

# QoS Impact on User Perception and Understanding of Multimedia Video Clips

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## Outline

- Introduction
- Approach
- Results
- Conclusions



## Introduction

- QoS deals with *delay* and *jitter*
  - But these ignore the human element
- Human element work has looked at:
  - Thresholds beyond which no improvement to users
  - Synchronization limits for audio and video
- Human element work has not looked at:
  - Capacity to understand
  - Ability to analyze informational content



## Goal

- Look at correlation between comprehension and QoS parameters
  - Frame rate for now
- Analyze through user studies
  - Show clips to a bunch of people
    - + Vary frame rate
  - Get PQ scores
  - Ask questions to ascertain comprehension



## User Studies

- Show movie clips to users
  - MPEG-1 (352x288 pixels)
  - 31-45 seconds long
- Users told to wear glasses (if appropriate)




## User Studies

- Users told:
  - Don't let personal bias to movie influence PQ
  - Do see if general MM QoS would satisfy the clip
- Specifically, users told to look at:
  - Clarity and acceptability of audio
  - Lip synchronization during speech
  - General relationship between visual and audio message components




## Parameters

- Fixed:
  - Color depth
  - Window size
  - Audio always present
    - + Even at low bandwidth, can do audio
- Varied:
  - Frame rate: 5, 15, 25
    - + But kept same for each user
    - + 10 users at each rate
  - Movie categories (next slide)




## Considerations in Movie Selections

- Spatial parameters or Temporal parameters
  - (Assume one or the other)
  - (Called it "Dynamic")
- Importance of audio information
- Importance of video parameters
- Importance of textual information
- Assign weights on a scale of 0-2 for each



## Groupwork


- Consider movies:
  - Action movie
  - Cartoon
  - Cooking
  - Choir
  - Commercial
  - Weather
- Rate 0-2:
  - Dynamic
  - Audio importance
  - Video importance
  - Text importance
- (Don't peek)



## Video Categories


VIDEO CATEGORY	DYNAMIC	AUDIO	VIDEO	TEXT
1. Action Movie	2	1	2	0
2. Animated Movie	1	1	2	0
3. Best	1	2	1	0
4. Choir	0	2	1	0
5. Commercial	1	2	2	1
6. Cooking	0	2	2	0
7. Documentary	1	2	2	0
8. Non	0	2	2	1
9. Pop Music	1	2	2	2
10. Raggy	2	1	2	1
11. Snooker	0	1	1	2
12. Weather	0	2	2	2

(How many possible "categories"?)




## Instructions

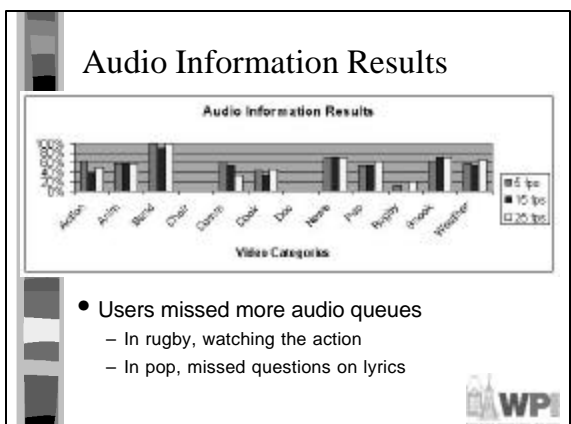
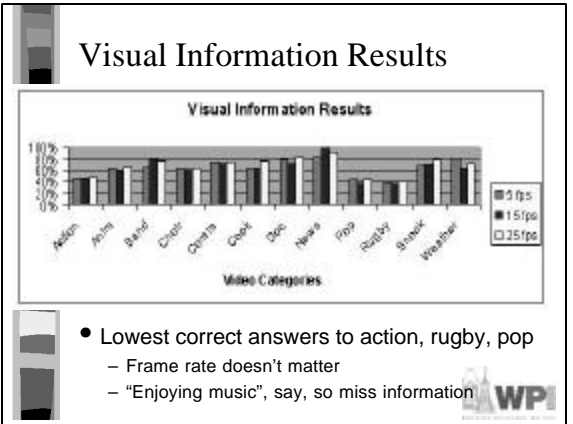
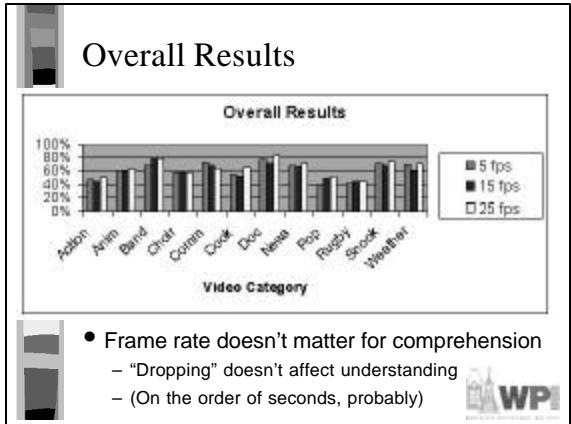
- Watch clip
- Window close
- Ask questions
- Rate clip for PQ: 1 (worst) to 6 (best)



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- ### Qualitative Results
- Snooker video
    - "What color was the pocketed ball?"
    - 'Red' ball looked brown
    - Those that watched, saw 'Red' score points
  - Commercial video (bathroom cleanser)
    - "Was the couple married?"
    - Couple was married, clue was ring
    - Users thought because of dialog and topic
  - Cooking video
    - "Were there forks?"
    - Yes, but not in a normal way ... large on wall
    - Only 30% got it right for real reason

- ### Perceptual Quality Results
- Lower the frame rate, lower the quality
    - Not linear
  - Enjoyment does not always match answering the questions correctly
  - Action got high quality
  - News got only average
    - Lip synch missing
  - Pop varied with frame rate
    - "Rich" media, maybe entertainment, needs bandwidth

- ### Conclusion
- User QoS is based on PQ plus understanding
  - Frame rate not proportional to understanding
  - Absorbing audio, video and text at the same time is difficult
    - Deliver messages in parallel
  - Relationship between PQ and understanding is complex
  - Highly dynamic scenes have a negative impact on understanding
    - But entertainment level the same
  - QoS needs
    - PQ and understanding, too

## My Conclusions

- I want to see the questions!
- Trick seems to be to make the questions all equal for each movie type
- Comparison of text across all types?



## Evaluation of Science?

- Category of Paper
- Science Evaluation (1-10)?
- Space devoted to Experiments?

