

# Choice and Decision Making for HCI

Description of a CHI 2013 Course

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## 1 CHI 2013 ADVANCE PROGRAM DESCRIPTION

*Note:* The brief description on this first page is a slightly more detailed version of the one published on the courses page of the CHI 2013 website.<sup>1</sup>

### 1.1 Title

C09: Choice and Decision Making for HCI

### 1.2 Date and Time

Tuesday, April 30th, 2013, 9:00–12:20

### 1.3 Benefits

People are constantly making small choices and larger decisions about their use of computing technology, such as:

- “Shall I use this new application as a replacement for my current one?”
- “Which privacy settings are best for me? Should I even take the trouble to figure them out?”
- “Shall I make a contribution to this on-line community?”
- “If so, which of the two available methods should I use?”

The ways in which users arrive at these choices and decisions can take many different forms and involve a wide range of processes, such as anticipation of consequences of actions, social influence, affective responses, and previous learning and habit formation. This course offers a synthesis of relevant research in psychology and HCI that will enable you to analyse systematically the choices made by the users that you are interested in. This type of analysis will be useful in the design and interpretation of studies that involve users’ choices and in the generation of strategies for helping users to make better choices.

### 1.4 Origins

This course was introduced at CHI 2011 and presented again at CHI 2012.

### 1.5 Features

- Discuss, with reference to concrete examples, several types of choice and decision problem regularly faced by users of computing technology.

- Learn how to go beyond current HCI analyses of these problems by applying relevant concepts and insights from several relevant areas of psychological research.
- Take away supplementary materials that expand on the discussion in the course and help you to apply its analytical framework in your own work.

### 1.6 Audience

HCI researchers, students, and practitioners who want to be able to understand and influence the ways in which users of the systems that they design or study make choices and decisions.

### 1.7 Presentation

Lecture segments with interspersed structured discussion.

### 1.8 Instructor Background

Anthony Jameson (PhD, psychology) is a principal researcher at DFKI, the German Research Center for Artificial Intelligence. After having studied specific aspects of users’ choice and decision making processes in connection with user-adaptive systems, recommender systems, and multimodal systems, he recently conducted a 2-year research project to prepare the comprehensive analytical framework presented in this course. He has given numerous tutorials at CHI and other conferences and has written chapters for the *Human-Computer Interaction Handbook*, including a recent chapter on the topic of this course. He is founding coeditor-in-chief of the *ACM Transactions on Interactive Intelligent Systems*.

### 1.9 CHI Community

User Experience

### 1.10 Keywords

*User and Cognitive models (primary keyword)*

User-Centered Design / Human-Centered Design

Other Keywords: Choice and Decision Making

<sup>1</sup>[http://chi2013.acm.org/attending/courses/#c09\\_desc](http://chi2013.acm.org/attending/courses/#c09_desc)

## 2 DETAILED COURSE DESCRIPTION

*Note:* The rest of this document is an adapted version of the course proposal that was submitted to the CHI 2013 course chairs in October, 2012.

### 2.1 Duration of the Course

The course requires two 80-minute slots, for a total duration of 160 minutes. This was the duration in 2012, and most participants found it to be “just right”. (More comments on the use of the time will be found below.)

### 2.2 Linkage to Other Courses, If Any

There are no links to other courses.

### 2.3 Learning Objectives

Participants will remove a blind spot in their understanding of computer use which in fact exists in the HCI literature as a whole: the lack of a set of concepts and a compendium of empirical knowledge for understanding (and predicting and improving) the choices and decisions<sup>2</sup> that people make while using computing technology. More specifically, participants will:

1. Learn to recognize cases in which users of computing technology can choose freely among different options.
2. Learn about many key concepts and empirical results from psychology and HCI that can help the participants to understand and influence such choices and decisions.
3. Learn how to apply these concepts and results to the analysis of specific choice and decision problems in their own work.

