

Summary of previous weeks

- We have seen some fundamentals of acoustics and digital audio processing:
 - Sound: its production, propagation and perception
 - Sonic waves representation and properties: time vs. frequency domain (waveform vs spectrogram)

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- Sound digitalisation:
 - ADC and DAC: sampling rate and bit depth
 - Aliasing, quantisation noise
 - Audio file formats
- Audio in and out:
 - Microphones
 - Mixing consoles or soundboard
 - Loudspeakers

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Air pressure variations **Digitalising sound** Voltage (0 Recording M. 111 Overview of the audio Storage M digital recording and playback chain MAR MAR Playback (0 彑 Mir pressure variations IAT-380 Sound Design







Audio editing

- · Various operations on sound files:
 - Volume/gain/amplitude modulation

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- Cutting: fade in fade out and zero crossing
- Normalising
- Compression/Expander
- Reversing
- Effects:
 - Distortion
 - Time domain effects:
 - Phaser, Flanger
 - Chorus - Time shifter

 - Delay
 Reverberation
 - Frequency domain effects
 - Filters
 - Equalisation

- Pitch shifter IAT-380 Sound Design

Editing and Mastering

• Editing (editing window):

- Loading sounds, cutting them, preparing them
- Sequencing
- Adjusting levels, pans, introducing effects
- Mastering (mixing window):
 - Apply noise reduction to eliminate hum and hiss.
 - Adjust stereo width.
 - Finalise track levels and equalize audio between tracks.
 - Add local or global ambience: reverberation, ...
 - Dynamic expansion.
 - Dynamic compression.
 - Peak limit the tracks.

• Bouncing:

- Choosing export format
- Selecting the portion of the timeline to export
- Export sound file

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The Sound Designer

- Like the cinematographer or the director that is responsible for the overall look of the film/animation/video, the sound designer is responsible for the overall sonic completion.
- The term was first associated to professional practice when an Academy award was given to Walter Murch for *Apocalypse Now*.
- Often, the audio production is achieved by a team
- Sound design for moving images can be divided into three domains:
 - Speech
 - Sound effects
 - Music

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Sound Design

- Components of sound structure and their influence on perception:
 - Pitch:
 - · High pitch for delicate, bright or elevated
 - · Low pitch for sinister, strong or peaceful
 - Loudness:
 - Loud sounds suggest closeness, strength or importance
 - · Soft sounds convey distance, weakness, tranquillity
 - Timbre: tonal qualities of a sound
 - Identity of the sound source:

- Reedy (oboe, clarinet): wistful, lonely or sweet
- Brassy (trumpet, trombone): cold, harsh, fierce, bitter, forceful, martial or big

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- Tympanic (percussion): drama, significance, power
- Sonic qualities: rich, thin, edgy, metallic, ...

Sound Design

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- Components of sound structure and their influence on perception:
 - Tempo:
 - · Fast: agitated, exciting, accelerating
 - Medium: steady, sustained
 - Slow: monotony, dignity, control
 - Rythm: sonic time pattern
 - · Simple: deliberatness, regularity, lack of complication
 - · Constant: dullness, depression, uniformity
 - · Complex: complication, elaborateness
 - Changing: uncertainty, vigor, erratic
 - Rhythms are culturally marked (South American, African, Asian, ...)
 - Harmonic structure: cultural marker (Western, Indian, Asian, ...)

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Speech

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- Verbal and non verbal speech affects meaning through two functions:
 - Naration: from an observer's point of view, descriptive and voice-over
 - Direct: literal description of what is being shown (especially useful in radio)
 - Indirect: not evident in what is being shown, add information to the visual content
 - Contrapunctual: composite statement that rest on the interaction between sound and image (e.g. exploits a conflict to convey another message)
 - Non verbal information is also important to convey emotional and subjective quality
 - Dialogue: conversation between the characters that are on the screen

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Speech		
Dialogue:		
 Accent: gives information (origin, cultured or crude) 	on about a charac e,)	ter
 Pace: the pace of the di information about the p boredom of a situation 	alogue conveys assion, urgency o	r
• Example:		
-B: I can't		
-A: You must -B: Ha!		
 Patterns: vocabulary, se information about the lo the historical or social of 	entence structure ocutor, its role as v context	convey well as

Speech

- Dialogue:
 - Prosody is important to all speech

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- Emphasis: stressing syllable or words convey information and can change the meaning -E.g.: He'd kill us if he got the chance
- Inflection: altering the pitch or tone of the voice. Bu raising the pitch at the end of a sentence a declarative becomes a question -E.g.: And the bombing continued.
- Mood: the sound of words in relation to the link between the signifier and the signified.
 –E.g.: Lounge sounds softer than bar.

