Gonna Have A Funky Good Time

A phenomenological investigation of the experience of groove

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Abstract

Groove is a vague and abstract term that is used to mean multiple things, yet listeners and performers have an instantaneous, personal 'feel' – an 'intuitive feelingful sense' (Feld, 1988) – for whether something grooves or not. This study is in two parts, both of which explore whether any more concrete conclusions may be drawn about this abstract phenomenon: the first part is an in-depth look at some of the literature on groove – a field where there has been a surge of interest in recent years – encompassing a wide range of approaches from ecological and empirical work. The second part, the main focus of the study, is a phenomenological investigation into what individuals perceive and experience as 'groove' in music, drawing on the results of a listening study. A recreation of The J.B.'s 'Doing It to Death/Gonna Have a Funky Good Time – Part 1 & 2' was digitally manipulated to feature participatory discrepancies, tempo manipulations, and timbral adjustments – contributing factors identified in the literature – and presented to a range of listeners who were then asked: 'Does this groove? Why? Describe the groove'.

Through discussing the results of the listening study, this study will explore the many ways in which listeners can think of or experience groove and how this may be expressed in language, highlighting just how multifarious and individual these experiences are. Following on from this, the study will draw out a few more general themes that may act as umbrella terms for categories of groove experience, avoiding universalising and essentialising statements. This study will appreciate individuality – it will not seek a universal theory or formula of groove. This open ended, exploratory essay will seek to challenge the previous literature on groove – which often reduces the phenomenon to a single, measurable quality – through displaying the multivalent and often-contradictory nature of groove perception. Finally, the study will evaluate the effectiveness of its approach and suggest possible avenues for future research into the phenomenon of groove that build on the present study.

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Track Listing for Accompanying CD

Recordings are also available online: http://[redacted]/gonna-have-a-funky-good-time/.

Within the text, 🔊① indicates track one on the accompanying CD/website.

All tracks are variations on a recreation of the J.B.'s 'Doing It to Death/Gonna Have a Funky Good Time – Part 1 & 2', performed by The Kings of Soul. All recording was performed and the manipulations of the recordings made using Logic Pro X.

Track Number	Description
1	Original looped recreation of two-bar groove
2	Quantized version (note onsets snapped to an exact metrical grid)
3	Bass part moved one demisemiquaver late
4	10 BPM faster
5	Drum EQ manipulated to boost bass
6	Drum part moved one demisemiquaver late
7	Guitar & bass parts cut so there is no sustain
8	Guitar part one demisemiquaver late

For detailed information about these manipulations and how they were produced, see Appendix 3.

List of Musical Examples and Figures

Gonna Have A Funky Good Time

A phenomenological investigation of the experience of groove

Groove is a vague term that is used to mean multiple things, yet listeners and performers have an instantaneous, personal 'feel' for whether something grooves or not. Steven Feld notes that people have an 'intuitive feelingful sense of a "groove"' and that groove is 'linguistic shorthand', which 'code[s] an unspecifiable but ordered sense of something…that is sustained in a distinctive, regular and attractive way, working to draw a listener in'.[1] What is groove, then? As I will discuss, this seemingly cryptic, ineffable phenomenon has been the subject or underlying theme of numerous studies that try to capture something of this intangible yet desirable, indescribable yet widely perceived quality and locate its source in the music, but might it really be the case instead that, as Deee-Lite and Bootsy Collins sang in 1990, 'groove is in the heart'?[2] Rather than attempting to locate groove in some measureable property of the music, should our attention be on the listener instead?

[1] Steven Feld, "Aesthetics as Iconicity of Style, or 'Lift-up-over Sounding': Getting into the Kaluli Groove," *Yearbook for Traditional Music* 20 (1988): 76.
[2] Deee-Lite, *Groove Is In The Heart*, 7" (Elektra, EKR 114, 1990).

This study intends to highlight the human experience of groove and provide an overview of the multifarious ways in which it may be felt; it does not set out to 'prove' any universal or fundamental quality of groove. By emphasising the phenomenological experience of groove – a real, lived, bodily experience that is gained through an individual's 'being-in-the-world'[3] – I hope that this study acts as a foil to the more empirical literature on the subject and so opens up avenues for future studies that take a more holistic approach. I focus my attention on the listener, not because I believe there are clear distinctions between 'the music itself' and the listener, each capable of existing in hermetic isolation from the other, but to emphasise the under-represented listener's side of groove scholarship and thereby balance the literature that concentrates nearly exclusively on the technical features of the music. The ontology of music perception is such that it cannot lie exclusively either in the music or in the mind of the perceiver; there is a reciprocal, 'chiasmic' relationship.[4] To quote Georgina Born, in her discussion of Lydia Goehr's *Imaginary Museum of Musical Works*, 'there is no single privileged location of musical meaning, [instead] it may be distributed across and configured by the relations between its several mediations'.[5]

After first exploring some definitions of groove and performing an in-depth survey and critique of the literature available – from both the ecological and empirical fields – the core of this essay is a listening study, which asks participants to listen to

[3] Maurice Merleau-Ponty, *Phenomenology of Perception*, trans. Colin Smith (New York: Routledge, 2002), Part III; Martin Heidegger, *Being and Time*, trans. Joan Stambaugh (New York: SUNY Press, 2010).
[4] The 'chiasm' is a concept formulated by Merleau-Ponty. It describes a reciprocal, crossing relationship whereby both parties are simultaneously acting and being acted upon. The example Merleau-Ponty uses is two hands holding – which hand is holding and which is being held? Both are acting in both ways depending on the perspective taken. See Maurice Merleau-Ponty, "The Intertwining – The Chiasm," in *The Visible and the Invisible: Followed by Working Notes*, ed. Claude Lefort, trans. Alphonso Lingis (Evanston: Northwestern University Press, 1968), 130–55.
[5] Georgina Born, "On Musical Mediation: Ontology, Technology and Creativity," *Twentieth-Century Music* 2, no. 1 (2005): 9; Lydia Goehr, *The Imaginary Museum of Musical Works : An Essay in the Philosophy of Music: An Essay in the Philosophy of Music* (Oxford: Oxford University Press, 1992). See also Georgina Born, "Listening, Mediation, Event: Anthropological and Sociological Perspectives," *Journal of the Royal Musical Association* 135, Special Issue 1 (2010): 79–89.

multiple tracks and answer, in whatever way they please, 'Does this groove? Why? Describe the groove'. The aims of the study are:

- to explore the many ways in which listeners can think of or experience groove and how this may be expressed linguistically, highlighting just how multifarious and individual these experiences are;
- to draw out a few more general themes that may act as umbrella terms for categories of groove experience – avoiding universalising and essentialising statements – and, through amalgamating multiple perspectives and experiences of the phenomenon, gain a more holistic awareness of the abstract concept of groove.

The listening study uses many manipulated versions of just one piece of music: The J.B.'s (James Brown's band) 'Doing It to Death/Gonna Have a Funky Good Time – Part 1 & 2'.[6] Listening to and contemplating this track was the initial impetus for conducting this study. The original, a ten minute single released in 1973, reached number one on the soul singles chart,[7] 'was an essential part of every party, picnic, and barbecue throughout [America in 1973] and in the years that followed',[8] and may be seen as an exemplar of music that is valued for its 'feel' and/or 'groove' rather than any specific lyrical or melodic content. At base, it is simply a repeated two-bar cell on a chord of Fm^7 over which various conversations, periods of group singing, and solos occur (Example 1, 🔊①). It is remarkably simple, yet it achieved commercial success – it not only topped the charts in 1973, but it also continues to be used as a sample[9] – and, for me, as well as others I have discussed it with, has some special quality of groove. Although 1973 is a while ago and musical tastes, fashions, and audience ex-

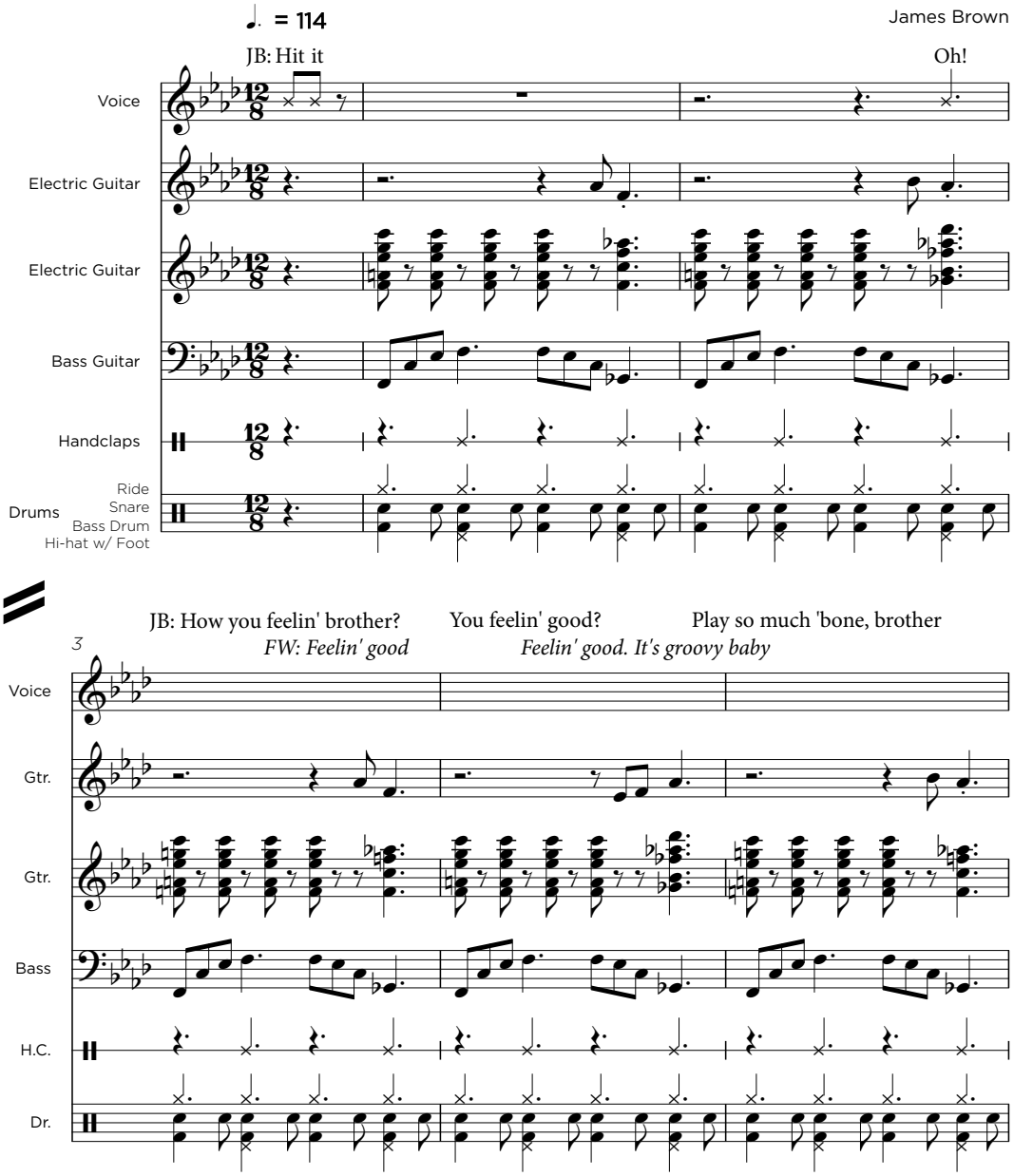
[6] The J.B.'s, *Doing It To Death/Gonna Have a Funky Good Time - Part 1 & 2*, LP (People Records, PE 5603, 1973).

[7] "Best Selling Soul Singles Chart," *Billboard*, July 7, 1973, 23; "Best Selling Soul Singles Chart," *Billboard*, July 14, 1973, 18.

[8] Fred Wesley Jr., *Hit Me, Fred: Recollections of a Side Man* (Durham: Duke University Press, 2002), 166.

[9] For a list of known uses of the track as a sample, see "Samples of *Doing It to Death* by Fred Wesley and The J.B.'s," *WhoSampled*, accessed March 17, 2014, http://www.whosampled.com/Fred-Wesley/Doing-It-to-Death/sampled/.

periences/expectations change, I would argue that similar qualities – particularly the extended repetition of simple musical cells – may be found in much contemporary pop, rock, and dance music, and that links may be drawn between this track and many others, making the conclusions drawn applicable beyond the bounds of the listening study.



Example 1: My transcription of the opening six bars of 'Doing It to Death' (JB = James Brown, FW = Fred Wesley Jr.)

