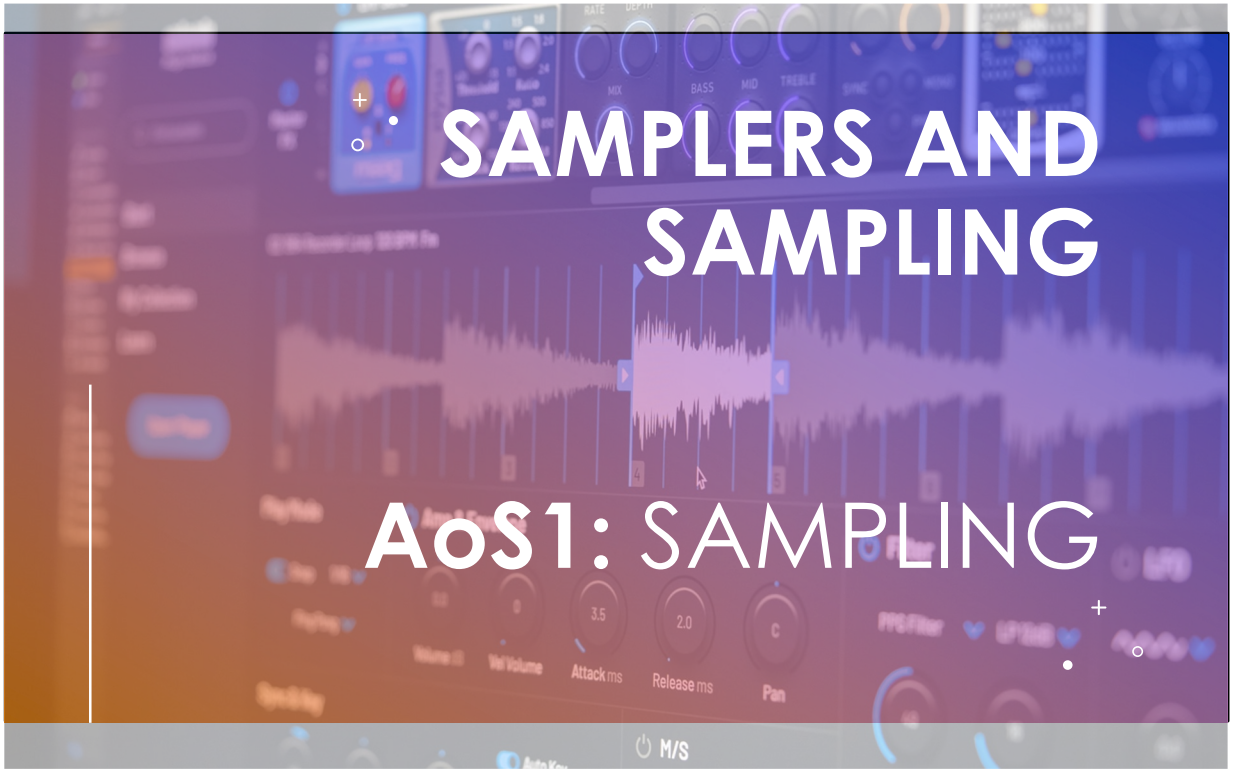

SAMPLERS AND SAMPLING
AoS1: SAMPLING
Attack ms
Release ms
Pan
M/S

What is Sampling?

- Sampling involves taking part of a sound and **reusing** it in a different context
- Samplers are commonly used to either **record**, **manipulate** and/or **playback** sampled audio material

Analogue Samplers

- Sounds would be captured onto tape and then manipulated
  - **Reversing** the playback direction
  - **Altering the speed** of the playback
  - **Combining** and **layering** sounds
- Formed the basis for modern day sampling
- The Mellotron is known widely as the first real sampler
  - It worked by using banks of pre-recorded tapes

The Musique Concrète movement pioneered the use of everyday sounds in music

Pierre Schaeffer - https://www.youtube.com/watch?v=N9pOq8u6-bA
Pioneer of modern sampling

Analogue Samplers:
-A key is pressed, and the tape head contacts the tape to play the sound

The ends of the tape would be spliced together to make a loop – this is an example of destructive editing because the tape is being physically altered

Limitations when sampling with tape: you couldn't change the speed of playback without affecting the pitch of the sample

Early analogue samplers were also generally expensive, heavy, inflexible and had a limited range

The Beatles - Tomorrow Never Knows

(Lower picture – Mellotron)

Digital Samplers

- Able to record audio as a **one-shot**, **single note** sample or as a **longer musical excerpt** or **short loop**
- Early digital samplers had a **limited memory** and therefore the **bit depth** and **sample rate** would be lowered
- Modern samplers share some parameters with synthesisers such as **LFOs** and **envelopes**

