HCI to HII (HCC): From Limen to Ligature

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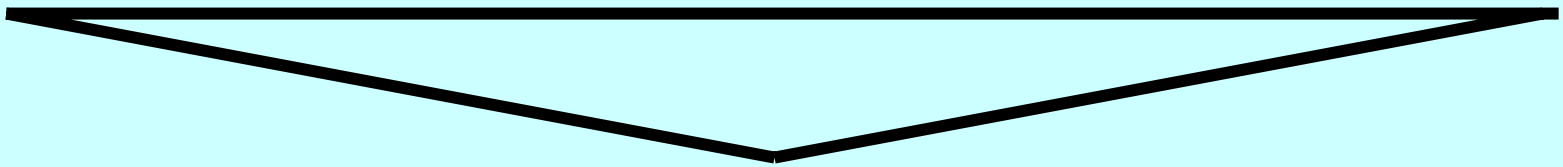
Outline

- HCI evolving from a peripheral add on to the core of cyberinfrastructure
- Information and interaction focus
- Open Video case

Human-Centered Computing Evolution

- Field
  - From Appendages to CS and Psychology: CHI and HCI
  - To HCI as discipline (with specializations CSCW, UA, etc.)
- UMD/UNC Group
  - From HCI in hypertext and DLs ----HCIR
  - To Human Information Interaction



Cyberinfrastructure: Seamless Interaction with Information Toosl and Resources

Open Video Case

open-video.org

- Theory: Video representation and human sense making embodied in Agileviews design framework
- Practice: Build and evaluate a video DL for research and education communities
  - Build: content, database, UI
  - Visual representations (surrogates): ss, sb, ff, ex
  - Evaluation paradigm

Open Video Vision

- An open repository of video ***files*** that can be re-used in a variety of ways by the education and research communities
  - A testbed for interactive interfaces
- An easy to use DL based upon the *agile views interface design framework*
  - Multiple, cascading, easy to control views (pre, over, re, shared, peripheral)
  - Views based upon empirically validated surrogates
  - An environment for building theory of human information interaction
- A set of methods and metrics that reveal how people understand digital video through surrogates

Background & Status

- Begun 1995 with colleagues at UMD & BCPS
- NSF Funding: IIS-0099538 1999-2003; IIS-0455970 (2005-6)
- Collaborators/Contributors/other funding: I2-DSI, ibiblio, CMU, UMD, NIST, LC, Internet Archive, NASA, ACM, Google, IBM
- ~4000 video segments
- ~30000 unique visitors per month (more during school year)
- ~1.5M hits/month
- MPEG-1, MPEG-2, MPEG-4, QT
- OAI provider
- PR: Yahoo, NYT, SLMQ; dozens of project papers
- Open source tools, Creative Commons licenses
- Ongoing user studies
- All SIGCHI videos as well as all UMD HCIL videos

