Camera Motion

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

- Defined
- Key and delta frames
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Camera Motion

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

Jan Black (100 kbps)
Skateboard (100 kbps)
Skateboard (500 kbps)
Motion and Bandwidth

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
    - “Whenever possible, shoot original footage for the Internet. There are different techniques for shooting video for TV versus the Web, and it is sometimes hard to take TV footage and convert it to usable footage for the web.” Journal of Computing in Teacher Education
    - “If possible, shoot exclusively for streaming. []If streaming media is not the primary objective of the shoot, you might not end up with any footage at all that will stream well.” Adobe, A Streaming Media Primer.
  - At lower bitrates, you have to eliminate extraneous motion in shooting, content and editing.
What’s this Mean?

- Manage expectations
  - Pure conversion jobs – sometimes high bit rate is only option
  - Original shoots:
    - Can produce very good quality at low bit rates if you manage motion and other critical elements
- Focus on the money shots
  - Use motion where absolutely necessary
  - Eliminate the extraneous

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
  - Background
Setup

- Backgrounds matter
- Positioning
- Dressing your talent
- Framing your shots

Backgrounds Matter

- Adding bandwidth cures motion ills, but not background issues
- Backgrounds to watch
  - Open backgrounds (codecs abhor a vacuum)
  - Graduated lighting
  - Highly saturated colors (reds)
- Goal
  - Slight clutter but minimal detail

100 kbps  500 kbps
Backgrounds – Rules to Live By

- *Avoid open spaces.* This wall was actually smooth beige, but codecs tend to inject motion into open spaces, creating distracting background noise.

Backgrounds – Rules to Live By

- *Avoid graduated lighting* – especially with a flat background.
Backgrounds – Rules to Live By

- Avoid highly saturated colors – Which tended to create motion in the background

Backgrounds – Rules to Live By

- **KISS (Keep It Simple, Stupid)**. This clip was challenging to compress because of the fine wallpaper pattern. This created almost constant background motion, even in top-performing codecs at generous data rates.
Backgrounds – Rules to Live By

- KISS 2. More irrelevant high contrast detail. The brick wall seemed like a good idea at the time, but between that and the grass, this image has tons of irrelevant detail to preserve, inevitably degrading the money shot.

Backgrounds – Rules to Live By

- **Think contrast.** Here we have facial skin against a mauve wall. Throw in poor lighting, and the doctor looks like he’s in a witness protection program.
Backgrounds – Rules to Live By

- Avoid motion. Shooting against a moving background is also a bad idea.

Backgrounds – Rules to Live By

- You look wonderful against black. The best background is a flat black, light-absorbing background like that used in the Jan Black clip.
Backgrounds – Rules to Live By

- *Embrace clutter.* If you can’t go flat black, avoid backgrounds with large open spaces, which seem to attract artifacts. This background is ideal, containing the type of large-item clutter that seems to localize and minimize compression artifacts.

Backgrounds Matter - General

- Other rules
  - Avoid complex textures and shapes (no herringbones, bookshelves, etc)
  - Ensure some contrast between subject and background, but not too much:
    - Martian against a green background
    - Black suit, white background
  - Background:
    - Should not move (trees, people, cars, etc.)
    - Should not be brighter than ambient light in the scene (backlighting, as in windows, doors, spotlights)
Backgrounds Matter

- Mind the general rules, but test, test, test
  - Can’t predict what will go wrong when codecs are involved
  - Encode test video to final parameters before finalizing set design

Positioning

- To soften background
  - Move camera away from subject
  - Move subject away from background
- Obviously, mind audio quality
- Tough to do with 1/3" CCD camcorders
Dressing Your Talent

- Simple, natural colors with minimal detail (e.g. avoid pinstripes, herringbone, etc.)
- Avoid high contrast colors (black suit, white shirt, red tie)
- Avoid “hot colors” that glare under lights and “bloom” when compressed
- Remove shiny objects like dangling earrings, necklaces and bracelets (sorry, Mr. T)
- Glasses may require special lighting (generally from the side) to avoid glare

Framing Your Shots

- Different than TV or DVD
  - No safe zone – so can put titles at lower edges
  - Much smaller viewing – so frame more closely
  - Or zoom in in editor
    - Note – for high value videos, consider using a professional tool for scaling
Coaching Your Talent

- Tight framing leaves little room for motion, which codecs can’t handle anyway
- Use voice modulation rather than hand and body motion to convey pacing and retain interest
Lighting

- In general
- Light positioning
  - Three point
  - Flat
- Hard vs. soft
  - Creating soft lights
- Lighting for Chromakey

In General

- 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
  - Then worry about style and mood
Techniques - 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-creates contrast
  - "hard" light
  - Shining down from back on head and shoulders

Three Point Lighting

- Key Only
- Key and Fill
- Key, Fill, Back

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

- Go with flat
  - Three point usually involves incandescent lights
    - Very hot
    - Seem to burn out frequently
  - Three point is really hard with multiple subjects and when subjects move
  - Shadows and contrast can degrade during compression

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 or wooden clothes hangars)
- Bounce the light off a wall or foam core
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

- AGC off
  - Don’t want minor movements to trigger gain reaction
  - Especially true when shooting for chromakey
- Format
  - Use DV or higher if possible
  - Avoid HDV and HD for SD output
- Progressive vs. interlaced

Progressive vs. Interlaced

- Theory
- Tests
- Results
- Analysis
Theory

- Flash 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

Questions?