

How a Song's Section Order Affects Both 'Refrein' Perception and the Song's Perceived Meaning



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1 Introduction

Several musicologists have assumed that specific musical features (such as unexpected notes, tempo and syncopation) can affect the interpretation of song lyrics in a predictable way, i.e. that these features can be used intentionally to further a specific interpretation of those lyrics [1, 4, 5, 8, 21]. However, testing such assumptions experimentally requires the use of various versions of sung stimuli in which only the target feature is different across versions, and recording such stimuli is very hard to do. One would always expect performance-dependent differences to confound the effect of the target features, because it is likely that changing specific musical properties has an effect not only on the listener but also on the performer. Digital technologies, by contrast, can be used to create various versions of musical stimuli without changing the performance. In earlier research, Schotanus [27–32] already has used such digitally manipulated versions of songs and sung sentences in various experiments and has found clear effects of accompanied versus a cappella singing, of out-of-key notes versus in-key notes, of syncopation and of song form on various aspects of song cognition.

In the current study, the effect of formal structure, particularly of song section order and repetition, on the way a song and its lyrics are perceived and interpreted semantically, will be further investigated. Apart from section form (including stanza form), section order also plays an important part in large-scale musical structure, which is assumed to affect both liking and musical meaning and to be of historical relevance [1, 5, 12, 21, 34, 35]; see Schotanus [27] for a brief review. Even in popular music studies, several authors have stressed the significance of musical form and

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particularly of repetition and have fought the widespread idea that in popular song musical form is too simple to be investigated [3, 10, 13, 16, 18].

Popular songs are usually classified as examples of one of four categories: strophic songs, AABA songs, verse-chorus songs and verse-chorus-bridge songs [6, 7, 35, 38]. However, it is questionable whether this is doing justice to the variety and the nature of song forms. For example, Schotanus [27] has shown that many songs do not belong to either of those categories and that in analyses of specific songs, the chosen category often does not fit the song's actual form. It is even debatable whether, for example, verse-chorus songs and AABA songs are indeed different categories. Apart from the fact that there are AABA songs in which the AABA part functions as a chorus, there are also songs (e.g. 'Yesterday' by the Beatles) in which the B part, the bridge, is repeated verbatim, as a result of which it may be mistaken for a chorus. What is more, Schotanus, Koops and Reed Edworthy [33] have shown that within a group of straightforward AAA songs such as the Genevan psalms, there are important formal differences between one song and the other which seem to affect song processing. At least they predict psalm popularity.

Therefore, it is necessary to investigate both the relevance of the traditional categorization of popular songs and the possibility that there are other useful ways to approach song form. Schotanus [24, 27], for example, has developed the RAS hypothesis. The RAS hypothesis states that the appreciation and interpretation of a song depends on a set of preference rules for 'song section order', which are based on the assumption that listeners intuitively search for a balance between 'repetition and surprise' (RAS). This hypothesis builds on the cognitive research undertaken by Ollen and Huron [20], Huron [11] and others [15, 22, 23, 36]. According to the RAS hypothesis, a violation of preference rules can cause feelings of tension or boredom which, however, are 'acceptable' to the listener if the lyrics allow for a 'meaningful' interpretation. For example, RAS rule 5 states that late repetitions (either late repetitions of song sections within a song or of melodic phrases within a song section) have a cumulative effect which is only acceptable if it is in line with the lyrical content of the song, or if it is compensated for by other musical features. Partial evidence for RAS rules can be found in several corpus studies [14, 27, 35], and for RAS rule 5 specifically in the Genevan Psalter study [33] and a study concerning Dylan songs [30].

In the current study, the question whether AABA songs and verse-chorus songs are essentially different from each other is investigated by comparing listeners' reactions to different versions of the same songs. Therefore, several experiments were conducted. Two of them, reported on earlier [27], will be summarized below. The last one, an online listening experiment that will be reported here, involved two songs. Both songs consisted of a number of A sections containing at least one refrain line, and one or two bridge sections. Both songs were digitally altered in several alternative versions, one of which had a verse-chorus-like structure with the B sections in a chorus position.

Participants were asked questions about their appreciation for the song, their interpretation of the song and their 'refrein' perception. In Dutch 'the' 'refrein' can refer to either a chorus or a salient refrain line. Therefore, the question which

part of the song people think is the 'refrain' is an easy way to determine whether a song is perceived as an AABA song or as a verse-chorus song. For example, if an AABA-like song is something essentially different from a verse-chorus song, the B section is unlikely to be perceived as 'the refrain', even if it is put in a chorus-like position.

