Shooting for Streaming

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Agenda

- The streaming environment
- Designing your set
- Lighting your set
- Optimizing camera controls
- Framing for streaming
  - (bonus topic, time permitting)
The Streaming Environment

- Inter-frame compression and motion
- Motion and bandwidth
- Sources of motion
- Conclusion

Interframe Compression and Motion

- Inter-frame compression
  - Defined
  - Key and delta frames
- Effect of motion
Inter-frame Compression

- Inter-frame compression
  - Defined
  - Key and delta frames
- Effect of motion
- What’s the point?
  - Motion degrades quality

Camera Motion

- Inter-frame compression
- Defined
- Key and delta frames
- Effect of motion
- What’s the point?
  - Motion degrades quality
Motion and Bandwidth - When Do We Care?

What’s this Mean?

- Motion is the enemy of interframe compression
  - Producing for 750 kbps and higher, no worries, quality should be good even with significant motion (assume SD resolution)
  - Producing for 500 kbps and lower
    - “Shoot original footage for the Internet. There are different techniques for shooting video for TV versus the Web, and it is sometimes hard to convert TV footage into usable web footage.” *Journal of Computing in Teacher Education*
    - “If possible, shoot exclusively for streaming. [I]f streaming media is not the primary objective, you might not end up with any footage at all that will stream well.” *Adobe, A Streaming Media Primer.*
  - The lower the bit rate, the more impact motion has on encoding quality
What’s this Mean?

- Manage expectations
  - Conversion jobs – high bit rates may be only option
  - Original productions:
    - Can produce very good quality at relatively low bit rates if you manage motion and other critical elements

What’s this Mean?

- Sources of motion, hidden and otherwise
  - Camera motion
  - Subject motion
  - Noise from background or lighting
  - Editing motion
Eliminating Extraneous Motion

- Camera - shooting techniques
  - Use a tripod
  - Avoid panning and zooming whenever possible. Cuts are better (multiple cameras help)
  - If possible, soften background (see Positioning)
- Limit on-screen motion
  - Talent – consider sitting, and advise against excessive motion

Conclusion

- High data rates cure most streaming ills
  - At 750 kbps or higher, streaming production is very similar to DVD or broadcast
- As data rates decrease, producing high quality streaming video becomes more challenging
  - One key is managing motion throughout the production cycle
- Along the way, lots of other pitfalls to avoid
Designing Your Set

- Background
  - Camera positioning for a soft background
- Clothing

Building the Perfect Background

- Backgrounds
  - High level goals for choosing a background
  - Building the perfect background
    - Studio
    - On location
  - Conclusion and checklist
- Clothing
Goals for the Background

- Provide contrast with talent
  - Obviously relates to clothing worn by talent
- Provide non-distracting but attractive complement for subject
- Compress well
  - Limited detail
  - No motion

Contrast
- Good contrast
  - Deloitte - dark grey suit, light blue back
  - Cranky Geeks - brown suit, black background
  - HP - grey shirt, dark background
  - HP - blue shirt, brown background
  - Amex - light blue shirt, grey background
  - Bad contrast
  - WSJ - variable background
  - P&G - blue/blue
  - Price - black/black
  - NIST - black/black
  - Real - blue/blue
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Compress Well

- Background shouldn't move
  - NAB/WSJ/Akamai
Other "Compress Well" Issues

- DON'T - Use flat, well-lit, light color backgrounds without some "clutter.
- DO
  - Add "clutter" to the background to contain artifacts
  - Darken background to lessen detail

Other "Compress Well" Issues

- DON'T use highly saturated colors – Which tended to create motion in the background
- DO - Use more muted colors
Other "Compress Well" Issues

- DON'T - use backgrounds with fine patterns and/or decorative lighting.
- DO - use a simple background with little visible detail

Building the Perfect Background - Office

- Keep it simple
  - If these are good enough for Real, MS and Accenture, it's good enough for you
- Be Flexible
  - Curtain system that can easily accommodate different clothing
Building the Perfect Background - Office

- 1 stand (~ $100 US)
- 2-3 backgrounds (~$130 US)
  - Flat black
  - Dark grey
  - Light blue

Building the Perfect Background - On Location

- Avoid complex textures and shapes (no herringbones, bookshelves, etc)
- Limit detail with lighting
- Or by blurring the background with camera settings
- Avoid light sources like windows, doors, spotlights
Background Checklist

- Does the background provide contrast with subject's face, clothing and hair?
- Is there extraneous detail in lighting or pattern?
- Is it moving?
- Are the colors highly saturated (rich reds and blues)?
- Are there well lit, wide open spaces?
- Are there any light sources like lights or windows?
- Are there extreme whites and extreme blacks? (WSJ)
- Have you tried compressing the footage and viewing the results?

