

# The Progressive Heavy Metal Guitarist's Signal Chain: Contemporary Analogue and Digital Strategies

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## Abstract

This paper seeks to elucidate signal processing as musical communication. To do this, I start by establishing an analytically meaningful aesthetic distinction between the signal processing techniques employed by Djent/Progressive Heavy Metal guitarists and techniques employed by guitarists working in other heavy metal sub-genres. I focus, in particular, on crucial differences in the mid-range of guitar tones characteristic of certain metal sub-genres, common practice gain-staging procedures, noise management techniques, and approaches to compression. I explain how these technical procedures are, in fact, musically meaningful. In so doing, I further an emerging research paradigm which sees recording practice as musical practice per se, rather than simply a "technical support" for the "true arts" of composition and performance (see Hodgson 2010).

## 1. Introduction/Background

Since inception, heavy metal has espoused a strong generic relationship with the sound of the electric guitar. Often in this genre the electric guitarist hails the listener, inviting one's undivided attention via virtuosic melody lines and riffs which are, in turn, accented by bass and drums. The sonic characteristics of the electric guitar in heavy metal, however, are markedly different than in other genres<sup>1</sup>. This discrepancy can be explained via heavy metal's unique standards for guitar technique and equipment strategies when compared with other popular idioms. Some of the most readily distinguishable characteristics of an early heavy metal guitar approach would include the following:

- 1) Saturated distortion
- 2) Virtuosic control of melodic soloing techniques such as rapid-fire legato and staccato techniques, bending, vibrato, 20<sup>th</sup> century techniques such as tapping
- 3) Time-based processing: reverb, delay, modulation
- 4) Medium to high output, dual-coil ``humbucker`` guitar pickups

During the classic heavy metal era, these tones were almost exclusively achieved

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<sup>1</sup> This is particularly true when heavy metal is examined historically within the context of other genres. The guitar tone featured on "Black Dog" by Led Zeppelin (1971) is easily distinguished from the tone featured on "Aces High" by Iron Maiden (1984), for example.

through the use of an electric guitar with a humbucker pickup plugged into a Marshall amplifier, often a JMP model. Earlier on, Led Zeppelin and Black Sabbath both employed the use of Gibson instruments, often associated with a fuller, darker tone in comparison to the super-Strats used in multi-guitar groups such as Iron Maiden. These super-Strats are Fender Stratocasters, or comparable generic varieties, which have been outfitted with two humbuckers in order to increase the guitar's output and clarity. The resultant sound is an intensified version of the classic strat sound. The super-Strat produces a tone which meets heavy metal's demands for an aggressive sound due to its pick-up design, but still allows a guitar player to cut through within a dense, multi-guitar mix. The super-Strat's alder or ash body encourages such prominent midrange and brightness characteristics.

In addition to utilizing dual-coil pick-ups, during the classic heavy metal era many guitarists upgraded the stock Stratocaster volume potentiometer (250 k Ohms) to a 500k Ohm pot. The higher resistance potentiometer allows for more high-end frequency content to pass through the signal, creating a louder resultant sound. This practice is referred to as "hot-rodding" by guitar enthusiasts and professionals. Hot-rodded Stratocaster-style guitars are better equipped than their unmodified counterparts at pushing the Marshall JMP circuit topography into a state of overdrive. Where a more saturated overdrive programme is required, boost pedals are employed [1]. Randy Rhoads (Ozzy Osbourne) popularized the MXR Distortion + for such application, where other guitarists favoured the Ibanez Tubescreamer (Paul Gilbert of Racer X), DOD 250 (Yngwie Malmsteen of Alcatraz), or comparable Boss pedals (SD-1, DS-1) [2, 3, 4]. Interestingly, guitar players normally adjusted the volume control to lie between 3 o'clock and full, leaving the distortion setting between approximately 7 o'clock and 10 o'clock. This way only a small amount of distortion is generated at the pedal stage, using the pedal instead to boost the electric guitar upon reaching the amplifier's input [4].

Later in the 1980s, heavy metal musicians in America began to adopt punk and hardcore influences toward two new intensified subgenres known as thrash and speed metal [5]. While there are a few minor production and arrangement differences between these subgenres, guitarists in each style shared a common lexicon in terms of musical equipment and technique. Groups including Helloween, Sepultura, Slayer, Megadeth and Metallica exhibit a technical repertory quite similar to heavy metal bands of the past: an emphasis on low-string palm-muting, saturated distorted guitar tones, and virtuosic guitar solos. In thrash and speed metal, however, these techniques are employed in a way that is both louder and faster.

