Name: _____

The Feel Good Index

The Article

From toddlers bopping along to the latest pop hit to grandparents rediscovering the songs from their long-lost youth, listening to music has the power to stir our emotions at any age.

Scientists have long known about the influence of music on mood, even using pop songs like New Order's "Bizarre Love Triangle" and Sinéad O'Connor's "Nothing Compares 2 U" to arouse joy or sadness in subjects during psychological studies. But why do certain combinations of sounds have such a strong effect on the way we feel? How does the brain translate music into an emotion?

In an effort to find some answers, a Dutch neuroscientist has tackled the analysis of one very specific type of music: the feel-good song. Jacob Jolij, an assistant professor in cognitive psychology and neuroscience at the University of Groningen, has come up with a mathematical formula that describes the anatomy of these songs in order to investigate why they make us feel so warm and fuzzy inside. Using a database containing 126 of the most popular feel-good songs from the last 50 years, Jolij applied statistical methods to see which characteristics of these tunes are responsible for their good vibes."I looked at the scientific literature in terms of what makes us feel good — primarily tempo and key," he said. "So I went through all the scores and sheet music from the songs to look at key and tempo, but also lyrics. Then I tried to fit a regression model, a mathematical technique, to see which songs could be listed as feel-good."

The project was commissioned by British consumer electronics brand Alba, who surveyed 2,013 adults in the United Kingdom on whether they use music to uplift their mood and which feel-good songs they preferred from several decades. To take the results a step further, Alba sought out a researcher that could tinker with the database of responses and output a mathematical formula for the ultimate feel-good song.

Jolij's final equation of Feel Good Index (FGI) includes the sum of all positive references in the lyrics, the song's tempo in beats per minute and its key. The higher a song's FGI, the more feel-good it is predicted to be. Happy lyrics, a fast tempo of 150 beats per minute (the average pop song has a tempo of 116 beats per minute), and a major third musical key all help create music we perceive as brimming with positive emotion.

"The number one feel-good song is 'Don't Stop Me Now' by Queen — it's quite a bit faster than the average song, plus it's in a major key that works quite well, and if you look at the lyrics, they are very positive," said Jolij. " 'Don't Stop Me Now' is an excellent example of a feel-good song."

Even in the complete absence of lyrics, music can carry powerful emotional connotations. Beats automatically activate motor areas of the brain, according to magnetic resonance imaging studies, and propel our bodies to move spontaneously to the rhythm. Therefore, fast-tempo songs are directly associated with more energy, movement, and dancing, which are typically linked to being in a joyful state.

However, other characteristics of music such as key are not as well-understood.

"That's a bit of a mystery, why we assign major chords with positive emotions and minor chords with negative emotions. There's definitely an element of learned association, although there are some people who claim it's more of a biological thing," said Jolij. "It's still one of the big questions in musicology."

Despite the open questions, there is little debate about the intertwining relationship between music and emotion — and therefore, music can indirectly influence our perception and actions. As part of a 2014 experiment, smokers were made to look at negative imagery while listening to Bartok's "The Miraculous Mandarin" and Prokofiev's "Battle on the Ice" — looming, frenetic and harsh classical pieces that stir up feelings of uneasiness and anxiety within the listener — then rated their levels of cigarette craving. Participants craved a smoke to a much greater extent after the experiment, despite having just had one.

Another study from 2014 looked at the potential power of music to soothe away symptoms of road rage, finding that low-energy songs significantly decreased systolic blood pressure during a simulated traffic jam. So while easygoing songs like The Temptations' "Just My Imagination" had this calming effect on drivers, peppy tunes such as Depeche Mode's "Just Can't Get Enough" did not.

[Why you probably hate the sound of your own voice]

Jolij's own research focuses on certain factors — including musical sound — that influence how humans perceive their surrounding environment. In his 2011 study published in PLOS ONE, he had subjects listen to music clips before taking on a difficult visual task, where they had to pick out a hidden face within a very grainy image. The experiment was designed to investigate how music-induced moods can rub off on our visual perception.

"We found music to be a very effective way to manipulate mood," Jolij said. "When they were happy, they were better at recognizing happy faces, and when they were sad, they were better at seeing sad faces. Being in a good mood actually helps your brain pick up positive information."

"Many people brought classical music to make them sad, in particular 'Requiem' by Mozart, saying this was played at the funeral of a friend or relative, or they would bring in music that they always listened to with an ex-lover," said Jolij. "I can come up with this feel-good formula and give you the perfect feel-good song, but it does not take into account the associations you have with the song. It can't predict your feel-good song, but I can predict what 1,000 people on average would say is their favorite."

The Formula

The Feel Good Formula has been getting some attention again! Since last year, we have repeated this study in a Dutch sample, but now with a continuous rating (i.e. "How 'feel good' is this song on a scale from 1-100?") That allows for a far better statistical model. Fortunately, the results do confirm the earlier work (i.e. Don't Stop Me Now is still firmly in the Top 3). For those of you interested, based on the Dutch data, the full regression formula is:

Rating = 60 + (0.00165 * BPM – 120)^2 + (4.376 * Major) + 0.78 * nChords – (Major * nChords)+(#of positive words or notions in lyrics)

Where BPM is beats per minute (tempo), Major is 1 if the song is in a major key and 0 is the song is in a minor key, and nChords is the number of chords in the song (including modulations etc.) The formula basically says we generally like songs with a tempo that deviates from the average pop song tempo, that are in a major key, and are a bit more complex than 3 chord songs, UNLESS the song is in a major key

Here are the top 10 feel-good songs according to the formula:

1	Don't Stop Me Now - Remastered Queen	6	I'm A Believer The Monkees
2	Dancing Queen ABBA	7	Girls Just Wanna Have Fun - Girls Just Wanna Have Fun Cyndi Lauper
3	Good Vibrations - Remastered The Beach Boys	8	Livin' On A Prayer Bon Jovi
4	Uptown Girl Billy Joel	9	I Will Survive - 1981 Re-recording Gloria Gaynor
5	Eye of the Tiger Survivor	10	Walking On Sunshine Katrina & The Waves

Your Turn

Your Song (please print and attach the lyrics): _____ by

_____

BPM=_____

Major (Major is 1 if the song is in a major key and 0 is the song is in a minor key) =_____

nChords (the number of chords in the song, if you don't know use 3) =_____

#of positive words or notions in lyrics (circle or highlight on lyric printout)= _____

FGE (Feel good equation, please write out your equation)=

FGI (Feel good index)=_____