

Name: James Grover

Student Number: 1808648

Module Title: Foundation (ADAD7003_LON)

Assignment Title: Foundation Assessment

Module Lecturer: Ciarán Robinson

In this essay, we shall examine the characteristic elements of three very different genres (though all share the basic 4/4 time signature). We'll discuss the long-established genres of disco and reggae, both of which still make regular chart appearances since their inception in the 70s, and also we'll examine the modern genre of pop-EDM, which went from nowhere to chart-dominance over the middle part of this decade.

POP-EDM

Pop-EDM takes many production techniques from the longer EDM format, utilising them over a pop song structure suitable for mainstream radio and Spotify playlisting; usually this is the verse-prechorus-chorus structure, prominent in hit songs since the 60s (Summach, 2011). Song length is typically 3:00-3:59, again typical for chart hits (Tough, 2016). Situated right after the chorus, the archetypal feature of this genre is the "pop-drop" (Harding, Sloan, 2016). These 'drop' sections, much like their club-focussed EDM counterparts, usually consist of a high-intensity mostly-instrumental interlude. Our reference track, "No Promises" by Cheat Codes, is a good example of the typical structure found in this genre [see Fig.1a], and my track "Keep Loving Me Tonight" is based around the same format.

The drop is usually the most energetic section, where the producer can show off 'their sound'. Hence, these sections are usually dense with production layers, but employ a simple arrangement, allowing each sound to be as 'big' as possible [1]. In both the Cheat Codes track and my track, all verse instruments stop before the drop section, leaving only drums, bass, and the 'lead' sound.

The most important element of the drop is a loud, maximally-punchy kick drum, usually playing a standard four-on-the-floor pattern at a danceable tempo. This beat, when played at tempos nearing 130bpm, mimics an excited human heartbeat and physiologically affects us, causing our own pulse to quicken (Powell, 2017). However, as radio hits became more important than club hits to this genre, the tempo range gradually widened, with minimum tempos dropping from 124bpm to as low as 90bpm. Also a trap-inspired variant of the genre has evolved, where tempos can drop even lower. My track uses a tempo of 120bpm.

Strategies for getting the perfect kick drum vary between producers; some hunt for just one sample they like and can use 'as is' [2], whereas others use layering techniques, combining samples (processed or unprocessed) to build a custom kick sound. The layering method is apparent when listening to the Cheat Codes stems, and I personally find the layering approach much more flexible and also much faster than hunting through sample packs for the 'perfect' kick. A standard strategy is using one sample to provide the sub frequency range, one sample for the mids, and another for the highs, using filters to remove unnecessary frequencies [a] This is the strategy I used during the creation of my track, then adding a fourth sample for extra mid-character.

The kick drum for this genre must be powerful at the lowest root note of the song (usually near 40Hz), with punch in the 100-300Hz range to be heard on small speakers, with 'knock' around 800Hz-1kHz, 'bite' around 5kHz and enough 10kHz to give you the feeling that the kick is 'in your face' (since high frequencies fall off quickest with

increasing distance) [b] — I use a frequency scope when designing kick drums, to make sure that they have optimal frequency content. Note that when layering kick samples, I've found it is important to check for optimal phase coherency (depending on how drastically the filters have been used).

Many tracks of this genre (including "No Promises" and my track) make use of a similar palette of drum sound. Typically, finger snaps are used on the backbeat, plus often a wood-block type sound in place of a snare (as in both the tracks here). Also clap and snare sounds inspired by the Roland 808 drum machine [c]. Hi-hat parts are often heavily layered for stereo detail, made of loops and/or sequenced drums, and other hand percussion like tambourines and shakers. Often these parts will contain a subtly swung groove; in the case of "No Promises" this is unusually pronounced (around 80% swing). There has also been a rise in the use of trap-influenced hi-hats recently, although neither of our 2 tracks here uses these.

