Abstract
The logos of metal bands can be by turns gaudy, uncouth, or nearly illegible. Yet, these logos work: they communicate sophisticated notions of genre and emotional affect. In this paper we use the design considerations of metal logos to explore the space of “illegible semantics”: the ways that text can communicate information at the cost of readability, which is not always the most important objective. In this work, drawing on formative visualization theory, professional design expertise, and empirical assessments of a corpus of metal band logos, we describe a design space of metal logos and present a tool through which logo characteristics can be explored through visualization. We investigate ways in which logo designers imbue their text with meaning and consider opportunities and implications for visualization more widely.

1 Introduction
The ways that metal bands visually communicate is everything that data visualization is not, and yet metal stubbornly continues to succeed precisely where the visualization community has experienced failure after failure. Data visualization is often obsessed with “clarity,” [13], an assumption that the very worst thing we could do for our audience is to not, as clearly and as minimally as possible, represent the dataset [7]. The logos of metal bands, by contrast, thrive in their unin- legibility, and in fact communicate sophisticated notions of genre and belonging and stance in ways orthogonal to how easy or difficult it might be to decode the “data” contained in the text. Similarly, data visualization has been self-described as the “unempathic art” [27], and struggles to create or deepen emotional connections [4, 14]. Yet, metal tightly integrates all sorts of death, despair, and derangement into its visual and musical aesthetics. We as a community have much to learn from the ways that bands and genres communicate with text and their complex illegible semantics.

In this paper we choose metal band logos, artifacts that fly in the face of all of our standard rules about design and legibility (and sometimes even good taste) as objects of study from an information visualization perspective. In short, our broad research question is: what do metal logos visually communicate, and how do they manage to communicate so much despite their frequent illegibility? In other words, how do visual rhetorics operate when the intent is not to be legible, but to perform a host of other important functions like communicating authority and belonging, emotion or intent, all while engaging with taboo or powerful subjects?

To address this question, we (a group consisting of visualization researchers from a variety of backgrounds as well as a professional graphic designer of metal band logos) present two parallel lines of inquiry: (1) An analysis of metal logos as visual form, resulting in a design space of 13 Dimensions of Doom: visual and typographic features, culminating in a design exercise where we see what implicit information we can communicate through iterations on a simple logo, and (2) MetalVis, a visual analysis tool that allows to explore a collection of 5,837 actual band logos based on their visual and semantic properties.

We use this paper to call for the visualization community to embrace the unintelligible, the macabre, and the hardcore: to think deeply, creatively, and continually about the relationships between data, text, and the messages that we deliver and hide, explicitly and subliminally, in our designs.

Code, tunes, data and other rocking materials are at: illegiblesemantics.com.

2 The Semiotics of Metal Logos
While visualization of musical data is an active area of research, as demonstrated in the comprehensive survey by Khulusi et al. [1], our focus is on how band logos, in concert with the musical acts they represent, perform communicative work. As such, we focus on the prior work around typography and visual semiotics. Van Leeuwen [25], shows how fonts and lettering can impart meaning: “A word can be changed into a ‘warning’ or a ‘question’ through typography and typographic signs alone [25]”— and enumerates features like weight, connectivity, and curvature that can change the way we view the text being written.

Comics present a useful example where lettering style and treatment is used to convey emotion, intent, and meaning. In Comics and Sequential Art, Eisner [9] shows an example where the dialogue in a comic drips blood. This was done, he writes, because “the effect of terror, implication of violence (blood) and anger brings the text into direct involvement.” We can find further examples in the DC Comics Guide to Coloring and Lettering Comics [5], in which two stand out

* †: These authors contributed equally to this work.
specifically given our metal focus: “bold, blocky letters for the thump of an impact” and “thin shaky letters for a ghostly wail”, reminiscent of death and black metal respectively.

Designers of metal band logos employ these techniques and more in their work: band logos have “typography that swirls like branches, drips like blood, and clings like spider webs” [22]. For example, Slayer’s logo has “straight, sharp edges to reflect the tight and controlled nature of the music” [22]. As per founding member Dave Lombardo [15], this angular look was an intentional choice to reflect their name: “We were trying to figure out what the logo was going to look like and I said ‘well, what is a murderer, what is a guy that kills: what does he do?’ [pantomiming stabbing motions] So then what I did was I carved it.”

