

Choice and Decision Making for HCI

Description of a CHI 2012 Course

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1 BRIEF DESCRIPTION

The brief description on this page is the same as the one published on the courses page ¹ of the CHI 2012 website:

1.1 Title

Choice and Decision Making for HCI

1.2 Name and Affiliation of Instructors

Anthony Jameson, DFKI, Germany

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 make these “preferential” choices can involve a wide range of processes, such as anticipation of consequences of actions, social influence, affective responses, and intuition based on prior learning. This course offers an up-to-date synthesis of relevant research in psychology, illustrated with HCI examples, that will enable you to analyze 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’ preferential choices and in the generation of strategies for helping users to make better choices.

1.4 Origins

This course was successfully introduced at CHI 2011.

1.5 Features

- Discuss, with reference to concrete examples, representative types of choice and decision problem faced by users of computing technology.
- Learn how to go beyond current HCI analyses of these problems by applying concepts and results from several

relevant areas of psychological research. 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 understand and support the choices and decisions of users of the systems that they design or study.

1.7 Presentation

Lecture segments + familiarization with worksheets designed for later independent use.

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*.²

¹<http://chi2012.acm.org/program/desktop/courses.html>

²<http://tiis.acm.org>

2 DETAILED COURSE DESCRIPTION

The following description has been adapted and updated from the course proposal that was submitted to the CHI 2012 course chairs in September, 2011.

2.1 Duration of the Course

The course requires two 80-minute slots, for a total duration of 160 minutes. In view of the breadth of the topic, there would be obvious advantages to having an additional slot;³ but a longer length would presumably discourage many participants from taking the course. Therefore, I have adopted the strategy of providing a good deal of supplementary material and offering a selective presentation and discussion during the course itself. This strategy evidently worked well in the CHI 2011 edition of the course.⁴

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 decisions⁵ 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 conclu-

sions 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.

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 upcoming 3rd edition of the *Human-Computer Interaction Handbook* ([2]), which will be made available to course participants. 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. The version of the course that was presented at CHI 2011 was well received, and the instructor has acquired additional practice by presenting adapted versions of the course on a number of occasions for research labs and companies.

2.5 Content

Preferential Choice and HCI

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*,

³The CHI 2011 course lasted just 140 minutes because of a peculiarity in the scheduling of the morning courses. Just about half of the participants who submitted an evaluation rated the length as “just right”, the others calling it “too short”.

⁴For the evaluation questions about whether the course “was worth the time and money” and “should be offered again next year”, by far the most commonly chosen response (at about 40%) was “strongly agree”.

⁵The 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.

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. Another graphical overview distinguishes several high-level strategies for supporting choices (cf. [3]), 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. Benefits of *broad bracketing* (relative to *narrow bracketing*) that have emerged from research are discussed, as are factors that influence the way in which people bracket choices.

Doing What You Have Done in the Past

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

Feelings, moods, and emotions play a number of different roles in choice and decision making. This section starts with an overview of the possible roles. Brief discussions of topics such as the *affect heuristic* help to understand how feelings and moods sometimes help people to make good choices but sometimes have the opposite effect. 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, such as: 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.

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.

For CHI 2011, I expected that the course would be of more interest to researchers and students than to practitioners, because of the novelty of the topic and the fact that there does not yet exist a tried and tested set of relevant methods and

guidelines (though the instructor and collaborators are currently working along these lines; see, e.g., [1]). But a number of the 2011 participants were practitioners who wanted to learn how to deal with specific problems from their own work, and most of these showed a quick understanding of how to make use of the material, to judge by their discussion contributions and their comments on the evaluation forms. Consequently, I will expect to be able to deal without difficulty with a mixed group of researchers, students, and practitioners.

2.7 Presentation

The key concepts and results from research on choice and decision making will be presented by the instructor with slides. They will be discussed with reference to examples of choices of computer users—including examples supplied by the course participants on the basis of their own research or practice.⁶ At the end of some sections, we will look briefly at the relevant pages of the worksheets which are provided as supplementary material, so that participants gain a bit of experience in using these worksheets, though they are mainly intended for later independent use: Participants can use them later for systematic guidance when analyzing specific problems that arise in their own work.

2.8 Schedule

- 20 minutes: Preferential Choice and HCI
- 20 minutes: An Integrative Analytical Framework
- 15 minutes: What Is a Good Decision?
- 25 minutes: Temporal Aspects of Choice
- *Coffee break*
- 25 minutes: Doing What You Have Done in the Past
- 20 minutes: Roles of Affect
- 20 minutes: Social Influence
- 15 minutes: Pitfalls in Learning From Experience

2.9 Course History

This course was offered for the first time at CHI 2011, and it was well received (see the note on the evaluation results given above).

In previous years, the instructor had acquired general experience with CHI courses as the (co)instructor of five such courses between 2001 and 2009. He had also given numerous tutorials at other major international conferences such as IJCAI and AAI.