The next most important element in the drop is the bassline, usually playing syncopated root notes of diatonic chords, with heavy 'sidechain' pumping (i.e. 1/4 note volume swells created with a plugin like LFO Tool from XFER); this ensures that the kick can punch through with maximum separation [d]. Layering techniques have also been used on the bass sound in my track, and were clearly audible in the Cheat Codes stems. Different synth patches were chosen for depth, width, body, buzz, and overall vibe, and carefully combined to make a powerful whole. The synth patches always play unisons but may jump octaves in different places, to keep each voice in its optimal range. Regarding FX, it's best to keep low frequencies entirely dry, but higher octave bass layers often have reverb and/or delay for space and/or character. Note that choosing a chord progression for the bassline to follow is actually one of the most crucial steps in this genre — the majority of songs only feature chords vi, IV, V, I and occasionally ii [see Fig.2a], but the way these chords move and harmonise with the main melody is what will make or break a song, and producers can spend hours trialing different chord combinations on each song [3].

Also the drop usually features a complex-sounding lead part, often made using edited vocals with lots of FX and experimentation [1], creating a unique tone that's hard to define; these "mystery sounds" add to the appeal of the track. For my song, I used a chopped-and-pitched section of the lead vocal, split into multiple layers [see Fig.3]. I also chose to use a subtle chord layer playing the same rhythm as the lead or as the bass, to invisibly thicken the track.

All other elements of this genre are the same as those typically found in most pop music, using all the standard pop production techniques, so shouldn't need more than a brief overview here. Basic piano triads are usually featured in some section(s), with a synth pluck or clean guitar picking in other sections. Transitions between sections nearly always use 'risers' to keep the energy high, and there is usually a lot of 'ear candy' such as small one-time percussion fills, pitched vocal FX, and ambient backing vocal shouts of "hey!". Lastly, vocal production in "No Promises", as in most pop-EDM tracks, is glossy and highly effected, accurately autotuned and with layers of vocaligned doubles and harmonies, maximising energy. The pre-production guide vocals in my song haven't yet had this gloss applied — the track is ready for a session vocalist to perform over.

DISCO

Disco music appeared in the 1970s as a more danceable version of pop. Later as the instruments changed from organic to electronic and the tracks became less about 'the song', disco spawned house music, which spawned EDM, and actually now with pop-EDM turning back to the pop song format, it's interesting to note that things have finally come full circle. However, the feel-good retro vibe of disco reappears in the charts on a semi-regular basis, and with it usually comes a slightly higher level of musicality than the typical pop song.

Disco songs (even modern ones) often rely on a little music theory, perhaps using modal harmony and/or incorporating devices from jazz music, e.g. the backdoor progression found in the prechorus of our reference track, Justin Timberlake's "Can't Stop The Feeling" (incorporating bVII and bVI chords in a major key) [see Fig.2b]. At minimum, there are usually some 7th chords within the characteristically-funky disco guitar parts. Also there is often an interlocking palm-muted guitar line for additional interest — these techniques are used in my track "Deep In Your Love". The left and right guitars were recorded via DI, quantised with Beat Detective, then 're-amped' through a compressor pedal plugin into a Fender Bassman simulation for that clean and snappy tone; the compressor is critical here to bring out the attack of the guitar. Also, spring reverb was applied to the monophonic riff for even more retro vibe [e], and the chords were sent to a short room reverb to let them sit back in the track in a natural manner.

In terms of musicality, many disco records feature real (and highly talented) string and/or horn sections playing fast and intricate fills or stabs, as does the Timberlake track. In my preproduction demo, I've used programmed strings and horns; of course a full production of the song would involve hiring skilled session players to rerecord these parts for better realism.

A classic disco bassline is riff based, played on a real bass guitar; these usually play around the chords rather than hitting all root notes, and alternate between syncopated and non-syncopated phrases. The syncopation keeps the track moving along, as it feels like each line and each beat falls into the next; this technique is used in both our tracks to good effect. The bassline in my track was played fingerstyle on a Fender Jazz bass and recorded via DI, then processed with a Sansamp plugin (based on a classic FX unit designed for DI bass).

While classic disco would have featured a real drummer playing the whole kit, modern productions rely more on sequenced grooves and use of loops to keep some human feel but with a superhuman level of control and consistency. Samples are layered on top of drum loops and percussion loops to get the feel of classic disco but the punch/power of modern pop. In my track, I used loops from Addictive Drums and combined these with drum machine samples via NI Battery, then I used my large diaphragm condenser mic (a U87 clone) to record additional hand percussion and mouth percussion, from which I edited my own loops to sequence throughout the track. This appears to be similar to the approach taken on the Timberlake track.