Defining 'Groove'

Groove is abstract: known upon hearing, but difficult to define. It can be many things to individuals and the first distinction that needs to be made is between groove as a noun and as a verb. Figure 1 displays various definitions of groove that can be found in some of the literature and in everyday vocabulary. It is an extremely broad and variously defined phenomenon that people conceive of in different ways: it can be a mark of quality, a statement of enjoyment, a technical or structural component, and many other things. The definitions shown in Figure 1 are drawn from standard dic-

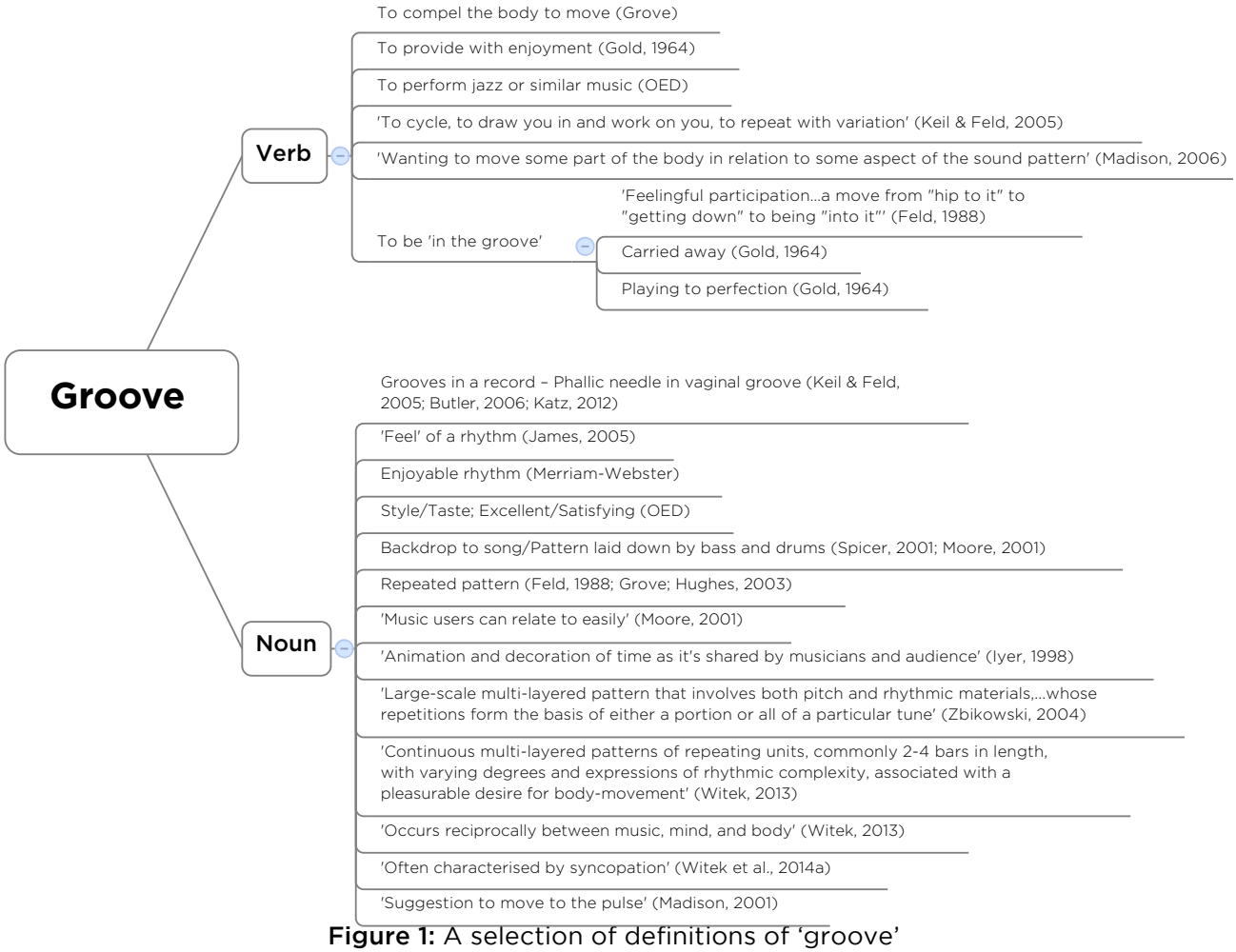


Figure 1: A selection of definitions of 'groove'

tionaries, ethnomusicology, pop/jazz/hip-hop musicology, empirical musicology, philosophical musicology, and cognitive/psychological musicology, as well as instrument instruction manuals, showing the variety and breadth of perspectives in the literature on groove. As this is a paper on the multiplicity of groove experience, I will not offer any one as the singular definition; Figure 1's presentation is intended to display this multiplicity in a non-hierarchical, 'rhizomatic' way, affording each definition the same priority, and emphasising the interconnected and interactive nature of this network of possible meanings.[10]

Alongside this great plurality of definitions, which suggests an ineffable quality of groove, there is also a resistance by some even to trying to capture the notion of groove in language. Simon Zagorski-Thomas writes:

> I discovered that questions about the mental processes associated with getting into a groove frequently met with outright hostility. On an Internet forum for drummers, I found…answers along the lines of 'If you don't feel it, you'll never understand it' and 'talking about it destroys the magic'.[11]

Whilst the latter statement, on the 'magic' of groove, reinforces the common perception of the intangibility of groove, possibly also pointing to a certain degree of illusion or mystery in the experience of groove, the former statement has undertones of elitism and exclusivity. Coming from a drummers' forum, a gathering of highly developed instrumentalists, this is hardly surprising, but it goes against the zeitgeist that groove can be felt by all; there are no barriers to experiencing it.

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[10] The rhizome is a way of presenting and interpreting data in a way that avoids organisational structuring. It is non-hierarchical, non-chronological, and allows for multiple entry and exit points whilst also allowing connections between data points to be created and broken in a fluid manner. See Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia Vol. 2*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), 3–25.

[11] Simon Zagorski-Thomas, "The Study of Groove," *Ethnomusicology Forum* 16, no. 2 (November 2007): 330. Refers to the research for Zagorski-Thomas's previous paper "In the Groove: Consciousness and Embodiment in Repetitive Rhythmic Playing Techniques in Music of African Diasporic Origin in London" (presented at the British Forum for Ethnomusicology Annual Conference, Aberdeen, 2004).

Current Literature

As the multifarious definitions above show, groove can be approached from many different disciplines. However, the literature may be split into two main groups: one that takes groove as a genre term and uses it as part of a discussion of hip-hop, DJing, electronic dance music, funk, and similar dance-based genres of music, and another that seeks an essence of groove 'in the music', often through analysing micromusical phenomena. The emphasis in the former group of literature is on groove as a dance phenomenon and the use of the word 'groove' comes from the association with vinyl records whose music is captured in a spiralling groove. Etymologically, there is a strong case for this physical medium – the record – being the root of the notion of groove.[12] This literature considers groove from more of a historical stance than from the listeners' experiences, but is particularly interesting for contextualising the evolution of sentiments of groove. To give a brief example, Mark Katz's *Groove Music: The Art and Culture of the Hip-Hop DJ* provides an authoritative history of the origins and evolution of hip-hop and turntablism, following it from its genesis in an apartment basement in the blighted South Bronx in the 1970s to well-financed, international DJ battles in the 90s and beyond.[13] Here, 'groove' comes from the grooves in the vinyl that are the instruments the DJs play, and the close affinity these 'musicians' feel with

[12] Robert Gold traces the idea of being 'in the groove' and the link with vinyl records back to a women's journal in 1936. In Robert Gold, *A Jazz Lexicon* (New York: A. A. Knopf, 1964), 131; Anon., *Delineator*, November 1936, 49.

[13] Mark Katz, *Groove Music: The Art and Culture of the Hip-Hop DJ* (Oxford: Oxford University Press, 2012).

their physical medium, for example how they 'read' a record for the drum break by looking for the darker band within the vinyl.[14]

The other main group of literature – the one most applicable to the present discussion of groove – investigates groove as a rhythmic phenomenon, located within the music, which may be explored through the analysis of recordings. Spearheaded by Charles Keil's 1987 article 'Participatory Discrepancies and the Power of Music', discussions of groove have focussed predominately on these micromusical phenomena, dubbed 'participatory discrepancies' (PD).[15] Keil writes that the term PD may be substituted by 'inflection, articulation, creative tensions, relaxed dynamisms, semiconscious or unconscious slightly out of syncnesses'. In short, PD are musical events that are 'out of time' and 'out of tune'. Though Keil doesn't discuss it at length himself, the link with groove comes from his classification of 'processual' PD as 'beat, drive, groove, swing, push etc.'.[16]

PD has been adopted as the umbrella term, under which 'out of time' is the typical approach taken by scholars evaluating groove. Being 'out of time' can more properly be described as 'expressive timing' or 'microrhythm'.[17] These are microtemporal deviations of rhythms and durations from the ideal and notatable, small idiosyncrasies that occur in human (and possibly, through 'humanising' algorithms, digital) performances. Two key areas where a lot of intriguing research has focussed in recent years are

[14] Similar narratives and histories of different musical styles, as well as investigations of groove as a genre term may be found in Mark Butler, *Unlocking the Groove: Rhythm, Meter, and Musical Design in Electronic Dance Music* (Bloomington: Indiana University Press, 2006), and Timothy Hughes, "Groove and Flow: Six Analytical Essays on the Music of Stevie Wonder" (Ph.D., University of Washington, 2003).

[15] Charles Keil, "Participatory Discrepancies and the Power of Music," *Cultural Anthropology* 2, no. 3 (August 1987): 275–83. Also, see Keil's "The Theory of Participatory Discrepancies: A Progress Report," *Ethnomusicology* 39, no. 1 (Winter 1995): 1–19, and the forebear to these articles: "Motion and Feeling through Music," *The Journal of Aesthetics and Art Criticism* 24, no. 3 (Spring 1966): 337–49.

[16] Keil, "Participatory Discrepancies and the Power of Music," 275.

[17] See Eric Clarke, "The Perception of Expressive Timing in Music," *Psychological Research* 51, no. 1 (1989): 2–9.

the PD that occur when performers do not line up exactly on the metronomic beat (instead some enter a fraction before, others a fraction after) and the individual microtimings of syncopations, where research has focussed in particular on how jazz musicians play their swing (the 'beat-upbeat ratio' or 'inter-onset interval' of their syncopations).

Regarding the first area, Anne Danielsen's edited volume, *Musical Rhythm in the Age of Digital Reproduction*, contains many exemplary chapters. In Danielsen's own chapter, she describes and reconciles the numerous, potentially-conflicting ways of perceiving the pulse in D'Angelo's 'Left and Right' through analysing the microrhythmic discrepancies within the track and presenting three potential models for ways of listening to/perceiving the complex pulse.[18] The volume also has chapters by other scholars on the role of timbre in aiding segregation of auditory streams that have microrhythmic tensions between them,[19] and on microtiming and 'dynamic attending' – modelling perception ecologically (perception as direct perception, experienced in the real world)[20] and as a resonance and adjustment of the internal oscillations of a listener, i.e. entrainment – in two R&B songs that do not suggest a single reference structure.[21]

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[18] Anne Danielsen, "Here, There and Everywhere: Three Accounts of Pulse in D'Angelo's 'Left and Right,'" in *Musical Rhythm in the Age of Digital Reproduction*, ed. Anne Danielsen (Farnham: Ashgate, 2010), 19–35.

[19] Kristoffer Yddal Bjerke, "Timbral Relationships and Microrhythmic Tension: Shaping the Groove Experience through Sound," in *Musical Rhythm in the Age of Digital Reproduction*, ed. Anne Danielsen, trans. Maria Witek (Farnham: Ashgate, 2010), 85–101.

[20] See James Gibson, "A Theory of Direct Visual Perception," in *Vision and Mind. Selected Readings in the Philosophy of Perception*, ed. Alva Noë and Evan Thompson (Cambridge, Mass: MIT Press, 2002), 77–89; James Gibson, *The Ecological Approach To Visual Perception* (Boston: Psychology Press, 1986); Eric Clarke, *Ways of Listening: An Ecological Approach to the Perception of Musical Meaning* (Oxford: Oxford University Press, 2005).

[21] Kristoffer Carlsen and Maria Witek, "Simultaneous Rhythmic Events with Different Schematic Affiliations: Microtiming and Dynamic Attending in Two Contemporary R&B Grooves," in *Musical Rhythm in the Age of Digital Reproduction*, ed. Anne Danielsen (Farnham: Ashgate, 2010), 51–68. One final example of this kind of research, but not from Danielsen's volume, is Michael Hove, Peter Keller, and Carol Krumhansl, "Sensorimotor Synchronization With Chords Containing Tone-Onset Asynchronies," *Perception & Psychophysics* 69, no. 5 (2007): 699–708.