Samples recorded and encoded onto the device as binary data

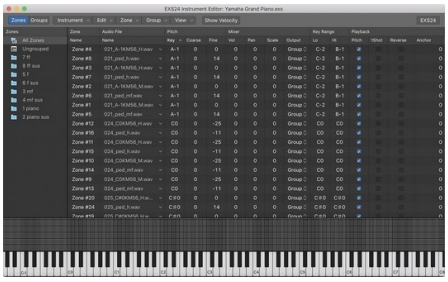
They are able to store these samples ready for playback or to apply processing and manipulations to them

Lowered bit depth and sample rate = lo-fi sound
The same way in which bit crusher plug-ins in DAWs work

Drum machines utilised early sampling technology as they only required short, single pitch samples
Don't take up a lot of memory
The Roland TR-909 used sampled cymbal sounds which sounded more realistic when compared to the synthesised sounds heard on the TR-808

Software Samplers

- The line between synths and samplers has blurred in recent years
- They can use synthesis functions such as **filters**, **envelopes** and **LFOs**
- Advancements in **computer power** and **memory capacity** made it possible to **improve the quality** of samples



Some synths provide sample playback/integrate fully functional samples and some can use samples as the bases of their synthesis engine to generate sound

Basically replacing an oscillator with a sampled waveform as a sound source

Fatboy Slim – Praise You: Uses sampling artefacts creatively to add rhythmic interest

The History & Development of the Sampler

Mellotron
- Led Zeppelin - *The Rain Song*

The E-MU Emulator
- Depeche Mode - *Construction Time Again*

E-MU ESI Series
- Daft Punk - *Homework*

1962 — 1979 — 1981 — 1986 — 1994 — 1997

Fairlight CMI
- Kate Bush - *Cloudbusting*

AKAI S900
- Fatboy Slim - *Right Here, Right Now*

Nemesys Gigasampler

Sampling Real Instruments

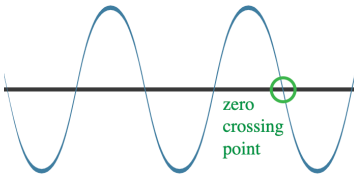
- When sampling a real instrument with the intention of playing it on a keyboard, the following techniques are used to make it sound more realistic
  - **Keyboard Tracking**
    - Spreading a single sample across the keyboard
  - **Multisampling**
    - Taking a sample every few notes to map across the keyboard
  - **Velocity Layering**
    - Switching between a selection of samples depending on the MIDI velocity

Keyboard Tracking: The sample will be pitch shifted in response to the key being played

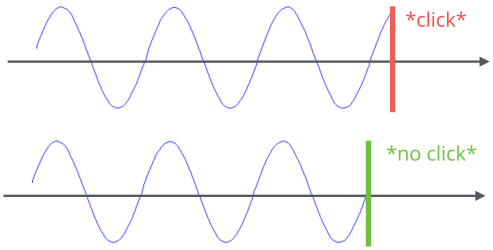
It can be noticeable when a sound has been pitch-shifted further than a few tones

Multisampling: The allows for the samples to be pitch-shifted across a smaller range of notes

Zero Crossing Editing



- Cutting samples at a zero crossing point help to avoid clicks



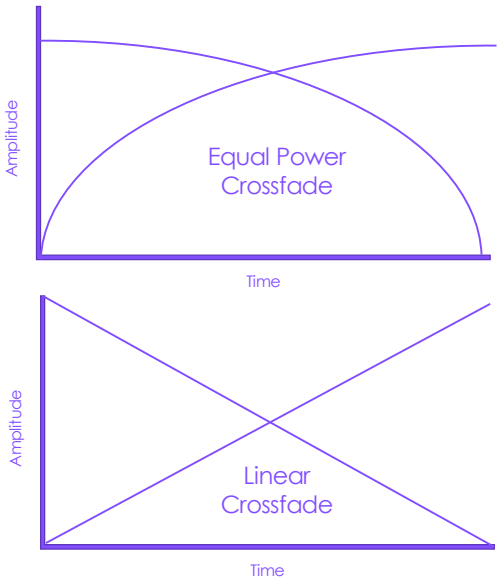
If the edit is at the end, fading the sample out or using crossfade looping can also help prevent clicks

Loop Points

- Sustained sections with constant volume are the best sections of a sample to loop

Crossfades

- Used to help avoid clicks when zero crossing edit points can't be used
- Fades between different samples, audio regions or loops



Graph shows amplitudes of the end of the first clip and beginning of the second clip over time

Manipulating and Altering Samples

EFFECT	DEFINITION
Looping	Repeats the sample
Normalising	Increases the volume to the maximum without distorting
Stuttering	Repeating small parts of the sample to create a stutter effect
Gapping	Adding spaces between small parts of the sample
Time-Stretching	Extending or reducing the time of the sample independently from its pitch (digital)
Pitch-Shifting	Changing the pitch of a sample independently from its length (digital)
Reverse	Playing the sample backwards
Transposing	Changes the starting pitch/key of a sample