Beyond communicating mood or themes, metal logo designers also use their designs to communicate group membership. Publisher Dayal Patterson [17] states “Logos in metal are often specific enough in their characteristics that they can tell the educated reader what subgenre is involved. In that sense they carry more information than merely the linguistic content. It’s almost a visual code.” Mark Riddick, author of Logos from Hell [20], a book-length compilation of metal logos, agrees [17]: “Although most bands tend to lean toward legibility for the sake of marketing, illegible logos also carry meaning and weight ... it can be assumed that the greater the illegibility the more extreme the band will be.” The resulting coded information and nigh-illegible package can act as a way to repel outsiders: as per designer Tim Butler [22], “the point of these logos is like, unless you’re in-the-know already, it’s not for you.”

The work that these visual conventions do is all the more visible in the breach, as with the example of the death metal band “Party Cannon,” whose logo (a cheerful, Toys-R-Us style collection of brightly colored bubble letters) has been described as “the least death metal logo possible” [21]. The juxtaposition of the cheery logo with the logos of the other bands with which Party Cannon shares billings during tours or festivals (which tend to be black and white, angular, and severe) creates a memorable (and humorous) effect: as per bassist Chris Ryan [21], “every time it goes viral we definitely gain legitimate fans that listen to the music, attend shows, buy merch, and properly get what we’re about.”

3 Domain Analysis: Dimensions of Doom

As a team including a metal logo designer who has worked with numerous bands across genres over the last 20 years, 6 visualization researchers from academia and industry, and collectively 7 metal heads with many years of headbanging experience, we set out to uncover a set of dimensions that are specific to metal logo design and not covered by traditional typography style descriptions. The goal of our analysis was to determine a set of dimensions that are separable, groupable, and consistent. Our hypothesis is that metal band logos in selected sub-genres have characteristics that make them visually distinguishable from band logos in other sub-genres. We wanted to try to figure out the information carrying characteristics of metal logo design.

As a first step, Gerrit Rijken, the first author and professional designer, identified samples of logos that he considers associated with specific genres and described their visual characteristics. Subsequently, our team sketched examples, checked against existing band logos, discussed the characteristics and tested independence, meaning, and the terms adopted against those used in graphic design.

In parallel activity, the academics strapped on their head-phones and looked to the literature, finding inspiration from semiotics legend Jacques Bertin [2], who talks of “letter” drawings, and takes a typographical perspective to ask “what are the independent variables ... that one can meet in the ‘letter’ and, possibly, in the word”. He suggests two com-
peting objectives in lettering. The first is letter publicity: characterized by “the freedom of imagination and the reduction of constraints”; this is the flourish with which styles can be used to convey semantics indirectly, the unintelligibility of the logo that Eisner, Lombardo and Patterson celebrate and that we seek to explore. The second objective is letter text and is characterized by “increasing constraints in efforts to improve readability,” i.e., the functional role that conveys information directly through language. Bertin identifies onze lignes indépendantes en typographie in his consideration of the subject [2] and describes letter orientation as “astonishingly spectacular”, but “prohibited by technique and good practice,” seemingly as the text objective takes priority over publicity. Along with the metal community, we challenge Bertin’s view of “good practice” and playfully riff on his notion of “typographic amusements” by embracing practice in metal logo design, in which orientation is varied with a flourish and styles, to use Bertin’s terminology, are varied widely but consistently. In the logo design space, immediate impact is essential and so letter publicity has a vital role, with letter text being less important than in many other contexts. This alternative approach draws attention to some important variables that are used to differentiate genres and imbue meaning at the cost of legibility.

Through an intense iterative process, of cross-checking, discussion, sketching and even consideration of computer science (e.g. [24]), we agreed upon 10 characteristics of style used in the design of characters and logos in metal, and 3 characteristics of the graphics that often adorn them. The result is a set of 13 Dimensions of Doom which, when added to relevant characteristics from Bertin, might enable us to describe the broad superset of metal logos and differentiate between the genres that they represent. We summarize the dimensions that are key to metal logo design below, with detailed descriptions and visual samples available as supplementary materials. We do so in light of Bertin himself noting the importance of ‘metal’ and his penchant for it when identifying the “engraving effect” or “steel effect” as an important style [2], thereby alluding to his own alt credentials.

The 5 dimensions inspired by Bertin are: Thickness (how thick are the letters?), Size (how much variation is there in letter size?), Texture (how much texture is there in the letter rendering?), Orientation (how much variation is there from standard vertical letter orientation?), and Color (how many colors (hues) does the logo have in terms of color range?).