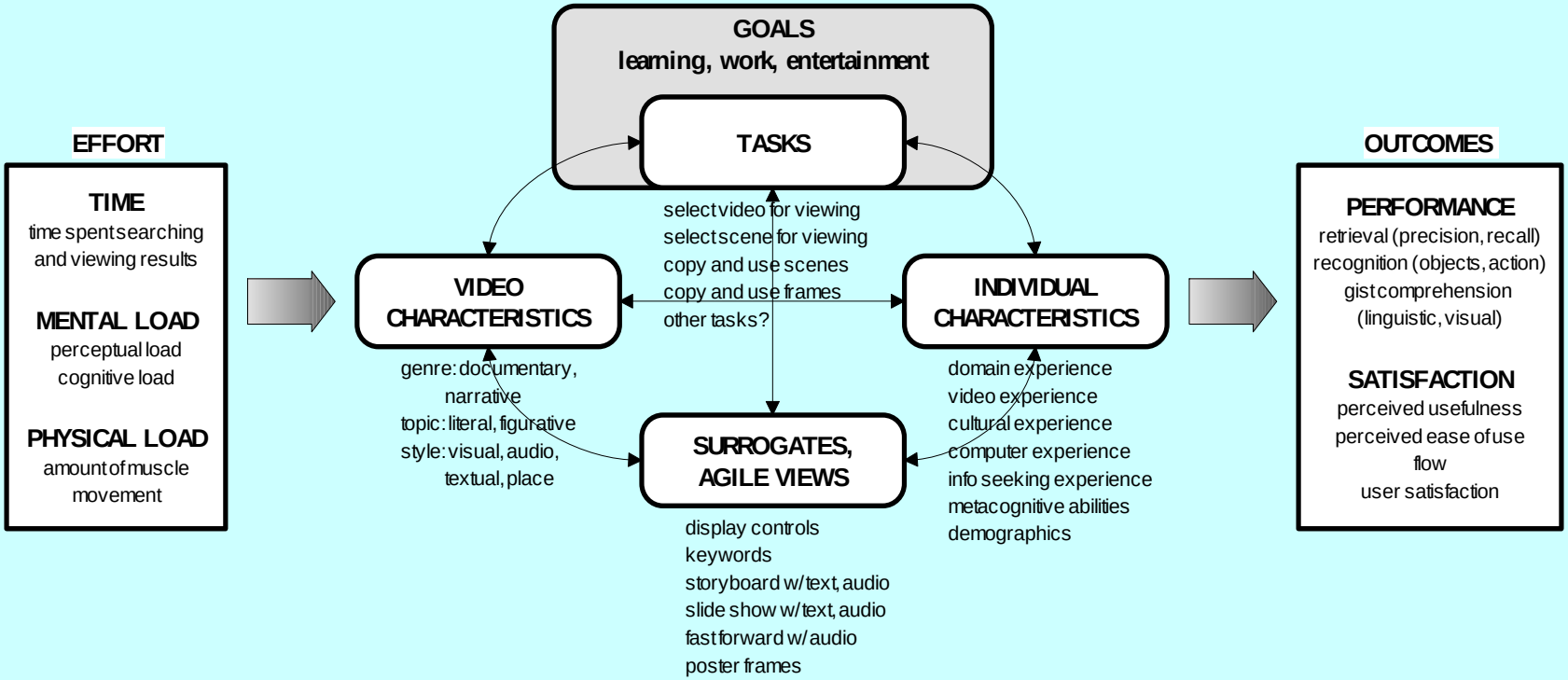
Agile Views Interface Research

- Provide a variety of access representations (e.g., indexes) and control mechanisms
- Usual search and browse capabilities
- Leverage linguistic and non-linguistic cues
- Create and test visual surrogates for overview preview, shared and history views (current emphasis shifting to audio)

Digital Video Surrogates

- Classes
  - Textual
  - Visual (slide show, storyboard, fast forward, excepts)
  - Audio
- Cost benefit analysis: maximize ‘meaning’ per unit time
  - Transmission time
  - Compaction rate
  - Cognitive processing time
- Performance vs. Preference

Research Framework (Evolved)



Quick Tour of More than a Dozen User Studies

Gary Marchionini, UNC-CH

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Exploratory Study (1999)

- What are the strengths and weaknesses of different surrogates from the users' perspective?
- Are any of the surrogates better than the others in supporting user performance?

The Surrogates

- Storyboard with text keywords (20-36 per board@ 500 ms)
- Storyboard with audio keywords
- Slide show with text keywords (250ms repeated once)
- Slide show with audio keywords
- Fast forward (~ 4X)

Method

- 7 video segments (2-10 min), 5 surrogates created for each
- 10 subjects with high video and computer experience
- Three phases (all multi-camera videotaped)
  - View full video then use 3 surrogates, repeat
    - Participant observation and debriefing
  - Do NOT view full video, use 3 surrogates, repeat
    - Participant observation and debriefing
  - Complete 3 assigned tasks with surrogates of choice
    - Think aloud and debriefing
- http://www.open-video.org/experiments/chi-2002/methods/study1.mov