Structure wise, disco tracks tend to run longer than most other pop, so they can really focus on the groove [f]. Song sections are less well defined as the drums mostly keep the

same beat throughout. Our particular reference track sticks a little more closely to the radio format, though other recent disco hits such as Daft Punk's "Get Lucky" and "I Feel It Coming" (with The Weeknd) maintain a consistent beat for nearly the entire song.

A notable feature of male-led disco songs is their proclivity for falsetto vocals. This may be because this vocal range can float above the arrangement, leaving space further down the scale for more interesting riffs and/or harmonically complex chords (this thinking is the same as why female vocals are preferred for EDM [4]). My track features an airy female vocal, which we recorded in a writing session with an X1 large diaphragm condenser mic from SE. I recorded the vocalist singing the lead vocal multiple times, saving these to playlists in Pro Tools and then choosing the best parts of each take (a process known as 'comping', which producer Max Martin is certain to have used when recording Justin Timberlake). We also double tracked sections of the lead vocal, and all the backing vocals, and these were then graphically tuned and quantised to each other with vocalign to achieve a tight modern sound in the short amount of time we had available. All the vocals were then bussed and sent to a vintage plate reverb for more space and retro vibe (with slight pre-delay to keep the vocals sounding 'forward').

REGGAE

Reggae is another dance-focussed genre of music, but contrasts with EDM and disco by its use of much slower tempos (typically around 70-80bpm). However, a key feature of reggae is the emphasis on the off-beats; usually a guitar, piano or organ plays staccato stabs between every beat (this rhythm is known as the 'skank' [g]). This subconsciously makes the music feel twice as fast as it actually is, giving the dancer the choice of a slow sway or a more energetic double-time dance. Hence reggae has a curious duality, working as a soundtrack to chilled out days, and also to party nights. Also reinforcing this duality is the fact that reggae typically has heavy and deep bass. Most consumer audio devices don't reproduce the lowest frequencies very well, so at home, reggae can often feel light and fun, but the music takes on a whole different tone when played loud in a club, with the bass shaking the listener's chest (Powell, 2017).

The genre of reggae as a whole allows for long meandering structures, with a variant called 'dub' often having much longer tracks, but this essay concentrates on 'hit songs' (as is the focus of the author). The reference song here, Ariana Grande's "Side To Side", and my song, "Who We Are", are structurally both fairly typical pop songs; this is true of most reggae chart-hits through the decades, loosely following whatever is the predominant pop song structure of the time. (Currently the popular format is actually to start with the chorus, which is a product of Spotify playlisting algorithms [h])

"Side To Side" exhibits all the hallmarks of classic reggae except replaces the real-drum groove with 808 style drum machine sounds (presumably to let the track 'work' on pop radio). In order to give a slight feel of real drums, the hi-hats are all very slightly delayed so as to not sit right on the gridlines. Also a woodblock style snare is used as an update to the classic reggae rim-click on the backbeat. The main drum groove features a sparse and syncopated kick drum rhythm, with a tone very focussed in the 60-120hz range, and hence there is a lot of space left for the bassline to take up a vast amount of sub-bass and play a busy 8th note pattern (as is typical of the genre). In my track, I used the same strategies but chose more natural-sounding samples to suit the more relaxed lyrical

themes.

The bass sound in the Grande track is again constructed of layers, affording consistency and precise control of the tone across the entire frequency spectrum. The main bass sound is a palm-muted DI-recorded real bass guitar, doubled with a wide and buzzy synth patch only in the choruses for attitude, and reinforced an octave lower by an '808' bass (which is essentially just a sine wave playing the root notes with a very fast pitch-dive on the attack portion of each note). In reggae, the bassline is critical to the arrangement, yet the fundamental root notes would normally be too deep to be heard on small speakers, so an important production technique is to strategically add overtones to the bass via careful saturation/distortion, or via a purpose-designed plugin like Waves RBass (which it appears was used in the reference track and which I frequently use in my own tracks, including this one).

