What Should Recommender Systems People Know About the Psychology of Choice and Decision Making?

1st Workshop on Decision Making and Recommendation and Acceptance Issues in Recommender Systems (DEMRA 2011)

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A Classical View of Decision Making

	# Words	Usa-bility	$$
Oxford Spanish English Dictionary ($24.99 Buy App)	++	−	− −
($0.99 Buy App)	− −	?	++
Slovoed deluxe ($24.99 Buy App)	++	−	− −

A More Comprehensive View

General Policies and Rules
Oxford Dictionaries

Social Examples and Expectations

Own Past Choices

Emotional Responses

Justifiability

Concrete Consequences

	# Words	Usa-bility	$$
Oxford Spanish English Dictionary	++	–	– –
	– –	?	++
Slovoed deluxe	++	–	– –
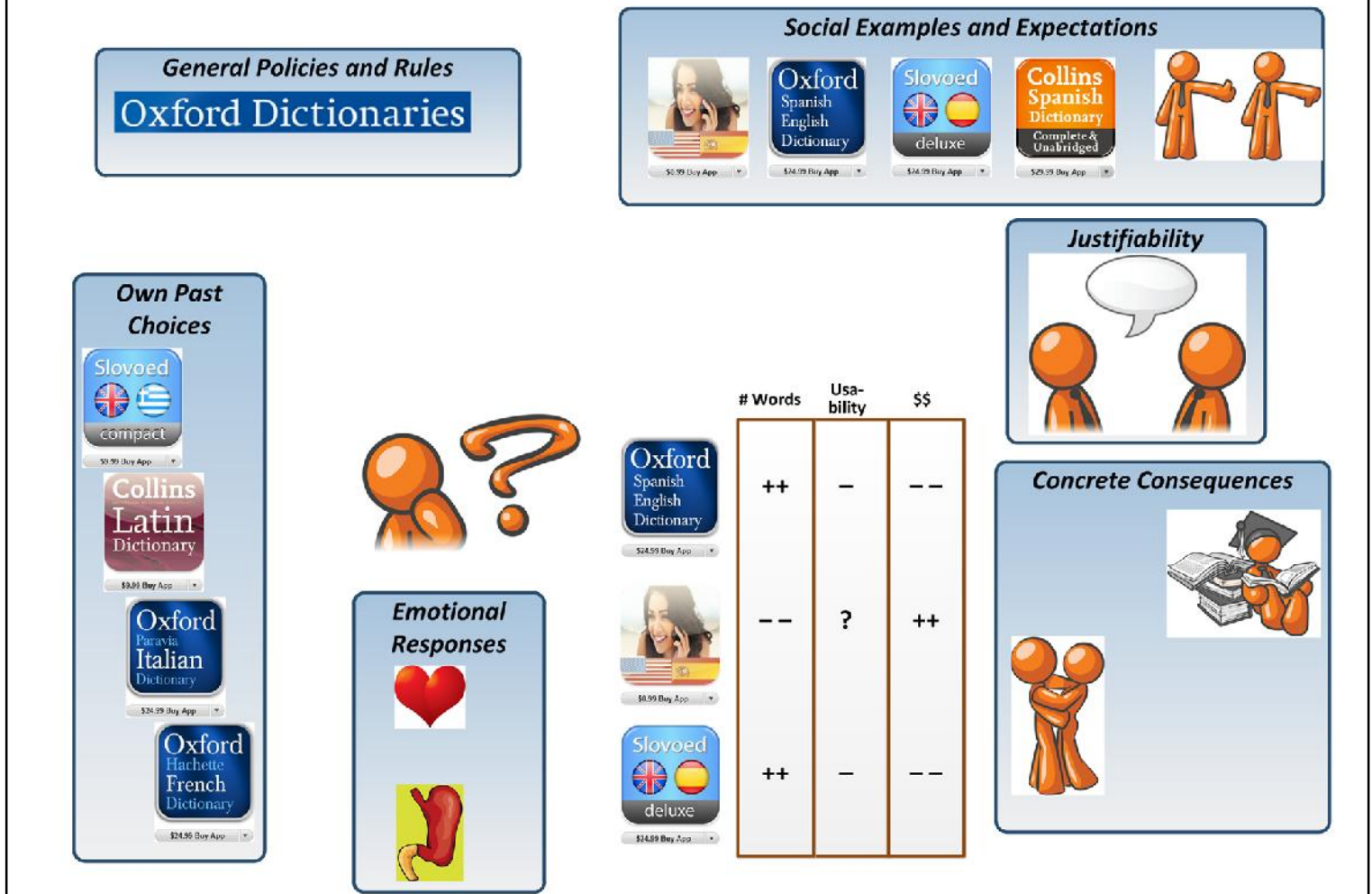
Relatively Comprehensive Views of Choice and Decision Making