Thrash and speed metal guitarists began to adopt new equipment in order to accommodate the genre's increased technical demands. Les Paul-style humbucker pickups were often replaced by active EMG 81/85 pickup sets. These high output pickups allowed guitarists to project palm-muted notes with a greater degree of clarity, an important concern for groups such as Metallica and Slayer [6]. Some guitarists, including Kerry King of Slayer, remained enthusiastic Marshall Amplification supporters, where others such as Metallica migrated to the new –then *boutique*– Mesa/Boogie brand. The Mesa/Boogie Mark IIc+ was intended to be capable of bright, high gain overdrive tones without requiring a boost pedal, making it an ideal amplifier for guitarists who require clarity for low-E string palm-muting

techniques. Other guitarists hired amplifier technicians to modify their Marshall rigs, particularly the 2203 and 2204 series. In order to obtain the characteristically tight, responsive sound Marshalls have been known for with increased levels of gain, many musicians began taking their amplifiers to Jose Arredondo. Arredondo's classic modification adds a gain stage to the 2203/2204, as well as an effects loop (powered by a preamp tube) [7]. The inclusion of an effects loop on these amplifiers becomes increasingly necessary as guitar tones become more processed throughout the 1980s.

Throughout the 1980s, heavy metal bands expanded their production goals, now reaching a wider audience. Groups such as Metallica began to feature both the sound of clean electric guitars and acoustic guitars throughout introductory passages and instrumental breaks on *Ride the Lightning* (1984), *Master of Puppets* (1986), and *And Justice For All* (1988). It became commonplace for groups such as Metallica, Testament and Megadeth to tour with a dedicated clean amplifier, such as the Roland Jazz Chorus. Nu-metal in the 1990s, being more commercial in scope, further complicated guitar rigs with a new array of effects and sounds. Guitarists Munkey and Head of KoRn, for example, both created texturally complicated sounds through the use of multiple amplifiers, the electroharmonic POG and MicroSynth, the Digitech Whammy, the Rocktron Banshee Talk box, and simple modulation effects [9].

In addition to expanding the tonal palette available to heavy metal practitioners through the use of innovative pedals, Nu-metal also accounts for another major idiomatic contribution: the popularization of the 7-string guitar. These 7-string guitars sound more powerful and authoritative<sup>2</sup> than their 6-string relatives<sup>3</sup>. Not content with the sound of the 7-string guitar, Meshugga further intensified the sound of heavy metal by using downtuned 8-string guitars by their 2002 progressive metal release *Nothing*. The monumental decision to use custom-built 8-string guitars for this album while utilizing a production style which favours heavy textural elements was one of the main influential moments in spawning the *djent* sub-genre.

The word used to distinguish this subgenre, "*djent*," is, in fact, an onomatopoeic device intended to vocally recreate the sound character of the guitar as captured on a *djent* recording. Both the guitarist's technique, as traditionally defined, and the equipment employed to represent the guitarist's technique are of equal importance to this idiom. What follows is an account of the aesthetic interaction between guitar technique and signal processing in *djent*, and their dependence on one another towards capturing the genre's musical essence.

## 2. Progressive Metal Technique

Progressive metal places strict technical demands on musicians. Guitarists must

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<sup>2</sup>The heavy metal aesthetic is typically viewed as communicative of cultural authority via its semantic norms. For more on this phenomena see Steve Waksman *Instruments of Desire* (2001).

<sup>3</sup> Unless the 6-string has been down-tuned sufficiently (B standard), although neck scale length often becomes an issue here.

often be prepared to compose and improvise within abstract intervallic structures<sup>4</sup> which are supported by oblique polyrhythmic and polymetric frameworks. This level of obfuscating complexity invites only seasoned musicians to participate, musicians who share a similar technical lexicon across both musical and instrumental/equipment realms. The equipment strategy necessitated by this genre is inextricable from the musical technique employed by guitarists. Guitarists program their instruments to enhance and strengthen the aesthetic character evoked by progressive heavy metal's distinct finger techniques [11]. The guitarist expects the instrument to produce a specific tonal quality, and plays the guitar in particular ways under this expectation creating a recursive aesthetic structure<sup>5</sup>.