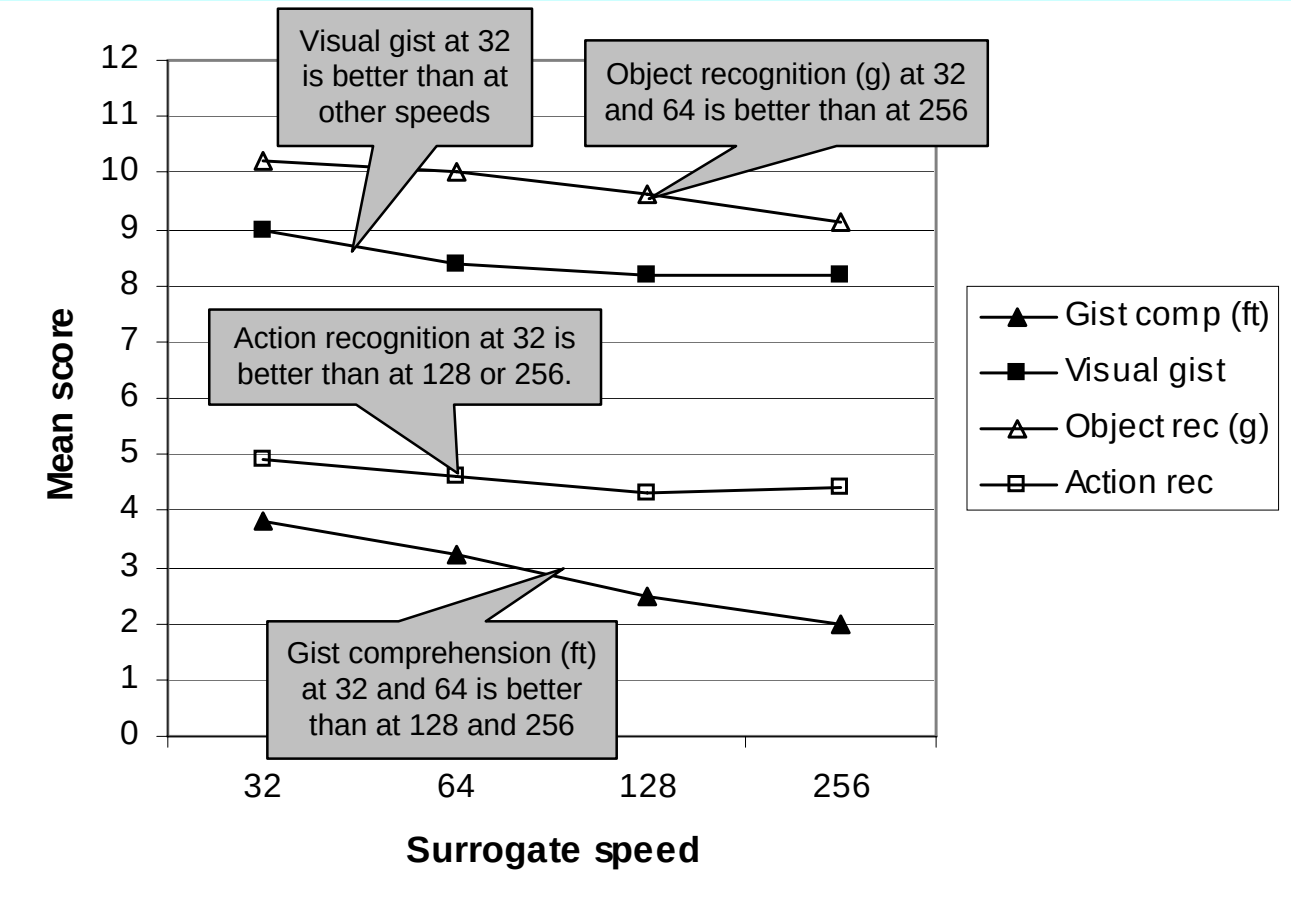
Tasks

- Gist determination—free text
- Gist determination—multiple choice
- Object recognition—textual
- Object recognition—graphical
- Action recognition (2-3 second clips)
- Visual gist—'vist' (predict which frames belong)
  - http://www.open-video.org/experiments/chi-2002/surrogates/index.html

Fast Forward Study

- How fast can we make fast forwards?
  - 4 ff conditions (32X, 64X, 128X, 256X)
  - Four video segments for each condition
  - 45 subjects (1/2 UG, 1/2 grad, 2/3 female)
  - 6 tasks (full text gist, multiple choice gist, word object recognition, graphical object recognition, action recognition, visual gist)
  - Counterbalance speed and videos
  - Web-driven experimental condition, 3-camera video tapes, single subject at a time in usability laboratory

Speed Effects on Performance



Text or Pictures?