The most well-known example of the second main area of PD research – on the idiosyncrasies of jazz swing – is Fernando Benadon's essay 'Slicing the Beat: Jazz Eighth-Notes as Expressive Microrhythm'.[22] This essay surveys jazz recordings by a range of different instrumentalists, and looks at how the musicians' individual swing performance varies to aid melodic expression and phrasing. Through measuring the variations in swing within phrases and transcribing performances, Benadon argues that microvariations in swing are an expressive device that have been neglected by analysts who have focussed primarily on melody and harmony. Following on from this, Benadon concludes that rhythmic subdivision and microrhythmic variability are key defining features of a performer's musical personality.

The main frustration with some of the current literature is that scholars take these microrhythmic musical phenomena, which are readily identifiable and measureable, and conclude that, since these properties are present, the music grooves. They take a correlation and present it as irrefutable causation: PD are present in track X, therefore it grooves.[23] This is a gross oversimplification of the literature, but there is yet to be a satisfactory account of how musical phenomena that occur at the millisecond level can be the foundation of groove. These studies often assume human input, and therefore

[22] Fernando Benadon, "Slicing the Beat: Jazz Eighth-Notes as Expressive Microrhythm," *Ethnomusicology* 50, no. 1 (January 2006): 73–98. For other examples of this type of PD research, see Matthew Butterfield, "Why Do Jazz Musicians Swing Their Eighth Notes?," *Music Theory Spectrum* 33, no. 1 (April 2011): 3–26; Matthew Butterfield, "Participatory Discrepancies and the Perception of Beats in Jazz," *Music Perception: An Interdisciplinary Journal* 27, no. 3 (February 2010): 157–76; Joseph Prögler, "Searching for Swing: Participatory Discrepancies in the Jazz Rhythm Section," *Ethnomusicology* 39, no. 1 (Winter 1995): 21; Walter Busse, "Toward Objective Measurement and Evaluation of Jazz Piano Performance Via MIDI-Based Groove Quantize Templates," *Music Perception: An Interdisciplinary Journal* 19, no. 3 (Spring 2002): 443–61; Henkjan Honing and W. Bas de Haas, "Swing Once More: Relating Timing and Tempo in Expert Jazz Drumming," *Music Perception* 25, no. 5 (June 2008): 471–76; Carl Haakon Waadeland, "'It Don't Mean a Thing If It Ain't Got That Swing' – Simulating Expressive Timing by Modulated Movements," *Journal of New Music Research* 30, no. 1 (2001): 23–37.

[23] This is not to mention the countless examples one could provide of music with PD that may not be qualitatively described as having groove (arguably, classical music?), or quantized (digitally snapped to an idealised temporal grid) music that has no PD, but certainly has groove (electronic dance music).

human fallibility (i.e. PD), is fundamental to groove. This type of study ignores the vast array of musics such as techno, electronic dance music, most drum machine-driven pop from the 1980s, and certain pieces of house music that have commonly been described as having groove and are closely associated with dancing (a fundamental definition of groove in Figure 1), but which have no PD whatsoever. In addition, the studies often seem to be self-fulfilling in that a track is deliberately selected because the researcher evidently has some kind of response to it and may be aware of a microrhythmic phenomenon occurring, it is then placed in the 'laboratory' and found to have the quantitative properties that the researcher qualitatively perceived. These rhythmic phenomena may certainly play a role, but linear mapping of a technical feature onto a perceptual experience is too deterministic. It is especially important to note that the literature is not in total agreement on the positive effect of PD on one fundamental definition of groove – the elicitation of body movement:

> Madison et al. found that beat salience and event density (sub-beat variability) correlated positively with ratings [of wanting to move]. *They did not find an effect of microtiming*, which has been the focus of many groove studies. In fact, a later study showed that *microtiming decreased liking and the desire to move*.[24]

Instead, might the experience of groove be something more than the sum of its (microrhythmic) parts? Tiger Roholt takes the view that:

[24] Maria Witek et al., "Syncopation, Body-Movement and Pleasure in Groove Music," *PLoS ONE* 9, no. 4 (April 2014): 2. Emphasis added. Refers to: Guy Madison et al., "Modeling the Tendency for Music to Induce Movement in Humans: First Correlations With Low-Level Audio Descriptors Across Music Genres," *Journal of Experimental Psychology* 37, no. 5 (2011): 1578–94; Waadeland, "'It Don't Mean a Thing If It Ain't Got That Swing'"; Vijay Iyer, "Embodied Mind, Situated Cognition, and Expressive Microtiming in African-American Music," *Music Perception: An Interdisciplinary Journal* 19, no. 3 (Spring 2002): 387–414; Charles Keil and Steven Feld, *Music Grooves: Essays and Dialogues* (Tuscon: Fenestra Books, 2005); Matthew Davies et al., "The Effect of Microtiming Deviations on the Perception of Groove in Short Rhythms," *Music Perception: An Interdisciplinary Journal* 30, no. 5 (June 2013): 497–510.

> [Groove] is a perceptual Gestalt grounded in microtimings, nuances; a groove arises in experience via a certain way of perceiving these nuances; the *musical significance* of fine-grained rhythmic nuance *just is* their role in a groove-Gestalt.[25]

Roholt argues for the active, participatory role of the listener. According to Roholt, groove is mind-dependent and, whilst these PD nuances may be present in 'the music itself', it is only realised in the listener's holistic experience.

In addition, the listener is frequently forgotten in the literature and events that are only perceivable in spectrograms that freeze and vastly expand a moment in time are being heralded as fundamental to the perception of groove. One example of this is Hans Zeiner-Henriksen's essay on small pitch drops in Roland TR-808 and 909 drum synthesisers' bass drum sounds and the link to downward body movements in dance.[26] The audible phenomenon – the pitch drops – is nearly, if not totally, impossible to perceive in the tracks described, and only decipherable when magnified in spectrograms. What is more, there is no consensus on what, empirically, are the bounds to our perception, and, as Kristoffer Yddal Bjerke points out, 'achieving *useful* measurements of microtemporal distances…requires a sense of the listener's ability to perceive them'.[27] It is for these reasons that the listening study in the second part of this essay aims to understand the experiential qualia of groove, and not some microscopic technical property. The listener is core to this study and cannot be forgotten.

Finally, before presenting the study, I will briefly critique two examples from the literature: one qualitative, one quantitative. Anne Danielsen's book, *Presence and Pleasure: The Funk Grooves of James Brown and Parliament*, provides an in-depth look

[25] Tiger Roholt, "Groove: The Phenomenology of Musical Nuance" (Ph.D., Columbia University, 2007), 5. Emphasis in original.

[26] Hans Zeiner-Henriksen, "Moved by the Groove: Bass Drum Sounds and Body Movements in Electronic Dance Music," in *Musical Rhythm in the Age of Digital Reproduction*, ed. Anne Danielsen (Farnham: Ashgate, 2010), 121–39.

[27] Bjerke, "Timbral Relationships and Microrhythmic Tension: Shaping the Groove Experience through Sound," 87. Emphasis added. Benadon places the threshold for perceiving events separately at 6ms, though many others put it as high as 20ms. "Slicing the Beat," 82–3.

at the history and development of funk.[28] Alongside close readings of the music of these two figureheads of funk – James Brown and the band Parliament – that feature lengthy analyses of their music and discussions of the social and cultural value of funk, Danielsen writes impressive sections on the issue of race and whether a white European is 'allowed' to write about funk (though, in ensuing chapters, she does occasionally risk treating funk as an African music),[29] funk's spread into pop and rock music,[30] and the role of pleasure in the experience of funk grooves.[31]

However, Danielsen's musical analyses, which make up a sizeable part of the book (33-91), are deterministic and reductionist, failing to account for the rich variety of the music she studies. Danielsen criticises discourses that 'fail to address the phenomenological qualities linked with the experience of music' (12), and says that she will write about funk 'from a position within subjective experience' (13). Yet, in this section of the book, the 'author is dead' as she removes her identity from the analyses,[32] making universal assertions such as: 'the pulse of the counter-rhythm is, *as a rule*, not sufficiently stated to make the music appear to be the product of two different basic pulse schemes' (67). Or, regarding 'Doing It to Death': 'the feeling of triplets in the first part of the bar is so strong that the total rhythmic feel of the song is challenged. Due to this, the 4/4 pulse *has to be* reinforced by an emphatic duple…gesture right on the two last quarter notes [crotchets] of the bar' (68).

These statements are certainly subjective, but they are presented as irrefutable fact with no acknowledgement that there may be alternatives to this way of thinking.

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[28] Anne Danielsen, *Presence and Pleasure: The Funk Grooves of James Brown and Parliament* (Middletown: Wesleyan University Press, 2006).
[29] Ibid., 3–36.
[30] Ibid., 95–140.
[31] Ibid., 192–218. Subsequent references will be given in the text. All emphases added.
[32] See Roland Barthes, "The Death of the Author," in *Image Music Text*, trans. Stephen Heath (London: Fontana Press, 1977), 142–48.

As Tia DeNora writes about analysis, in the context of Susan McClary's infamous analysis of Beethoven's Ninth Symphony, there is a tacit shift, or 'slippage', when:

> an analyst substitutes his or her own interpretations or responses to the music for more systematic evidence that the music's semiotic properties and its affects 'pre-exist' analysis, that they are 'out there', waiting to be perceived or uncovered.[33]

Analysts sometimes 'slide between, on the one hand, [their] personal responses to music and, on the other, reference to catalogues of musical devices'.[34] DeNora asserts that 'analysis [alone] is not sufficient as a means of addressing music's affect in practice'.[35] In addition to these 'slippages', the analyses and conclusions drawn from them/projected onto them by Danielsen reduce groove to a sequence of rules that diminish the rich variety of the music. Countless examples may be found that conflict with Danielsen's 'rules', for example 'Doing It to Death' maintains the exact same pattern of syncopation for ten minutes (see 🔊① and Example 1), completely contradicting Danielsen's assertion that 'a regular pattern of syncopation cannot be allowed to continue for too long' (67) (unless Danielsen's 'too long' is more than ten minutes).

The more empirical literature on groove can also be problematic. In the pursuit of quantitative data that hasn't been corrupted by too many variables, so much of the music can be stripped away or made synthetic that listeners can hardly relate to what is left, and so results are hardly applicable beyond the bounds of the study. There are, of course, many arguments for doing this kind of research and it is valuable in its own right. In a broad, ecological study, concrete and testable/verifiable conclusions are hard to draw because the data is so holistic and diffuse, whereas empirical work allows variables to be isolated and, historically, have provided a vast number of insights into our experience of music. Empirical and ecological work coexist in a reciprocal relationship

[33] Tia DeNora, *Music in Everyday Life* (Cambridge: Cambridge University Press, 2000), 28.
[34] Ibid., 29.
[35] Ibid., 28.

– each field draws on the other and an ecological study may be followed by an empirical one to refine the results or vice versa.

As an example of a recent empirical study and to give a brief critique of some of the potential shortcomings of this style of research, I turn to Maria Witek et al.'s thorough investigation into the relationship between syncopation, body-movement, and pleasure when listening to drum-breaks.[36] The study found that participants desired a moderate amount of syncopation both in answer to 'To what extent does this rhythm make you want to move?' and 'How much pleasure do you experience listening to this rhythm?' Following their finding that there is an inverted U-shaped relationship between syncopation and pleasure/movement, they argue for a theory of 'optimal perceptual stimulation' regarding musical complexity (in this case, syncopation) and body movement and dance.[37]

However, the stimuli used in their study, 50 drum-breaks that were synthesised using Apple's GarageBand, are highly synthetic and so it is hard to connect the results to 'real' music (despite the title of the paper and some popular press claiming it is for 'groove music').[38] Whilst the breaks were drawn from real world examples and other

[36] Witek et al., "Syncopation, Body-Movement and Pleasure in Groove Music."

[37] Ibid., 9.

