



World Usability Day 2006

14 November 2006 • Making life easy!

Bridging Computer Science and Behavioral Science: What Role do Online Communities Play in Our Lives?

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Several Themes

- Important Challenges where User Experience is a key component
- Value of Interdisciplinary Approaches
- Usability ... and More
- Value of a Broad Education and Background
- Changing the World ... one step at a time

Two Research Projects

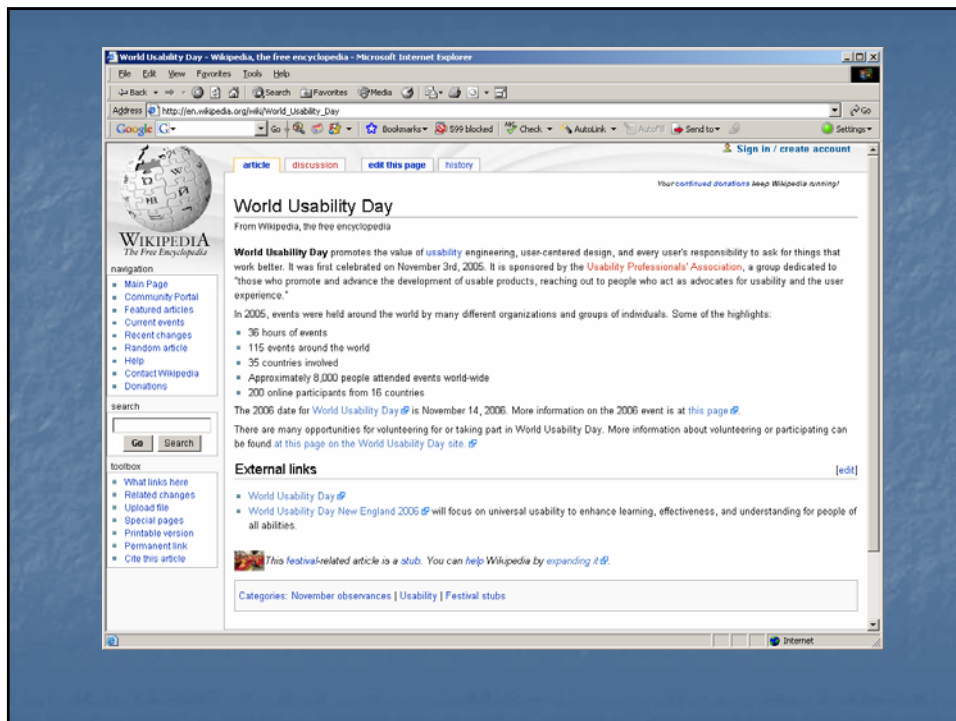
- Collaborative Research on Contribution to On-Line Communities
- MINTS – HIV-prevention study of Internet Latino Men

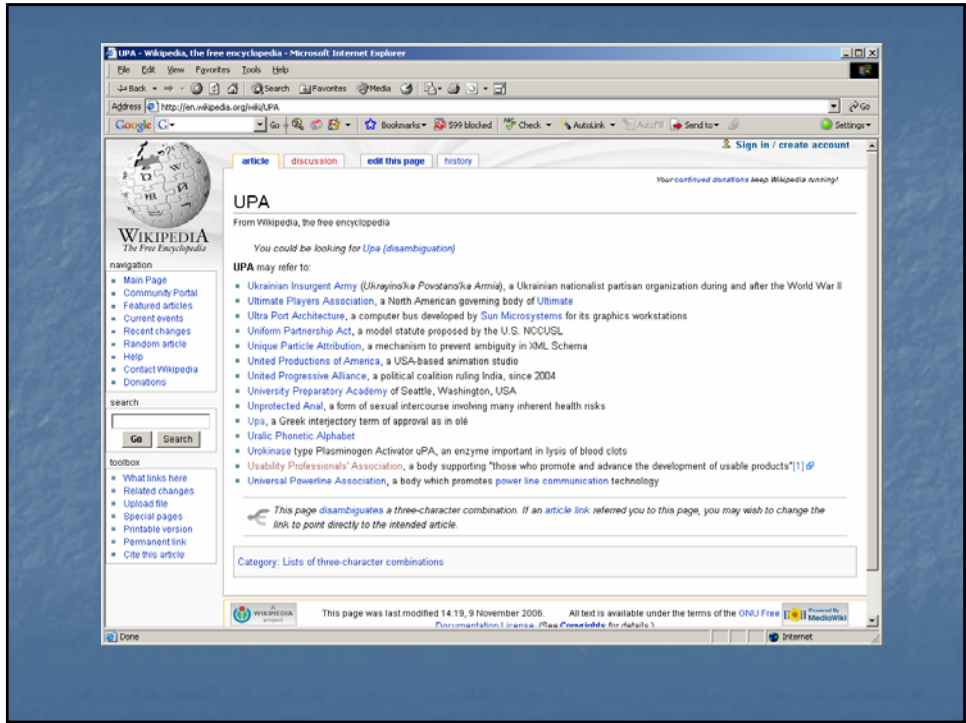
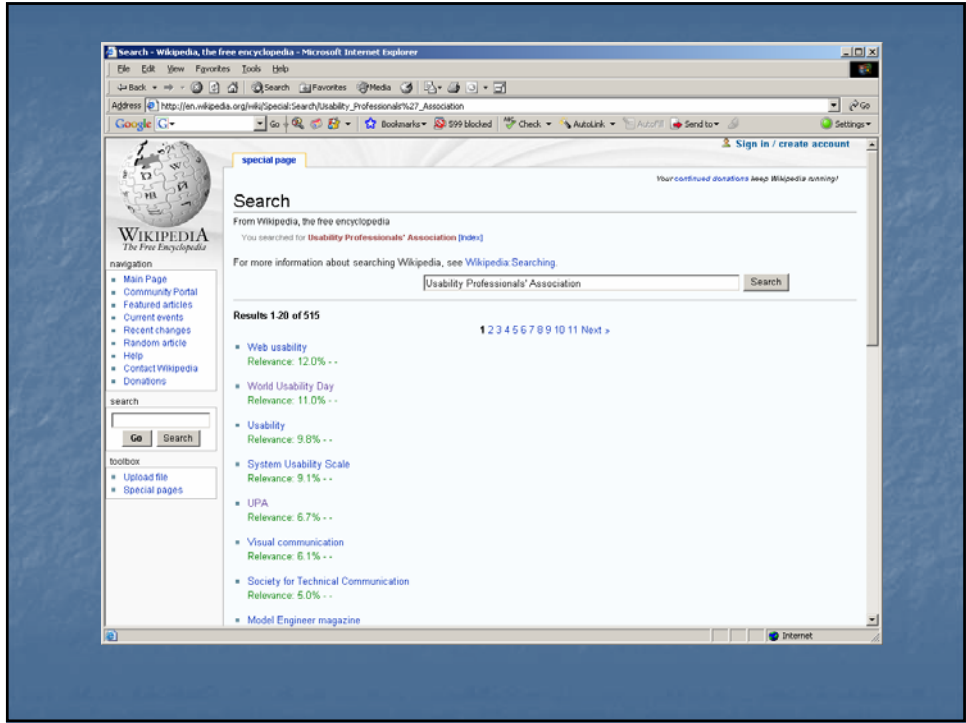
Research Goals