One such technical approach concerns the angle at which a guitarist holds the plectrum, or guitar pick. The pick should be held at an approximate 35-75 degree angle to the guitar strings. In holding the guitar pick at this angle this way, the guitar pick tends to scrape across the string in such a way that it emphasizes the transient of the resultant note, and causes the guitarist to play notes which sound rhythmically *behind* the beat. The addition of extra string/pick noise this way is essential to the progressive heavy metal sound as it aids in producing clarity as well. It is quite difficult to discern pitch content on distorted and downtuned 7-8 string guitars if the guitarist does not emphasize pick attack.

In addition to modifying guitar pick angle, palm-muting is utilized by metal guitarists to dampen the low guitar strings in order to produce a more authoritative sound. Palm-muted passages are often accompanied by kick drum and bass guitar accents in order to accentuate this powerful sounding guitar technique[12]. In progressive heavy metal, the guitarist's palm tends to move slightly more towards the bridge pick-up in comparison to the traditional palm-muting technique. The progressive metal approach to palm-muting yields low-string notes which sustain less and are thus more percussive, again calling more attention to the transient. Despite sounding loud, aggressive, and percussive, this technique requires a low amount of energy from the guitarist. It is crucial that an economy of motion be established in the player's technique, such that no more energy is used in palm-muted guitar riffs than is necessary. Over-playing can result in sharp notes and an uneven, unbalanced resultant tone.

Another point of technical interest in contemporary progressive metal is the dominant approach to power chords espoused by bands such as Animals as Leaders, Tesseract, and Periphery. The traditional guitar power chord, spelled Root-

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<sup>4</sup> For an example of abstract intervallic design, see Joe Diorio's *Intervallic Designs* (2000) which demonstrates a contemporary series of complex harmonic and intervallic relationships. Simple intervals can be demonstrated here: <http://www.musictheory.net/lessons>

<sup>5</sup> That is to say, the guitarist has set up his equipment in advance to communicate idiomatic progressive metal phrasing more accurately. The same guitarist will then, of course, play phrases appropriate to the equipment and settings selected. More than a self-fulfilling prophecy, both the guitarist and the chosen equipment rig work together to express the progressive metal aesthetic.

Fifth-Root on the guitar's lowest strings is modified-usually in a drop A (or lower) tuning- to be spelled Root-Fifth-Root-Fifth in this genre [12]. This four-string chord necessitates a guitar tone which provides more clarity than metal of the past, where power chords would consist of two or three string power chords. In addition to using these expanded power chords, some progressive metal artists favour a harmonic palette which lies outside of the typical metal milieu. It is not uncommon to hear suspended chords, and some artists even choose to employ 7<sup>th</sup> and 9<sup>th</sup> voicings both with and without the application of distortion.

### 3. Equipment

This expanded harmonic vocabulary necessitates an approach to generating distortion which does not obfuscate the instrument's pitch content. Guitar-rig design in progressive metal contrasts starkly with the dominant approach in nu-metal. Nu-metal guitar rigs, while also employing 7-string and baritone electric guitars, also mainly relied on Mesa/Boogie's dual and triple Rectifier amplifiers. The Rectifier model provides Nu-metal with much of its unfocused, ultra-distorted, low-end centric guitar tone<sup>6</sup>. This amplifier is capable of generating high levels of gain, and is suitable for the simplified technical demands of the Nu-metal genre. Progressive metal, on the other hand, requires a tight, refined tone to accommodate its rhythmically involved riff passages [11]. Moreover, progressive metal guitarists also need access to the diverse array of less-distorted-to-clean textural sounds employed by nu-metal guitarists such as Munkey and Head of KoRn.

Novel solutions have been developed by progressive metal practitioners which seek to meet the genre's diverse demands. The progressive heavy metal community at large is evenly split between embracing digital modelling technology and remaining with vacuum tube amplification and physical speaker enclosures [13]. As to be expected, there are numerous commonalities in general approach between the way one might program a patch on a digital device [14, 15, 16, 17, 18] and set up a physical guitar rig within this genre, [19, 20, 21]<sup>7</sup>. It is just as common within this idiom, for example, to see a guitarist to place an Ibanez Tubescreamer between his guitar and amplifier, as it is for a guitarist to use a digital emulation of the Tubescreamer before a digitally emulated amplifier. These digital emulations may be software plug-in based, such as some of the freeware available from LePou plug-ins or Line 6's Pod Farm, or digital hardware units such as Fractal Audio's

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<sup>6</sup> The Mesa/Boogie Rectifier series amplifier is, in fact, employed by some progressive heavy metal guitarists. To differentiate from this amplifier's use in Nu-Metal, however, guitarists will apply a drastically different equalization curve through both pedals and amplifier pre-amp settings (as well as post-tracking).