How the participants will ultimately make use of what they have learned will depend on what they are trying to do:

- When they are interpreting data from a user study in which particular choices and decisions have been observed, they will be able to acquire a more realistic and comprehensive view of the possible ways in which these choices and decisions may have come about. In particular, they should be able to avoid the common mistake of jumping to conclusions because of lack of awareness of some of the possible explanations.
- When they are considering how users can be helped to make better choices and decisions with a given (existing or envisaged) system, they will be able to make use of their understanding of the cognitive and affective processes that are involved in choice and decision making and ways of supporting them.

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<sup>2</sup>The terms *choice* and *decision* are used here, together and in alternation, to do justice to the variety of forms that the processes in question can take. *Decision* suggests a thorough, effortful process, while *choice* suggests a quick selection that may be based, for example, on habit. Both types of process can be found with users of computing technology, often in the same situations.

### 2.4 Justification

It is widely (though perhaps not universally) accepted that researchers and students in HCI should have some understanding of the cognitive (and related) processes that underlie the behavior of users of computing technology. Hence, HCI theory and courses regularly include material on how users figure out how to operate an unfamiliar new system; the types of errors that they can make; how they perceive and interpret visually displayed information; and how they acquire skill over time. But HCI people normally have no way of acquiring a useful HCI-relevant perspective on how users make choices and decisions, because there has so far been no coherent presentation of this topic for HCI. The present course therefore fills a gap not only in CHI’s offering of courses to date but also in HCI instruction more generally.

While this goal is ambitious, it is realistic in view of the work that has been done in building up this material: The background research was conducted in a 2-year targeted research unit that the instructor directed. He has written a chapter on this topic for the 3rd edition of the *Human-Computer Interaction Handbook* ([2]), which will be made available as part of the course notes. On invitation from the editor-in-chief and the publisher of the journal *Foundations and Trends in Human-Computer Interaction*, he is currently working with several coauthors on a much longer article for that journal, of which a preprint will be made available to the course participants. The versions of the course that were presented at CHI 2012 were well received (the average ratings on all of the main evaluation questions being between 5.5 and 6.0 on the 7-point rating scale). In addition to the experience at CHI conferences, the instructor has acquired additional practice by presenting adapted versions of the course a number of times for research labs and companies.

### 2.5 Content

#### *What Are We Talking About?*

This section introduces and justifies the topic. The instructor offers examples of choices made by computer users, such as:

- “Shall I use this new application as a replacement for my current one?”
- “Which privacy settings are best for me? Should I even take the trouble to figure them out?”
- “Shall I make a contribution to this on-line community?”
- “If so, which of the two available methods should I use?”

The instructor then asks each participant to write down an example from his or her own work; these examples are then discussed briefly. It is explained how *preferential choice*, where there is no single “correct” option, is different from the types of choice most commonly examined in the HCI field: those in which a user needs to choose a correct menu option, hyperlink, icon, or other interface element in order to be able to perform a task. It is explained why interaction designers are “choice architects” who inevitably influence the

preferential choices that users make and who therefore bear some responsibility for helping users to make good preferential choices.

### *An Integrative Analytical Framework*

As an advance organizer, this section gives a visual overview of the various aspects of choice and decision processes that will be considered in the rest of the course, organizing them along three dimensions: phases of the choice process; modes of processing (analytical versus intuitive); and the diverse types of consideration that choosers take into account. Several high-level strategies for supporting choices (cf. [3]) are distinguished, each of which can in principle be applied to any aspect of the choice and decision process.

### *What Is a Good Decision?*

If we want to help computer users make good decisions, we need to know what properties of a decision make it “good”. The concept of *ecological rationality* is contrasted with more traditional views of good decisions as being ones that result from the application of normatively justifiable procedures.

We discuss how choosers in general do not only aim to achieve good outcomes but also want to avoid investing undue time and effort or experiencing stressful thoughts—and also want to be able to justify their choices to other persons or at least to themselves.

### *Temporal Aspects of Choice*

This section discusses some key concepts and results concerning choices that are in some sense distributed over time—a frequent situation where choices about computing technology are involved.

