1. Dancing with a Stranger, Wow., Talk, Old Town Road, and Without Me, were in the Billboard charts for at least 76% of 2019.
   1. These songs were on the Billboard charts for at least 40 weeks.
   2. Hover over to see artist name and album.
2. However, Senorita, Lalala, Bad Guy, Trampoline, and Someone You Loved were the most popular songs based on Spotify Strings
   1. These songs were the most popular Spotify songs, but differs from the most popular songs on Billboard list in terms of number of total weeks on the chart
   2. Hover over to see total weeks and compare Spotify popularity songs. Bars highlighted in green correspond to Spotify most popular songs of 2019, and bars highlighted in blue correspond to songs with longest number of weeks on Billboard charts.
3. These Billboard and Spotify songs share similar music characteristics
   1. Hover over to see song names, popularity score,
   2. Danceability Scores
      1. Danceability describes how suitable a track is for dancing based on a combination of musical elements, including tempo, rhythm stability, beat strength, and overall regularity. A value of 0.00 is least danceable, and 1.0 is most danceable (Spotify for Developers).
      2. The average danceability score for songs in Billboard charts for 2019 (n = 595) was 0.68, with a range from 0.24 to 0.99. 100% of the songs with the longest number of total weeks on chart had a danceability score above average. Whereas 60% of the Spotify most popular songs had a danceability score above average. Overall (comparing across 10 songs), 80% of the highlighted songs had a danceability score above average, but the Billboard songs were the most danceable songs with an average of 0.82, versus Spotify’s average of 0.68.
      3. Someone You Loved by Lewis Capaldi has the lowest danceability score, with a score of 0.5. Talk by Khalid has the highest danceability score, with a score of 0.90.
   3. Speechiness Scores
      1. Speechiness detects the presence of spoken words in a track. The more exclusively speech-like the recording (e.g., podcast, audio book), the closer to 1.0. Values above 0.66 describe tracks that are probably made entirely of spoken words, and values between 0.33 and 0.66 describe tracks that may contain both music and speech (e.g., rap music). Values below 0.33 most likely represent music and music with few words (Spotify for Developers).
      2. The average speechiness score for songs in Billboard charts for 2019 (n = 595) was 0.14, with a range from 0.02 to 0.56. 80% of the songs with the longest number of total weeks on chart had a speechiness score above average. Similarly, 80% of the Spotify most popular songs had a speechiness score above average. Overall (comparing across 10 songs), 80% of the highlighted songs had a speechiness score above average, and the averages between groups are comparable (0.11 Billboard vs 0.11 Speechiness).
      3. Senorita by Shawn Mendes and Camila Cabello has the lowest speechiness score, with a score of 0.02. Bad Guy by Billie Eilish has the highest speechiness, with a score of 0.38.
   4. Valence Scores
      1. Valence describes the musical positiveness conveyed by a track. Tracks with high valence or with a score approaching 1.0 sound more positive (e.g., happy, cheerful, euphoric), while tracks with low valence or a socre approaching 0.0 sound more negative (e.g., sad, depressed, angry; Spotify for Developers).
      2. The average valence score for songs in Billboard charts for 2019 (n = 595) was 0.48, with scores ranging from 0.036 to 0.97. 40% of the songs with the longest number of total weeks on chart had a valence score above average. Whereas 80% of the Spotify most popular songs had a valence score above average. Overall (comparing across 10 songs), 80% of the highlighted songs had a valence score above average, but Spotify songs were more positive than Billboard songs, with an average of 0.55 for Spotify and 0.45 for Billboard.
      3. Talk by Khalid is the most negative song with a score of 0.35. Senorita by Shawn Mendes and Camila Cabello is the most positive song with a score of 0.75.
   5. Liveness scores
      1. Liveness detects the presence of an audience in the recording. Higher liveness values represent an increased probability that the track was performed live. A value above 0.8 provides strong likelihood that the track is live (Spotify for Developers).
