly linked.

How many users may not make this connection (% 100 75 50 25 10 5 0)?

**[B.5.d] NO CORRESPONDING IDENTIFIER:**

If there is no label or description associated with the action, how will users relate it to an active goal?

Give the percentage of users that might have trouble making a connection between the action and an active goal (% 100 75 50 25 10 5 0).

**[B.6] INCORRECT ACTION CHOICES:**

Are there other actions that also seem appropriate to some current goal? If so, specify what they are and why they might seem appropriate to the user.

\_\_\_ No other actions seem appropriate.

How many users might choose an incorrect action (% 100 75 50 25 10 5 0)?

**[B.7] KNOWLEDGE CHECKPOINT:**

If you have assumed user knowledge or experience, update the USER ASSUMPTION FORM.



Task Sequence / User Action: \_\_\_\_\_

---

**[C] EXECUTING THE ACTION:**

**[C.1] TIME-OUTS:**

If there is a time-out in the interface at this step, does it allow enough time for the user to select and perform the appropriate action?

\_\_\_ There is no time-out.

\_\_\_ Enough time is allocated for this action.

Indicate how many users will time-out (% 100 75 50 25 10 5 0).

Will users know how to or be able to recover from it? If not, indicate why.

\_\_\_ Yes, users will be able to recover.

How many users will not recover (% 100 75 50 25 10 5 0)?

**[C.2] HARD TO DO ACTIONS:**

Is there anything physically tricky or difficult about executing the action? If so, indicate exactly how the action must be executed.

\_\_\_ There is nothing physically tricky or difficult.

What percentage of users may have trouble (% 100 75 50 25 10 5 0)?

**[C.3] SYSTEM STATE CHECKPOINT:**

If the system state may influence the user, update the SYSTEM STATE FORM.

**[C.4] SYSTEM RESPONSE TO EXECUTED ACTION:**

Now assume the correct action has been taken (or perform it) and describe the system's response.

Task Sequence / User Action: \_\_\_\_\_

---

**[D] DETERMINING PROGRESS:**

**[D.1] QUIT OR BACKUP:**

After executing the action, will users see that they have made progress toward a current goal? If not, indicate why.

\_\_\_ Yes, the users will realize that progress has been made.

How many users will not notice progress and thus try to quit or backup (% 100 75 50 25 10 5 0)?

**[D.2] KNOWLEDGE CHECKPOINT:**

If you have assumed user knowledge or experience, update the USER ASSUMPTION FORM.

**[D.3] COMPLETE AND INCOMPLETE GOALS:**

**[D.3.a] GOALS THAT LOOK COMPLETE:**

Based on the system response, which goals will be properly completed?

Are there falsely completed goals? List these below and next to each indicate what caused the user to believe it was complete.

\_\_\_ There are no falsely completed goals.

How many users will mistakenly complete goals that they should not have (% 100 75 50 25 10 5 0)?

**[D.3.b] GOALS THAT LOOK INCOMPLETE:**

Based on the system response, which goals will the user NOT consider to be complete even though he should have? Assume that the user has completed these goals and mark them as complete on the GOAL STRUCTURE FORM. Also list these goals below.

\_\_\_ No goals will be viewed as incomplete.

How many users will mistakenly view goals that should have been completed as incomplete (% 100 75 50 25 10 5 0).

**[D.3.c] "AND-THEN" SUPERGOAL COMPLETION:**

Is the last subgoal of an "AND-THEN" structure complete? If so, mark the supergoal as complete on the GOAL STRUCTURE FORM.

\_\_\_ Not applicable.

Will the users realize that the supergoal is complete? If not, indicate why.

\_\_\_ Yes, users will realize that the supergoal is also complete.

How many users will not realize that they have also completed the supergoal (% 100 75 50 25 10 5 0)?

**[D.3.d] THE SUPERGOAL KILLOFF PHENOMENON:**

Will the supergoal be prematurely killed off? If so, indicate why.

\_\_\_ No, premature supergoal killoff will not occur.

How many users will prematurely kill off this supergoal (% 100 75 50 25 10 5 0)?

**[D.4] KNOWLEDGE CHECKPOINT:**

If you have assumed user knowledge or experience, update the USER ASSUMPTION FORM.

Task Sequence / User Action: \_\_\_\_\_

---

**[E] MODIFYING THE USER'S CURRENT GOAL STRUCTURE:**

**[E.1] FORMATION OF NEW GOALS:**

**[E.1.a] NEW GOALS FORMED FROM SYSTEM RESPONSE:**

Does the system response suggest a new goal to the user? If so, add it to the GOAL STRUCTURE FORM.

**[E.1.b] OTHER NEW GOALS:**

What other new goals might the user form given the current goals, the state of the interface, or background knowledge? Add these goals to the GOAL STRUCTURE FORM.

**[E.2] KNOWLEDGE CHECKPOINT:**

If you have assumed user knowledge or experience, update the USER ASSUMPTION FORM.

---

Cognitive Walkthrough Form #6:

ACTION EVALUATION FORM

Task Sequence / User Action: \_\_\_\_\_

---

**[F] MISCELLANEOUS:**

**[F.1] ADDITIONAL DESIGN INFORMATION:**

Would it have been helpful if more design information had been made available before or during the Walkthrough? If so, indicate why.

\_\_\_ No, such information would not have been helpful.

**[F.2] OTHER:**

Any other comments?

\*\*\* CUMULATIVE FOR THE TASK OR SYSTEM \*\*\*

User Task(s): \_\_\_\_\_  
\_\_\_\_\_

**[1] SUMMARY:**

Summarize the key findings. Pay particular attention to how well the user's goals ended up matching the designer's action sequence, how reasonable the assumptions about the user's background are, the final goal structure (along with the number and severity of any incorrectly formed goals), and those aspects of the interface design that are most weak or strong at accommodating the user's needs. Next to these findings indicate any initial thoughts on how problematic issues might be remedied.

[ THIS PAGE INTENTIONALLY LEFT BLANK ]

# **Cognitive Walkthroughs: Instructions, Forms, and Examples**

Cathleen Wharton

University of Colorado at Boulder

Department of Computer Science  
and Institute of Cognitive Science

Campus Box 344

Boulder, CO 80309-0344

ICS Technical Report #CU-ICS-92-17