One subclass of choices comprises those where some of the consequences are remote in time. It is explained how the *discounting* of future benefits and costs is basically rational but that people often assign even more weight than they should to very imminent consequences, relative to later ones (*hyperbolic discounting*). We discuss two forms of *commitment mechanism* which interaction designers can consider offering in order to enable users to overcome this bias in particular cases.

The second subclass comprises cases where a particular choice (e.g., which of two alternative input devices to use) is made repeatedly over time. The concept of *temporal choice bracketing* is introduced, which refers to the case where a user decides on a general policy for an anticipated sequence of choices, instead of making each choice individually. Advantages and limitations of *broad bracketing* (relative to *narrow bracketing*) that have emerged from research are discussed.

### *Reuse of Previous Choices*

Even when choosers do not employ broad choice bracketing for repeated choice problems, they often simply adopt the simple solution of choosing whichever option they have chosen in the past in similar situations. Research results

concerning *recognition-primed decision making* and habitual behavior illuminate different reasons why repeating past choices can be ecologically rational. One practical implication for interaction designers is that, by influencing a user’s choices in the short term you can indirectly influence their later choices as well.

### *Roles of Affect*

The most important roles of feelings and moods in choice processes are synthesized in a way that takes into account a range of recent research in this area. Concepts like those of *somatic markers* and the *affect heuristic* help to understand how emotions sometimes enable people to make better choices; they also offer an alternative perspective on work in the HCI field concerning concepts like *emotional design* and *user experience*.

### *Social Influence*

This section departs from the observation that choosers often avoid deliberation and choose in accordance with social examples and expectations. We see why it is worthwhile to understand the different reasons why people may choose in accordance with social influence: for example, aiming to benefit from other people’s experience versus desiring to identify with a particular group.

### *Pitfalls in Learning From Experience*

Whereas previous sections have already provided examples of how computer users adapt their patterns of choice on the basis of experience, this final section focuses on some typical reasons why such learning does not always lead to better choices, referring to the distinction between *kind* and *wicked* learning environments ([1]): difficulties in perceiving and interpreting the consequences of choices; the possibly multidimensional nature of the set of available options (e.g., possible configurations of an application); and the fact that *exploration* of options is often constrained by a need to *exploit* what the chooser has already learned about the options.

### *Concluding Discussion*

In this final section, participants will be encouraged to raise any questions they may have that have not yet been addressed adequately.

## **2.6 Background of Attendees**

Attendees should have at least the sort of general familiarity with HCI concepts that is acquired in an introductory HCI course. Although no further specific knowledge is required, even experienced HCI researchers can benefit from this material, because it has not so far been available in the literature. Although concepts and results from psychological research will be presented, they can be understood without the benefit of any training in psychology.

At CHI 2011 and CHI 2012, the participants included both practitioners and researchers, with the former group being larger. The evaluation results have shown that participants of both types see themselves as having benefited considerably

from the course.

## 2.7 Presentation

The most important information will be conveyed by the instructor with slides and an occasional very brief system demonstration. Concepts and research results will be illustrated concretely with reference to specific examples of choices of computer users (though the research summarized in general concerned choices in other domains). Near the beginning of the course, participants will be encouraged to supply examples and questions from their own research or practice.<sup>3</sup> At the end of each section, we will look at the worksheets which are provided as supplementary material, and participants will be encouraged to comment on how the questions in the worksheets apply to their own selected problem. The worksheets are also intended for later independent use.

## 2.8 Schedule

- 15 minutes: What Are We Talking About?
- 20 minutes: An Integrative Analytical Framework
- 15 minutes: What Is a Good Decision?
- 30 minutes: Temporal Aspects of Choice
- *Coffee break*
- 25 minutes: Reuse of Previous Choices
- 15 minutes: Roles of Affect
- 15 minutes: Social Influence
- 10 minutes: Pitfalls in Learning From Experience
- 15 minutes: Concluding Discussion

## 2.9 Course History

This course was offered for the first time at CHI 2011 and repeated in 2012, and it was well received both times (see the note on the evaluation results given above). The plans for 2013 have been adapted on the basis of suggestions made by the CHI 2012 participants.