Gigerenzer, G. (2007). *Gut feelings: The intelligence of the unconscious.* London: Penguin.

Johnson, J. G., & Busemeyer, J. R. (2005). Rule-based decision field theory: A dynamic computational model of transitions among decision-making strategies. In T. Betsch & S. Haberstroh (Eds.), *The routines of decision making*. Mahwah, NJ: Erlbaum.

Collections of Articles That Represent Diverse Points of View

Koehler, D. J., & Harvey, N. (Eds.) (2004). *Blackwell handbook of judgment and decision making.* Malden, MA: Blackwell.

Betsch, T., & Haberstroh, S. (Eds.) (2005). *The routines of decision making.* Mahwah, NJ: Erlbaum.

Lichtenstein, S., & Slovic, P. (Eds.) (2006). *The construction of preference.* Cambridge, UK: Cambridge University Press.

Schneider, S. L., & Shanteau, J. (Eds.) (2003). *Emerging perspectives on judgment and decision research.* Cambridge, UK: Cambridge University Press.

Legend

- Here are some results from psychological research

- We're already taking that point into account!

- That suggests a question about recommender systems research …

- That gives me an idea about something that I might do

- Here's what I can read to find out more about this topic
  - In the notes to the slides

Mainstream Judgment and Decision Making Research

What Is a Good Choice Process? (1)

- People often want to be able to *justify* a choice to themselves – or to someone else
- Recommender systems are good at generating explanations
- But could we generate new types of explanation?
  - Justifications that make the user feel good
  - ... or can be used to justify the choice to someone else

Shafir, E., Simonson, I., & Tversky, A. (1993). Reason-based choice. *Cognition, 49,* 11–36. Reprinted in Lichtenstein & Slovic, 2006.

Lerner, J. S., & Tetlock, P. E. (2003). Bridging individual, interpersonal, and institutional approaches to judgment and decision making: The impact of accountability on cognitive bias. In S. L. Schneider & J. Shanteau (Eds.), *Emerging perspectives on judgment and decision research*. Cambridge, UK: Cambridge University Press.

Tintarev, N., & Masthoff, J. (2010). Explanation of recommendations. In F. Ricci, L. Rokach, B. Shapira, & P. B. Kantor (Eds.), *Recommender systems handbook*. Berlin: Springer.

What Is a Good Choice Process? (2)

- People don't like dealing with troubling *tradeoffs*

- RSs can compute tradeoffs well

- How can I shield the user from tradeoffs (while still helping them to make good choices)?

- Leave out options that introduce tradeoffs and are only a bit better

Yates, J. F., Veinott, E. S., & Patalano, A. L. (2003). Hard decisions, bad decisions: On decision quality and decision aiding. In S. L. Schneider & J. Shanteau (Eds.), *Emerging perspectives on judgment and decision research*. Cambridge, UK: Cambridge University Press.

Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *Journal of Consumer Research, 25,* 187–217. Reprinted in Lichtenstein & Slovic, 2006.