The 13 Dimensions of Doom are categorized in three groups. The first 5 dimensions are related to letter style: Novelty (how original is the font used in the letters of the logo?), Angularity (how angular are the outlines of the letters?), Constraints (how fixed are the angles of the letter segments?), Sharpness (how many prickly and sharp elements do the letters have?), and Tightness (how tight, clean, and precise are the letters?). 5 further dimensions relate to the entire logo: Symmetry (to what degree does the logo have vertical axis symmetry?), Space (how much negative space is left between letters?), Connectivity (how connected are the letters?), Dimensionality (how 3D does the logo look?), and Deviation (how much does the lettering deviate from the baseline?).

Finally, 3 dimensions relate to any additional graphics present: Congruence (how congruent and ‘meaningful’ are any graphical elements with respect to band name or genre?), Abstraction (how abstract are they?), and Integrity (how fully are the they integrated into the logo?).

3.1 Design Exercise
To explore and develop the dimensions, and see what they might tell us about metal logo design, Gerrit Rijken designed a variety of metal band logos drawing on his own experience and a wide range of iconic logos of bands in various genres of extreme metal. To ensure fair comparison, make the task manageable, and minimize confounding factors, we selected a small subset of letters, that collectively involve sharp edges, curved swirls, and opportunity for symmetry, for all genres: VIS. This resulted in a set of 30 uniquely designed metal band logos, as shown in Figures 2, 3, and 4. These were then developed in discussion with musicians and artists in the metal scene to ensure genre style accuracy and coverage. The list includes Jørn Inge Tunsberg (Hades Almighty, ex-Immortal), Dennis Jak (Daathuz, Nembrionic, ex-Unlord), Frode Gaustad (Dominator, ex-Thy Grief), Tjeerd Alwicher (Interro), Kristoffer Aalhus (Vinterbris, Funeral Void), and Korijn van Golen (Façade, Onheil), who confirmed that the visual styles of the logos adequately conveyed the intended genres. Due to the fractal, permeable, and protean nature of metal (sub)genres, our intent was not to fully cover the space, but to represent important “landmark” genres.

3.2 Designs and Dimensions
We then selected a subset of seven designs from the 30 VIS logos that covered a range of genres and styles and rated these according to the 13 Dimensions of Doom and the 5 Bertin dimensions. All authors rated each logo independently on a 5-point scale for each of the 18 dimensions (consult the
supplemental materials for our responses). Through this process, we gained insights into which of the dimensions differentiated, which caused disagreement, whether the designer had a unique perspective and which dimensions were difficult to assess.

Briefly, we could separate some specific logos well with Abstraction, Dimensionality, Space and Originality, which have outliers. Certain logo groups can be discriminated well with Sharpness, Integrity, and Symmetry, which are somewhat bimodal. Discriminating between all logos works best with Constraints, Texture and Angularity, which are most regularly spaced. We detected some disagreement between roles – Gerrit’s designer’s eye versus the VIS researchers – on Deviation, Size and the Additional Graphics dimensions. These dimensions were the most challenging to assess, partly due to lack of clarity on what exactly constitutes an additional graphical element. Most disagreement within the group was found in assessing logo Color, Tightness and Deviation. In terms of disagreement within the group across all dimensions, our VIS logos were ranked based on genre and decade, and the map is manually crafted. Instead, we opted for an automatic layout and different similarity metrics characterizing the visual design of the band logos. Our interactive web-based tool, MetalVis (see Figure 5 and illegiblesemantics.com) is the result. It allows the logo design space to be explored through various approaches to defining the similarity between bands and logos:

Supervised modeling (logo/genre classifier) To explore the latent visual space of metal logos, we trained a neural network classifier on our corpus, based on Inception v3 [23]. We used the logo images scaled to 160×160 pixels as input and predicted the 51 most common genres from the metadata as output variable. We then projected the last fully-connected 256D hidden layer to 2D with UMAP [16]. The results are shown in Figure 5. Some genres appear to form coherent clusters in the high-dimensional space. For example, black metal (white background) can be found at the top of the map. At the opposite end, we find both a thrash metal cluster (blue) as well as a heavy metal cluster (gold).
Indeed quite divergent in terms of visual style. This supports
our hypothesis that the visual style of metal logos conveys
information about the genre.

Unsupervised modeling (logo VAE) Since such a supervised
classifier is biased toward the genre labels, we also tried a
purely image-based unsupervised approach with a variational
autoencoder (VAE). For this approach, we trained a rather
simple VAE on 10,000 logos that were first re-scaled to 64×64
pixels and converted to grayscale. We then directly used the
two-dimensional latent space that the encoder learned for
the layout, by feeding all logos into the encoder and receiving
two coordinates for each. The latent space contains regions
that represent the logo’s coarse shape (Figure 6).