<sup>7</sup> I am not contending that digital replications of analog equipment are accurate, nor am I contending that they are necessarily always comparable. A survey of djent tutorial guides and online communities - as, of course, early djent (ca 2010) was produced by forumites for forumites- shows that similar strategies are employed when choosing gear and setting up the signal chain. Musicians in the field are far more concerned with resultant timbres than with the ability of digital modellers to accurately provide spectral replications of analog circuit topography, it would seem.

famed AxeFx. While some progressive metal and *djent* practitioners correctly argue that experienced ears can discern the difference between digital and vacuum tube-based rigs, others guitarists argue that the amount of processing involved in establishing these tones – even when using a tube amplifier – results in a sound which tends to reduce the sought-after warmth produced by tube amplification. For this reason, numerous progressive metal practitioners opt to use digital technology.

What follows is a short field guide for achieving progressive metal guitar tones, in the vein of Periphery, Meshugga, Animals as Leaders, and Tesseract. Some of these bands are affectionately known as *djent* groups, an onomatopoeic nickname - also arguably a subgenre designation- used to describe the unique guitar timbre featured on these recordings. The guitar's tonal quality on *djent* recordings is essential in enhancing and highlighting the guitarist's finger technique, and it also represents a unique instance where a musician's traditional technical milieu must be accompanied with a high degree of competence in the technological. This subgenre often necessitates a song writing methodology which employs recording throughout the process due to complex polyrhythmic and polymetric arrangements<sup>8</sup>. Bands such as Meshuggah write new material through sending recordings of musical ideas back and forth electronically. Perhaps then, it is natural for guitarists within the progressive metal idiom to be increasingly conscious of how their guitar tones translate to recording.

Achieving a suitable guitar tone with the heavy stop-and-start polyrhythmic staccato guitar riffs featured on Meshuggah recordings would be an arduous task with a Marshall JMP, or Mesa Boogie Mark IIc+. For this reason, guitarists within this idiom employ the use of noise gates. Professional and amateur progressive metal guitarists will both often use between one and three noise gates [13]. For single noise gate applications, it is best to place the noise gate in the the effects loop of the amplifier. This is particularly effective with high gain amps such as the Peavey 5150/6505, which is known to induce signal noise. Where multiple noise gates are used, each one is configured to apply only a subtle amount of noise reduction. The hope is that through employing multiple noise gates at various stages throughout the signal path, there will be a greater retention of desired signal content. The two noise gate set-up is constructed such that the first gate precedes a guitarist's compression and overdrive stompboxes before reaching amplifier input, and the second gate is placed in the amplifier's effects loop. The overdrive and compression assist in "fighting" the noisegate, keeping the signal more uniform and allowing the guitarist more control once the signal reaches the noise gate. From this point an EQ is employed in order to produce the signature *djent* equalization curve, but also to re-adjust for lost frequency content due to the application of the noise gate<sup>9</sup>.

The three guitarists in Periphery, prior to switching to AxeFX preamps for live and recording applications, used a three noise gate set up [13, 19]. It is important to note

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<sup>8</sup> For more on polyrhythm and polymeter please see:  
<http://www.drumlessons.com/drum-lessons/rock-drumming/what-is-a-polyrhythm/>

<sup>9</sup> The prototypical *djent* EQ curve features a mid boost around 1.5 kHz, with high and low end roll-offs.

that each time a noise gate is added to the signal chain the workload of the other noise gates is lessened, allowing each unit to be programmed using a more subtle scheme. The intended result is that the noise gates to apply less colouration in the form of reducing frequency content, especially in the signal's high-end information<sup>10</sup>. In the three noise gate set up, noise gates are placed after the compressor, after the over drive, and within the amplifier effects loop. Popular applications for this purpose may be the ISP Decimator, MXR Smart Gate, or Boss NS-2.