Framing Effects

- How options are formulated can influence choices, even where essentially the same information is presented

    "Includes 95% of words needed by tourists"

    "Omits 5% of words needed by tourists"

- Don't let *framing* differences introduce distortion

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*(2), 263–295.

Hastie, R., & Dawes, R. M. (2010). *Rational choice in an uncertain world.* Thousand Oaks, CA: Sage. (Section 12.2)

Dependence on Option Set (1)

- The choice between Options *A* and *B* can be affected by the presence of an Option *C*
- *Example 1*
  - Waiter: "Fruit salad or ice cream?"
  - Diner: "Ice cream"
  - Waiter: "We also have chocolate cake"
  - Diner: "I'll take the fruit salad"

The following articles describe not only some of the phenomena in question but also ways of modeling them computationally in a parsimonious way:

Roe, R. M., Busemeyer, J. R., & Townsend, J. T. (2001). Multialternative decision field theory: A dynamic connectionist model of decision making. *Psychological Review, 108*(2), 370–392.

Busemeyer, J. R., & Johnson, J. G. (2004). Computational models of decision making. In D. J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making*. Malden, MA: Blackwell.

Dependence on Option Set (2)

- *Example 2*
  - *$50: Print-only subscription to "Economist"*
  - *$100: Electronic-only subscription*
  - *$100: Electronic and print subscription*

- How can a RS avoid distorting influences of this type?

- Eliminate **dominated** options

- Present options in more than one context

- ...

Multiattribute Choice Strategies (1)

- People seldom do *weighted adding*
  - Instead: *lexicographic*, *elimination by aspects*, *satisficing* …
  - Typical: Use simple strategy to *winnow*; then more effortful strategy

- One function of RSs is to winnow many options down to a few

Payne, J. W., Bettman, J. R., & Johnson, E. J. (1993). *The adaptive decision maker.* Cambridge, UK: Cambridge University Press.

Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *Journal of Consumer Research, 25,* 187–217. Reprinted in Lichtenstein & Slovic, 2006.

Multiattribute Choice Strategies (2)

- Help the user to do things like:
  - ... rule out all items with an undesirable property (elimination by aspects)
  - ... filter or sort options in a lexicographic way
- Formulate explanations of recommendations in terms of such a strategy
  - ... (regardless of whether the strategy was used by the system)

The Temporal Dimension

Collections of Articles About Temporal Aspects of Choice

Loewenstein, G., & Elster, J. (Eds.) (1992). *Choice over time.* New York: Sage.

Loewenstein, G., Read, D., & Baumeister, R. (Eds.) (2003). *Time and decision.* New York: Sage.

Time Discounting

- Preferring a *smaller, sooner* benefit to a *larger, later* one is often justifiable ...

- ... but people often overdo it, especially when it's "*very* soon"

- How can we help users avoid this bias?

- Get them to choose early - and commit themselves
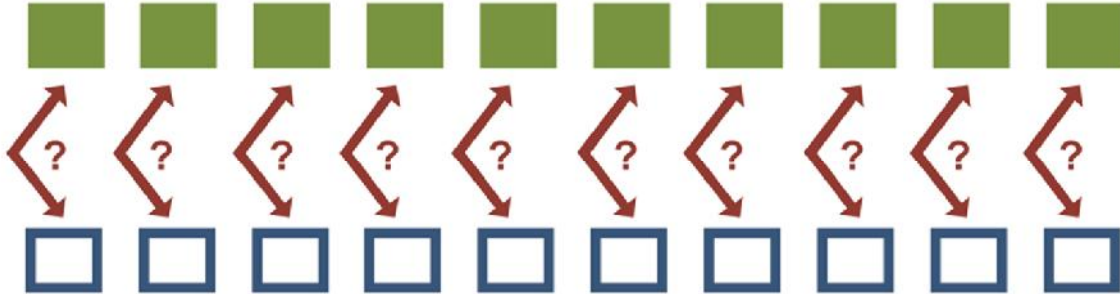
- Make later consequences more salient