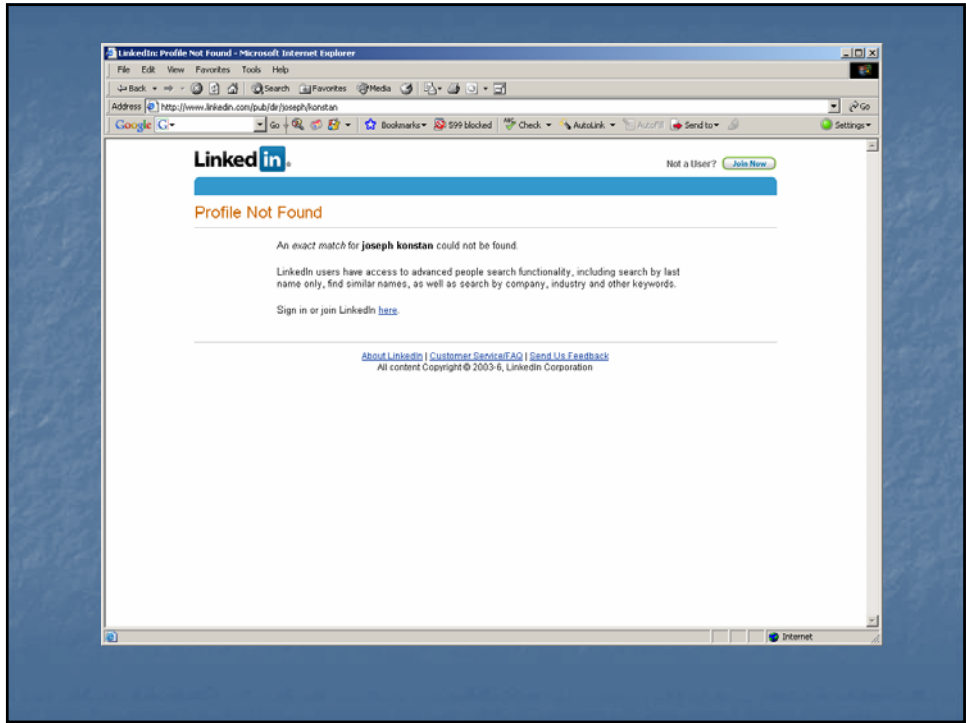
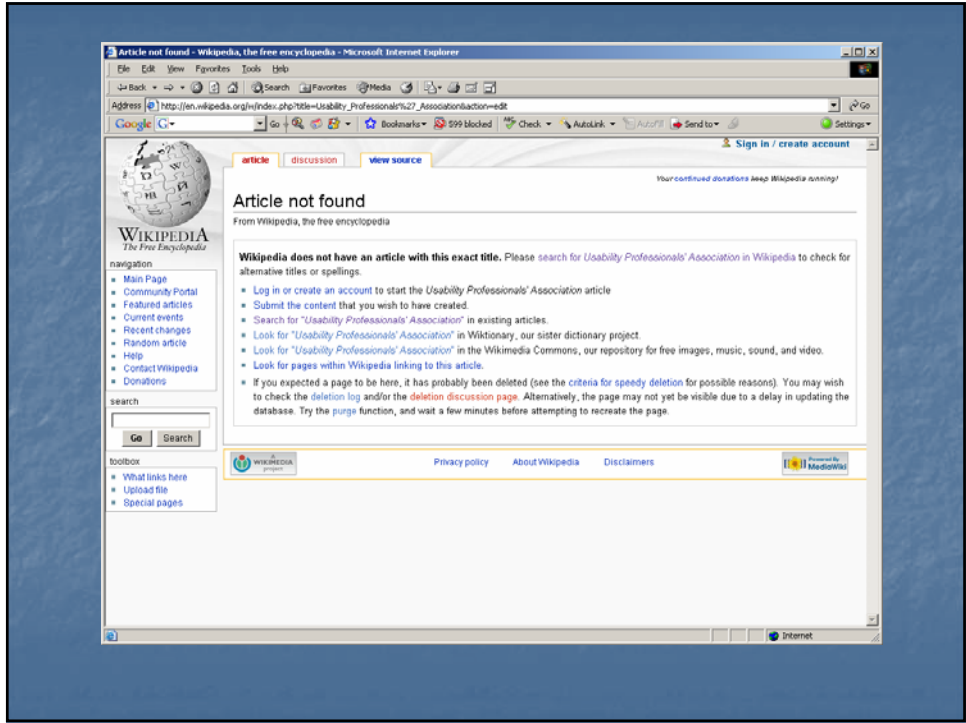
- Build an understanding of how to elicit “optimal” participation in on-line communities
 - Test off-line theories in on-line context
 - Resolve cases where theories make conflicting predictions
- Deliver mid-level theory in the form of a “designer’s guide” for on-line communities

Why Does this Matter?

- *Bowling Alone*







Why Does this Matter?

- *Bowling Alone*
- Open-Source Movement
- Community Action

Can Design Help?

- That's what we're trying to find out!

Types of Design Factors

- Visibility of Identity
- Status
 - Private or public
- Structure of Community
 - Number of members
 - Diversity
 - Self-Awareness
- Economic Structures

Types of Theory

- Social Psychology Theories
 - Identity leads to accountability
 - Affinity (liking) leads to participation
 - Uniqueness (need) leads to participation
- Economic Theories
 - Simple utility maximization
 - Inequality aversion

Usual Research Model

- Off-line analysis and experiments
 - Predict as well as possible based on historical data
- On-line user studies
 - Short-term
 - Long-term

An Initial Study

- A study of participation in discussions with two factors controlled
 - Similarity of tastes
 - Awareness of own uniqueness
- Results
 - Dissimilarity increased contribution
 - Awareness of own uniqueness increased contribution
 - Active discussants were not highly-active raters
 - Participants rated more than a control group

Other Projects

- Member-Maintained Communities
 - What happens when you let the masses maintain the database?
- Social Preference
 - Using economic models to study user behavior
- Value of Information Analysis
 - Individual influence
 - Balancing community and individual value
- MovieLens MovieNight

Member-maintained community

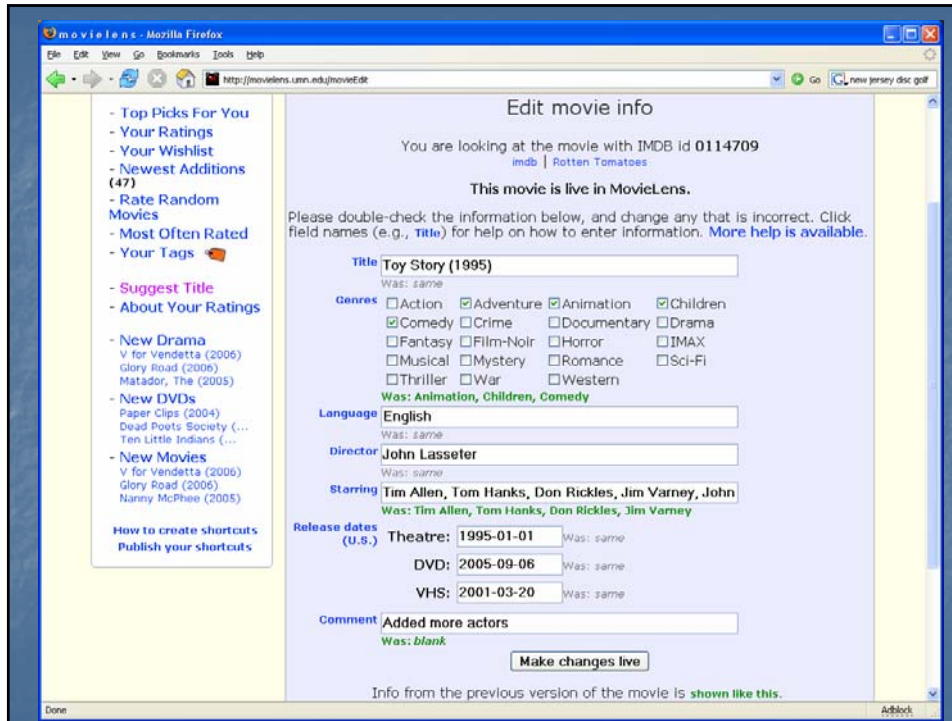
- Broad notion of online community
 - People interacting online
 - Directly or indirectly
- Member-maintained
 - Normally, few perform upkeep (Butler et al. 2005)
 - Why not many?