## References

1. Robin Hogarth. *Educating Intuition*. University of Chicago Press, Chicago, 2001.
2. Anthony Jameson. Choices and decisions of computer users. In Julie A. Jacko, editor, *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications*. CRC Press, Boca Raton, FL, 3rd edition, 2012.
3. Anthony Jameson, Silvia Gabrielli, Per O. Kristensson, Katharina Reinecke, Cristina Gena, Federica Cena, and Fabiana Vernerio. How can we support users' preferential choice? In *Extended Abstracts of the 2011 Conference on Human Factors in Computing Systems*, Vancouver, 2011.

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<sup>3</sup>Experience with the CHI 2011 and CHI 2012 courses confirmed that brief discussions of these examples in the entire group is more effective than "discuss-with-your-neighbor" breakout sessions.

## 3 MATERIAL SAMPLE

The following pages include some slides from the CHI 2012 course. The last page is one of the CHI 2012 *worksheets*, which were provided as a downloadable Word document so that participants could write in them.

In the 2012 evaluation, the most frequent responses to the statement "The course material provided is helpful" were "Agree" and "Strongly agree".

# Choice and Decision Making for HCI




## Preferential Choice: Examples

Mary,  
Where are those slides? I need them by 4 pm.  
- Steve

Respond now or later?



Gesture or dictate?

Configure app? How?



## ... vs. Nonpreferential Choice

*Preferential choice*



Should I gesture or dictate?

Requires new theoretical input from various areas of psychology:

- Judgment and decision making
- Naturalistic decision making
- Behavioral economics
- Habitual and other routine behavior
- Learning and intuition
- Emotion
- Self-control
- Social influence
- ....

*Nonpreferential choice*


If I want to dictate, which icon should I tap?


Well supported by HCI theory, guidelines, ...