[38] Helen Shen, "People Like Their Music Served Medium Funky," *WIRED*, April 16, 2014, http://www.wired.com/2014/04/funky-music/. This concern is acknowledged and addressed to some extent in the researchers' second, forthcoming, paper:

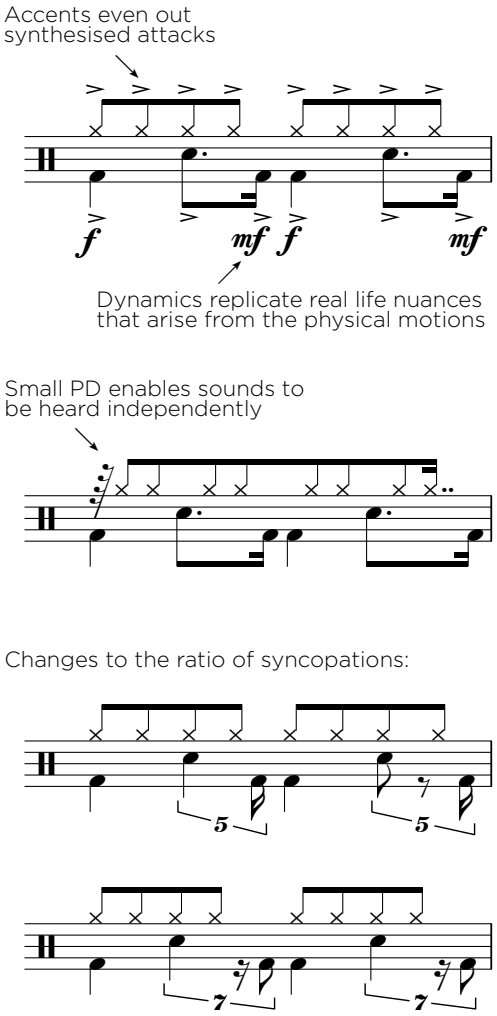
> [Syncopation theories and studies] suffer from [an] important limitation by taking only one instrumental layer into account when calculating meter and syncopation salience. This limitation is particularly problematic considering the polyphonic character of the musical genres with which syncopations are largely associated, such as pop, rock and groove-based music. In this music, syncopated patterns in one instrument are often accompanied by at least one other instrument sounding the tactus [the pulse, the rate of which is linked to bodily activity: heartbeat, suckling, walking, chewing, sex] and metrical framework in some way.

However, the musical examples in this paper are similarly removed from 'real' musical examples that participants could relate to ecologically, and they treat the drum kit as an assemblage of individual instruments that make a polyphonic texture, not one polyphonic instrument. Whilst this may seem like a nuanced difference, the interaction of elements needs to be considered beyond the drum kit and the performance could incorporate the human rhythmic discrepancies that arise when one person performs

'believable' examples were composed by Witek, the sound of each break is lifeless since the software creates the track from a limited library of bass drum sounds, hi-hat sounds etc. that are invariable. In real life drum-breaks in the genres Witek et al. imitate, there are dynamic nuances that mark out time of the bar such as emphasis on the beat, and also sonic changes such as those that occur when you hit a drum or cymbal twice in quick succession, but this does not happen automatically in limited software like GarageBand. Additionally, GarageBand restricts the rhythms in the examples to a limited metric grid, ignoring the aforementioned research that shows how drummers and other musicians swing their rhythms and do not perform in perfect semiquaver quantization. Steps can be taken to force software to play with these kinds of 'humanised' rhythms and nuances (Example 2), but there are no indications, from listening to the examples, that these steps were taken.[39] Of course, all of these criticisms are examples of where an empirical study has to restrict itself in order to minimise variables and obtain useable results, but they do suggest the potential for ecological work or empirical work that is focussed in other areas to compensate for some of these restrictions. If the researchers had included, for example, PD or alternative syncopations in their audio materials, this could confuse the data, but a separate study could build on Witek et al.'s work and research these qualities.

multiple actions 'simultaneously'. Maria Witek et al., "Effects of Polyphonic Context, Instrumentation and Metrical Location on Syncopation in Music," *Music Perception*, in press.

[39] For an evaluation and analysis of digital music with large degrees of PD and syncopation, where 'straightforward rhythmic templates are distorted and refracted into scuttling, sidewinding two-step shuffles', see Nick Sigsworth, "Breakbeat Science: Rhythmic Complexity, Metric Ambiguity and Syncopation in Two-Step Garage" (BMus Dissertation, King's College London, 2010).



Example 2: Demonstration of some techniques that may be used to make software 'perform' drum patterns in a more human way

Listening Study – The 'Experiment'

The listening study consisted of a small number of people who were sent a questionnaire that asked them to listen to several tracks and answer, in whatever way they wished, 'Does this groove? Why? Describe the groove' (Appendix 1. See Appendix 2 for the Participant Information Form). The tracks were versions of 'Doing It to Death/Gonna Have a Funky Good Time – Part 1 & 2' that had been recreated, then manipulated to exhibit characteristics often found in the literature on groove (🔊①). Two pools of words were provided – using words that feature in adjectival studies into rhythmic perception by Alf Gabrielsson (Figure 2a) and Helga de la Motte-Haber (Figure 2b) – as a starting point, though these were not prescriptive and participants were free to ignore these words.[40] The words were presented in this random arrangement to minimise any chance of being too leading:

Figure 2a: Word pool of adjectives used to describe rhythm in Gabrielsson

[40] Alf Gabrielsson, "Adjective Ratings and Dimension Analyses of Auditory Rhythm Patterns," *Scandinavian Journal of Psychology* 14, no. 1 (1973): 251–2; Helga de la Motte-Haber, *Ein Beitrag zur Klassifikation musikalischer Rhythmen* (Köln: Arno Volk, 1968), 40–42 (my translation).

Figure 2b: Word pool of descriptions of rhythm in de la Motte-Haber

PARTICIPANTS: 18 participants were directly approached to take part in the listening study, 14 of whom responded. They were all known acquaintances in their early 20s, selected to represent a range of musical experiences and training – from the completely untrained through to the professional, but, inevitably, all raised in a Western musical tradition – and because of the expectancy that they would use their natural language rather than an academic voice. They were allocated a random participant number between 15 and 32, which is their only identifier in the study. They were not paid to take part.

STIMULI: A multitrack recreation of the main two-bar groove from the original song, 'Doing It to Death' (bars 1 & 2 in Example 1), was made by musicians from The Kings of Soul, a band experienced with performing this genre of music, and looped to create an eight-bar, 16 second, track. Seven additional eight-bar tracks (four loops of two bars) were subsequently created, using Logic Pro X to manipulate the source materials (see Table 1 as well as Appendix 3 for detailed information). Participants accessed these tracks online (http://[redacted]/gonna-have-a-funky-good-time/) and could listen to each track as many times as they liked, though each

had a randomised listening order prescribed by their response form to prevent the order having an overall effect on responses. They were encouraged to use quality speakers or headphones (though Witek et al. have demonstrated there is no significant effect of audio quality on the value of data).[41]

Track Number (on CD and website)	**Manipulation**
1	None – Original recreation
2	Quantized (note onsets snapped to an exact grid)
3	PD – Bass one demisemiquaver late
4	Tempo – 10 BPM faster
5	Timbre – Drum EQ manipulated to boost bass
6	PD – Drums one demisemiquaver late
7	Articulation – Guitar & Bass with no sustain
8	PD – Guitar one demisemiquaver late

Table 1: Track listing of my manipulations to 'Doing It to Death'

[41] Witek et al., "Syncopation, Body-Movement and Pleasure in Groove Music," 3.

Listening Study – Results

Firstly, I would like to emphasise just how varied and individual the responses to the study were. No single definition of what groove is can be found within the results, nor was there any consensus as to whether a specific track 'had groove' or not, or whether one was the 'best'. Whilst certain descriptions recurred more frequently than others, the language used by all the participants was completely unique to them. In addition, responses were highly varied with some participants believing a certain track grooved, others disagreeing; some liking an example, others not.

To illustrate of the breadth of data and to give a sense of my personal reading of these unique phenomenological experiences, here are a few examples of typical responses:

> Seems to sit quite nicely. Although there's something a little unsettling about the guitar I think, the last beat sounds pushed perhaps. As a result it doesn't sound totally relaxed and grooves less than it might. Pretty good though. **P23, Track 1**

> To my ear sounds almost identical to clip 1. Perhaps doesn't really 'groove' as it could. Sounds quite studied and mechanical. Perhaps familiarity with the original makes me want it to sound more flexible and organic. **P28, Track 2**

> No. The drums sound too behind, reminds me of a school band. **P20, Track 6**

These are just three random choices from the 112 individual responses, but the variety of response styles is clearly evident, demonstrating just how personal this phenomenon of groove experience is and certainly how personal its communication is. The first example, describing the unmodified track, begins and ends with value judgements. The participant also describes the music as 'a little unsettling' and tries to locate the source of this discomfort. Following on from this, the response suggests that 'relaxed' is a key component of groove and, since this participant perceives a lack of re-

laxedness, this track falls short of being groovy. The second example, describing the quantized track, presents some comparisons with the participant's prior experiences – moments before when listening to Track 1, and some time further ago, when they listened to the original J.B.'s version. Again, the source of what the participant believes to be inhibiting the sense of groove is sought: 'sounds quite studied and mechanical'. Finally, the words 'flexible' and 'organic', whilst very vague and, in the latter case, conceptually loaded terms for musicologists, do evoke something of that intangible, desirable quality of groove that many of the participants seem to be seeking in their responses.[42] The terms are a counter to the 'studied' and 'mechanical' and express something natural and human that this participant desires. The final response, a description of the example where the drum track is delayed by a demisemiquaver, again tries to locate the change in the track (this is a common feature of responses, possibly due to the structure of the study, but it is by no means an integral part of the data collected). I read the participant's memory of a school band as suggesting a mark of lower quality or musicianship. It brings to mind musicians who are not listening to or engaging completely with each other (described in the same participant's response to Track 3 as 'interlocking to the right extent'), and is an aural phenomenon that many people can associate with from their school days or from hearing young family or neighbours playing music.

One participant, P18, wrote some extended responses that encompass a range of perspectives on the phenomenology of groove. Having shown a glimpse of the breadth of responses, I will analyse a couple of these to illustrate how one individual may express their personal experience of groove. This participant is not being presented as representative of the entire study, quite the opposite. The above discussion

[42] In fact, this participant is a music graduate and writes: 'The voice in my head left over from my degree starts yelling when I write words like "flexible" and especially "organic"!' (P28, Notes).

emphasised the multivalent and individual nature of groove, now I wish to demonstrate in more depth just one of many varied ways in which participants responded. To reiterate, no 'typical' example may be found, nor fabricated – each response is unique and equally valuable.

P18's first response is the longest and is immensely rich, providing much to analyse:

> Yes, it grooves (based on instinct, as all my answers will be). To me, it seems to start through the interaction of the predictable bass line, and the guitar's triplets. I'm not quite sure what to follow, but I feel the need to move. The most important part seems to be the interaction of the guitar and base [sic] line between the second and third beat of each bar. In that brief exchange of beats, I don't know when to beat my heart, or breathe. Yet the guitar and bass continue rhythmically and regardless, and I don't know where to go – follow the bass or follow the guitar? When the long fourth beat arrives (with the clap and the held bass), there's a period of respite before the next bar starts, and my limbs and brain feel activated again and I have to move. Perhaps it is the combination of needing to move and not knowing when to breathe. That Nile Rogers [sic] tone in the guitar part helps to signpost that this is groovy, but is not essential. After listening to it a while find it less groovy. It becomes tame, because it's a little too rhythmic and predictable. For it to be groovy, I have to imagine it as the introduction to something more groovy!
>
> **P18, Track 5**

First of all, the respondent explicitly states that they have an instinctive feel for whether it grooves or not. This agrees with some of the definitions of groove described earlier, particularly Feld's notion of an 'intuitive feelingful sense of a "groove"'. However, later in the response, having listened to the two-bar phrase several times and evidently contemplated it at some length, P18's response and perception of groove – or at least their analysis of groove – changed from a drastic, physical feeling to a more gnostic, verbally mediated, 'intellectual' response and, in the course of this, the sense of groove is reduced.[43] As George Clinton, founding member of Parliament, said of funk, which can be substituted by 'groove' in this context: 'Funk is something one

[43] Carolyn Abbate, "Music—Drastic or Gnostic?," *Critical Inquiry* 30 (Spring 2004): 505–36.

feels, and everybody has the ability to feel it. The irony is: The more one thinks about it, the harder it is to get the feel of The Funk. It's just done'.[44]

Much of the response consists of describing and analysing the technical aspects of the performance. P18 describes themselves as fairly musical with many years of instrumental lessons including, importantly, several years of guitar. This may explain the prominence of technical discussion, particularly regarding the guitar and bass. Technical knowledge connects to a discussion of genre through describing the guitar's 'Nile Rogers [sic] tone' (Nile Rodgers is the founder and guitarist of disco/funk band Chic as well as working with countless other famous groups in these idioms). As described earlier, the literature on groove may be classed into two main categories: one that takes groove as a genre descriptor, the other discusses groove as a rhythmic phenomenon. P18's invocation of Chic shows that these two groups are not completely distinct, but that links may be drawn between them. In addition, reference to Chic overtly demonstrates that P18 mentally compared the examples they were listening to with prior experiences, situating and cross-referencing their perception of groove when listening to the study's examples within the far larger context of personal musical experiences. Following on from P18's situating of the track, they write that the track becomes 'tame' and 'predictable'. This suggests that they desire some degree of surprise or unexpectedness, or at least a sense of progress for the track to qualify as 'groovy'. Finally, P18 describes numerous physical processes and movements – breathing, heartbeats, brain engagement, and limb activation – and their relation to the perception of groove. This is an extremely personal sense of groove since it is linked with