The off-beat 'skank' strokes are also heavily layered in "Side To Side", featuring a DI-recorded electric guitar providing a bright and jangly top end, another lightly crunchy 'amped' guitar playing the same part, a 3rd guitar panned hard-left playing a double-stroke pattern through a 'wah' pedal. Also a piano and multiple layers of synths join in for the chorus, all playing the same chords and rhythm. In the case of reggae, this layering isn't necessarily a modern production flourish — similar layering of 'skank' rhythm instruments can be found in much older reggae songs (e.g. Red Red Wine by UB40). In my own song, again I was looking for a more relaxed sound so the layering is less extensive; a single guitar does the majority of the work, bathing in a unique texture via an experimental FX chain (using SoundToys EffectRack). Note that the reggae guitar playing technique involves lots of fast left-hand muting to increase the percussiveness (and the same is true of funky disco guitar playing); this style of playing takes considerable practice to master.

In terms of the actual chords, a lot of older reggae is overtly happy sounding and major-key, but most popular modern music is darker, either sticking to minor key or floating ambiguously between relative major and minor. In this case, I chose a minor progression in the verses of my track, similar to the Grande track, but in the chorus I wanted an uplifting anthem feel so it subtly modulates to the relative major.

In "Side To Side", the vocal production is yet again done in a glossy and heavily-edited pop style. For my 'more-chilled' reggae track, I worked with the singer to get a confident yet relaxed performance, with minimal backing vocals (again recorded on the X1 microphone). Also in "Side To Side", various whoops/shouts in the backing vocals are sent to a 'dub delay', which is a stereotypical reggae production technique involving sending elements to an echo effect with lots of repeats and a polyrhythmic delay time (dotted notes or triplets of some medium length value) — this is a technique I also employed sparingly in my track (as it can come across as quite cheesy if overused).

CONCLUSION

The three chosen reference tracks are good examples of where each genre is peaking commercially in our current decade. Purists may argue these examples don't accurately represent the given genre, but I believe I've shown in Fig.2 that each reference track shares the vast majority of elements with bona-fide classic tracks of its genre, and hence

can be considered a modern classic of said genre.

It's worth noting that two of the three reference tracks were produced by uber-producer Max Martin, and all three references were mixed by the world's current number one mix engineer, Serban Ghenea — indeed the references were chosen for their state-of-the-art production techniques in terms of making hit songs, with the three tracks having around two billion Spotify streams between them (at time of writing). Both Max and Serban are known to be very secretive about their studio processes, with each having only given a tiny number of interviews on record, but with critical listening and analysis of the mix stems, we can glean much useful information about how to make these hits across these different genres.

It's also worth noting that there were much simpler songs than the tracks studied here in each genre that were equally successful; each genre has had mega-hits consisting of only verses and a repeated hook, and there is enough structural variability between similar sized hits to suggest that song structure is not particularly important to hit-making [see Fig.1]. An interesting future study would be the trends surrounding these frequent 'throwback' hits, studying top 40 revivals of vintage genres like disco and reggae and comparing their performance, per genre, to modern genres like EDM — there is still much to be learned about why we like the music we like and why certain songs become hits.

APPENDIX: FIGURES and PRIMARY RESEARCH (from studying songs and stems)

Fig.1a: Pop EDM structures (similar sections coloured similarly)

Green = Verse
 Blue = Prechorus
 Pink = Chorus (lyrical)
 Red = Hook (simplistic)
 Black = Instrumental section
 Yellow = B-hook
 Orange = Bridge/Middle 8