Positioning for a Soft Background

- Why we like soft backgrounds
  - dramatic
  - low detail so easy to compression
- Goal of shot
  - Sharp foreground
  - Blurry background
  - Perfect background for compression
Challenging with 1/3" CCD camcorders

Meaning? Larger CCDs (e.g. better cameras) have larger depth of field

Increasing Depth of Field

- Open aperture as widely as possible
- To avoid overexposure, you can:
  - Engage the camera's ND filter.
  - This decreases light to the CCD, allowing a more open aperture without over exposure
  - Lower lights in the scene
  - Increase shutter speed
  - This also decreases the light to the CCD

[Diagram showing depth of field for different cameras]

http://www.mediachance.com/dvdlab/dof/index.htm
DOF and F-stop

- F 8.0
- F 5.6
- F 2.4

http://www.cambridgeincolour.com/tutorials/depth-of-field.htm

Increasing Depth of Field

- Position camera away from subject
- Use zoom lens to get in close
- In picture, close background is slightly out of focus
To Soften Background - Summary

- Camera as far from subject as possible
- Subject as far from background as possible
- Aperture open as wide as possible
  - Lower lights
  - Engage ND
  - Increase shutter

Clothing

- Feng Shui in clothing and backgrounds
  - Combinations that work well and why
- Clothing checklist
Feng Shui in Background/Clothing Matching

- Avoid extremes of dark and light
  - Cameras have limited ability to handle the "contrast ratio"
  - Usually either follows the bright regions (and obscures dark regions)
  - Or follows the dark regions (and obscures bright regions)
  - Or just obscures both
Clothing Checklist

- Clothing
  - Solid colors - dark blues, grays or browns
  - Avoid white and light blue (which looks like white on camera)
  - Advise in advance to match background, and to bring alternatives (or lighter shirt/darker coat)

- Hair
  - Pulled back (Loose ends disappear once compressed)

- Jewelry
  - Some OK, large bling is additional detail and reflective

- Glasses may require special lighting (generally from the side) to avoid glare
Lighting

- Overview
- Decision time - flat lighting or shadows
- Lighting to produce flat lighting
- Other issues
- Assessing light sufficiency at the shoot (bonus, time permitting)

Overview

- Lighting is the single most important determinant of video quality
  - Low lighting creates noise in the video, complicating low bitrate compression
  - Better cameras do better with low light; consumer camcorders need more light
- Hierarchy of considerations
  - Ensure lighting is adequate to produce clear, easily compressible image
  - Then worry about style and mood
Flat Lighting or Shadows?

- In film and broadcast, lighting is often used to set the mood
  - Shadows
  - Relative darkness

Shadows typically created with Three Point Lighting

- Key-major light source
  - "Hard" light
  - 45° angle from camera, pointing down at 45°
- Fill-moderates shadows
  - "Soft light
  - 45° angle from camera, pointing down at 45°
- Back light (or rim) creates contrast with background
  - "hard" light
  - Shining down from back on head and shoulders
Three Point Lighting

- Mind the nose "caret"
  - Should never cross lips (light too high)
  - Should never cross into cheek (light too far to the side)

The Problem: Shadows are Tough on Streaming

- Film has a greater "contrast ratio" than DV/HDV/HDCAM camcorders
  - Contrast ratio - the range between darkest and lightest regions in the frame
  - When range is too high, camera loses detail (like face in picture)
The Problem: Shadows are Tough on Streaming

- Compression lowers the contrast ratio even further because it throws away colors and gradations
  - So, shadows may obscure detail
- Overall, lighting techniques that work on film may produce poor results for streaming

In Addition

- The purpose of shadows is to create "mood"
  - Your quarterly results may be down, but film noir is still be a bit much
- 3-point lighting is tough to maintain in a dynamic, moving environment, or with multiple speakers
- 3-point lighting usually involves hot, power-hungry incandescent lights
Accordingly,

- Most business oriented TV shows use "flat" lighting that eliminates facial shadows

On the Other Hand

- Some streaming case studies use shadows to great effect
What Do These Have in Common?

- Client case studies so "mood" lighting makes more sense than sales training
- They're all one person interviews, with little motion
- More are 480x360 resolution, which provides sufficient pixels to manifest the shadows
- They're all relatively high data rate (270 kbps)
- They're all rendered to Windows Media
- Interestingly, they're all produced by HP

Shadowy Conclusions

- Business type videos
  - Announcements, training, messages, etc.
  - Go with flat lighting (no shadows)
- Go with traditional 3-point lighting when
  - Mood is appropriate
  - Data rate and resolution high enough to support it
  - Single, non-moving person
  - You are skilled at lighting or can hire skilled assistance
Producing Flat Lighting

- 2 keys and a back light
  - Typically, 2 *soft* lights
  - 45° angle from camera, pointing down at 45°
- Back light-create contrast
  - Shining down from back on head and shoulders