The virtues of the many

- Scale (Slashdot 2003)
- Speed (Viégas et al. 2004)
- Robustness against change
- Direction-setting (but, see Dibbel 1998 on LambdaMOO)

Two fundamental challenges

- Quality of contributions
 - Designing review mechanisms
 - Who can review, when?
- Quantity of contributions
 - Helping people find tasks
 - Intelligent task routing



Designing contribution review

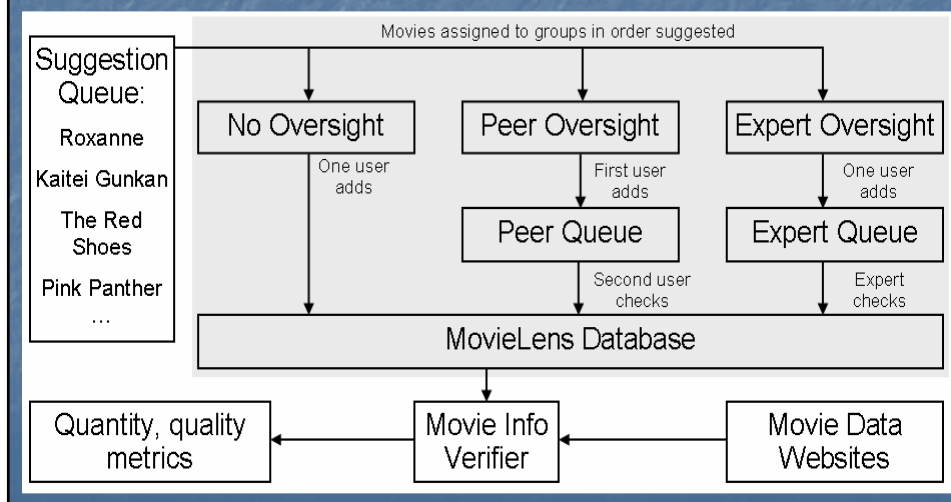
- Editorial oversight improves quality
 - Journalism
 - Peer review
- Wikipedia foregrounds questions
 - Who can review?
 - When to review?

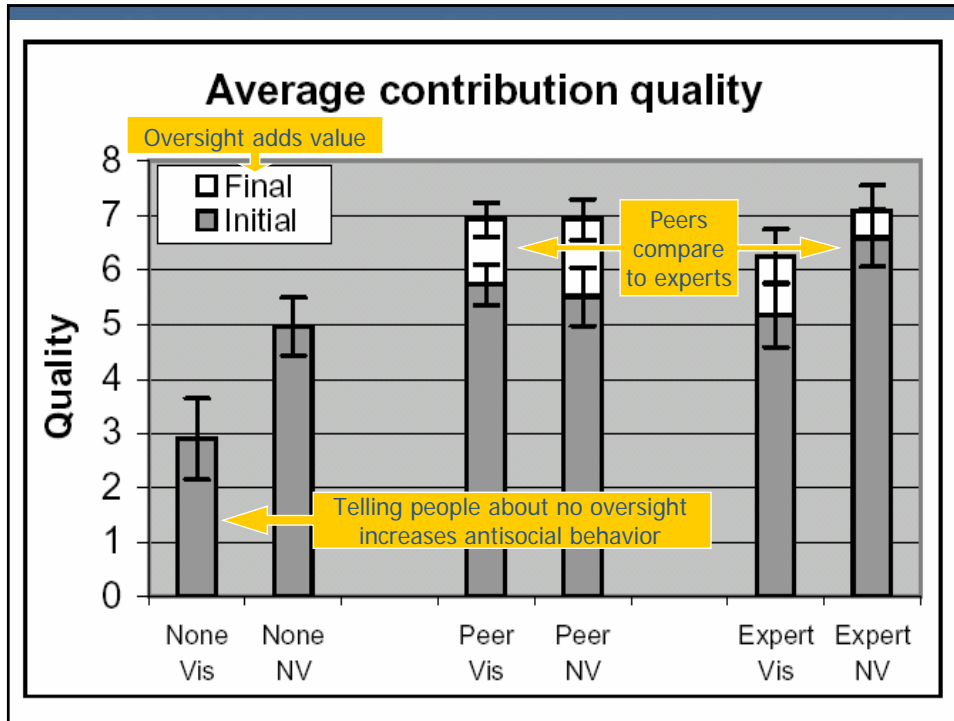
Who can review?

(Cosley et al., CHI05)

- Can peers do as well as experts?
- Task: add movies to MovieLens
- Hypothesis: Review increases motivation
- Design: 3 x 2
 - Level of review
 - Visibility of mechanism

Who can review overview



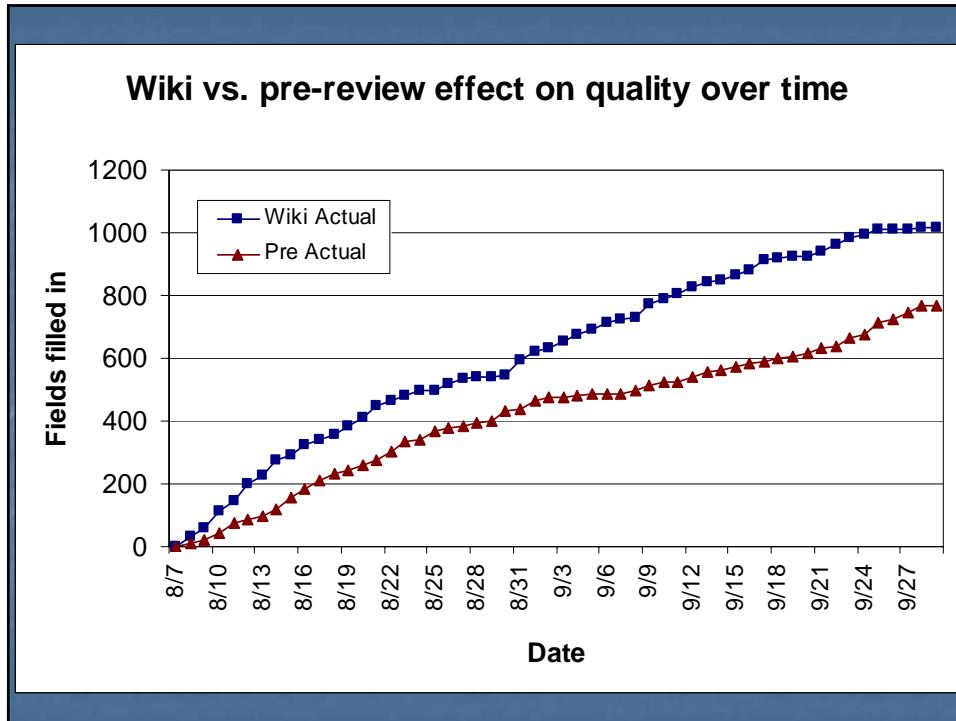


When to review

(Cosley et al., CHI 2006)

- Should contributions be visible before they are reviewed?

- Task: editing movies
 - Pre-review
 - Post-review ("Wiki-like")



Modeling review timing

- Multiple ways of knowing
- Increase generality
- Value simplicity (Axelrod 1985)
 - Many assumptions, clearly stated
 - Assumptions = design opportunities

Value changes over time

- DB value = sum of item values
- Value changes over time
- Some work helps, some hurts

$$V_{t+1} = V_t + G_t - B_t$$

Modeling Wiki-like's behavior

- DB value = sum of item values
- Value changes over time
- Some work helps, some hurts
- Tasks become harder to find as the database reaches its maximum value

$$V_{t+1} = V_t + (1 - P_t)\gamma - P_t\beta$$

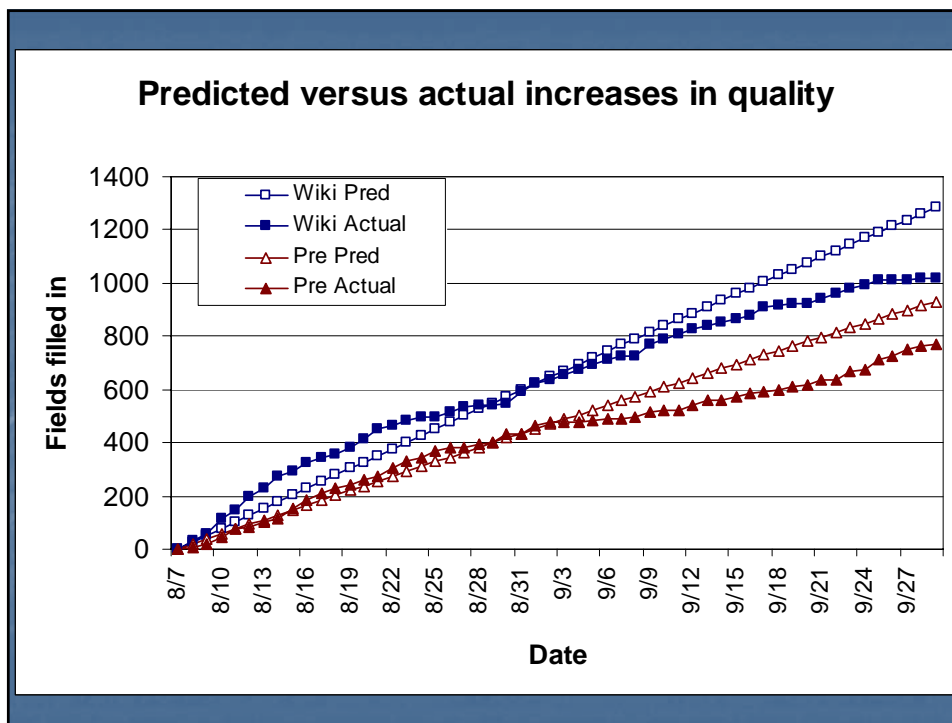
Proportion of maximum DB value

Pre-review imposes costs

- Some work is wasted
- Two people per completed contribution

$$V_{t+1} = V_t + \frac{1}{2} \frac{((1 - P_t)\gamma)^2 - (P_t\beta)^2}{(1 - P_t)\gamma + P_t\beta}$$