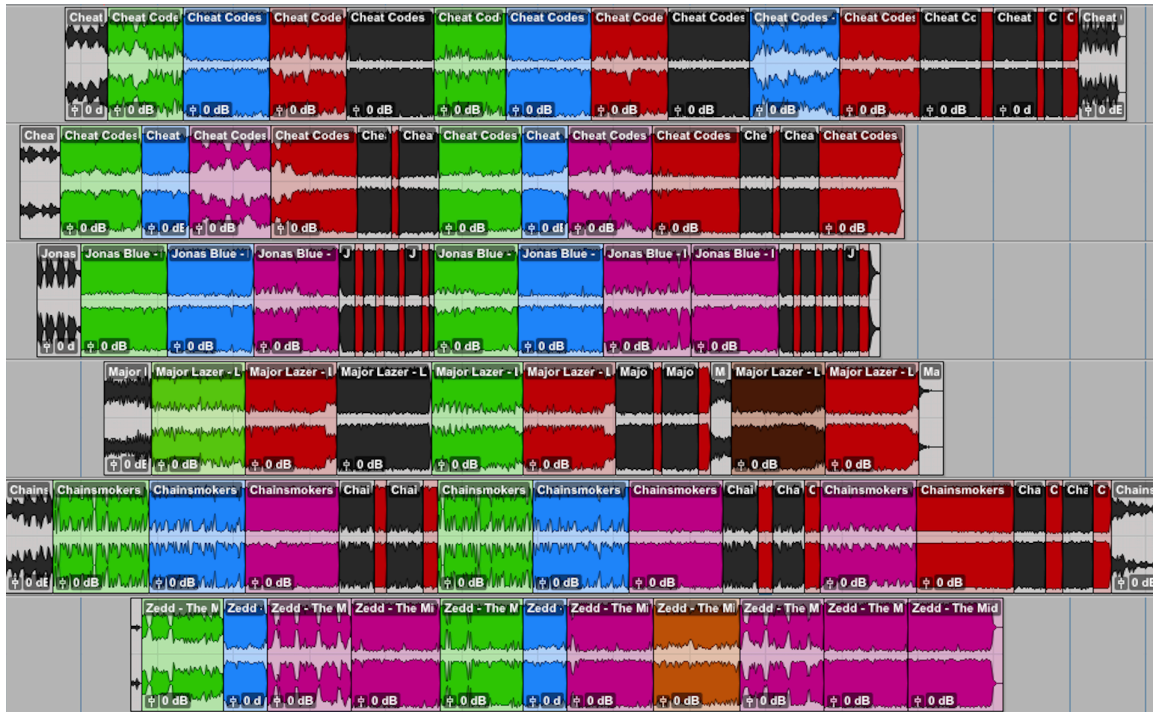


Fig.1b: Disco Structures

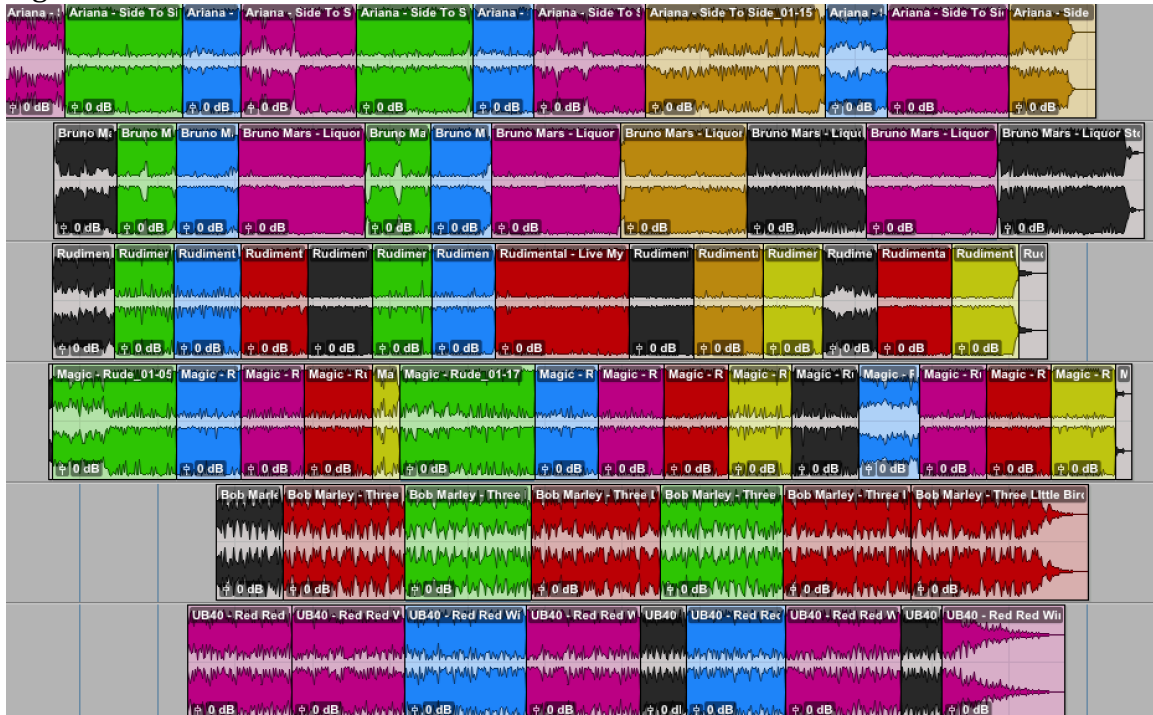


Fig.1c:Reggae Structures

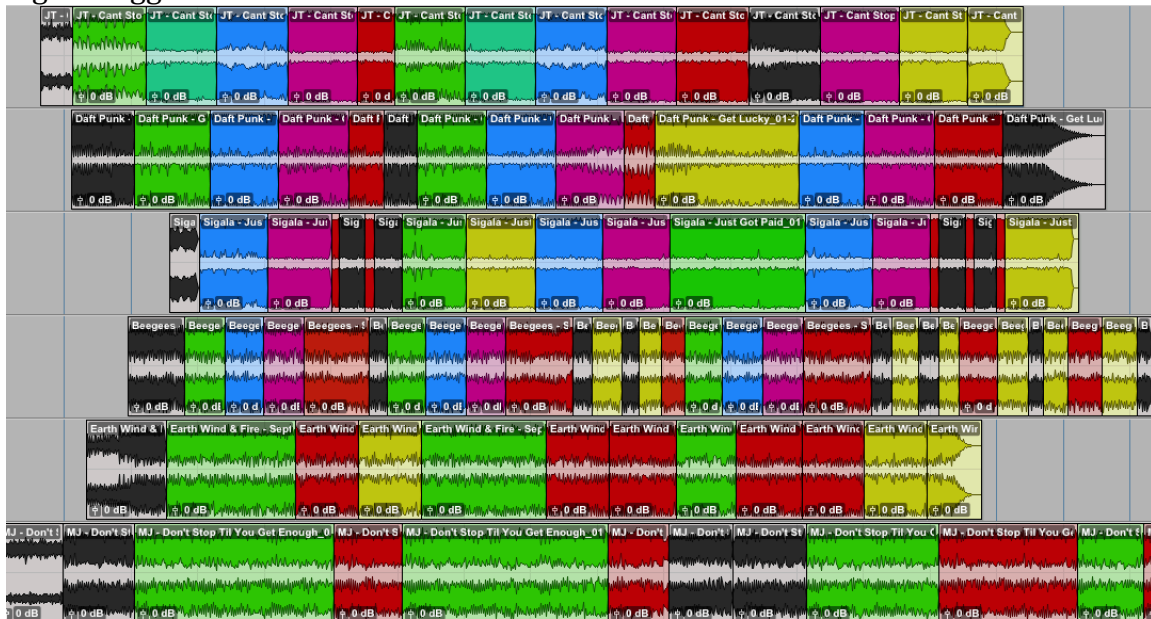


Fig.2a)

POP EDM						
SONG	No Promises	Only Me	Mama	Lean On	Closer	The Middle
ARTIST	Cheat Codes ft Demi Lovato	Cheat Codes ft Little Mix	Jonas Blue ft Willam Singe	Major Lazer et al.	The Chainsmokers ft Halsey	Zedd et al.
RELEASED	2017	July 2018	2017	2015	2016	Jan 2018
SPOTIFY PLAYS (as of 18/10/18)	423M	84M	545M	1179M	1411M	537M
"Down" chorus then "drop" section	x	x	x	x	x	x (only 1st time)
Four-on-the-floor kicks in drop	x	x	x	x	hiphop kick rhythm	hiphop kick rhythm
Minimal drop: bass+drums+lead	x	x		x (subtle chords)	x (only chord stabs)	actually contains full chorus
Every section is a buildup	x	x	x	x	x	x
FX sweeps between sections	x	x	x	x (quite subtle)	x	x (less than usual)
Mostly electronic drum sounds	x	x	x	x	x	x
Synth backing	x	x	x	x	x	x
Lead sound from fx	x	x	x (+	x	synth but a	x