Overdrive is employed within the progressive metal guitarists' signal chain in order to generate a small amount of gain and improve the clarity of the signal by increasing brightness and midrange - an essential task when amplifying below-standard guitar tunings. Overdrive pedals such as the classic Ibanez TS-9 are ubiquitous in the *djent* guitar rig milieu in attempt to refine some of the overwhelmingly dark characteristics of additional low 7th and 8th strings on the electric guitar. The TS-9 and comparable overdrive units feature three adjustable settings: level, tone and gain. The level setting is typically set to "full," with the gain setting between 7 and 9 o'clock. The tone knob, often set to "full" brightness, can be adjusted to taste as one's guitar, pickups, cables and strings may require varying amounts of additional brightness.

Compression pedals are a historical rarity within heavy metal guitar rigs. Many argue that typical heavy metal gain staging -through amplifier topology and the use of pedals- naturally compresses the guitar signal dramatically, negating the need for additional compression. Compression is employed within a *djent* signal immediately after the guitar output. The intent in placing the compressor directly after the guitar is to intentionally reduce dynamic range, a peculiar goal for a guitarist. Often in rock and pop guitar rigs, analog devices such as class A and class A/B tube amplifiers are employed to increase the dynamic range of the guitar output in comparison to solid state rigs. A high level of dynamic range is less desirable in progressive metal, where value is placed on technicality and precision [19]. Compressing a guitar signal early in the chain allows for a more even attack, particularly on palm-muted notes. As discussed, progressive metal and *djent* guitarists apply the palm muting technique in a more percussive way than in previous generations, moving the right hand further away from the bridge than the standard technique. This tendency coupled with a more extreme angling of the plectrum produces an aggressive sound which is full of low end frequency content. Moreover, some guitarists employ an aesthetic approach which includes both low string palm-muting and chords, as well as medium-to-high pitched motives in the form of technical excursions such as finger tapping, rapid-fire staccato and legato departures, and explorations of dissonant tension-building musical devices such as minor 2nds, tritones, and diminished arpeggios. The sheer technical variety displayed in the progressive metal paradigm necessitates an intuitive solution to the potential unevenness in guitar /amplifier SPLs. While both amplifier stage and pedal stage overdrive supply some compression, more compression is typically

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<sup>10</sup> While it is exceedingly common to see this atypical set-up in the progressive metal world, this paper seeks to report on what is occurring in the field rather than deal with its efficacy in application.

required for the amplifier to produce more consistent SPLs.

Where a physical amplifier and speaker enclosure is employed, greater dynamic consistency is also helpful in the mic'ing process during recording. If the guitar signals' dynamic range is too wide, for example, it can be difficult to manage a speakers' excursion characteristics. Excursion point constitutes the amplitude level wherein the speaker begins to move from its resting position, enacting significant timbral changes. In a 4x12" speaker enclosure, for example, engineers (or interns operating on their behalf) at Big Blue Meanie studios in New Jersey will listen to each speaker separately, attempting to discern which speaker which produces the clearest and most powerful impact [23, 24]. Of course, it is recommended that minimal exposure to these high SPLs take place without hearing protection. A speakers' excursion characteristics can have a significant impact on the resultant guitar tone, particularly at the low-end of the audible frequency spectrum [24]. In *djent* music, the clarity of suspended chords and root-fifth-root-fifth power chords can also suffer if the amplifiers' master volume setting is not optimized to interact with the speaker enclosure. Low-mids can be particularly problematic here, but each speaker's individual characteristics can vary according to frequency response, age/use, wiring schema, power, resistance, and other characteristics. If the guitar signals' dynamic range is too wide, it can be difficult to ensure tonal consistency in dealing with an enclosure's excursion point. Alternatively, however, with an appropriate level of dynamic range and quality speakers an enclosure can, with careful master volume adjustment, excure in a way that is sonically reminiscent of desirable tape compression.

#### 4. Plug-in Tools

The previously described guitar rig can be costly to build and is subject to inconsistencies caused by damaged cables, faulty power sources, speaker age and hours used, inaccurate logging of settings and signal flow, and notorious vacuum tube issues such as tube type, bias and hours of use. These are, of course, also concerns for guitarists across genres. The guitar community at large, however, tends to employ less than three noisegates, a compressor, one or more EQs and an overdrive, whereas this is often a bare-minimum guitar rig for progressive metal [13]. Guitarists may also employ the use of other filters, pitch alteration, modulation, time-based effects, and sometimes multiple amplifiers within this idiom.