[44] George Clinton's Preface to Rickey Vincent, *Funk: The Music, The People, and The Rhythm of The One* (New York: St. Martin's Griffin, 1996), xiii. Also quoted in Danielsen, *Presence and Pleasure*, 192.

the auditor's own body and suggests that the participant's bodily processes are entrained by the music.[45]

Later on, regarding the track where the drum kit is delayed by a demisemiquaver, P18 writes:

> Argh! The guitarist is coming in too early every second bar! Groove, to me, needs to project looseness through its absolute accuracy. The guitarist might be doing what 'he's' doing intentionally, but somehow this doesn't work at all (unless it was a temporary deviation from a more steady rhythm). And the bass is doing something weird when it reaches the bottom of that second bar too, does it come in fractionally too early?
>
> **P18, Track 6**

The most interesting part of this response, to me, is the idea of 'project[ing] looseness through…absolute accuracy'. This encapsulates the conflicting views of many respondents: for something to groove it needs to be 'tight', but it also needs to sound 'relaxed' or 'lazy'. Many participants seem to seek a sense of effortless mastery when listening for groove. This quality of relaxed tightness may be linked with some of the literature on groove that discusses the concept of the 'pocket' or what Danielsen (after Eric Clarke) calls 'beat bins';[46] the notion that events not occurring exactly simultaneously may still be conceived of as being in time or on the beat due to a degree of 'rhythmic tolerance' (Figure 3). 'Looseness through absolute accuracy', therefore, is a quale that has featured in the literature, but the models and descriptions that I have encountered do not sufficiently stress the personal experience of this phenomenon, how a listener's rhythmic tolerance (dotted line in Figure 3) can and will differ and the degree of relaxedness or tightness they desire will vary.

[45] For an overview of musical entrainment, see Mark Doffman, "Making It Groove! Entrainment, Participation and Discrepancy in the 'Conversation' of a Jazz Trio," *Language and History* 52, no. 1 (May 2009): 130–47; Jessica Phillips-Silver, C. Athena Aktipis, and Gregory Bryant, "The Ecology of Entrainment: Foundations of Coordinated Rhythmic Movement," *Music Perception* 28, no. 1 (September 2010): 3–14.
[46] Danielsen, "Here, There and Everywhere," 29–32.

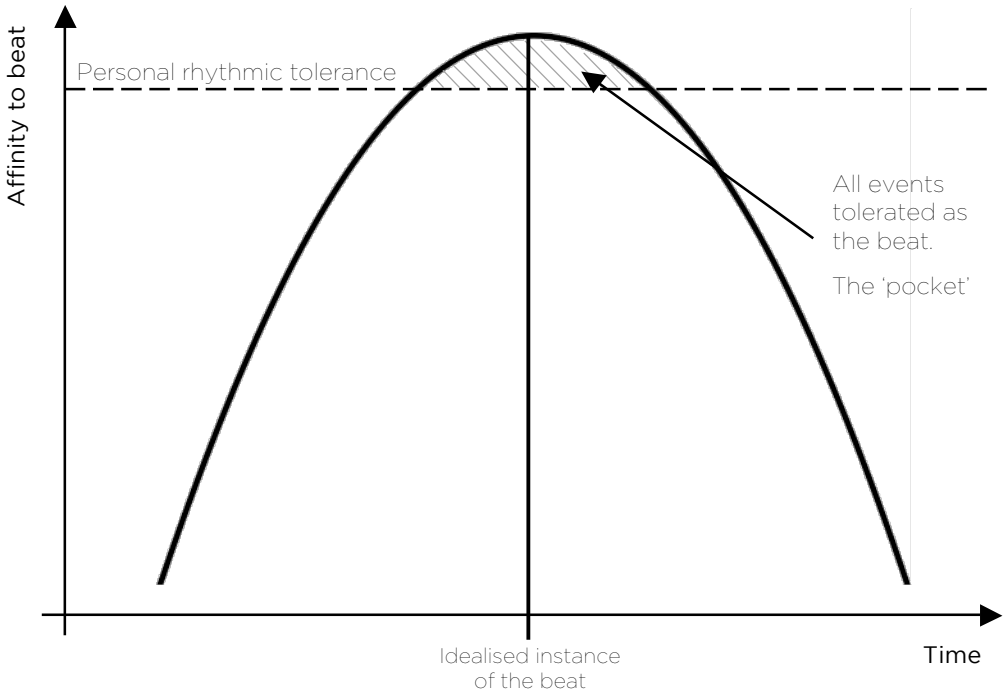


Figure 3: Graph representing the 'pocket', the concept that a beat is not a singular instance, but a domain. This figure is my response to the graphs in Danielsen, 'Here, There and Everywhere', 31-2.

* * *

A few less individual results arise from analysing the collective data. One of the most noticeable points is that, although individual participants used a wide vocabulary and diverse range of descriptions (see above), the word 'feel' and its derivatives recurred with a noticeable frequency, far greater than any others. The words 'feels' (used 33 times), 'feel' (22), and 'feeling(s)' (2) are significantly the most, with the only words occurring more frequently being words such as 'the', 'and', 'I' etc. Whilst the word 'feel' may be seen as the socially dominant word for conveying this indefinable sense of something, I would suggest that the prevalence of 'feel' also shows how personal and embodied the phenomenon ('feelingful sense') of groove is. This supports my argument that this phenomenon cannot be reduced to a statistical result or universal statement about participatory discrepancies, syncopation, the One,[47] or any other

[47] This is the notion of the fundamentality of the downbeat (beat one), particularly a slightly anticipated downbeat, to the groove in funk music. See Danielsen, *Presence and Pleasure*, 73–94. Also, Bootsy

theory that dehumanises (in the sense of removing the *individual* human) or homogenises the groove experience. This also connects with the previously discussed notion of the drastic and gnostic experience of groove – the instantaneous 'feeling' of groove is a drastic phenomenon, one that studies, including the present one by necessity, tend to express or manifest in more gnostic ways.

One other more general result from the study is that, using information from an informal survey of the participants' self-ratings of their musicality, there is no noticeable difference between the responses from musicians and non-musicians. (No one stated they were not musical nor that they had no connection with music, all declaring some relation to musicking – whether in active music making, close engagement with listening and reading, or many other types of musicking.)[48] Participants with more experience of playing instruments were perhaps more likely to use technical language and to try and define what the difference between tracks was, but this is only a small observation. This lack of clear differentiation between practical music makers – (self-) trained musicians – and those with less experience suggests that groove is a phenomenon that can be experienced by everyone and is not some sophisticated or exclusive quale that listeners need 'training' to appreciate.

* * *

Even though the results described above are so diverse, it is still possible to conceive of some larger categories within which these individual descriptions may be grouped. These more general themes are useful to conceive of as they demonstrate and draw

Collins's videos "Bootsy's Basic Funk Formula," *YouTube*, accessed June 16, 2014, http://www.youtube.com/watch?v=IHE6hZU72A4&feature=youtube_gdata_player; "Bootsy Collins on the 1," *YouTube*, accessed June 16, 2014, http://www.youtube.com/watch?v=_44LS44BFaU.

[48] Perhaps more salient conclusions could be drawn if the participants performed a more rigorous assessment of musicality. For example, Daniel Müllensiefen et al., "The Goldsmiths Musical Sophistication Index (Gold-MSI) v1.0: Technical Report and Documentation [Revision 0.3]," October 9, 2013, http://www.gold.ac.uk/media/Gold-MSIv10_Documentation.pdf.

together some of the more common qualities of groove perception expressed by participants, presenting underlying similarities despite surface idiosyncrasies. However, it is important to take these as general themes containing many diverse responses and not to reduce the multifarious responses expressed in the study down to simplistic or essentialising terms. It is vital to note, therefore, that this categorisation is highly subjective and is only the result of my personal classification of the results. Given just how open the study question was and the unconstrained style of response, as well as the non-specificity of the notion of 'groove', I am sure that others could emphasise alternative properties of the results or draw out slightly different themes from the data collected. Despite this, I believe that the categories capture the main themes and that any differences between my categorisation and that of another analyst would largely be a matter of semantics and nuances.

Having surveyed the data, I would like to suggest five broadly described categories into which much of the data may be grouped. This follows, but differs from, Gabrielsson's 'dimensions/clusters' that he surmised from his study involving adjectival ratings of rhythm.[49] My categories are:

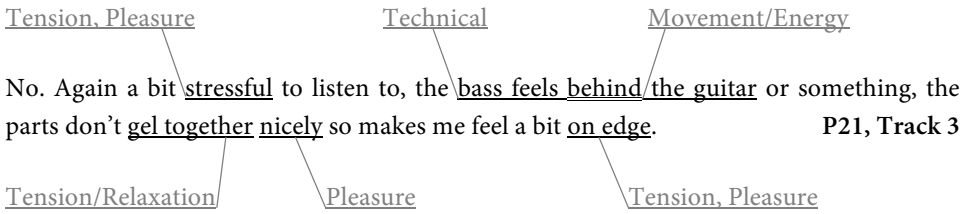
Tension/Relaxation Technical Language Expectation/Surprise

Pleasure Movement/Energy

The categories are intentionally non-exclusive – many responses may be classed under several rubrics – and there are numerous overlaps between groups. The category titles were not preconceived, rather, they were devised during the course of analysing the responses using an iterative process: when reading through the results, if a theme suggested itself, I would highlight it and return to the beginning to see if similar themes

[49] Gabrielsson grouped results under the headings: 'vitality', 'movement character', 'simplicity-complexity', 'activity', and 'excitement-calmness' in his "Adjective Ratings and Dimension Analyses of Auditory Rhythm Patterns," 259.

could be found elsewhere, and only then would a final category title be chosen. It is important to note that my categories arose from the real, practical experience of several individuals; they are not a theoretical or synthetic concept. To demonstrate a few of these and their application to an example:



The categories encompass both positive and negative descriptions – the data did not agree on many points and participants often noted the presence of or lack of a specified quale, so, for example, the category 'Pleasure' also contains many expressions of dislike (for instance, 'stressful' is a negative member of the Pleasure category). The categories are also deliberately non-specific: Tension/Relaxation, for instance, does not specify whether it is felt tension in the participant's reaction to the music or perceived tension in the musical sounds. There must be a degree of fluidity to the categories since any strict classification of such varied personal expression could force a reading of the responses and thereby potentially be misleading.

These five themes suggest a great deal about how the participants in this study listened and felt groove in general. Whilst the individuality of responses should always be born in mind, the themes allow the large amount of data to be parsed and comprehended more easily. Multi-layered and often conflicting qualitative descriptions can be drawn together and viewed more simply as a collective group. To illustrate, terms such as flow, strong, frantic, relaxed, driving forward, pulling back, and many others may be grouped under the rubric 'Movement/Energy', whilst (too) common, standard, normal, regular and repeating, familiarity, right extent, and a plethora of others

may be grouped under 'Expectation/Surprise' (some descriptions may also be categorised under multiple rubrics too). Whilst the uniqueness of each response is lost in grouping them, a general sense of the core qualities respondents desired may be gained. These core qualities that participants reported so often show that, despite its apparent complexity with many layers of contributing factors, there are actually relatively few key qualia that people seek in groove. However, these five properties are not a 'checklist' of qualities of groove where if, for example, three or more are perceived as being present in a piece of music, it can be categorised as having a sense of groove. In fact, the positive and negative members of categories demonstrate that there is no 'essence' of groove – it is unique to each listener and conflicting opinions will certainly exist.

As well as making the data more manageable and exposing core qualities that are desired by participants, the categories act as containers of meanings, drawing together multiple perspectives and experiences. By amalgamating participants' various attempts at capturing the abstract concept of groove or a facet of groove, a greater, more holistic sense of what they are trying to communicate, but are unable to do so directly, may be gained. However, I am not suggesting that there is some essence or article that *is* groove, a perfect noumenological 'thing-in-itself' that we can access through integrating various phenomenological perspectives.[50] Rather, I believe that the categories may be viewed as webs with individual nodes that signify various dimensions of groove that participants try to communicate. When these nodes are drawn together, they can signify something more intangible and abstract without diminishing the im-

[50] Noumenon is a Kantian concept about the imperceivable thing-in-itself (*das Ding an sich*), the mind-independent object in itself. This is as opposed to the phenomenon of something as it appears to an observer. A common example used by philosophers is a chair: the chair can exist 'in-itself' independently of whether we perceive it (noumenon), but the chair as it appears to our senses is the phenomenon. Immanuel Kant, "On the Basis of the Distinction of All Objects As Such into Phenomena and Noumena," in *Critique of Pure Reason*, trans. Werner Pluhar (Hackett Publishing, 1996), 303–23. See also Tom Rockmore, *Kant and Phenomenology* (Chicago: University of Chicago Press, 2011), 45–6.

portance of the individual components. Pleasure is probably the best category to present as an example of this, with participants expressing various degrees of like or dislike in response to a track, various degrees of the necessity of liking or disliking the track to their experience of groove, and various degrees of intellectualised or felt pleasure (gnostic vs. drastic). Despite this great variety of perspectives, at the core of all of these responses is some notion, which varies from individual to individual and moment to moment, of pleasure being important to the experience of groove (Figure 4).