vocals			synth lead)		"speaky" one	
Syncopated roots as synth bassline	x	x	x	x	x (matching chord rhythm)	x (matching chord rhythm)
Reggaeton snare rhythm			x	x		
Snaps on 2 & 4	x	x	x	x	x	x (from verse 2)
808 snare fills		x	x	x	x	x
Complex hat/perc groove in drop	x	x	x	x (heavy groove)		
"Trap" hats		x	x	x (only short fills)	x (subtly)	x (only at end)
Plain piano chords behind chorus	x		x		x	
Guitar used as a backing instrument	x	x			x	x
Lots of "ear candy" fills	x			x (only in drop)	x (melodic more than percussive)	x
Vocal "throw" delays	x	x		x		x
Vocoder harmonies	x				x (just high octave)	x
Plucky riff as verse chords	x	x	x	x (chord- riff only)		x
"Hey!" sample	x			x		
BPM	113	108	104	98	95	107
Echonest "Energy"	67	74	79	81	54	66
Echonest "Danceability"	74	61	74	72	74	75
Key	A# major	G major	B minor (as if D major)	Bb major	F minor (as if G# major)	G major
Main Chord Progressions	IV iv I IV / IV V iv I	vi IV V vi / vi IV V I / ii V vi (IV)	vi IV V vi / ii IV vi V	IV V vi I	IV V vi V	IV I V (vi)... weirdly timed changes

Fig.2b)

DISCO REVIVAL				COMPARED TO CLASSIC DISCO		
SONG	Can't Stop The Feeling	Get Lucky	Just Got Paid	Stayin' Alive	September	Don't Stop 'Til You Get Enough
ARTIST	Justin Timberlake	Daft Punk et al.	Sigala et al.	Bee Gees	Earth Wind & Fire	Michael Jackson
RELEASED	2016	2013	Sep 2018	1977	1978	1979

SPOTIFY PLAYS (as of 18/10/18)	868M	368M	31M	245M	386M	120M
Four-on-the-floor kick pattern	x	x	x	x	x	x
Funky guitar chords	x	x	x	x	x	
Slightly jazzy chord voicings	x	x	x	x	x	x
Funky bass guitar	x	x	x	x	x	x
Funky monophonic guitar part	x		x	x	x	x
16th (ghost?) notes on hi-hat	x	x	x	x	8th note feel mainly	x
Consistent groove	x	x	more of an EDM format	x	x	x
Other non-standard percussion	x (cowbell)		x (wood blocks)	x (wood blocks)	x (congas?)	x (lots)
String melodies			x	x	x	x
Horn stabs	x		x	x	x	x
High vocals (falsetto if male)	x	x	x	x	x	x
BPM	113	116	120	104	126	119
Echonest "Energy"	83	81	92	57	83	82
Echonest "Danceability"	67	79	73	71	69	88
Key	C major	Gb minor (as if A major)	Gb minor (as if A major)	F minor (as if G# major)	Gb minor (as if A major)	B major
Main Chord Progressions	I vi IV vi / bVII I bVI (mixolydian)	ii IV vi V	ii IV vi V / vi V ii IV	vi V II (dorian) / vi (riff) / vi V vi iii	IV iii vi / ii V iii vi	bVII I (mixolydian)

Fig.2c:

REGGAE REVIVAL					COMPARED TO CLASSIC REGGAE	
SONG	Side To Side	Liquor Store Blues	Let Me Live	Rude	Three Little Birds	Red Red Wine
ARTIST	Ariana Grande ft Nicki Minaj	Bruno Mars ft Damien	Rudimental et al.	Magic!	Bob Marley & The Wailers	UB40

		Marley				
RELEASED	2016	2010	June 2018	2014	1977	1983
SPOTIFY PLAYS (as of 18/10/18)	732M	64M	55M	552M	262M	182M
Chord stabs on upbeats ("skank")	x (guitar)	x (piano)	x (guitar + organ)	x (guitar)	x (guitar)	x (guitar + organ)
Deep 8th note bass riffs	x	x	x	x	x	x
Organ counter melody	x (mellotron in 2nd half)	x		x	x	x
Dub delays	x (subtle)	x	x	x		
Swung "real" hat groove	(trappy 808 hats in triplets)	x (light)	x (light)	x	x	x (programmed)
Ringy "real" snare fills	808 fills in same style	x	x	x	x	x
Rim clicks	808 clap in same style	x	x	x	x	
Stabby horns	x (subtle sax stabs)		x	x		
Monophonic muted guitar part		x	x	x	x (with wah)	
BV shouts with delay	x	x	x	x		
Air horn / alarm fx	x	x				
BPM	79.5	76	72.5	72	74	89
Echonest "Energy"	74	82	84	76	49	47
Echonest "Danceability"	65	69	66	77	81	86
Key	Gb minor (as if A major)	Db minor (as if E major)	G# major	C# major	A major	C# major
Main Chord Progressions	vi ii V / IV V vi	vi ii IV V	ii I V	IV V I vi	I IV	I IV ii V

Fig.3: Lead sound creation, steps 1 2 and 3.