# Choice and Decision Making for HCI

## A Classical View of Decision Making






\$5.99 App Store



\$3.99 App Store



\$4.99 App Store

# Words	Usability	\$\$
I	(I)	II
++	+	--
--	?	++
++	-	--


## A More Comprehensive View

**General Attitudes, Policies, and Self-Image**


Oxford Dictionaries

★★★★★


**Social Examples and Expectations**




**Evaluations of Known Items**



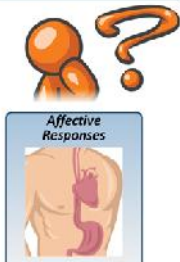
**Justifiability**




**Own Past Choices and Experiences**



**Affective Responses**



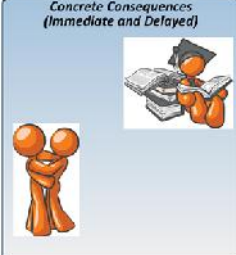
**Framing of Options**



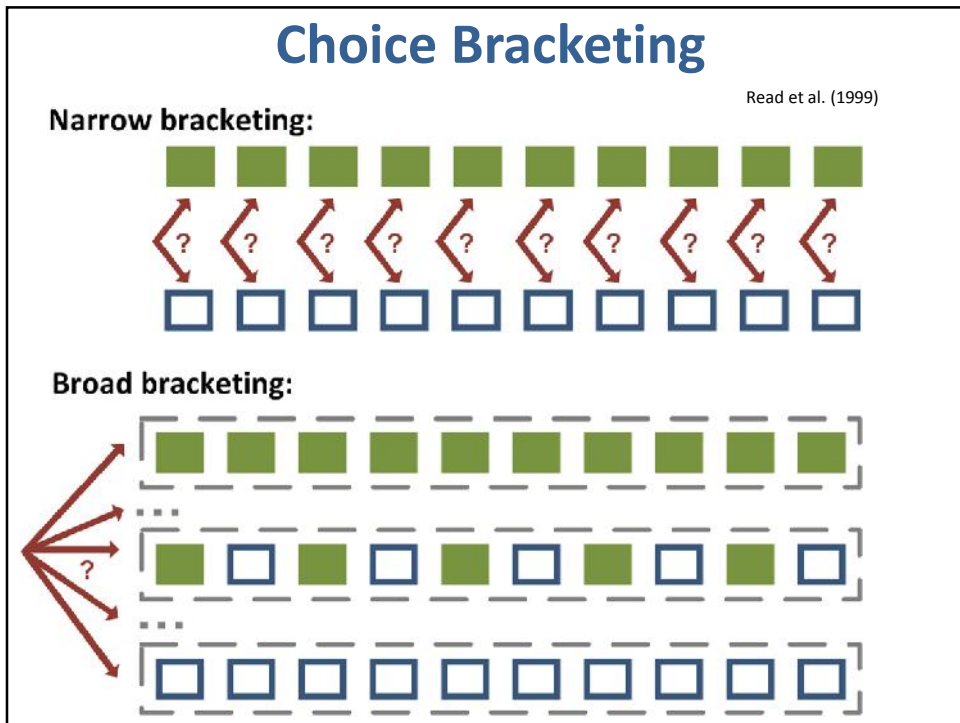
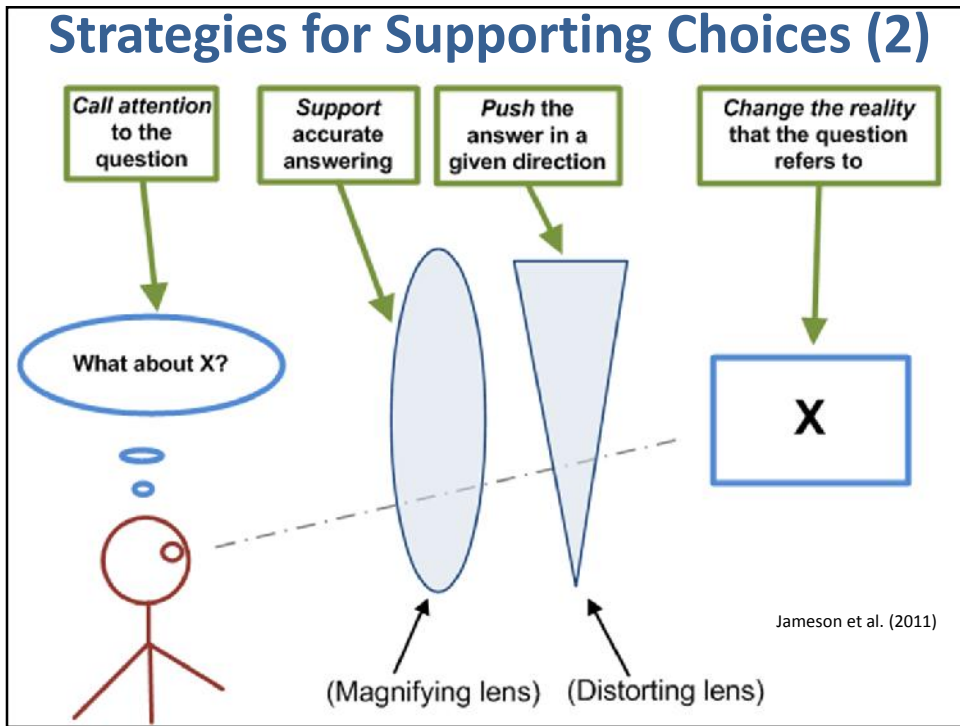
**Value Functions and Importance Weights**