2.10 References

1. Silvia Gabrielli and Anthony Jameson. Obstacles to option setting: Initial results with a heuristic walkthrough method. In T. Gross, J. Gulliksen, P. Kotzé, L. Oestreicher, P. Palanque, R.O. Prates, and M. Winckler, editors, *Human-computer interaction - INTERACT 2009*,

12th IFIP TC 13 International Conference, pages 400–403. Springer, Berlin, 2009.

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.

3 MATERIAL SAMPLE

The following pages include several representative slides that will be discussed in the CHI 2012 course. The last page is an example of the *worksheets* that will be provided as a downloadable Word document so that participants can write in them.

In the 2011 evaluation, by far the most frequent (> 40%) response to the statement “The course material provided is helpful” was “Strongly agree”.

⁶Experience with the CHI 2011 course confirmed that brief discussions of these examples in the entire group is more effective than “discuss-with-your-neighbor” breakout sessions.

Preferential Choice: Examples

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

Respond now
or later?

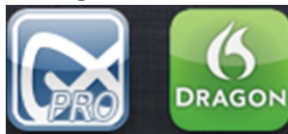


Gesture or
dictate?

Configure
app? How?



... vs. Nonpreferential Choice



Preferential choice

Nonpreferential choice

Should I gesture
or dictate?

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

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
-

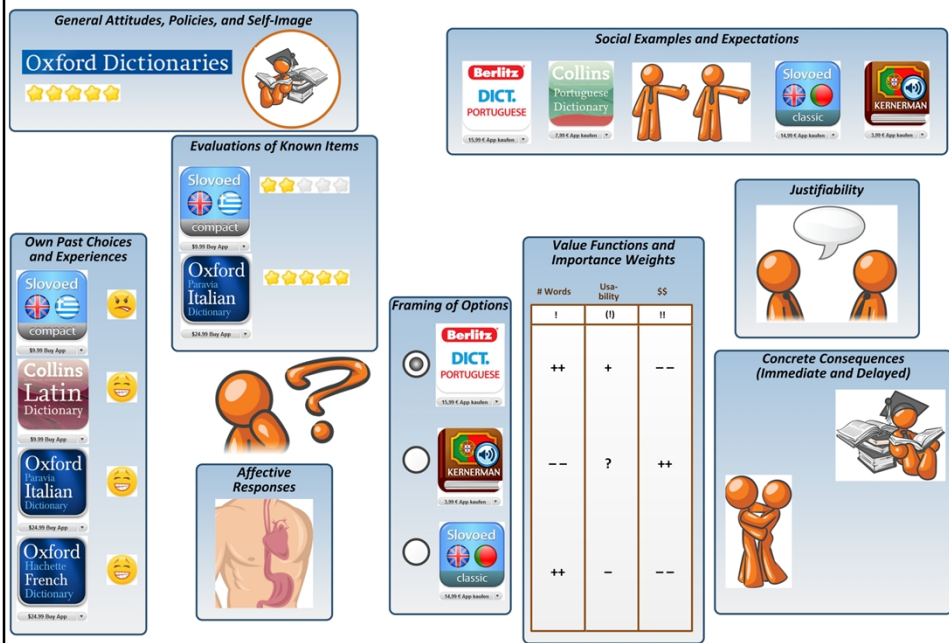
Well supported by HCI theory,
guidelines, ...

A Classical View of Decision Making

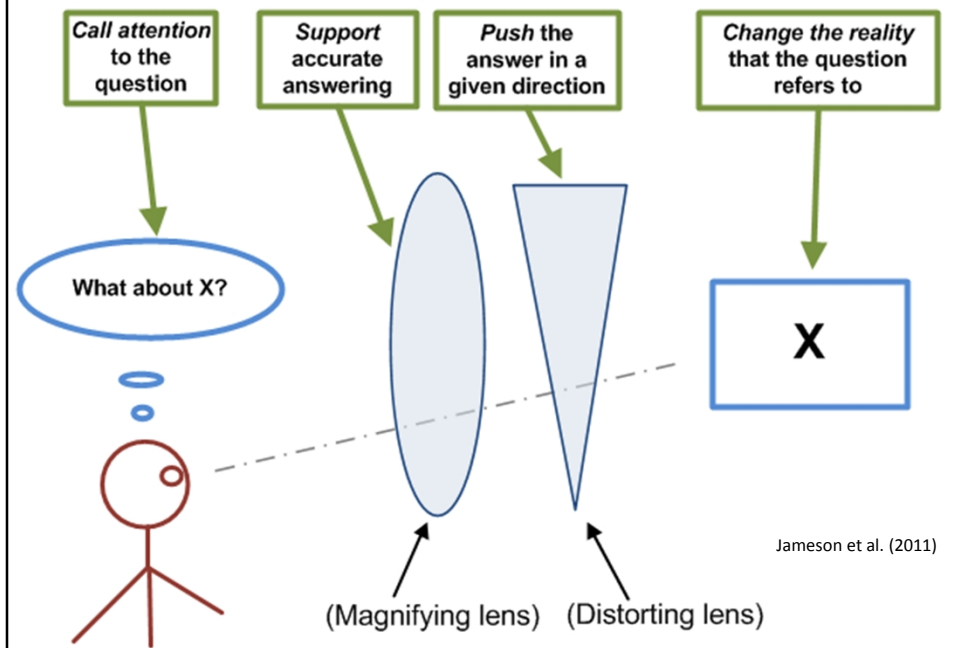


| Value Functions and Importance Weights | | |
|--|-----------|------|
| # Words | Usability | \$\$ |
| ! | (!) | !! |
| ++ | + | -- |
| -- | ? | ++ |
| ++ | - | -- |