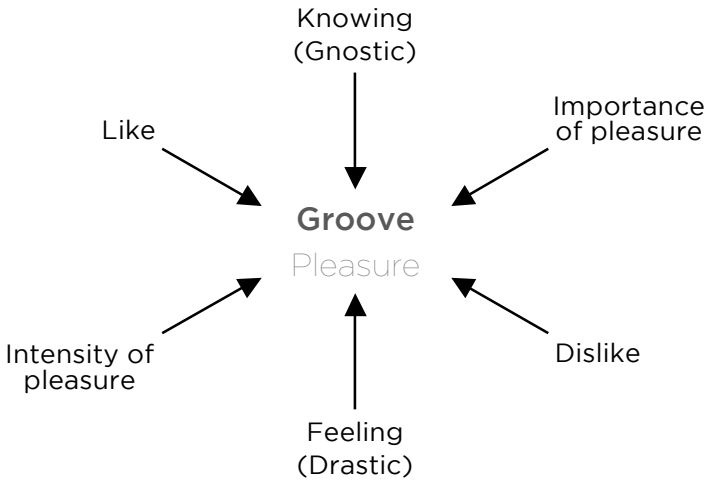


Figure 4: Diagram representing multiple perspectives pointing to the abstract, intangible notion of the pleasurable aspect of groove

Familiarity, expressed as a key part of the category 'Expectation/Surprise', was a recurring theme of the responses, with many participants comparing the example tracks overtly or tacitly with prior experiences (see the discussions of P18, Track 5 and P28, Track 2 above). However, familiarity is a quality that is exemplary of the often-contradictory nature of responses: it may be seen to act both to promote and to diminish the groove experience. This is summed up in the following response:

> The tempo goes faster. I'm beating it with my foot. But again too common, for me, to be 'groovy'. I mean I'm expecting a surprise which never comes. **P25, Track 4**

P25 seems to have conflicting views about this track: there is some kind of entrainment occurring, which is commonly associated with a positive groove feeling, but

they find the track, overall, to be 'too common' and therefore not groovy. There is no surprise, which they desire.

The five main themes described above are not necessarily new and many have featured, though often tacitly, in the literature. To give a few examples from the literature on groove: Danielsen writes about pleasure;[51] Janata et al., Witek, and Witek et al. write about pleasure and movement;[52] Clarke, Breckenridge, Greenwald, Johnson & Larson, and Zeiner-Henriksen are some of the many that have written about movement;[53] and finally Zbikowski and many others have written on the importance of listening structures, which include notions of expectancy or surprise.[54] Although there is specific literature on many of the qualities of groove that I have identified, by gathering all the terms together and presenting them equally, I wish to avoid suggesting any one as an essential or fundamental feature of groove.

In addition to these five large categories, I found that a further category, a subset of Movement/Energy, could be suggested: 'Human'. This title implies a vast category, but I would suggest the most salient features in the data collected are: movement of the body/specific limbs, breathing, pulse, sounding like a human vs. computer performance, organic/natural vs. synthetic, and vivacious vs. lifeless. Dancing is the most obvious manifestation of the Human subset of Movement/Energy category and is a

[51] Anne Danielsen, "The Sound of Crossover: Micro-Rhythm and Sonic Pleasure in Michael Jackson's 'Don't Stop 'Til You Get Enough,'" *Popular Music and Society* 35, no. 2 (2012): 151–68.

[52] Petr Janata, Stefan Tomic, and Jason Haberman, "Sensorimotor Coupling in Music and the Psychology of the Groove," *Journal of Experimental Psychology: General* 141, no. 1 (February 2012): 54–75; Maria Witek, "…and I Feel Good!' The Relationship Between Body-Movement, Pleasure and Groove in Music" (DPhil, University of Oxford, 2013); Witek et al., "Syncopation, Body-Movement and Pleasure in Groove Music."

[53] Eric Clarke, "Rhythm/Body/Motion: Tricky's Contradictory Dance Music," in *Musical Rhythm in the Age of Digital Reproduction*, ed. Anne Danielsen (Farnham: Ashgate, 2010), 105–20; Stan Breckenridge, "Grooving Body Movements Through Bass Lines: A Tradition in African American Music," *The Western Journal of Black Studies* 24, no. 3 (2000): 175–82; Jeff Greenwald, "Hip-Hop Drumming: The Rhyme May Define, but the Groove Makes You Move," *Black Music Research Journal* 22, no. 2 (Autumn 2002): 259–71; Mark Johnson and Steve Larson, "'Something in the Way She Moves'-Metaphors of Musical Motion," *Metaphor and Symbol* 18, no. 2 (2003): 63–84; Zeiner-Henriksen, "Moved by the Groove."

[54] Lawrence Zbikowski, "Modelling the Groove: Conceptual Structure and Popular Music," *Journal of the Royal Musical Association* 129, no. 2 (2004): 272–97.

core element of many participants' and scholars' notion of groove (though scholars prefer to discuss 'entrainment'). One participant describes this urge to dance/entrainment vividly and makes an interesting distinction:

> Yes, makes you want to do hand claps and make a dance circle. More strong than sexy. Good for breaking, not so good for wining. **P26, Track 7**

This track, with shortened guitar and bass notes (no sustain), prompts a specific reaction from P26. They want to dance, to form a circle (a communal dance), and see the track as suggesting a specific kind of dance – break dancing rather than wining (a Caribbean/Jamaican dance involving gyration of the hips). P26 is associating this music with prior experiences and rating their desire to move, and to move in a specific way, according to this track's nuanced differences.

Conclusion

What conclusions may be drawn about the phenomenon of groove from the forgoing discussion of the literature and from the results of the listening study? Is groove just an 'intuitive feelingful sense' or can more concrete descriptions or definitions be found? Is groove something that can be analysed, measured, or distilled into an essence? How may scholars approach the subject and how can the experience of groove be communicated? Finally, what lessons can be learned from the present study to improve future work and what form could this work take?

Multiple perspectives that locate groove 'in the music' may be found when surveying the wide range of literature on groove. Whilst appreciating many of the insights this field of research has provided – with some significant histories of genres, analyses of specific pieces or aspects of the music, and research into the perception and effect of micromusical phenomena – I have argued that this research has largely failed to take the role of the listener (a subjective individual, not an ideal auditor) into account and has thereby neglected a significant part of groove perception. In addition, the literature has tended to fixate on the idea of locating groove in participatory discrepancies and other micromusical phenomena, and, although some aspects of this research are very persuasive and the conclusions do often appear to explain what the researchers are investigating, the confidence and tacit universality of these conclusions is questionable and readily challenged with numerous counter-examples.

To address this, I conducted a listening study that approached groove from an ecological, phenomenological perspective, focussing on the listener's side of groove perception – locating groove in the mind/ear of the listener, rather than in the music.

The study took real musical examples similar to what listeners would have experienced before, drawing on the work of empirical studies to inform the various manipulations that were made to the original track, and sought a number of people's direct experiences of the music, asking them 'Does this groove? Why? Describe the groove'. The intention was to provide a foil for the current literature on groove, balancing it with a listener-centric study, and thereby challenging the status quo of groove scholarship that studies music in isolation from the world around.

From analysing the responses to the listening study, I would conclude that groove is a multifarious experience that each listener has an individual sense of and taste for. No two responses were alike, there was no consensus amongst responses about any particular track, feature of the music, or perceptual quality, and the style and substance of each response expresses completely unique sentiments. The participants all have different prior experiences of/with music and varying ways of communicating, and so approached the listening and responding task with their own unique strategies. Responses ranged from the concise and to the point ('Not really. Too fast', P16, Track 4) to the extended, multifaceted discussions of P18 (discussed above), which included descriptions of physical responses, comparisons with other songs, detailing of the technical aspects of the track, and a host of other features.

There are no set criteria upon which one can judge something as 'having groove', although, despite surface idiosyncrasies, certain tropes did recur in the listening study. Responses could be grouped into five main categories that were not preconceived and which were broadly defined: Tension/Relaxation, Technical Language, Expectation/Surprise, Pleasure, and Movement/Energy, with a further sub-category of Movement/Energy: Human. Although it is important to appreciate the individuality of respondents, these categories are the key result of the listening study. They facili-

tated the analysis of the large number of responses and were indicative of the more consistently reported facets of groove respondents sought. They enabled often-contradictory statements to be viewed together and larger ideas to be extracted.

These categories also provided a way of getting past the challenge of parsing respondents' multiple and varied linguistic styles and vocabularies, and, importantly, offered a way of getting a sense of the indefinable, abstract concept of groove. Responses, both within one participant's responses and also across the collective group, would often talk around an intangible notion of groove that could be grasped more easily by amalgamating multiple perspectives. The category labels are not themselves this idea – they are far too simplistic descriptions and saying there is an idea falsely suggests that there is a single essence that can be found – but give a general impression of the numerous and varied statements made by participants, the locus of which is the unreachable abstract conception of a facet of groove. Through amassing several people's experiences and descriptions of the abstract and intangible concept of groove, by viewing their multiple perspectives collectively, you can get an impression of what they are all getting at, without actually being able to 'see' it.

It is important to recognise whose perspectives this study has drawn on. The participants in the listening study were all sat at their computers in various locations/ situations, listening and writing about short extracts of music. The listeners were limited in the degree to which they can direct themselves towards the music as the music was recorded in mono and there was no visual element to the study (aside from the word pools (Figures 2a & 2b), which appear to have been largely ignored by respondents). Different responses to the listening study may have been gained if the study had interviewed the musicians who made the original track immediately after performing

it, or other musicians who regularly engage with and perform this kind of music. Additionally, discussions with 'technical' listeners, such as music producers or sound engineers, may also have presented different perspectives that emphasised alternative qualia.

Following on from this, I would suggest that the perception of groove is highly dependent on which elements of the music people are listening to. Some literature argues that listeners use bass frequencies more often as a reference point, acting as an aural 'anchor'.[55] However, for some listeners, higher frequencies are known to operate in a similar role, providing what is known variously as the 'grid of reference',[56] 'matrix of semiquavers',[57] or 'temporal atom' (abbreviated to 'tatum').[58] It all depends on which frequencies are perceived as dominant and which aspects of the music are listened to. Auditory perception researcher Brian Moore writes:

> According to pattern recognition theories [and confirmed by numerous other studies] the lower resolvable harmonics should be the most important for determining pitch. For temporal theories, the high unresolved harmonics should be the most important, since inference of harmonics is essential for the extraction of residue pitch.[59]

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[55] For example Hove, Keller, and Krumhansl, "Sensorimotor Synchronization With Chords Containing Tone-Onset Asynchronies"; David Temperley, "A Unified Probabilistic Model for Polyphonic Music Analysis," *Journal of New Music Research* 38, no. 1 (2009): 3–18.

[56] Barak Schmool, interview by Author, October 24, 2013; Barak Schmool, "What Makes Music Funky: Rhythmic Substructure and Groove Theory in Music from Africa and the African Diaspora" (presented at the Oxford Music Faculty Research Colloquium, Oxford, 2014).

[57] This term is employed frequently by London-based jazz pedagogue and trumpeter Mark Armstrong.

[58] Jeffrey Bilmes, "Timing Is of the Essence : Perceptual and Computational Techniques for Representing, Learning, and Reproducing Expressive Timing in Percussive Rhythm" (Masters Thesis, Massachusetts Institute of Technology, 1993), 21–3. Also see Vijay Iyer, "Microstructures of Feel, Macrostructures of Sound: Embodied Cognition in West African and African-American Musics" (Ph.D., University of California, Berkeley, 1998).