- Prediction: Wiki-like adds value faster



Equilibrium is the same

- Long-term, pre-review = Wiki-like
 - Again, provable
 - But, Wiki-like gets there faster
- Contributors determine value
 - Not surprising, but... surprising!
 - But, mechanism might affect *contributors*
- Needs to be validated

This is where you should get skeptical!

Economic Modeling of Contribution

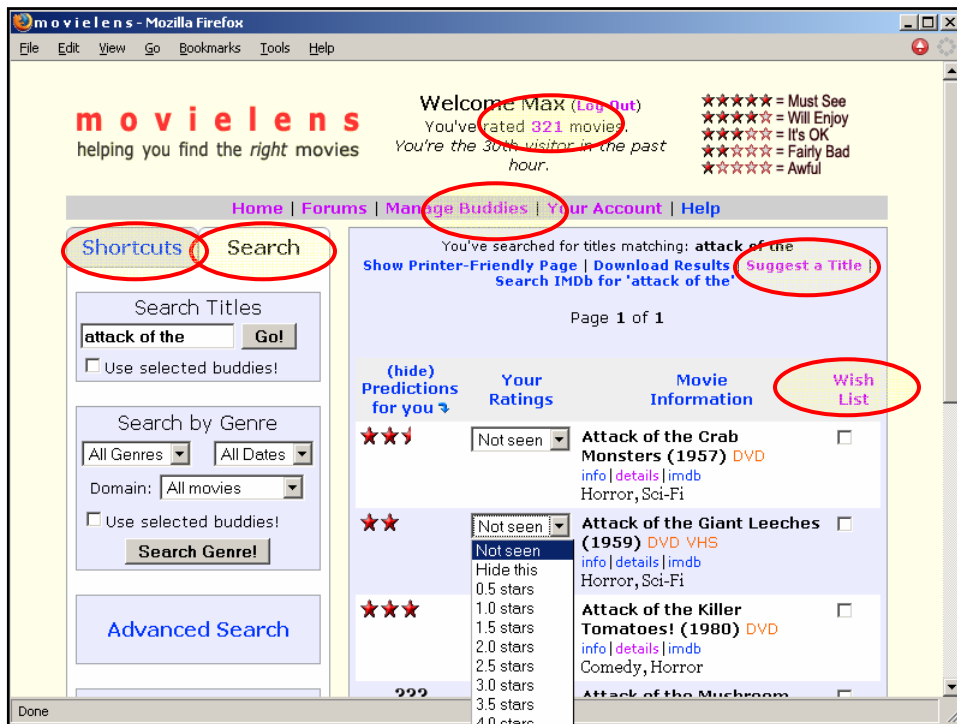
(Harper et al., UM 2005)

Social Preference Experiment

- Can we model user incentive for contributing to MovieLens?
- Can we use this model to create personalized messages to influence user behavior?
- Can we study which theories best predict behavior change?

Preliminary Model

- Benefit: prediction quality
 - Can be improved by rating
 - Diminishing returns
- Cost: time to rate
 - Increases over time (new movies harder to find)
- Rational agent will optimize



Improving the Model

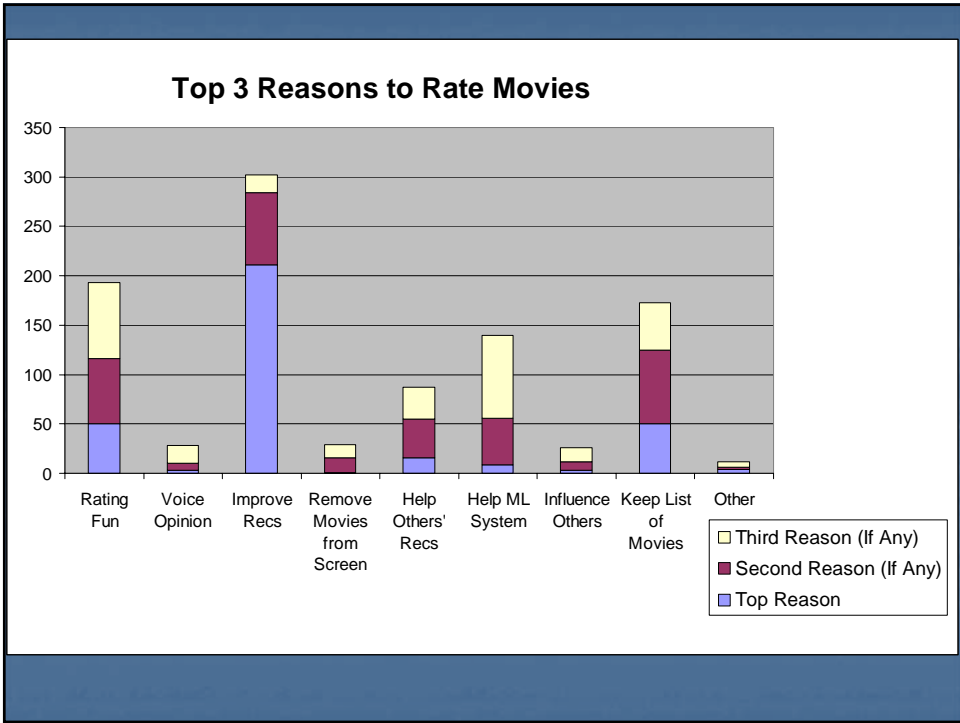
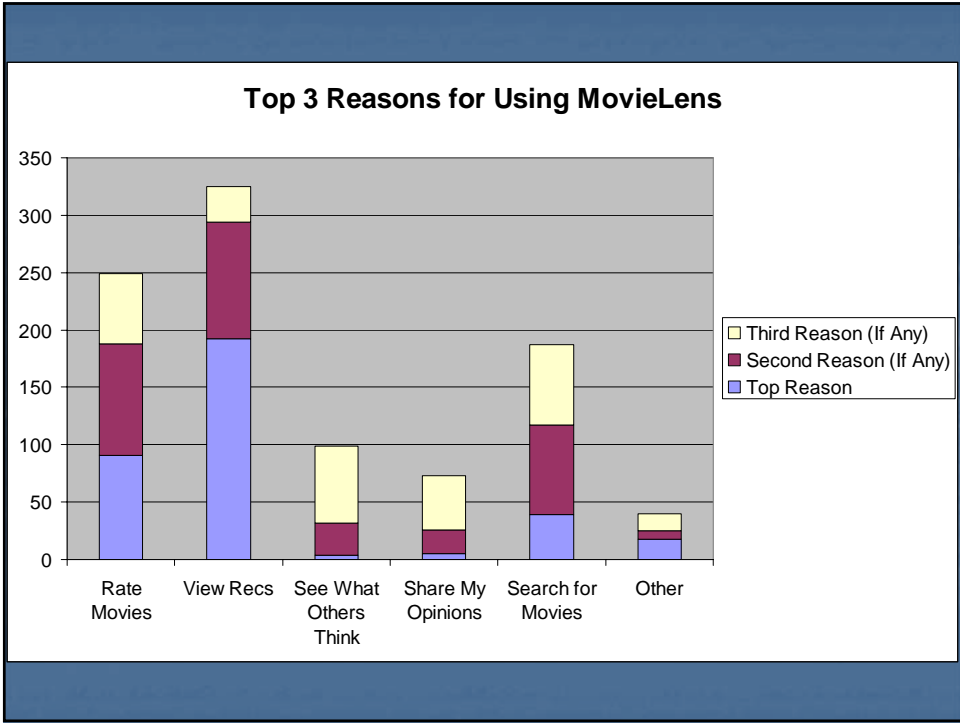
- Check intuitions, learn motivations
 - Survey users
- Bottom-up, iterative approach:
 - Collect behavioral data
 - Hypothesize about effects
 - Build a new model
 - Lather, rinse, repeat

