Picture Music

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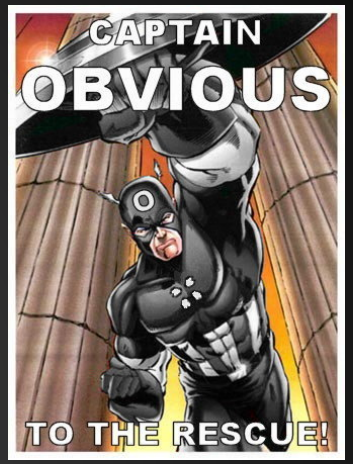
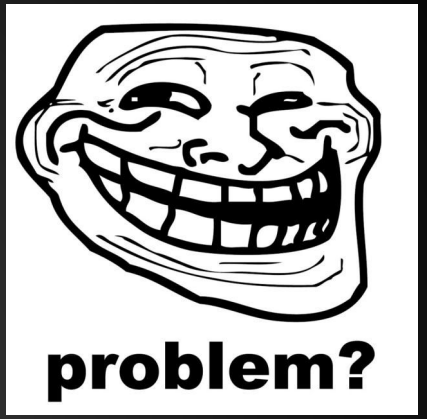
CMPS 161

Overview / Motive



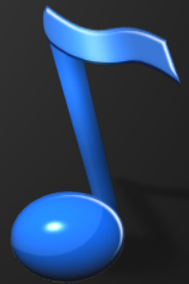
- Sound isn’t “seen,” but is heard
- Visualizations don’t commonly use sound
- Visualize with a different perspective

Problem



- The untrained ear

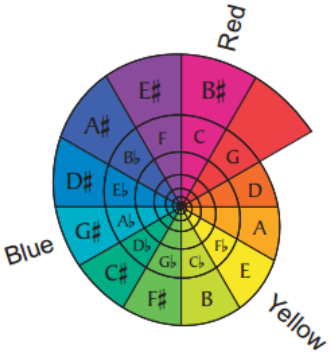
- Lack of distinction with sounds
  - Direct mapping of data to sound frequency
  - Static and annoyance
  - Unappealing
- Music
  - Using a Music Theory approach



Color	Characteristic	Gland	Qualities	Imbalance	Resonance Frequency
Red	Physical	Gonads	courage, action, grounding, stabilty, survival	violence, greed, self, centeredness	194.18Hz
Orange	Social	Spleen	passion, trust, emoltions, health, pleasure, let go	Jealousy, envy, aimlessness, obsessiveness	210.42Hz
Yellow	Intellectual	Adrenals	personal power, self esteem	fear, anger, hate, power	126.22Hz
Green	Self assertive	Lymph	Acceptance, forgiveness, love, radiance	Instability, repressed, love	136.10HZ
Dark Blue	Conceptual	Thyroid	Communication, truth, creative/arts	Depression, ignorance	141.27Hz
Indigo	Intuitive	Hypothalmus, Pituatry	Perception, realisation, intuition, clairvoyance..	Fear, tension, headaches	221.23Hz
Violet	Imaginative	Pineal	Fulfilment, inspiration	Confusion	172.06Hz

Ratio Color Note Frequency
1.000 - RED 555,392,958,464 (C) 55.5 hz
1.122 - Orange 623,307,159,552 (D) 62.3 hz
1.189 - Yellow 699,811,233,792 (E) 66.0 hz
1.334 - Green 741,418,725,376 (F) 74.1 hz
1.498 - Blue 832,149,913,600 (G) 83.2 hz
1.681 - Purple - 935,155,386,680 (A) 93.4 hz
1.781 - Violet - 1,048,508,891,136 (B) 98.9 hz
2.000 - White - 1,110,785,916,928 (C) 110.0 hz

Primary Colors and Orientation:
The primary color relationship defines the extent of a particular colors range of influence. For example, if Red is the color in question, then there are diminishing amounts of Red in each color proceeding towards Yellow, and there are diminishing amounts of Red proceeding towards Blue.



Red = 100% Red - 0% Yellow
Red-Orange = 75% Red - 25% Yellow
Orange = 50% Red - 50% Yellow
Yellow-Orange = 25% Red - 75% Yellow
Yellow = 0% Red - 100% Yellow

Red = 100% Red - 0% Blue
Red-Violet = 75% Red - 25% Blue
Violet = 50% Red - 50% Blue
Blue-Violet = 25% Red - 75% Blue
Blue = 0% Red - 100% Blue

Mathematically, primary colors are defined by the 5:4 ratio. In sound, the 5:4 ratio defines the interval of the major 3rd. When placed in the context of chords, the major 3rd interval defines orientation. If the major 3rd interval occurs with the root position of a chord, then the chord will be major. If the major 3rd interval occurs with the 5th position of a chord, then the chord will be minor. Since major and minor are mathematical inversions of each other, then the Primary color interval is defining orientation and is visually describing what is being heard aurally.

Chromatic Color:
Color relationships which are nearly complimentary such as Red and Yellow-Green are defined as chromatic. When pure hue and equal intensity colors of Red and Yellow-Green are mixed, the Red and Green will cancel each other out as color complements, leaving a reduced chroma Yellow. This is why these pairs of colors are defined by the word chromatic. Mathematically, chromatic colors are defined by the 16:15 ratio. In sound, chromatic intervals are physically consecutive steps of the next tone of the set of 12 tones. For example B and C define a chromatic interval. Chromatic intervals in sound will also sound dissonant just like the tritone. Since Yellow-Green is the color associated with the tone B, and Red is the color associated with the tone C, then the chromatic color effect is visually describing the type of dissonance that is being heard aurally.

These examples clearly demonstrate that when color and sound are scientifically correlated, the language of color accurately describes visually what is being heard aurally. This means that the concepts of color properties which are understood by the visual artist can be directly applied to music. Thus all sound relationships can be defined by the properties of color in order to obtain meaning and immediate recognition of musical structure.

Some things I’m using…

- C# && .NET framework
  - Natively supports manipulating image files
- midi-dot-net (C#)
  - Library for MIDI playback
  - Simple without hassles

The Data

- A picture! Hopefully a high-resolution one.
- How's this broken up?
  - Gradient map generated per-pixel
  - Color value correlated to note (C-B)
  - More intense colors (brighter) are reflected with Major
  - Less intense colors (dull, darker) are reflected with Minor

Things Learned

Music is not easily dynamically generated in nice formations. Even Wolfram-Alpha has issues with this.

Background tunes are easier(ly) generated with Music Theory. They tend to sound like Runescape, but that’s kinda what their soundtrack is made from.

Other things learned

Color has a minimal amount of data with a great amount of sub-data to be derived from it.

I.E. Gradient, diff, brightness, and pretty much all the PhotoShop read-functions out there.

Mapping these to sound without making it obvious and coherent is very difficult

More things learned

Orchestra not possible without creating many many presets.

At this point, dynamic music hits its limitation.

Wolfram Alpha music generator isn’t coherent.

Theming isn’t always accurate. Music doesn’t break down linearly.

Someone needs to do this for a grad project.