      2. The average liveness score for songs in the Billboard charts for 2019 (n = 595) was 0.18, with scores ranging from 0.029 to 0.91. 20% of the songs with the longest number of total weeks on chart had a liveness score above average. Similarly, 20% of the Spotify most popular songs had a liveness score above average. Overall (comparing across 10 songs). 20% of the 10 highlighted songs had a liveness score above average, meaning that 80% of the songs were most likely recorded without the presence of an audience. The averages by group are similar, with Billboard having an average score of 0.12, and Spotify with an average score of 0.11.
      3. Talk by Khalid has the lowest liveness score, with a score of 0.6. Dancing With A Stranger by Sam Smith and Normani is the song with the highest liveness score, with a score of 0.22. However, Dancing With A Stranger is far below the 0.8 anchor indicating strong presence of audience during recording.
   6. Energy scores
      1. Energy scores range from 0.0 to 1.0, and represents a perceptual measure of intensity and activity. Energetic tracks tend to feel fast, loud, and noisy. For example, death metal tracks have high energy, while classical music tend to have low energy scores (Spotify for Developers).
      2. The average energy score for songs in the Billboard charts for 2019 (n = 595) was 0.62, with scores ranging from 0.06 to 0.96. Overall (comparing across 10 songs). 100% of the 10 highlighted songs had an energy score below average. Spotify’s most popular songs are on average more energetic than Billboard songs that have been on the charts the longest (0.51 for Spotify vs 0.44 for Billboard.
      3. Lalala by Y2K and bbno$ has the lowest energy score, with a score of 0.39. Old Town Road by Lil Nas and Billy Ray Cyrus is the most energetic song, with a score of 0.62.
   7. Tempo scores
      1. Tempo is the speed or pace of a given piece and it is directly derived from the average beat duration. Tempo is recorded in beats per minute (bpm; Spotify for Developers).
      2. The average tempo score for songs in the Billboard charts for 2019 (n = 595) was 122.39, with scores ranging from 62.45 to 204.13. 60% of the songs with the longest number of total weeks on chart have a tempo score above average. Similarly, 60% of the Spotify most popular songs have an above average tempo score. Overall (comparing across 10 songs). 60% of the 10 highlighted songs had a liveness score above average. The averages by group are similar, with Billboard having an average score of 122.20, and Spotify with an average score of 123.75.
      3. Wow. By Post Malone has the lowest tempo score, with a score of 99.96. Old Town Road by Lil Nas and Billy Ray Cyrus, and Without Me by Halsey are the songs with the highest tempo scores, with a score of 136.04.
4. Tally of results
   1. Spotify: Tempo, Valence
   2. Billboard: Danceability, Liveness (slightly), Energy,
   3. Tie: Speechiness
   4. Table in d3 showing this?

Pooled: The MEANS Procedure

| **Variable** | **N** | **Mean** | **Std Dev** | **Minimum** | **Maximum** |
| --- | --- | --- | --- | --- | --- |
| |  | | --- | | **danceability** | | **acousticness** | | **speechiness** | | **tempo** | | **liveness** | | **energy** | | **valence** | | **time\_signature** | | |  | | --- | | 595 | | 595 | | 595 | | 595 | | 595 | | 595 | | 595 | | 595 | | |  | | --- | | 0.6793294 | | 0.2363148 | | 0.1425455 | | 122.3919176 | | 0.1763165 | | 0.6209951 | | 0.4786143 | | 3.9798319 | | |  | | --- | | 0.1539191 | | 0.2491156 | | 0.1252770 | | 30.3886007 | | 0.1336912 | | 0.1643203 | | 0.2142009 | | 0.3063799 | | |  | | --- | | 0.2400000 | | 0.000143000 | | 0.0246000 | | 62.4460000 | | 0.0294000 | | 0.0561000 | | 0.0361000 | | 1.0000000 | | |  | | --- | | 0.9780000 | | 0.9780000 | | 0.5640000 | | 204.1320000 | | 0.9130000 | | 0.9560000 | | 0.9760000 | | 5.0000000 | |