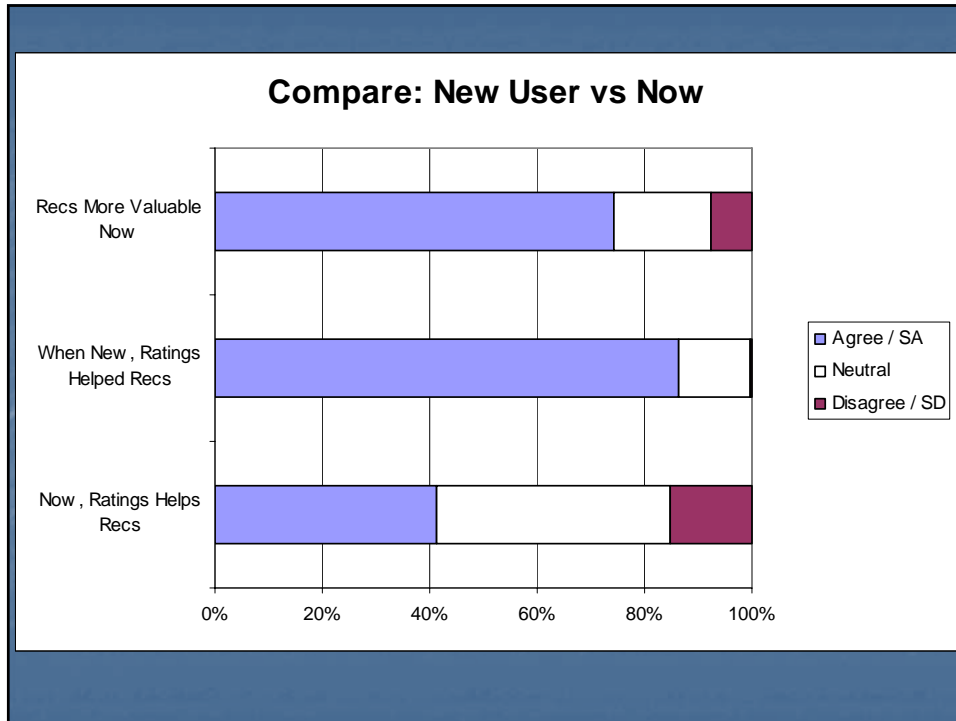
Improving the Model

- User study: entry criteria
 - 30 or more ratings
 - At least 3 separate logins
- 358 MovieLens users
 - mostly happy users
 - mostly power users...
 - >3/4 in the top quarter of users in terms of # ratings

Improving the Model

- Survey data
 - Online survey
 - 7 multi-part questions
 - ~10 minutes
 - Examples:
 - "Rank your top 3 reasons to rate movies"
 - "How much would you pay to receive MovieLens recommendations?"
 - "Is rating movies fun?"
- Survey questions and results are at:
<http://www.grouplens.org/data/mlsurvey0604.html>





Survey Insights

- Some beliefs confirmed
 - Quality of recommendations matter
 - Recommendations get noticeably better over time
- Some new knowledge
 - Effects on others not too important
 - Rating things is fun

Improving the Model

- Behavioral Data
 - Examples:
 - "How many times have you logged in during the past 3 months?"
 - "How accurate have your recent predictions been?"
 - "How mainstream are your movie tastes?"

Calibrated Model

ratings

$$\ln x_i = a_0 + a_1 \gamma_i + a_2 \beta_i + a_3 f_i + a_4 c_i + \vec{\Lambda} \vec{Z} + \varepsilon_i.$$

"Benefit"

"Taste"

"Fun"

"Cost"

Controls

Marginal Benefit (1/2)

$$\ln x_i = a_0 + a_1 \gamma_i + a_2 \beta_i + a_3 f_i + a_4 c_i + \vec{\Lambda} \vec{Z} + \varepsilon_i.$$

- Benefit from recommendation quality
 - Survey: Oops! Users didn't like \$\$.
 - No useful direct measure
 - Estimate with other data, instead
- What's the scale? How do you use the data?
 - Well, we combined several variables...

Marginal Benefit (2/2)

$$\ln x_i = a_0 + a_1 \gamma_i + a_2 \beta_i + a_3 f_i + a_4 c_i + \vec{\Lambda} \vec{Z} + \varepsilon_i.$$

- Survey
 - (+) Frequency, use ML to pick movies to watch
 - (+) Frequency, search for a movie
 - (-) Frequency, look only at first screen of recommendations
 - (+) Frequency, look at 5+ screens of recommendations
- Behavior
 - (+) # "hide this" ratings
 - (+) # saved searches (i.e. custom searches)

Results

- Regression Analysis
 - Adjusted $R^2 = .342$
 - $p = <.001$
- Behavior-only model possible

Many More Steps ...

- But the key point is:
 - Design influences behavior!
 - Design includes the UI, but goes beyond it too.
 - Knowledge of human behavior influences good design.

MINTS – On-Line HIV Research

- Large NIH-funded project
 - Simon Rosser, PI, School of Public Health
 - Epidemiology
 - Co-Investigators from Medical School
 - Family Practice and Community Health
 - Program in Human Sexuality
 - Co-Investigators from Rhetoric
 - Co-Investigators from Education
 - Curriculum/Instruction
 - Co-Investigators from Computer Science
 - Outside experts (including community experts)

Background

- MINTS – Men's Internet Study
- Phase I – Assessment of MSM HIV risk for internet-using Latinos
 - Over 1000 valid subjects
- Phase II – Assessment of MSM HIV risk across US populations; develop and study Internet-based intervention
 - Approximately 3000 subjects

Five Acts Were Good Enough for Shakespeare

- Design and Informed Consent
- Data Integrity
 - the Evil Subject Naught
 - the Gang of 52
- A Few "Content" Lessons from Phase I
- Lessons Learned about on-line Surveys
- A Glimpse at the MINTS-II Intervention


Design and Informed Consent

- Trust
- Ethical Behavior
- Attractiveness
- Bilingual Equivalency
 - Forward and back translated
 - Pilot tested for equivalency

Recruitment

We started by wanting to recruit 1,000 Internet-using Latino MSM
Using banner advertisements at 3 layers of gay.com

 Estudio sobre sexo/internet para hombres latinos
Haga click aqui y gane \$20
Universidad de Minnesota

 Estudio sobre sexo/internet para hombres latinos
Haga click aqui y gane \$20
Universidad de Minnesota

 Latino Men's Internet Sex Study
Click here and earn \$20 on-line
University of Minnesota

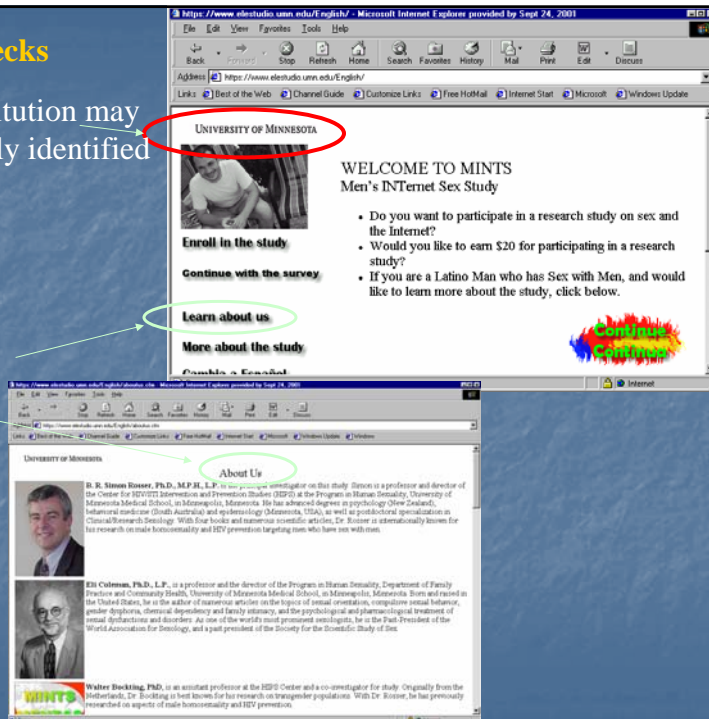
 Latino Men's Internet Sex Study
Click here to Earn \$20
University of Minnesota

- “Bullet point language.”
- e.g. 5 words to establish credibility.
- “Instant” decision making is more similar to market research than conventional studies

Credibility Checks

Sponsoring institution may need to be clearly identified and promoted.