# Words	Usability	\$\$
I	(I)	II
++	+	--
--	?	++
++	-	--

**Concrete Consequences (Immediate and Delayed)**



# Choice and Decision Making for HCI



# Choice and Decision Making for HCI

## Recognition-Primed Decision Making

### Typical procedure

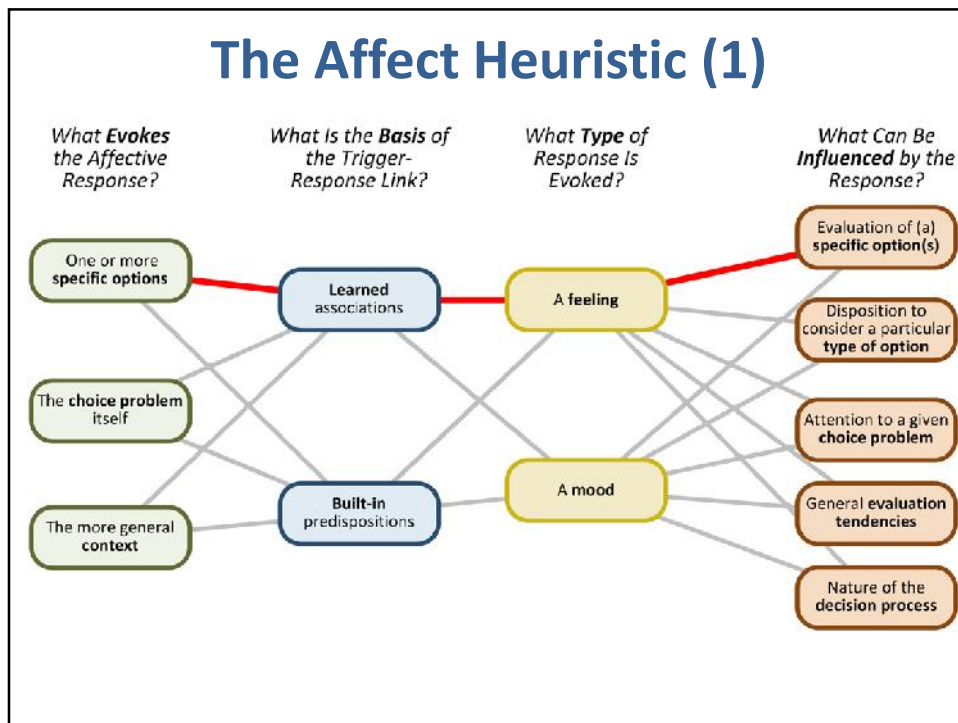
1. Experience the situation
2. Recognize it and identify a typical action for that situation
3. *If it seems necessary:*
  - a. Evaluate that action via mental simulation
  - b. Until it seems likely to work, modify it and evaluate it again
4. Implement the action

### Features

- Focus on **situation assessment**
- **Serial** generation / evaluation of options
- **First option** is usually **workable**
- Evaluation through **mental simulation**
- **Satisficing**
- Focus on **elaborating and improving options** (not choosing between options)

Klein (1998)

## The Affect Heuristic (1)





## Temporal Aspects of Choice (pp. 13–19)

What **immediate consequences** of choosing an option may the user consider? (Examples: the experience of performing the action in question; an immediate change in the system’s appearance or behavior; an immediate emotional reaction.)

What **delayed consequences** may the user consider? (Examples: something like the “immediate consequences” in the previous question, but later in time; a response by other persons; an increase in the user’s efficiency in using the system.)

*If there are delayed consequences:*

Is the delay long enough for **time discounting** to become important? Does it make sense for the designer to try to **reduce the delay**? If so, how?

Might the choice lead to a **preference reversal** between a “smaller-sooner” and a “larger-later” benefit? If so, does it make sense to provide some sort of **commitment mechanism**? If so, how might it look?

*If the issue of broad vs. narrow choice bracketing arises*

How would broad bracketing look in this situation concretely?

What might be the **benefits** (if any) of broad bracketing?

What **factors** that already exist in the situation could encourage or discourage broad bracketing?

What **design measures** could you take to encourage or discourage broad bracketing?

	<i>Alert</i>	<i>Support</i>	<i>Push</i>	<i>Change Reality</i>
<i>Information</i>				
<i>Interface</i>				
<i>Training</i>				
<i>Natural Experience</i>				