Read, D. (2004). Intertemporal choice. In D. J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making*. Malden, MA: Blackwell.
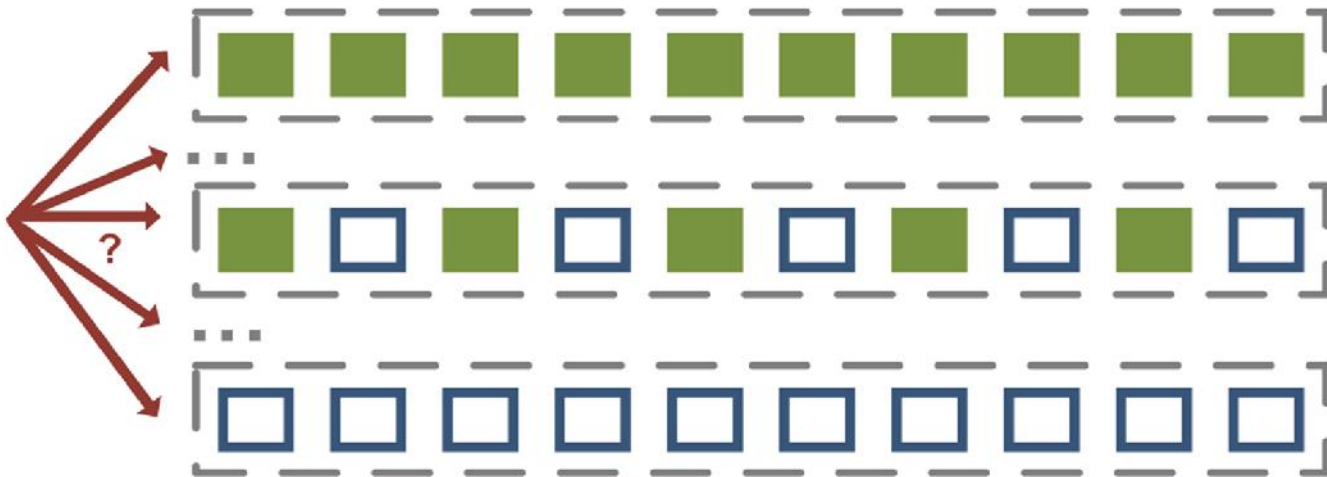
Rachlin, H. (2000). *The science of self-control.* Cambridge, MA: Harvard.

Temporal Choice Bracketing (1)

Narrow bracketing:

Broad bracketing:

Read, D., Loewenstein, G., & Rabin, M. (1999). Choice bracketing. *Journal of Risk and Uncertainty, 19,* 171–197. Reprinted in Lichtenstein & Slovic, 2006.

Temporal Choice Bracketing (2)

- ***Broad bracketing*** often has advantages

1. You have fewer decisions to make

2. You can take into account
   - ... considerations that apply only to **sequences** of choices
     - variety; outcomes getting better over time
   - ... predictable changes in the chooser over time
     - increase in skill; change in tastes
   - ... (for group recommenders) Overall fairness

Temporal Choice Bracketing (3)

- How can a RS support broad bracketing?

- Present each option as a *sequence* of choices

  - ... and take into account the different evaluation criteria for sequences

- This strategy is already applied in some group recommenders

How to Choose Without Deciding

Role of Emotion (1)

- The tendency to choose an option can be influenced by the emotions it evokes (*affect heuristic*, *somatic marker hypothesis*)

- Affective responses can be helpful, efficient signals

- How can a RS enable emotions to perform their function?

- Present options in such a way that relevant emotions can be evoked

Damasio, A. R. (1994). *Descartes' error: Emotion, reason and the human brain.* New York: G. P. Putnam's Sons.

Slovic, P., Finucane, M., Peters, E., & MacGregor, D. G. (2002). The affect heuristic. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment*. Cambridge: Cambridge University, Press.