Information on the researchers may require more researcher disclosure than in conventional studies



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WELCOME TO MINTS
Men's INternet Sex Study

- Do you want to participate in a research study on sex and the Internet?
- Would you like to earn \$20 for participating in a research study?
- If you are a Latino Man who has Sex with Men, and would like to learn more about the study, click below.

Enroll in the study

Continue with the survey

Learn about us

More about the study

Combo a Enroll

UNIVERSITY OF MINNESOTA

About Us

Dr. B. Simon Bauer, Ph.D., M.P.H., L.P. is a principal investigator on this study. Simon is a professor and director of the Center for HIV/STI Intervention and Prevention Studies (CEIPS) at the Program in Human Sexuality, University of Minnesota Medical School, in Minneapolis, Minnesota. He has advanced degrees in psychology (New Zealand), behavioral medicine (South Australia) and epidemiology (Massachusetts, USA), as well as postdoctoral specializations in Clinical Research Sexology. With Dr. Bauer and numerous scientific articles, Dr. Bauer is internationally known for his research on male homosexuality and HIV prevention targeting men who have sex with men.

Dr. Coleman, Ph.D., L.P. is a professor and the director of the Program in Human Sexuality, Department of Family Practice and Community Health, University of Minnesota Medical School, in Minneapolis, Minnesota. Born and raised in the United States, he is the author of numerous articles on the topics of sexual orientation, compulsive sexual behavior, gender dysphoria, chemical dependency and family systems, and the psychological and pharmacological treatment of sexual dysfunctions and disorders. As one of the world's most prominent sexologists, he is the Past-President of the World Association for Sexology, and a past president of the Society for the Scientific Study of Sex.

Walter Bockting, Ph.D. is an assistant professor at the CEIPS Center and a co-investigator for study. Originally from the Netherlands, Dr. Bockting is best known for his research on transgender populations. With Dr. Bauer, he has previously researched on aspects of male homosexuality and HIV prevention.


Informed Consent Online

- Online reading different from print
 - Jumping around, hypertextual
 - Skimming, not reading
 - Bullets, not sentences
 - Nobody reads long consent forms
 - Harder to read on screen
- Solution: Chunked consent with active consent statements

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We started with a welcome page which briefly summarized the points of key interest

Best of the Web Channel Guide Electronic Links Microsoft Internet Explorer Microsoft Windows Update Windows

 Welcome

You are invited to be in a study examining the sexual behavior, attitudes, and beliefs of Internet-using, Latino, Men who have Sex with Men (MSM) who live in the United States. This includes men who may consider themselves gay, bisexual, or straight (heterosexual).

WHAT IS THE PURPOSE OF THE STUDY?

The purpose of the study is to better understand the risk behaviors of Latino men who use the Internet and how meeting other men for sex on the Internet influences our safer sex decisions. The information we get from this study will help us to design a new HIV prevention program for this population.

WILL I BE PAID?

Yes, participants will receive \$20 for completing the on-line survey.

WHO IS CONDUCTING THE STUDY?

This study is being conducted by Dr. Simon Rosser, Ph.D., M.P.H., and a team of investigators at the Center for HIVSTI Intervention and Prevention Studies (HIPS) at the Program in Human Sexuality, Department of Family Practice and Community Health, University of Minnesota Medical School. Your decision about whether or not to participate will not influence your future relations with the University of Minnesota or any other organization or agency connected with this research project. For more about the study investigators see [who we are](#).

CHECK TO SEE IF YOU ARE ELIGIBLE TO PARTICIPATE:

Yes No

Internet time may be faster than real life time. For this reason, we brought our eligibility criteria forward so we did not waste non-eligible persons' time.

CHECK TO SEE IF YOU ARE ELIGIBLE TO PARTICIPATE:

<input type="radio"/> Yes <input type="radio"/> No	I am male. This includes all biological males and anyone currently identifying as male.
<input type="radio"/> Yes <input type="radio"/> No	I am Latino. This includes men who identify as Hispanic Chicano, Mexican-American, Caribbean, or Latino. The definition we are using is a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
<input type="radio"/> Yes <input type="radio"/> No	I am 18 or more years old. This is an adults-only website. If you are not 18 years old, you must leave this site now.
<input type="radio"/> Yes <input type="radio"/> No	I have had sex, meaning any kind of sexual contact, with at least one other man. All men who have sex with men, not just gay and bisexual men, are welcome to participate.
<input type="radio"/> Yes <input type="radio"/> No	I currently live in the United States, including Puerto Rico and Hawaii, regardless of legal status.
<input type="radio"/> Yes <input type="radio"/> No	I understand that I will be asked some questions about sex and sex with other men.
<input type="radio"/> Yes <input type="radio"/> No	I have not filled in the study before. It is very important that you only complete the study once. (If you are returning to complete the study, please click here.)
<input type="button" value="I click to affirm I am eligible to enter this study"/>	
<input type="button" value="← Exit the study"/>	


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File *Chunking Consent: How Internet consent differs from conventional*

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WHAT WILL I BE ASKED TO DO AS A STUDY PARTICIPANT?

If you agree to participate in the study, we will ask you to enroll in the study. You will then be asked to answer about 200 questions online about your experiences, attitudes, and beliefs concerning sexuality, drug use, and related issues. These questions will take you about 45 minutes to answer.

I understand I will be asked questions about my sexuality, drug use and related issues.

If you have any problems during the study, please contact RESEARCH@mintsonline.umn.edu

Design considerations: Note common use large portions of white space to focus

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I understand I will be asked questions about my sexuality, drug use and related issues.

I CONSENT and wish to enter the study →

← I DO NOT CONSENT and wish to leave the study

[General Privacy Statement](#)

If you have any problems during the study, please contact the study coordinator, Jeffrey Stanton (phone: 800-715-5864, email: MINTS@mail.comosedice.umn.edu), the principal investigator, Professor Simon Rosser (email: rosse001@tc.umn.edu), or the University of Minnesota Research Subjects' Advocate line (phone: 612-625-1650, email: irb@umn.edu).

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Technical communication: short, direct sentences; avoid nuances.

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We used brief descriptions summarized by short 1-sentence summaries in different colors.

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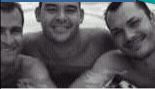
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Chunk 2: WHAT ARE THE RISKS AND BENEFITS OF PARTICIPATION?



Benefits. Some men may find that this study helps them to think about HIV, the Internet, and the importance of safer sex. Also some men feel good about participating in research studies.

Risks. If you find that being asked questions about sex is embarrassing, you may feel uneasy about answering certain personal questions on the survey. We need to ask these questions in order to complete the study, but this study is entirely voluntary. So, you can choose not to answer any question, to stop at any time, or to pause and come back later to finish the survey.

If you are particularly concerned about confidentiality, then [Click Here](#) for more information on how to best keep your answers confidential.

I understand the benefits and risks for this study as outlined above

I CONSENT and wish to enter the study →

← I DO NOT CONSENT and wish to leave the study

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Chunk 3: WILL I BE IDENTIFIED?



No. We do not require you to provide any information that identifies you. We do ask you for your zip code and birthdate to make up a unique identifier that only you will know. This is necessary to register for the study. We will also ask you to provide an email address so we can contact you if there are any problems during the study. All email addresses will be deleted at the end of the study. Because we are asking sensitive questions, we have obtained a Certificate of Confidentiality from the National Institutes of Health. The researchers will use this certificate to challenge any demands for information that would identify you. For more information, press [here](#).