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Sound Effects

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- Sound effects group anything sonic that is not speech or music!
- Two (non mutually exclusive) main functions:
 - Contextual sound is like direct narration
 - It is also referred to as diegenic sound, i.e. that emanates from within the story space
 - Opposed to non diegenic: from outside the visible, like underscoring music
 - Narrative: add more information to the images (like indirect narration):
 - Descriptive: describe sonic aspects non directly linked with the action (e.g. birds, insects, the hubbub of human activity, surrounding sounds, ...)
 - Commentary: makes an additional statement that has a link with the story line (e.g. cheering of the crowd when an athlete goes out of the stadium, machinery getting toward the scene, sound of a monster in a pursuit, ...)

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Sound Effects

- · Sound effects have multiple functions:
 - Focusing attention: when multiple elements are seen at the same time, sound can draw attention (e.g. someone choking in a crowd)
 - Defining space: sounds allow defining space by establishing:
 - Distance: loudness
 - Direction of movement: panoramic automation and loudness
 - Relative positions of the various sources: loudness and panning
- Frectral content → also plays an important role
- Openess of outdoor spaces: wind, ...
- Dimensions of indoor spaces: reverberation
- Establishing Locale: a cawing seagull and wind places you at the ocean, a mocking cakle of exotic birds places you in the jungle; honking car horns and screeching brakes in the city and the crack of a bat hitting a ball and the roar of the crowd in a baseball stadium

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Sound Effects

- Sound effects have multiple functions:
 - Creating environment: more precise than just creating locale, the picture can be quite sophisticated, quite unique
 - Emphasizing action: sound effects can highlight action and call attention (car crash: emphasising the collision and the sonic aftermath with silence)
 - Intensifying action: increase or heightens dramatic impact (slap, in cartoons: running, falling, ...
 - Depicting identity: one the obvious function (in a dark scene, barking identifies a dog as slurred speech identifies a drunk)

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 Setting pace: car chases get most of their pace from the screetching tires, gun battles from the rhythm of bursts and bullets hitting or ricocheting

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Sound Effects

- Sound effects have multiple functions:

 Providing counterpoint: when sounds are different from what is expected. E.g. the judge bangs a gavel in the sound of dollar bills getting peeled off (justice and corruption) or a political leader acclained by the crowd (but using tortured screams instead of cheers).
 - Creating humor: boings and boinks, E.g. cartoons
 - Symbolizing meaning: many manipulations can suggest extra meaning (e.g. mixing a prison door with an agonized groan)
 - Unifying transition:
 - Overlapping: the sound continues from scene to another. E.g. A sentence: "a candidate who stands for" ... "equal rights for all" completed in another scene by another character.
 - A lead-in: the audio of a scene is introduced before the scene starts
 - Segue: denotes an abrupt transition, a scream segue to the shriek of a train whistle

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Sound Effects

- Sound effect can be pre-recorded or live:
 - Sound effects library: already made effects
 - Foley sound effects:

 - Goes back to the days before television when radio dramas were very common
 Named after Jack Foley, a sound editor for Universal Pictures for many years



Sound effects

- Examples of Foley sound effects:
 - http://ca.youtube.com/watch?v=DW849EYX14k
 - Squeezing cornstarch in a gloved hand to simulate walking in snow
 - Using a feather duster in the spokes of a spinning wheel to create beating wings
 - Twisting stalks of celery to simulate the sound of tendons being stretched
 - Putting a dry sill conditioner on a piece of cloth and sliding a board around to simulate the sound of skiing
 - Pulling a fist in and out of a water melon to produce the sound of a monster taking the heart of a living person
 - The roar of a Los Angeles freeway recorded through a vacuum cleaner pipe served as a basis for the sound of Luke Skywalker's land speeder in Star Wars