Techniques - Flat Lighting

- No shadows (except under the chin on the left)
  - Minimized on the right with a bounce card
Creating Soft Lights

- Use fluorescent lights
- Bounce lights off reflectors or umbrellas (light kits)
- Diffuse hard light with fabric softener sheets or diffusion paper (held with clamps)
- Bounce the light off a wall or foam core

Studio Lighting - Fluorescent

- Lowel
  - Key lights in front
  - Back lights shining down on subjects
  - Fill lights in the back

Photo courtesy of Lowel Light Inc.

http://www.lowel.com/fluotec/setups/duo_anchor_news.html
Lighting for Chromakey - Small

- When subject not moving and close to green screen
  - Use one light for both subject and background
  - Make sure there are no shadows in greenscreen
  - Use backlight (not shown)

Lighting for Chromakey - Medium

- When subject is far from screen
  - Light subject using traditional three point lighting
  - Light background separately
    - May need lights from top and bottom to ensure even light
    - Use soft lights to light chromakey background (and on subject to lesson shadows).
Camera Settings

- Use manual shutter (60), Gain (0) and Iris
  - Don't want AGC to adjust upon minor movements
  - May change desired exposure
  - May create "motion" that's challenging to compress
- Use manual focus
  - Rule of thirds positioning can mess with auto-focus
- Shoot progressive when available (but don't expect miracles)

Progressive vs. Interlaced

- Theory
- Tests
- Results
- Analysis
Theory

- Streaming media is FRAME based (as are most streaming formats)
- Shooting in a progressive (frame) based format will deliver optimal quality (more later)
- Especially compared to interlaced, which is field based, with fields merged during editing or encoding to create frame

Tests

- Shoot image with side by side cameras;
  - Progressive – JVC GYHD100
  - Interlaced – Canon XL H1
- Low to moderate motion
- Processing
  - Both output via Adobe Media Encoder (CBR)
  - JVC processed with Cineform preset
Low motion

- No major difference (none expected)
  - JVC a bit sharper

More motion

- Perhaps more detail in progressive shot
- Definitely more blocks in progressive shot
Even more motion

- Perhaps more detail in progressive shot
- Definitely more blocks

Premiere Frame – No Encoding

- Premiere’s de-interlacing is very accurate
  - Even before compression, unipod images look very similar
Analysis

- Preliminarily (limited tests)
  - For lower motion clips, shouldn’t see a difference
  - For higher motion clips, improved de-interlacing algorithms improves quality of interlaced source (minimizing difference with progressive video)
- If it was me?
  - I wouldn’t buy a camera solely because it had progressive capabilities
  - If I had a camera with progressive, I would shoot in progressive mode
    - Pay attention to the workflow! Easy to hose progressive video if using wrong presets

Framing for Streaming

- Framing for streaming
  - No safe zone
  - Classic positioning
  - Rule of thirds framing
Framing - No Safe Zone

- Safe zone
  - Outer 10-15% eliminated as overscan
  - All pixels show in streaming
- So:
  - Can zoom in a bit tighter b/c more room for other content

Framing - Smaller Window

- Most streaming video produced at 320x240 - 480x360
  - Much smaller viewing window, so you have to frame more closely
    - The smaller the frame, the larger the subject should be in the frame
    - Larger frames can (and should) back off
- Classic positions (next page)
  - Classic framing is what people expect to see
  - Deviate at your peril - most between shots tend to look awkward
Mind Your Shots

- XCU - extreme close-up
  - Section of face
  - Very personal
- CU - close-up
  - Whole face
  - OK if very small screen
- MCU - medium close-up
  - Shoulders up, excludes arms
- MS - Medium shot
  - Waist up
  - Good to show arm motion

http://www.cybercollege.com/m/mb_tvp006.htm

Framing on the Net - Bonus

- Akamai - 160x120
  - Too small, bad framing
- HP - XCU
  - More than I want to see
- MS
  - Good MCU
- Cranky Geeks
  - Good MS
Framing on the Net

Too far for streaming at 160x120

Good MC - excludes arms

XCU - OK in moderation

MS - OK for big screen, shows arms

Rule of Thirds Still Applies

- When facing the interviewer
  - Talking to someone else
  - Position in back third of the frame, eyes at or near the top 1/3
  - With "Look room" in direction they are facing

- When facing the camera
  - Talking to the viewer
  - Position in the middle
  - Eyes at or near top 1/3
Rule of Thirds Still Applies

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  - Talking to the viewer
  - Position in the middle
  - Eyes at or near top 1/3

Questions?
Additional Resources

- Video Production for Streaming, an interactive training DVD from StreamingMedia.com (available 12/15/06, $249)
- Proprietary Codecs, 2006; Choosing and Using the Optimal Video Codec, a report from StreamingMedia.com (available now, $299)
- Flash Codecs, 2006; Choosing and Using the Optimal Video Codec, a report from StreamingMedia.com (available now, $299)