I understand that the study is confidential, and that only an email address will be used to contact me during the study

I CONSENT and wish to enter the study →

← I DO NOT CONSENT and wish to leave the study

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Sample Integrity

- Risks
 - Reaching a non-representative audience
 - Validate demographics (e.g., compare with census data)
 - Slow recruitment (too easy to get thousands of subjects before weekend)
 - Understand demographics
 - Cheating (multiple surveys)

MINTS-I Data

47,495,771 banner ads displayed on gay.com	
33,024 click-throughs, indicating visits to the study site	
1742 enrollments – completion of eligibility screening and consent	
1150 completed surveys	
1026 surveys deemed valid and complete	
18 of these surveys are first completions by people who later completed one or more additional surveys	
119 repeat surveys (second or later complete survey from a single subject)	
65 surveys from 'Subject Naught'	54 surveys from 17 other repeaters
5 surveys from participants deemed ineligible to participate	
3 evidence of non-Latino identity	2 evidence of non-US residence
534 incomplete surveys, therefore rejected	
520 surveys deemed incomplete but otherwise valid (from a unique person)	
14 surveys deemed incomplete and invalid (repeat submission)	
58 surveys not started (did not answer any questions)	

What Happened?

- Significant duplicates submissions
 - Attempts to get compensation
- How were they detected?
 - Payment paper trail
 - IP address range
 - Time-to-completion
- Would it have mattered?
 - Yes – changed results!!!!

MINTS II – Aim I

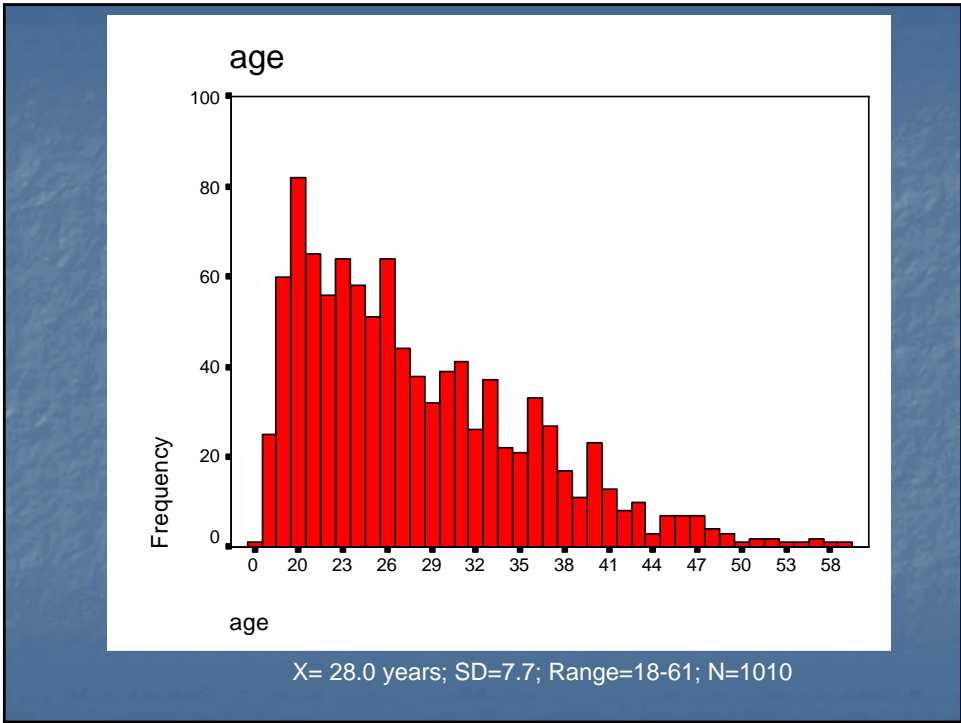
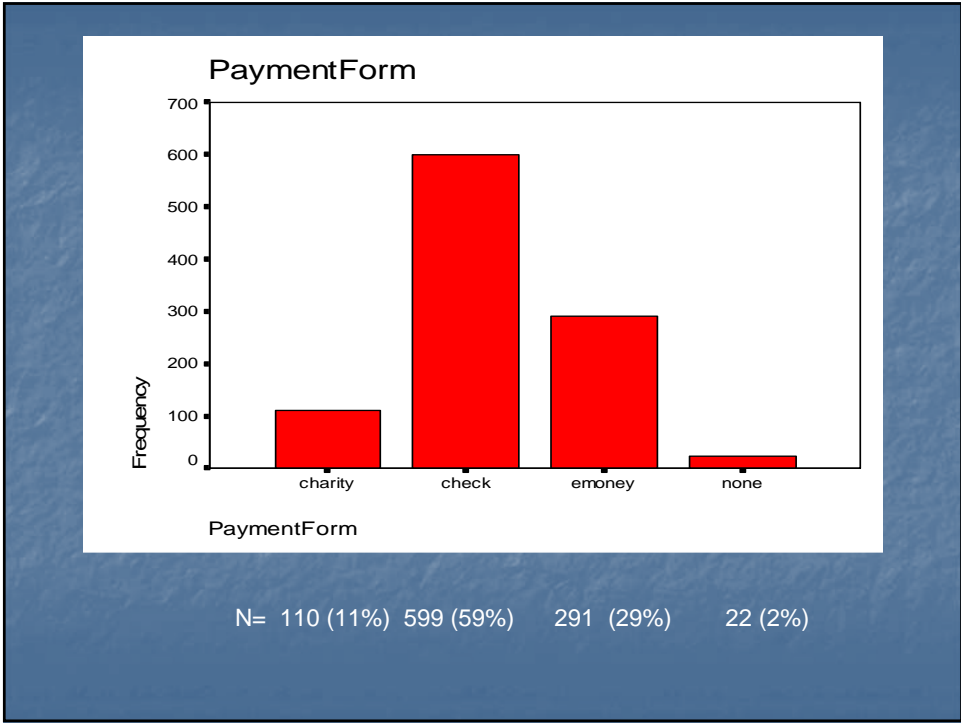
- Still too early for final data, but ...
 - Over 150 subjects (out of 3000 completers) invalidated for evidence of being duplicates
 - The Gang of 52
 - A gut feeling (this is not the same as evidence, after all evidence can be wrong!) that duplicates increased when we increased compensation

Validity Concerns

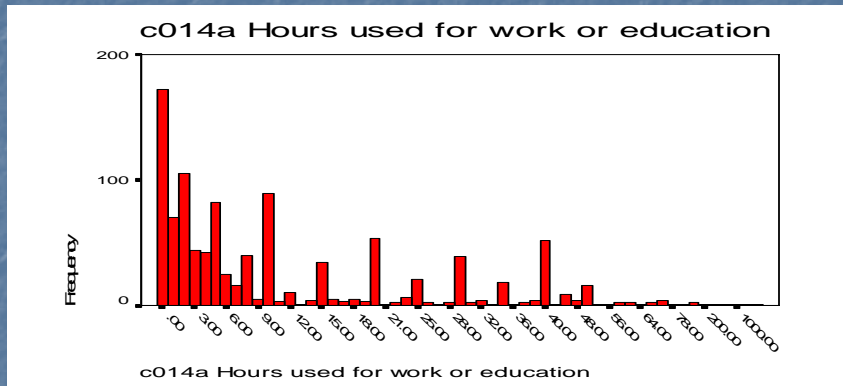
- Automated inspection shows numerous examples of inconsistent data
 - Age mismatch from enrollment to completion
 - Bogus data for some numeric fields (e.g., age = 4)
- Hypothesis (still being tested): attention and validity wane over a long survey
- Caveat – this is a very long internet survey
- Caveat #2 – users expect short!

A Few Interesting Results

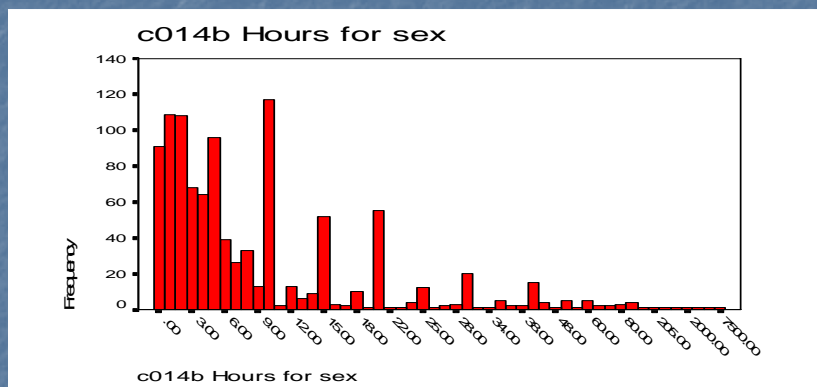
- In the spirit of understanding people ...