- Research Questions:
  - Given both textual and visual metadata; which surrogate will be ***utilized***, which surrogate will be ***preferred***?
  - Does the ***placement*** of the surrogates affect how they are used?
  - Does the assigned ***task*** affect how surrogates are used?
  - Does ***personal preference*** play a role in how surrogates are used?
- Eye-tracking Study

Narrativity Study (CHI 02)

- CHI walk up kiosk, 20 people used
- 20 one-minute clips (half b&w, no audio) selected on 2 criteria: contain characters, have cause/effect relations between scenes (5 in each category)
- SRD on chars, cause, and interaction
- (ASIST 03 paper)

Shared Views and History Views Studies (02-03, Geisler dissertation)

- Evaluate AV Design Framework by instantiating and evaluating a design
- Shared (based on recommendations) and History Views (based on logs)
- Phase 1: compare OV to Views interface (28 participants). OV>accuracy; NSRD on time, but learning effect; AV>navigation/efficiency; AV>satisfaction
- Phase 2: qualitative analysis of shared and history views

VisOR study (Fall 03)

- Interface effects of automatically extracted features (TREC 02 features); 17 subjects each doing 14 search tasks
- Sliders to adjust weights of different features did not affect performance
- Keywords, indoors/outdoors and cityscape/landscape most useful
- Use of color and brightness helped with exact match searches
- General satisfaction with using different features
- (Gruss Master's paper, 2004)

Look vs Read Study (Sp 03)

- Twelve subjects think aloud while viewing results pages for five search tasks with text (titles, descriptions) or visual (3 keyframes, storyboard) surrogates
- Surrogates used differently depending on task; neither primary with considerable switching and combining (e.g., find airplane, most used visual first)
- Time a factor in deciding which to use and when
- (Hughes Master's Paper, 2004)

TREC 03 Study

- Compare transcript only, feature only, and combined surrogates with 36 subjects
- NSRD in precision across 3 surrogates, transcript only and combined yielded SR higher recall in less time and SR greater satisfaction results.

(TREC notebook; ACM MM 04)

Video Relevance Judgments

- How do people make relevance judgments for video? Qualitative study (Yang dissertation; CHI 05; ASIST 04)
  - 3 groups
    - Video editors/producers
    - Video librarians
    - Video users (professors)
- 9 visual gist attributes
- Differences across users

Other Studies

- Relative value of surrogates in context
  - Four sets of surrogates (ff, sb, excerpt, combined) compared (in analysis)
- Mu dissertation: cognitive load effects on collaborative learning with video (ISEE) Investigation of tasks
- TREC 05 study

Take Away Summary

- User studies inform good design
- Give people multiple views and easy control mechanisms
- No silver bullets (many factors determine performance and preference); people make context-dependent tradeoff decisions
- Video offers new kinds of potentials for learning and communication; do not ignore audio channel semantic richness
- Good user interfaces get used

Next Steps for OV?

- Long-term
  - How do people make sense of video?
  - How does video get integrated into interpersonal communication (mobile)?
  - OV production system sustainability and preservation?
- 2006-2009
  - Video use by teachers (Ron Brown, NASA fellowship)
  - Spanish language videos and finding aids
  - New surrogates (e.g., audio, IBM Faculty Research Award)
  - Workflow management (Gary Geisler, IMLS grant)
  - Mobile device delivery
  - Next generation agile interface
  - Curator's preservation decision template (NDIIPP grant)

HCC--HII

- Our work is no longer add on but central to human adoption
- We can adapt our lessons and techniques to other problems, (e.g., statistical data, personal health records at UNC)
- Our students are highly recruited
- How do we define research agenda that assumes HCC as central (ligament) rather than add on (limen)?