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Sound effects



- The sound of the engine noises, take-offs and flybys of the Millenium Falcon in Star Wars are made of:
 - · Tiny fan motors
 - Torpedo planes from WWII
 - · Low frequency sine waves beating
 - · Phased white noise with frequency filtering
 - A blimp
 - · Phased atom bomb explosion
 - Distorted thunder clap
 - F-86 jet afterburners
 - Phantom jet idle
 - A 747 takeoff
 - F-105 jet taxiing

 - Slowed down P-51 prop plane pass-by

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Music

- Music has the same basic structural elements common to all sounds but with an emphasis on the harmonic (melodies, ...) and rhythmic structure
- Three types of music:
 - Production source music: the production (during shooting or postproduction) occurs on screen (e.g. a singer or ensemble)
 - Source music: the source is on screen (or from within the story) but the production is not visible (e.g. a jukebox, a radio, supermarket music, ...)
 - Underscore music: music added during postproduction to enhance the informational or emotional content

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Music

• Functions of music:

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- Establishing locale
- Emphasizing or intensifying action
- Depicting identity (some theme can be associated with the various characters)
- Setting pace
- Providing counterpoint
- Unifying transitions
- Fixing time: the 30' or middle age
- Recalling and foretelling events (the shark is around)

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- Evoking atmosphere, feeling or mood

Music in spot announcement Because of its effect on memory and emotion, it

- is a stapple in spot announcements:
- Commercial and promotional announcement
- Advertisements
- Jingles

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- ...
- Some of them are memorable:
 - http://ca.youtube.com/watch?v=iRv1npBbCFc
 - http://ca.youtube.com/watch?v=9I9-B4uq0zY&NR

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Sound design for moving images

- There is no set procedure!
- The most important thing is to study the script (or the images)
- · Script analysis involves:
 - Determining the overall sound design for each scene or the entire work
 - Spotting: deciding on the placement of sound speech, effects and music
- Examples:

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- In a story about a musician, music can constantly intertwined throughout the scenes
- In a scene about a completely self-involved person, not hearing any background sound will underscore psychic isolation

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1.1.1.1		The Fund		Page Number 4 of 6	
 Project	ibe	4.14		Date Prepared 10/21	
spotter.					
Item	Syn/Nonsync	In-time	Out-time	Description	
1	NS	01:42:15:10	01:43:12:09	Airplanes taking off	
2	N5	01:45:26:29	01:46:15:12	Muddled voices	
3	5	01:49:52:12		Door slam	
4	NS	01:49:52:12	01:53:05:05	Traffic noises	
5	NS	01:54:03:27	01:56:22:17	Restaurant noises	
6	s	01:56:13:25		Gunshot	10
7	NS	02:03:14:23	02:04:03:10	Phone ringing	
8	N5	02:10:52:12	02:11:01:24	Glass breaking	100
9	N5	02:11:27:03	02:12:04:19	Dog barking	
10	5	02:12:46:18		Glass breaking	
11	NS	02:15:33:16		Thunder	
12	NS	02:16:12:15	02:19:22:04	Rain, wind, and thunder	
13	5	02:21:45:23		Car backfire	
14	NS	02:21:50:20	02:23:47:04	Children playing	
15	NS	02:23:47:04	02:26:33:12	Ocean waves	
16	NS	02:24:55:23		Thunder	
17	NS	02:26:10:10		Thunder	
18	5	02:30:12:14		Hit glass	
19	NS	02:33:05:06	02:34:55:07	Dogs barking	
20	NS	02:35:12:14		Door slam	



Sound Design for Moving Images

• Editing considerations:

- Sounds can be:
 - Synchronised
 - Asynchronised
- The art of making transitions:
 - Segue or cut: cutting from one element to another
 - Crossfade: fading out one sound while you fade in another
 - Audio leading video
 - Video leading audio
- Particularly difficult for underscore music:
 - There is no rule!
 - · Avoid sonic muddle
 - · Once music starts, avoid to fragment it

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"Music is the poetry of the air."	Jean	Paul Friedrich	Richter
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