Role of Emotion (2)

- But affective responses can also distort and mislead

- How can such distortions be compensated for?

- Avoid stimuli that evoke irrelevant affect

Forms of Social Influence (1)

- There are various reasons why people are influenced by *social examples*
  - You can *learn* from their experience
  - You want to *identify* with their group
  - There are *practical benefits* to conformity

- Collaborative filtering systems automate learning from social examples
  - People like you choose

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach.* New York: Taylor & Francis. (Chapter 4)

March, J. G. (1994). *A primer on decision making: How decisions happen.* New York: The Free Press.

Forms of Social Influence (2)

- But we could try to support identification
  - "Cool machos choose "

- And we could help users achieve the practical benefits of conformity
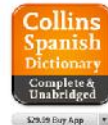 - "Most of the people you will want to share with use "

Forms of Social Influence (3)

- Other people sometimes have *expectations* that the chooser wants to take into account
  - People can **reward or punish** you if you don't conform
  - The expectations may be *legitimate*

- Let's try to support these goals
  - "Your company wants you to use "

Repetition of Previous Choices (1)

- For various reasons, people often just choose the *same option* they have chosen the past
  - They have formed a *habit*, which is triggered by a situation
  - They want to be *consistent* with their previous choices, even if these were partly arbitrary (*arbitrary coherence*)
  - They have *acquired skill or tastes* that favor the previously chosen option

Habits

Wood, W., & Neal, D. T. (2007). A new look at habits and the habit-goal interface. *Psychological Review, 114*(4), 843–863.

Verplanken, B., Myrbakk, V., & Rudi, E. (2005). The measurement of habit. In T. Betsch & S. Haberstroh (Eds.), *The routines of decision making*. Mahwah, NJ: Erlbaum.

 Johnson, J. G., & Busemeyer, J. R. (2005). Rule-based decision field theory: A dynamic computational model of transitions among decision-making strategies. In T. Betsch & S. Haberstroh (Eds.), *The routines of decision making*. Mahwah, NJ: Erlbaum.

Arbitrary Coherence

Ariely, D., Loewenstein, G., & Prelec, D. (2003). Coherent arbitrariness: Stable demand curves without stable preferences. *The Quarterly Journal of Economics, 118,* 73–105. Reprinted in Lichtenstein & Slovic, 2006.

Ariely, D. (2008). *Predictably irrational.* New York: HarperCollins. (Chapter 2)

Repetition of Previous Choices (2)

- Content-based recommendation can efficiently propose choices similar to those from the past

- Is it realistic to interpret a user's previous choices as independent pieces of evidence about their "preferences"?

- Should a RS take into account the possible *domino effect* of its recommendation?

A Final General Question

What Are Preferences, Anyway? (1)

- The term "preferences" has several meanings, including these:

  - *Specific preferences*: "I prefer the Oxford English-French dictionary to the Collins English-French dictionary"

  - *General preferences*: "Whenever I have the choice, I choose an Oxford dictionary"

  - *Forced choice general preferences*: "I don't really care about the publisher, but if you make me choose one publisher for all my dictionaries, I'll choose Oxford"

The confusion caused by the many meanings of the term *preferences* goes largely unnoticed in the literature, even in the following collection, which offers numerous perspectives on preferences:

Lichtenstein, S., & Slovic, P. (Eds.) (2006). *The construction of preference.* Cambridge, UK: Cambridge University Press.

What Are Preferences, Anyway? (2)

- General preferences play a less dominant role in choice than is commonly assumed
  - *Construction of preference*: People can arrive at a specific preference in many different ways, often with different results for different ways
- Don't assume that you can predict people's specific preferences by forcing them to specify general preferences

What Are Preferences, Anyway? (3)

- Try to avoid the term *preference* altogether, using more specific terms

  - For a specific preference: a **choice** made in a particular situation

  - For a general preference: A **policy**, **rule**, or **attitude**