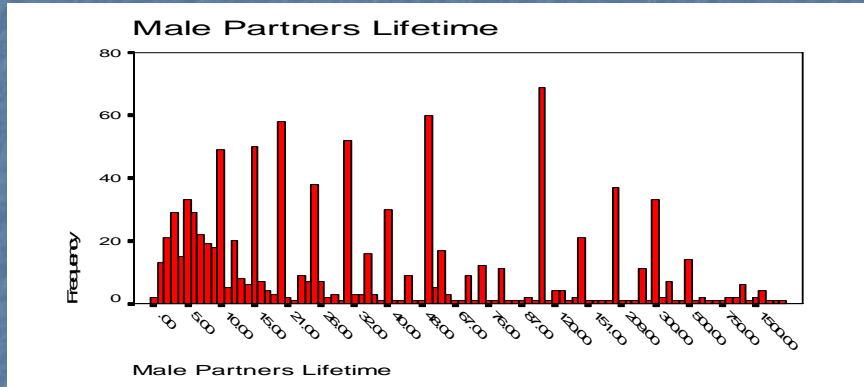
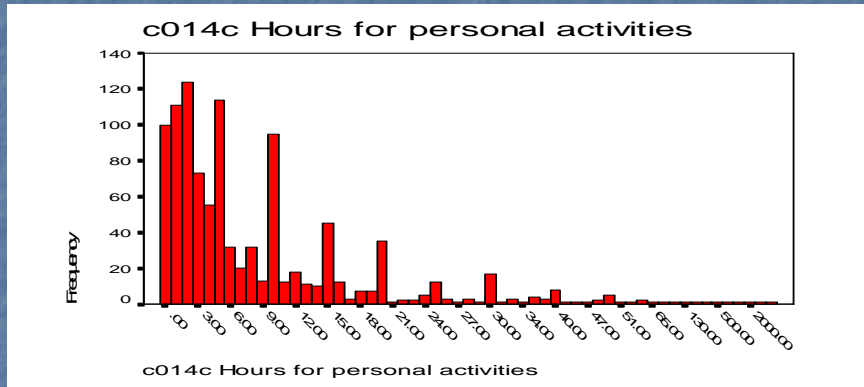
Hours of Internet Use: For Education



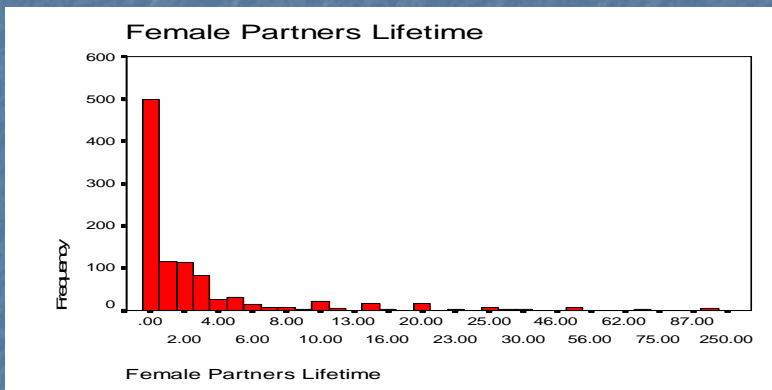
Hours of Internet Use for Sex



Hours of Internet Use for Other (Nonsexual) Activities

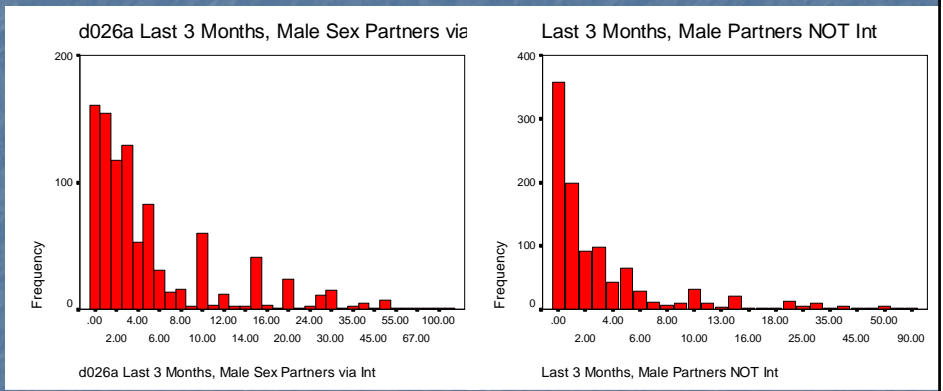


N=972; X=103.7; SD=309.2; R=0-5,000



N=997; X=4.0; SD=13.3; R=0-250.

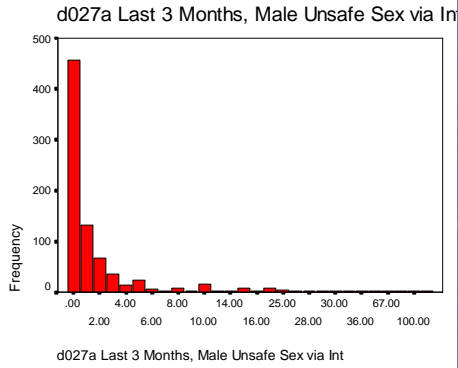
In the last 3 months, number of male sex partners by and not by the internet.



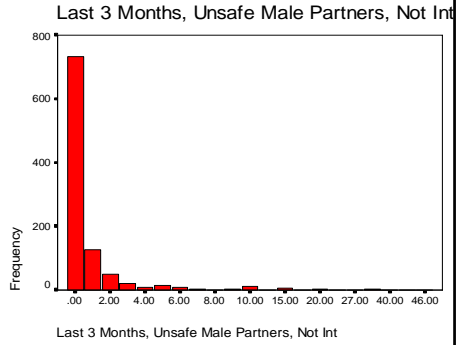
N=958; X=6.1; SD=11.2; R=0-200.

N=1020; X=3.7; SD=7.6; R=0-90.

Comparison of number of male partners, unsafe sex met via the Internet and Met conventionally.

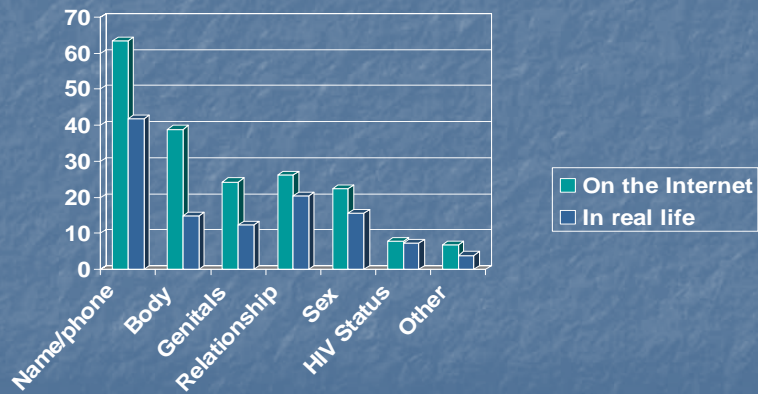


N=794; X=2.5 SD=10.3; R=0-200.



N=999; X=1.1; SD=3.8; R=0-46.

Lying on the Internet and in Real Life



Obvious, In Retrospect

- For subject #1, online is much harder than offline
 - Automating common sense
 - Tools still inadequate
 - Hard to change on the fly
 - Need for human monitoring
- Crossover somewhere in the thousands
 - Small marginal effort
 - Broader recruitment base

Thoughts Going Forward

- We really need to understand the nature and distribution of unreliability in internet studies
- When does larger sample size or reach outweigh reduced individual reliability
- I'd love to study incentives for attentive/reliable/accurate data

A Glimpse at the Future

- The MINTS-II Intervention
- co-Developed with experts in education, interactive media, sexology, public health
- Will be tested through a randomized clinical trial to assess reduction in sexual risk taking over 12 months
- Grounded in the Sexual Health Model, and based on a successful in-person workshop

Demo

Conclusions

- Challenging problems
- Need for Interdisciplinary Collaboration
- Broad Approaches to Understanding and Designing for Humans
- Broad Notion of User Experience

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