Genre-based embedding Our map of logos in MetalVis
can also be directly organized by the genres of bands (using
UMAP’s Sokal-Michener distance [16]). Doing so allows the
user to “manually” explore the label designs in different gen-
res. This approach allows us, for instance, to spot interesting
outliers, where the visual style of the logo is incongruent
with the genre, e.g., Cauldron, a heavy metal band with a
death metal-style logo. It also allows us to explore cross-over
bands and explore whether the visual styles of these logos
are also mixing visual elements of their base genres, e.g., do
blackened death metal bands have logos that feature both
stereotypical black and death metal visual attributes?

Other features of MetalVis Besides these embeddings, we
also tried out various other ways of organizing these maps
of metals. For instance, we used the color of the logos and
created a UMAP embedding based on the distance between
color histograms. This approach allows us to learn about
which genres tend to use which colors: red logos tend to be
from death metal bands, while (somewhat counter-intuitively)
black metal logos tend to be white. Standard interactions
such as filtering, zooming and panning, and tooltips allow
for an interactive exploration. In addition, all maps can be
displayed using the original embedding with overlapping logos
or a griddified version without overlaps, created with Hagrid [8].
Inquisitive metal-heads can check out the MetalVis tool at
our companion website illegiblesemantics.com.

5 Discussion

While admittedly preliminary, we think both of our lines of
inquiry, in concert with other methods like close reading [1],
point to a useful way of interpreting and evaluating these
rhetorical dimensions of visualization design. Rather than
focusing exclusively on the data contained within them (and
how easy or “efficient” [3] it is to extract these data), we
should think about what sort of work our visualizations
perform (or “what worlds they build” [6]) regardless of the
specific datasets connected to them. Ease of information
extraction is neither necessary nor sufficient to determine the
success or failure of a visual design.

Just as metal logos communicate genre and belonging
before the viewer has been able to “decode” their textual
content, we think our exploration emphasizes the commu-
nicative work that visualizations perform before the viewer
decodes the first data value. Kennedy et al. [10] point to
this hidden “work” (such as the use of clean lines and two
dimensional perspectives) that communicate senses of objec-
tivity. Richards [19] claims that the manipulation of visuals
to convey authority is an important part of how scientists
work to make their arguments. What we get out of visualiza-
tions is influenced by titles [12], our preconceptions [26], and
the visual metaphors we employ in our designs [28] in ways
that are seemingly disconnected from the actual information
represented in the visualization itself.

As with any analysis of meaning, we are colored by our
own perspectives. We cannot, nor do we attempt to, speak
for all metal designers, bands, or fans. Further complicating
our work is that the notion of “genre” itself is an ever-changing
moving target. Bands can straddle multiple genres, which are
themselves possessed of fuzzy boundary conditions subject
to interpretation and disagreement. Bands themselves can
alter their self-description and logos over time as they grow
and change musically.

In the future, we hope to both extend, refine, and unify our
parallel explorations. For instance, variability and ambiguity
in our interpretation of dimensions point to a need to iterate
on our dimensions and evaluate them more formally. We
also believe that including additional features (such as time,
geo-graphics, or our Dimensions of Doom) in our quantitative
models could allow us to tell a more robust and holistic story
of how visual style creates meaning in band logos.

Just as simple visualizations like scatterplots can act as
metaphorical “fruit flies” for visualization research [18], we
are convinced that further study of metal logos, with their het-
erogeneity and polysemic structure, deep cultural complexity
and gloriously illegible semantics, could be useful for test-
ing or developing models around open visualization research
problems in visual rhetoric, affect, and visual similarity.

5.1 Conclusion

We focus on metal logos as an object of study. Not just
because they rule [4], but because they manage to accom-
plish what so much mainstream data visualization struggles
to achieve: making us energized or emotional, uncomfortable
or afraid. And they accomplish this without getting hung up
on “clarity” or “readability,” “data-ink” or “discoverability,”
but rather by embracing and celebrating letter publicity at
the cost of letter text. Our preliminary analysis is begin-
ing help us understand this design space and offers plenty
of scope for developing our knowledge of metal logos, the
messages that they impart, genres that they represent and
what this might mean for visualization. Just as metal culture,
on the fringes of society, can be a powerful commentary on
our society, so too can metal logos, at the fringes of graphic
design, serve as commentary on the visualization community.

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