Digital guitar pre amps and audio plug-ins can simulate real world guitar equipment within varying degrees of accuracy. While expansive guitar rigs will always have their place, occasionally time and budget concerns dictate a more efficient approach. For this reason, digital solutions have been implemented widely across the genre of progressive metal. Important figures including John Petrucci, Steve Vai, Misha Mansoor, Mark Holcomb, Jake Bowen, Tosin Abasi, Devin Townsend, Jeff Loomis, and Travis Montgomery have all switched from traditional guitar rigs to the Fractal AxeFX, to name a few. Drones of semi-professional and amateur guitarists have followed suit, making the AxeFX a popular device amongst progressive metal guitarists [25].

Other popular applications include PODFarm software by Line 6, which can be operated in a stand-alone or plug-in format. As progressive metal represents an



avid online community, guitarists often trade PODFarm patches on forums, or use YouTube to provide PODFarm tutorials [26].

Perhaps the most interesting approach espoused by the progressive metal community is the use of freeware plug-ins. A number of overdrive, amplifier, and cabinet simulation plug-ins have been developed by LePou and TSE Audio, requiring only a guitar, a software DAW, and a suitable interface to accept direct signal. The TSE808 plug-in enacts a convincing Ibanez TS808 simulation, and the X50 emulates the Peavey 5150/6505. LeCab by LePou is an impulse response loader, allowing one to convolve previously encoded impulses containing psychoacoustic cabinet, room, and microphone information with an existing signal.

As far as signal flow is concerned, plug-ins are often employed in the same order as in real-world guitar rigs [14, 15, 16, 17, 18, 19, 20, 21]. For compressor and noise gate options, one can use specialty plug-ins or those included within any DAW software package. Here is the prototypical progressive metal signal chain:

Guitar → Compressor → Noise Gate → TSE808 → Noise Gate → TSE X50 → EQ → LeCab

The following represents a suggested starting point for settings within the signal chain, based on observable trends within the djent/progressive metal community (Table 1.1-7)

Guitar

-Downtuned, 7 or 8 String -Medium to High-Output Pickups (ex. Bare Knuckle Aftermath, EMG 81/85) -Bridge pickup, volume on full
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Table 1.1

Compressor

Attack	Medium-to slow, to allow pick attack to pass through
Ratio	3-4:1
Release	Longer release, to help fight the sustain-reducing features of the noisegate

Table 1.2

Noise Gate

Threshold	Settings will vary depending on input signal. Try to minimize any perturbing noises the compressor may be amplifying without losing high end spectral content and the transient. The first noise gate should be applied conservatively.
Decay	Fast

Table 1.3

Overdrive

Level	"Full"
Tone	"Full"
Gain	"0"

Table 1.4

Noise Gate

Threshold	Settings will vary depending on input signal. Try to minimize any perturbing noises the overdrive may be amplifying (or creating) without losing high end spectral content and the transient. The second noise gate can be applied more liberally.
Decay	Fast

Table 1.5

TSE X50

Pre Gain	"9 o'clock"
Low	"11 o'clock"
Mid	"3 o'clock"
High	"1 o'clock"

Post Gain	“10 o'clock”
Low End	“Full”
Presence	“1 o'clock”

Table 1.6

#### LeCab

A popular impulse response is the “SNEAP_EDGE.wav” impulse, used both in the left and right channels.
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Table 1.7

## 5. Conclusions

These settings represent a starting point only and will vary according to individual taste and technique. For progressive metal guitarists, much of their artistry lies in how they negotiate settings within their own rigs versus the standard prototypical rig<sup>11</sup>. In this way, what some may dismiss as small or imperceivable changes in tone actually represents significant alterations for these musicians. The signal processing strategies applied by *djent* practitioners is required for (1) the optimized representation of low register notes, particularly low B, A, G# strings; (2) the accurate expression of musical technique (as traditionally defined); (3) to ensure a smooth capture to recording media; (4) and for overall aesthetic enhancement. Guitarists in this idiom employ a signal chain running counter to the dominant guitar rig-building ethos which favours dynamacy and warmth. Instead, these guitar rigs work to apply progressive metal's aesthetic programme to the instrument, making staccato lines sound more pronounced, virtuosic scalar runs become intensified and effortless sounding, and low-string palm-muted riffs gain increased clarity and sonic authority. In addition to other aspects of recording practice, it is most useful to recognize the signal processing strategies employed by *djent* guitarists as an inherently musical phenomenon

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<sup>11</sup> Although, to be clear, the prototype suggested is well known to the *djent* community. The same general strategy concerning gating, compression, and EQ is applied ubiquitously, with small alterations based on personal taste.

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