[59] Brian Moore, *An Introduction to the Psychology of Hearing* [5th Edition] (London: Academic Press, 2003), 216–17. Studies mentioned in the section by Moore include R. J. Ritsma, "Existence Region of the Tonal Residue I," *The Journal of the Acoustical Society of America* 34, no. 9A (1962): 1224–29; R. J. Ritsma, "Existence Region of the Tonal Residue II," *The Journal of the Acoustical Society of America* 35, no. 8 (1963): 1241–45; F. A. Bilsen and R. J. Ritsma, "Repetition Pitch Mediated by Temporal Fine Structure at Dominant Spectral Regions," *Acustica* 19 (1967): 114–15; Brian Moore, Brian Glasberg, and Michael Shailer, "Frequency and Intensity Difference Limens for Harmonics within Complex Tones," *The Journal of the Acoustical Society of America* 75, no. 2 (1984): 550–61; Brian Moore, Brian Glasberg, and Robert Peters, "Relative Dominance of Individual Partials in Determining the Pitch of Complex Tones," *The Journal of the Acoustical Society of America* 77, no. 5 (1985): 1853–60.

Whether the auditor listens to the pitch/melodic materials or to the rhythm, the low frequencies or the high, depends both on the anatomical structure of the listener's ear,[60] and the music itself – whether the most prominent frequencies are high (for example Afro-Cuban music with a clave) or low ('four-on-the-floor' house music/EDM or drum & bass). This is both an active and a passive aspect of listening and perceiving groove; the listener cannot change the structure of their inner ear, but can focus on specific elements of the sound to make certain features more perceptually prominent or dominant. In discussions with various people about this project, a variety of listening styles were evident; some reported that the guitar or hi-hat is their aural 'anchor', others the bass drum or bass guitar. Even more possibilities would doubtless be available if there was a melodic or vocal line in the track selected for the study.

The listening study was a useful tool for providing a broad awareness of listeners' perceptions of groove. The data was entirely qualitative, analysing the way people describe their experiences of groove, not how specific tracks/manipulations were responded to in which ways. The purpose of the study was to appreciate the multiplicity of groove perception and, whilst the collation and aggregation of responses into categories allowed a more detailed sense of the abstract phenomenon of groove, the conclusions drawn are intentionally inconclusive.

The study has provided a much-needed response to the literature, which locates groove in the music. However, in future studies, several aspects of the listening study could be altered or revised. In fact, several participants wrote comments on the nature of the study in a section for notes at the end of the study form (Appendix 1), suggesting potential improvements for any future work and, consequently, expressing further

[60] See R. J. Ritsma, "Periodicity Detection," in *Frequency Analysis and Periodicity Detection in Hearing*, ed. R. Plomp and G. F. Smoorenburg (Sijthoff: Leiden, 1970), 250–63.

details about their experiences of groove. Some participants commented on the order of the tracks and to what extend their responses were affected by it, for example:

> My perception of each of these tracks is so affected by what has come before…so I feel that my comments are only useful to the extent that they describe the way I am reacting to these tracks right now within the context of listening to 8 successive plays of these tracks in this study, not perhaps the way I would react to actual music that incorporates the variations that these tracks represent. I suppose that's inevitable. **P20, Track 4**

The effect of track order was ameliorated by the fact that each participant was prescribed a random listening order. In addition, the analysis did not concern which specific tracks were being listened to, so the order they were heard is again diminished in importance. Although P20's main observation about the listening study is not a great worry, the second point – that listening to eight successive plays of short tracks with minor differences – is a potential area where improvements could be made, possibly through presenting a wider range of musical examples or reducing the number of tracks listened to in such an intense period. A similar concern was raised, along with a further criticism, by P25:

> Firstly, I think it is hard to define what is groovy or not on the basis of such short extracts. Indeed, where I'm concerned, I need to be in a certain 'mood' as well as in a (spatial) environment which will create a sense of 'grooviness'. **P25, Notes**

As well as struggling with the presentation of the tracks, P25 raises the important point that the listening environment and the listener's state of mind would both have a significant effect on the perception of groove. P25 develops this point further, writing:

> [F]or me [groove is] more something…that has to do with dancing or a bodily experience that is linked to a whole – a whole which includes music but not only: place, state of mind, light, degree of 'light-headedness', etc. **P25, Notes**

Perhaps the listening study could have taken place in an environment more associated with this kind of music such as a club, although the intoxication to which P25 alludes could cause communication problems.[61]

Another aspect of the study that could be conducted alternatively in the future is the means by which responses are collected. The method employed here – using a questionnaire – is restrictive and limits responses to a linguistic domain. P32, on the subject of communicating groove in words, commented: 'This is way harder than I thought…' (P32, Notes). Perhaps freeform personal interviews may be preferable and would provide more drastic responses, rather than the unavoidable gnosticicism of the present study. Through interviews, which could be filmed for later analysis, participants would be able to use physical gestures, turns of phrase may be explained further, participants may play their own music to demonstrate a point, and so on.[62] The experience would be more natural and human, and hopefully responses would be richer for it.

To summarise, this study has argued that groove is not an inherent and definitive property of certain pieces of music whose source is there to be found and analysed, but a perceptual phenomenon that is present in the experience of a listener. As Stevie Wonder sang: 'Just because a record has a groove/ Don't make it in the groove./ But you can tell right away at letter A/ When the people start to move'.[63] The literature makes a persuasive case for there being something 'in the music' that makes people perceive groove/which people perceive as groove, but, as a result of critiquing the

[61] See 'A Night of Research' in Sarah Thornton, *Club Cultures: Music, Media and Subcultural Capital* (Cambridge: Polity Press, 1995), 87–92.
[62] This kind of experiment was performed on a very small scale in Maria Witek, "Groove Experience: Emotional and Physiological Responses to Groove-Based Music," in *Proceedings of the 7th Triennial Conference of European Society for the Cognitive Sciences of Music* (Jyväskylä, Finland, 2009).
[63] Stevie Wonder, *Sir Duke*, 7" (Tamla, T 54281F, 1976).

range of literature and surveying the responses of the listening study, I would caution against drawing too firm conclusions. Any 'rule' that scholars draw may be challenged with countless pieces of music that break these rules. The variety of music that people associate with groove is so great – whether it is produced by humans or computers; features large degrees of or absolutely no PD, syncopation, timbral variation, tempo variation etc. – that extreme, rule-breaking examples are easy to find. There must be some reason, however, whether it is 'in the music' or is a socio-cultural phenomenon, that explains why there are dance floor fillers and dance floor killers, and why, for example James Brown's music from the 1960s such as 'Papa's Got a Brand New Bag', can still be perceived as groovy despite musical tastes having evolved.

To quote P18: 'it takes two to tango (or groove)' (Track 3). This study has focussed on the listener side of the perception of groove to build a case for the long neglected listener and hopefully move to redress the balance in groove perception, but the music is, of course, a significant factor. The ontology of perception is such that the perception of groove cannot lie exclusively either in the music or in the mind of the perceiver. There is a reciprocal relationship: the music and the listener are continuously acting on each other. Neither side is dominant. Groove arises from the interaction of the listener – their experiences, moods, expectancies, the social and cultural context, and countless other factors – and the music.

* * *

Appendix 1: Consent and Study Form

Gonna Have A Funky Good Time

Consent Form

Date:	
Briefly describe your musical experience (e.g. untrained, two years of violin lessons in junior school, avid listener, current music student, amateur band member, professional for five years etc.):	

Statement of Consent
I have read the participant information sheet; have had the opportunity to ask questions about the study and have received satisfactory answers to questions, and any additional details requested; understand that I may withdraw from the study without penalty at any time by advising the researcher of this decision; understand that this project has been reviewed by, and received ethics clearance through, the University of Oxford Central University Research Ethics Committee; understand who will have access to personal data provided, how the data will be stored; and what will happen to the data at the end of the project; where the research will be written up as a student's thesis , understands how personal data included in that thesis will be published and stored; understand how to raise a concern and make a complaint (see complaints procedure) and agree to participate in this study.

Type Name:	

Study Information

In this study you will listen to various recordings and answer the following questions in any way you wish: 'Does this groove? Why? Describe the groove'.

The recordings will be presented to you in a randomised order. **Please follow the order!** You may listen to the tracks as many times as you wish.

Please make every effort to listen through good headphones or quality speakers.

To access the recordings, go to: http://[redacted]/gonna-have-a-funky-good-time/. If you encounter any technical difficulties, please email me: [redacted].

This is part of a study into how different listeners experience groove, so please note there are no 'correct' answers. Write as much or as little as you wish and use any language you think appropriate. Be descriptive, technical, emotional, poetic, figurative…

To get you started, here some word pools you may find useful. Feel free to ignore them.

Study

Please ensure you are listening to the correct track!

1	Does this groove? Why? Describe the groove.
2	Does this groove? Why? Describe the groove.
3	Does this groove? Why? Describe the groove.
4	Does this groove? Why? Describe the groove.
5	Does this groove? Why? Describe the groove.

6	Does this groove? Why? Describe the groove.
7	Does this groove? Why? Describe the groove.
8	Does this groove? Why? Describe the groove.

Do you have any comments? Any words or descriptions you would like to clarify?

Thank you very much! Please save this form and email it back to me.

Appendix 2: Participant Information Form

Participant Information for 'Gonna Have a Funky Good Time'

You are invited to participate in a questionnaire for a research project on the experience of groove. The project seeks to understand how different people experience groove and how small changes in the music affect this.

Please read this form and ask any questions that you may have before agreeing to be in this study.

Information

The study is being conducted by [redacted], a Master's student in the Music department of the University of Oxford. Findings from the study will be used as part of a dissertation.

If you agree to be in this study, you will be provided with a questionnaire that directs you to listen to various recordings and asks you: 'Does this groove? Why? Describe the groove'.

You may answer (or not answer) these questions however you wish – there are no 'correct' answers.

You may stop or withdraw from the study at any time.

Risks and Benefits of the Study

The study has minimal risks. You should be aware that the information you provide may be made public and the resulting project may be published or made available online, though all data will be anonymised.

The benefits to participation are that you can help further the literature on groove by assisting research into the human experience of groove, a compliment to the more technical and empirical research already available.

Confidentiality & Data Protection

The records of this study will be kept private. In accordance with the Data Protection Act of 1998, research records will be kept in a locally stored, password-protected file; only the researcher and academic advisor will have access to the original records. No copies will be made public without your written permission, and they would only be available for educational or research purposes.

Any data used in the research will be anonymised, any potentially identifying information will be changed, and pseudonyms will be used.

Voluntary Nature of the Study

If you decide to participate in this study, you are free to withdraw at any time. If you decide not to participate, your decision will be kept confidential and any data already supplied will be withdrawn.

Contacts & Questions

If you have a concern about any aspect of this project, please contact me: [redacted] or my supervisor, Professor Eric Clarke: eric.clarke@music.ox.ac.uk and we will do our best to answer your query.

The researcher should acknowledge your concern within 10 working days and give you an indication of how s/he intends to deal with it. If you remain unhappy or wish to make a formal complaint, please contact the chair of the Research Ethics Committee at the University of Oxford (Chair, Social Sciences & Humanities Inter-Divisional Research Ethics Committee; Email: ethics@socsci.ox.ac.uk; Address: Research Services, University of Oxford, Wellington Square, Oxford OX1 2JD). The chair will seek to resolve the matter in a reasonably expeditious manner.

Please keep a copy of this form for your records.

Statement of Consent

If you have read and understood the above information and any questions have been answered satisfactorily, please indicate your consent on the study form.

Appendix 3: Detailed information about track manipulations

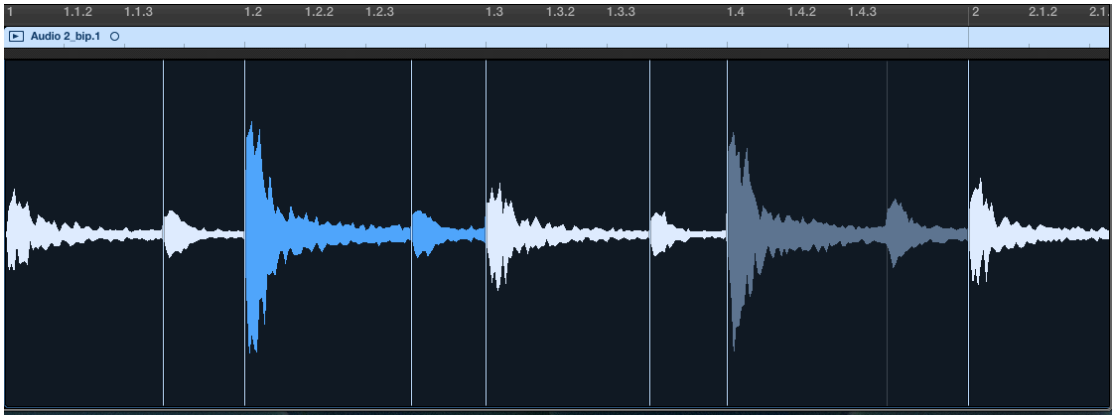
Track 1: Original recreation

Each instrument was recorded separately. First, the drums performed to a click at 114 BPM. Next, the bass part was recorded whilst the performer listened to the drums. Finally, the guitar was recorded whilst listening to the previous two recordings.