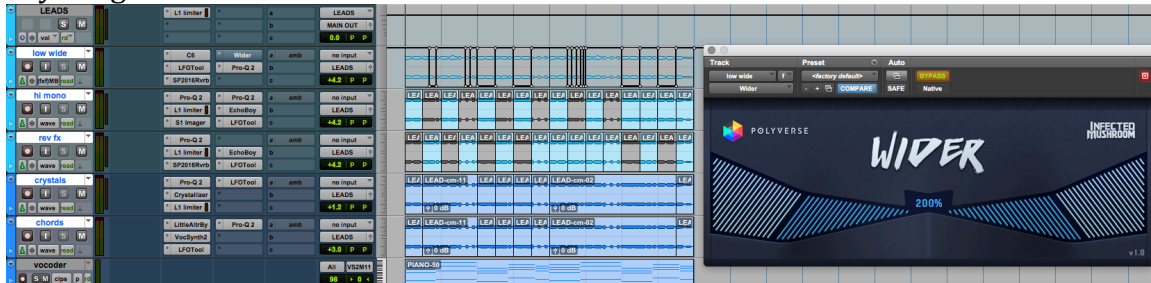
Resequencing Vocal Chops



Using Pitch Shifters and rendering



Layering



Bibliography of Secondary Research:

Harding, Charlie, and Nate Sloan. (2016) "43. Pop Drops and Chipmunk Soul". Switched On Pop, n.d. <http://www.switchedonpop.com/43-pop-drops-and-chipmunk-soul/>.

Noah Askin and Michael Mauskopf (2018) "What Makes Popular Culture Popular?". American Sociological Review

Owsinski, Bobby (2017) "The Mixing Engineer's Handbook 4th Edition"

Powell, John. (2017) "Why We Love Music". John Murray Publishers Ltd.

Tough, D. (2016) "An Analysis of Common Songwriting and Production Practices in 2014-2015 Billboard Hot 100 Songs", mEiEa, 17(1), pp. 86-87.

Summach, Jay (2011): "The Structure, Function and Genesis of the Prechorus". Music Theory Online 17, no. 3.

Stavrou, Michael Paul. (2003) "Mixing With The Mind". Flux Research.

Yizhao Ni, Raul Santos-Rodriguez, Matt Mcvicar and Tijl De Bie. (2015) "Hit Song Science Once Again A Science?"

Video interviews with producers of these genres:

[1] Cheat Codes: <https://www.youtube.com/watch?v=nWeiOUqxqr4>

[2] Avicii: <https://www.youtube.com/watch?v=-dIcuU58Oy8&frags=pl%2Cwn>

[3] Sigala: <https://www.youtube.com/watch?v=VLNQLxJzSas&frags=pl%2Cwn>

[4] Calvin Harris: <https://www.youtube.com/watch?v=QYSQszM0-u4&frags=pl%2Cwn>

Other referenced links:

[a] <https://www.soundonsound.com/techniques/layers-complexity>

[b] <http://www.sengpielaudio.com/calculator-SoundAndDistance.htm>

[c] <https://www.edmprod.com/drums-guide/>

- [d] <https://theproaudiofiles.com/sidechain-pumping-techniques-edm/>
- [e] <https://medium.com/music-thing-modular-notes/everything-i-know-about-spring-reverb-1fb4b32abf87>
- [f] <https://www.attackmagazine.com/technique/passing-notes/lessons-from-disco-chords/>
- [g] <https://en.wikipedia.org/wiki/Reggae>
- [h] <https://www.theguardian.com/music/shortcuts/2017/oct/04/spotify-song-intro-streaming-arctic-monkeys-led-zeppelin>