A More Comprehensive View



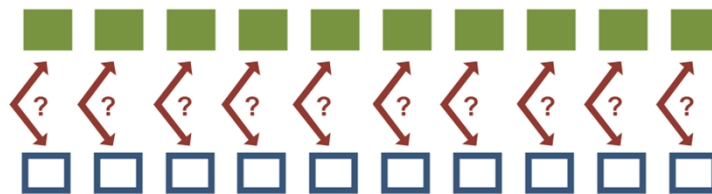
Strategies for Supporting Choices (2)



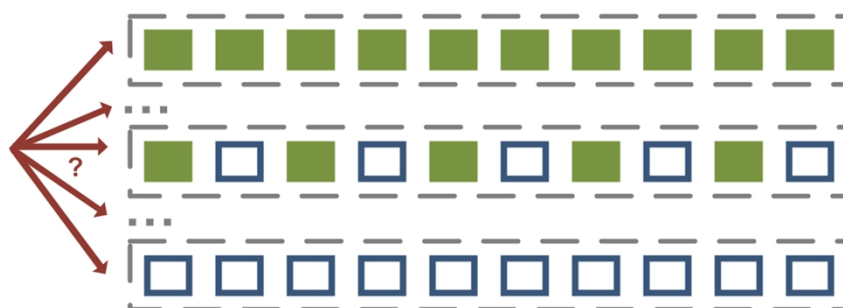
Choice Bracketing

Read et al. (1999)

Narrow bracketing:



Broad bracketing:



Recognition-Primed Decision Making

Typical procedure

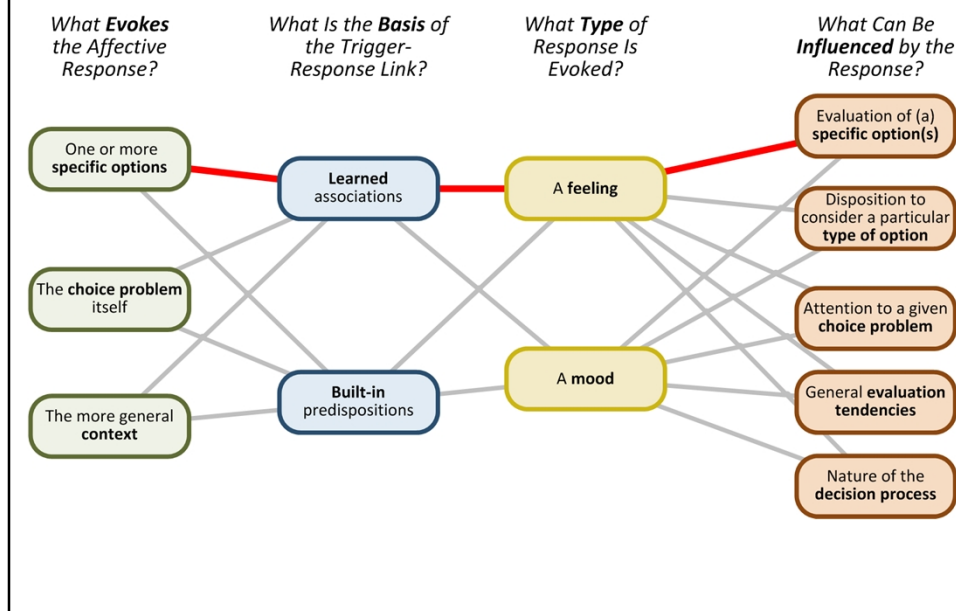
1. Experience the situation
2. Recognize it and identify a typical action for that situation
3. *If it seems necessary:*
 - a. Evaluate that action via mental simulation
 - b. Until it seems likely to work, modify it and evaluate it again
4. Implement the action

Klein (1998)

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)

The Affect Heuristic (1)



Social Influence (pp. 36–38)

Social examples

In your choice situation, are relevant ***social examples*** available?

If so:

How could they influence the user's choice (social examples as information; desire to identify with group; practical benefits of conformity)?

Might social examples be ***misleading*** in this situation (as with pluralistic ignorance)?

How could the designer ***encourage appropriate use*** of the social examples?

Norms and expectations

Are there ***norms and expectations*** that could influence the user's choice?

If so:

How could they influence the user's choice (reward or punishment; acknowledgement of legitimacy)?

How could a designer ***support appropriate responses*** by the user to the norms and expectations?