All subsequent manipulations are made to this original track.

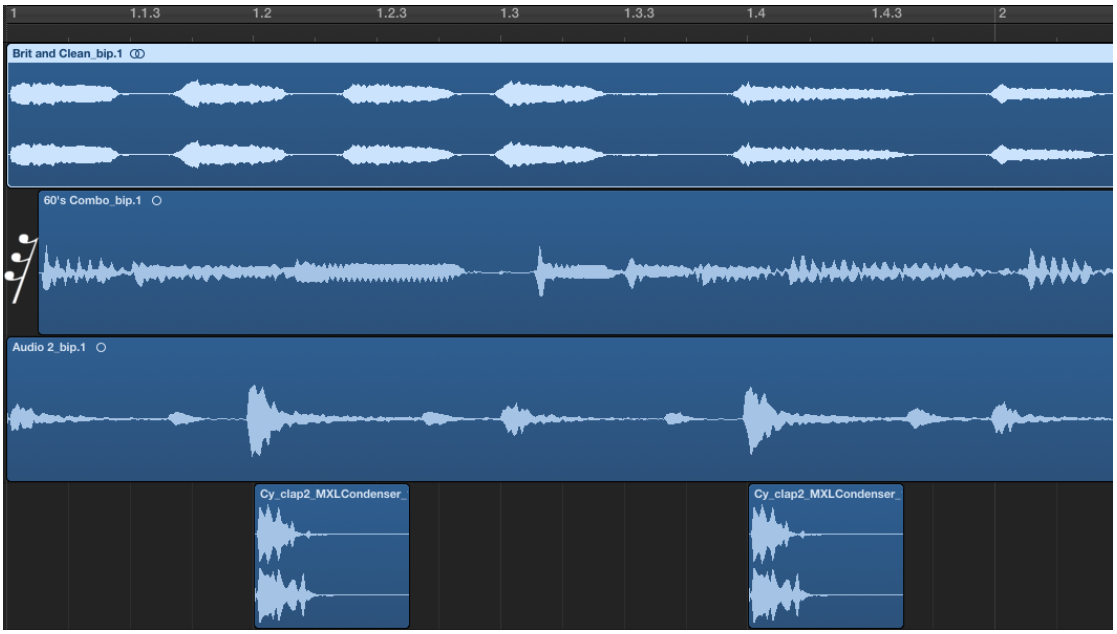
Track 2: Quantized

Logic Pro X's 'Flex Time' tool was used to manipulate each instrument and constrain it to an exact metric grid. For example, the drum's note onsets were moved to exactly coincide with the beat or, for the swung quavers, the triplet:



Track 3: Bass participatory discrepancy – one demisemiquaver late

Leaving all of the other parts as in the original (Track 1), the bass part was moved one demisemiquaver behind (demisemiquaver annotation added for clarification):

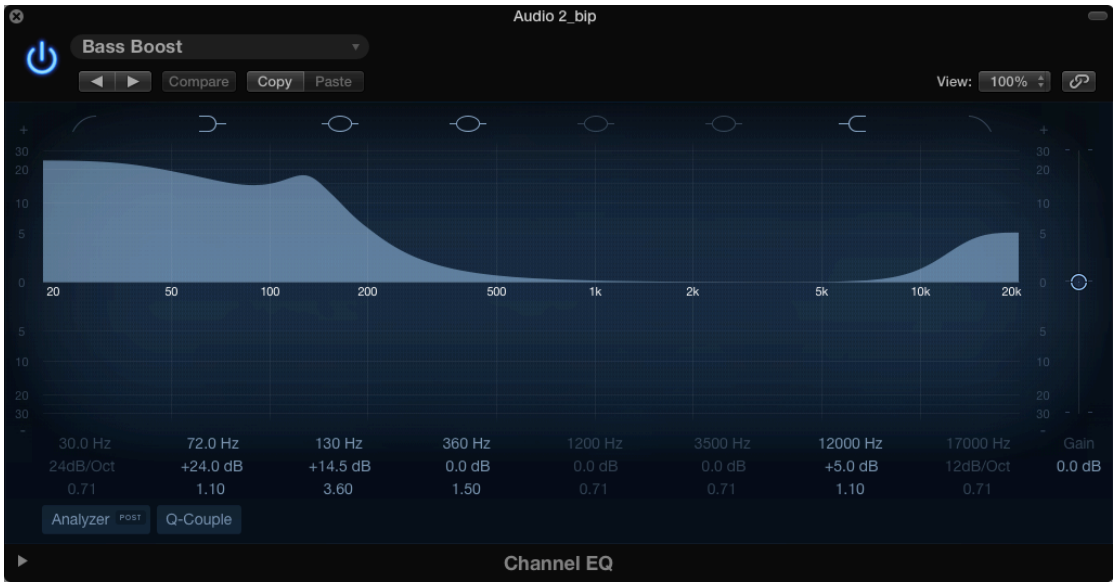


Track 4: 10 BPM faster

The entire track's speed was boosted 10 BPM to 124 BPM using Logic's 'Varispeed' function that enables tempo changes without any change to the pitches.

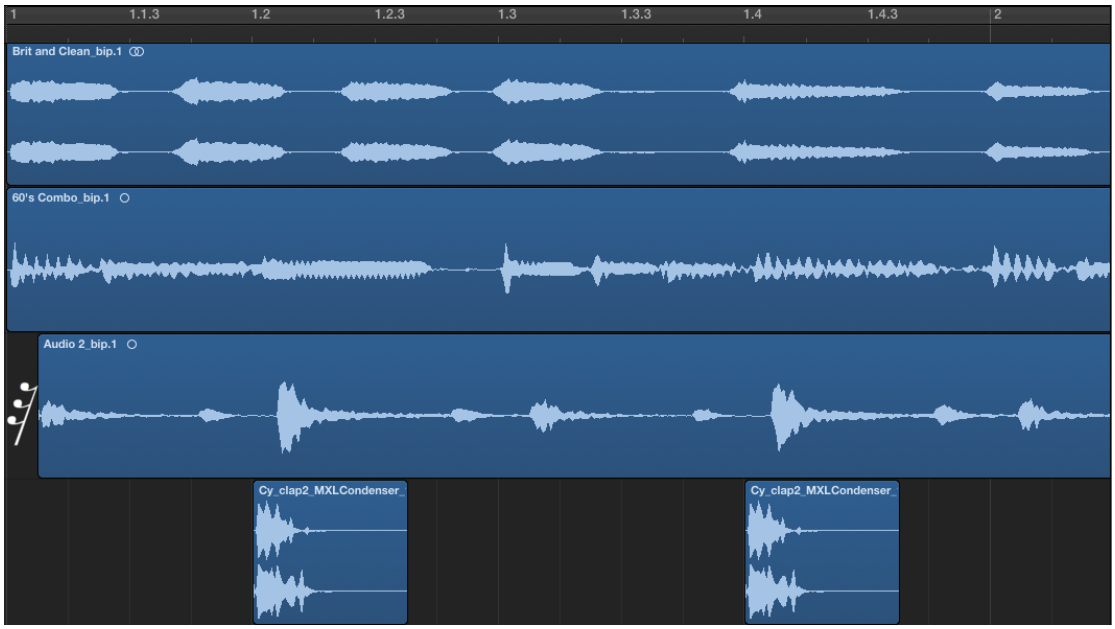
Track 5: Drum EQ manipulated to boost bass

The EQ of just the drum track was changed from the default curve to Logic's 'Bass Boost' preset, which boosted the frequencies below 200 Hz:



Track 6: Drum participatory discrepancy – one demisemiquaver late

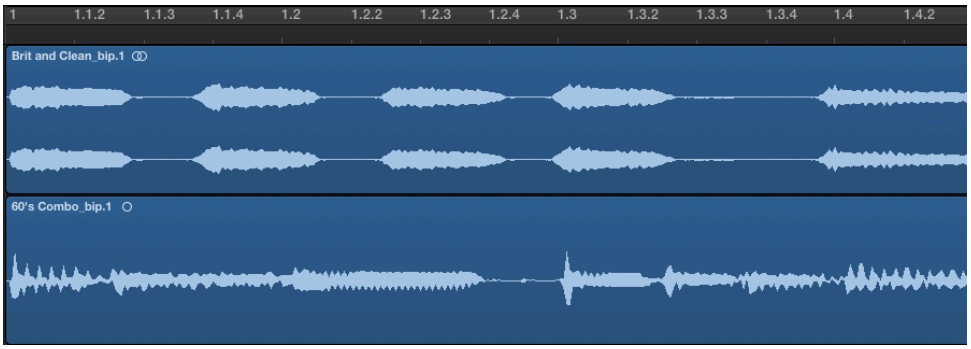
Leaving all of the other parts as in the original, the drum part was moved one demi-semiquaver behind.



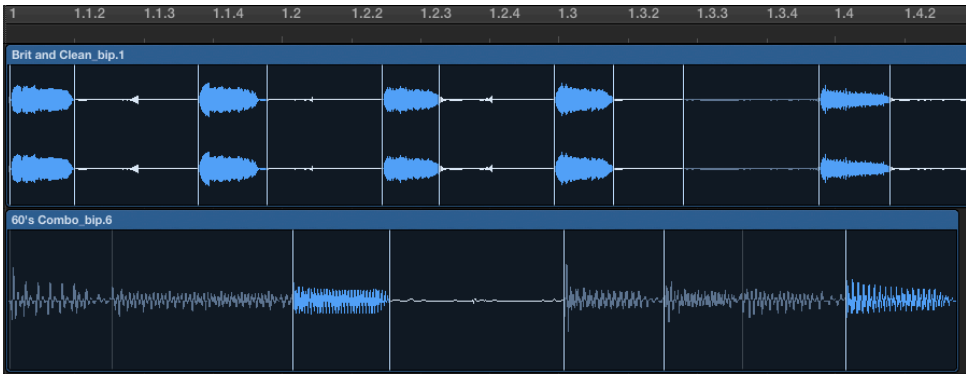
Track 7: Guitar & bass parts cut so there is no sustain

Using Logic's 'Flex Time' tool, the guitar and bass parts were manipulated so that there was no note longer than a quaver:

Original:

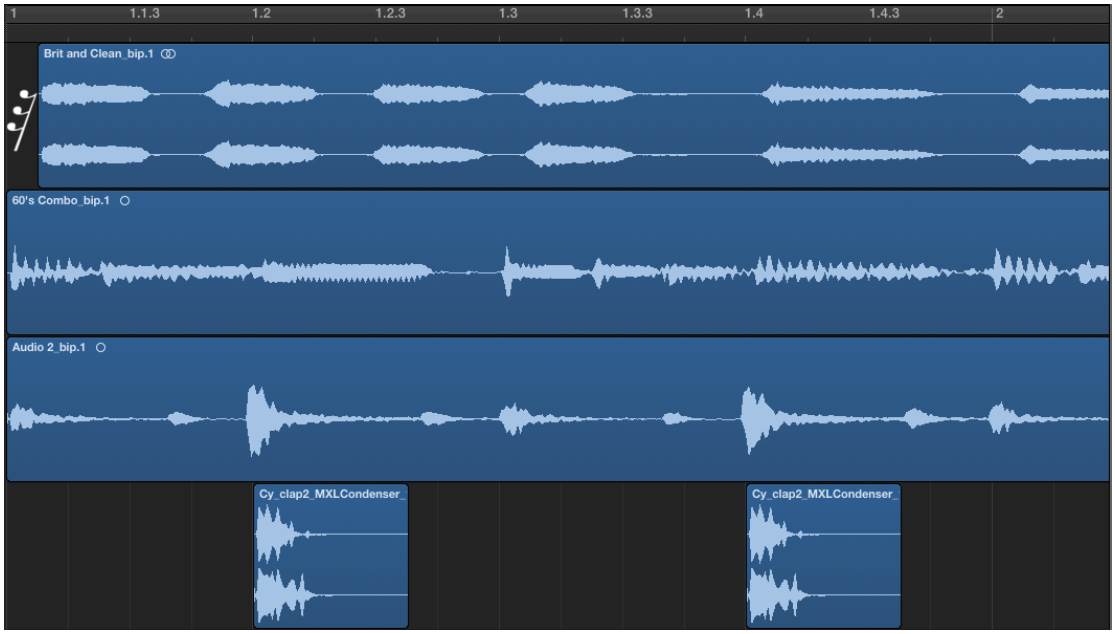


Shortened:



Track 8: Guitar participatory discrepancy – one demisemiquaver late

Leaving all of the other parts as in the original, the guitar part was moved one demi-semiquaver behind.



APPENDIX FOUR

CUREC Approval

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