A COMPUTATIONAL STUDY OF CHORUSES IN EARLY DUTCH POPULAR MUSIC

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1. INTRODUCTION

Recorded popular music in the Netherlands first appeared in the beginning of the 20th Century. This research studies a particular element of musical form that emerged as popular music came about: the chorus. A case-study dataset of Dutch music from before the Second World War has been assembled, annotated and analyzed using melody extraction and comparison of pitch characteristics between different segment [Bartsch & Wakefield, 2001].

2. CHORUS ANALYSIS

Choruses in Western popular music have been referred to as the 'most prominent, 'most catchy, 'most memorable and even 'most musical parts of songs, [Bartsch & Wakefield, 2001, Eronen & Tampere, 2007, Middleton, 2003]. While agreement on which section in a song constitutes the chorus generally exists, the above attributes are far from understood in music cognition and (cognitive) musicology [Honing, 2010]. On the other hand, as a frequent subject of study in the domain of Music Information Retrieval, the notion of chorus has been shown to correlate with a number of computable descriptors. Yet when studied more closely, the chorus detection systems that locate choruses most successfully turn out to rely on the amount of repetition and energy levels in the signal [Eronen & Tampere, 2007], with more sophisticated systems also taking section length and position within the song into account [Goto, 2003].

The term chorus originates in a denomination for the parts of a musical piece that feature a choir or some other form of group performance, as seen in many folk music traditions. With the early popular song and the development of Tin Pan Alley, Broadway, solo performance became the norm and the chorus became a structural unit of musical form while establishing itself as the site of the more musically distinctive and emotionally affecting material. The same evolution was observed for the analogs in European entertainment [Middleton, 2003]. The motivations to study the particularities of early Western choruses are two-fold: on the one hand, the concept is rather specific to popular music, and may tell us something about where to look for the historical shifts and evolutions that have resulted in the emergence of a new musical style. On the other hand, as choruses can be related to a catchy and/or memorable quality, to the notion of hooks, and perhaps to a general cognitive salience underlying these aspects, the nature of choruses may indicate some of the musical properties that

constitute this salience. The choice to focus on early Dutch choruses stems from the conviction that the choice of a regional case-study allows to sample from a more consistent tradition, and because the data were at hand.

The following central question is formulated: are choruses observably different from other song sections, and specifically regarding melody, do choruses feature differences in their pitch structures when compared to other song sections? This question is now studied more closely for the case of early Dutch popular music.

3. DATASET

A dataset has been created as a diverse sample of the Netherlands popular music as it sounded before the 1950s. This Dutch50 dataset contains 50 songs by 50 different artists, all dated between 1905 and 1950. Recurring styles include cabaret, colonial history-related songs, advertisement tunes released on record and early examples of the *levenslied* musical style [Klöters, 1991]. An expert was consulted to judge the representativeness of the selected artists, and approved. Structural annotations were made by the author, indicating beginning and end of sections and labeling each with a section type chosen from a list of seven (intro, verse, chorus, bridge, outro, speech and applause). For all songs, the melody was then extracted using the *Melodia* Vamp plug-in [Salamon & Gomez, 2010]. This algorithm works best when applied to uncompressed audio with a prominent melody, as in our dataset. The resulting pitch contours and pitch salience were segmented along the annotated boundaries. For each section, statistics on the contour could then be computed and compared.

4. RESULTS

The first property of the pitch contours to be considered was the pitch strength, also referred to as the salience function. This salience is a measure of the strength of the fundamental frequency of the melody and its harmonics. For each section, the Average Pitch Strength (hereafter APS) was computed and normalized by subtracting the average pitch strength for the complete song. Figure 1 (left) shows the estimate of the mean APS across all sections in the dataset, with confidence intervals for the mean indicated. Note that 8 songs were not considered as they contained only one type of section, in which case the labeling (verse or chorus or other) was found to be rather arbitrary. The
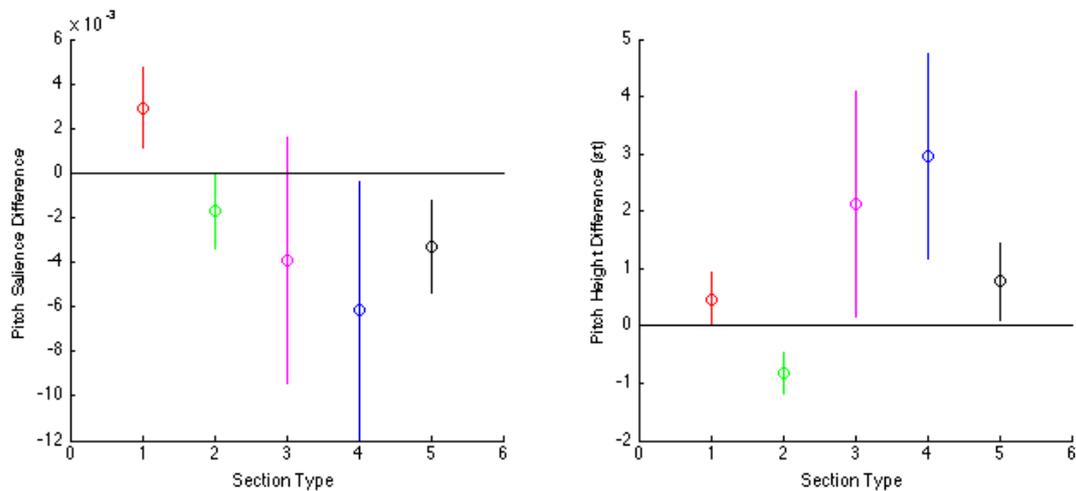
Figure 1: Mean APS and APH per section type. Section types from left to right: chorus (red), verse (green), bridge (pink), other (blue) and 'all non-chorus' (black).

figure illustrates how chorus APS significantly exceed the mean song APS (zero; dashed line) and are demonstrably higher than verse and other APS.

The next property considered is the pitch height. For each section, the Average Pitch Height (APH) was computed and again normalized. Figure 1 (right) shows the estimates of the mean APH. Interestingly, chorus APH are higher than the mean song APH as well as the verse APH (with around 20 semitone cents difference), though not compared to the bridge and other APH., which behave in rather extreme ways.

Another feature that was computed is the average pitch range (APR) With the pitch range as the standard deviation of the pitch height, chorus APR were, on average, higher than verse APR, suggesting a broader pitch range is used in choruses than is in the verse. The tendency does not generalize when chorus sections are compared to all non-chorus sections.

Finally, the average pitch direction (APD) is introduced. This measure aims to capture if the pitch contours in a section follow an up- or downward movement. It is currently computed simply as the difference between the pitch height of the sections end and its beginning. No movement can be shown for choruses, but the APD for verses is greater than zero with $p = 0.0134 < 0.05$, suggesting an upward tendency in pitch during the verse.

5. CONCLUSION

In the present research, a study of melodic pitch yields results that indicate a number of intrinsic musical differences between chorus and verse sections in early Dutch popular music. Given the widely spread discourse of choruses as the most catchy and memorable sections, these results present some reference points for a more elaborate study of cognitive salience in melodies. At the same time, they show the potential of a comparison of pitch structures between the considered genre and its precursors rooted in folk tradition. Future work will also include a similar anal-

ysis of post-1950 popular music (cfr. the Billboard dataset) and the design and testing of more detailed contour-based descriptors (cfr. [Salamon et al., 2012]).

6. REFERENCES

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