However, it is questionable whether B sections in chorus positions will indeed not be perceived as choruses, as both choruses and bridges are supposed to be contrasting song sections. Summach [35] observes that bridges more often show tonal instability than choruses, but he also observes that such bridge-specific and chorus-specific properties change over time. Moreover, a chorus does not always have a contrastive melody [6]. On the other hand, Van Balen [37] found that choruses in early twentieth-century Dutch popular songs could be retrieved automatically by searching for specific distinctive sound properties. It is, however, undocumented which songs Van Balen used and which song parts were deemed choruses. Consequently, it is unclear whether his research did not involve AABA songs containing highly contrastive B sections.

On the other hand, there may be other song properties that distinguish between bridges and choruses, for example, the nature of the other sections within the song. For example, Summach [35] observes that harmonic tension in A sections in AABA songs tends to be resolved, whereas harmonic tension in verses tends to be left unresolved. Furthermore, in AABA songs, the A sections often contain a refrain line or word (e.g. 'Yesterday') representing the main message of the song, whereas in verse-chorus songs, the main message is assumed to be represented by the chorus [34]. Yet, it is not unusual for verses in verse-chorus songs to contain refrain lines as well (e.g. Radiohead's 'Creep'). The difference may be that listeners will base their interpretations of an AABA song on the refrain line within the A sections, whereas their interpretations of a verse-chorus song are based on the chorus.

If 'refrain' perception would turn out to be dependent on position, either partly or completely, this would call for a cognition-based approach of song form. It would be evidence for both Pattison's assumption that song structure creates certain 'power positions' within the lyrics [21] and that music can be used as a foregrounding device, for example, by accentuating specific song parts [24, 27]. Possibly, the set of RAS rules could be extended with a few preference rules governing 'refrain' perception.

Concerning the existing RAS rules, in one song, RAS rule 5, regarding the effect of late repetitions, was at stake. In one version of that song, there was an accumulation of A sections towards the end of the song. This is a violation of that fifth RAS rule and is assumed to negatively affect the appreciation of this song version.

Although it is not the target issue of this paper, using song versions including sections with verbatim repeated song lyrics, and asking questions about the appreciation and the interpretation of these songs, will make that this study will also contribute to the literature concerning verbatim repetitions of words. It will provide either evidence or counter-evidence to the hypothesis that verbatim repetitions of language are interpreted as more acceptable and more meaningful when presented

with music (and in particular when sung) and that repetition can change the meaning of the repeated language at its second occurrence [9, 27]. Apart from that, the study will also contribute to the widespread hypothesis that verbatim repetitions increase liking [19], if only the listeners do not become aware of the fact that their positive feelings are caused by mere repetition [11].

1.1 Previous Experiments

The current experiment was preceded by an online listening experiment reported on in the author's dissertation [27] and a smaller live experiment reported on in a conference poster [25]. In the online experiment, a total of 149 participants, between 15 and 84 years old ($M = 52.58$; $SD = 14.27$), listened to one of four versions of the same song and were asked a few questions about them. The order of the original song was altered in such a way that in one version the B sections were in the middle (the original AABAABA coda version), in one version they were at the end (AAAABAAB coda, a verse-chorus-like version) and in one version they occurred in the beginning of the song (ABABAAA coda, a version with a cumulation of A sections at the end). Finally, an additional fourth version was created by deleting the last A section from the original version, accentuating the AABA structure (AABAABA coda).

The hypotheses were that in the original and the fourth version, the content of both A sections and B sections and coda would contribute to the overall interpretation of the song; that in the second version, the contribution of the content of B sections and coda to the overall interpretation would be more prominent; and that in the third version, the content of the A sections would be more influential.

The first, second and fourth versions were hypothesized to be perceived as relatively well formed, in contrast to the third version, which violates the fifth RAS rule. The second version, on the other hand, was hypothesized to be the best structured one in terms of RAS rules, as the first and fourth versions are slightly at odds with RAS rule 5. In the first version, the number of A sections is not decreasing, whereas in the fourth one, the decrease starts relatively late. Finally, the B section was assumed to be mentioned more often as a 'refrain' than the last line of the A section in the second version.

The results were largely in line with the hypotheses. The ABABAAA coda version received the lowest ratings concerning musical quality and lyric quality and showed an A-section-oriented bias in interpretation and refrain perception, whereas the AAAABAAB coda version received the highest ratings concerning musical and lyric quality and showed a less A-section-oriented bias in interpretation and refrain perception. However, only the latter effect was significant, particularly in comparison with the ABABAAA coda version.

Thus, section order indeed seemed to affect song appreciation, song interpretation and refrain perception in a predictable way. However, the study had several limitations. First, sample size seemed to be too small to receive clear significant

results concerning the disapproval of the ABABAAAac version. Second, the song's formal structure may be too deviant to be perceived as either an AABA or a verse-chorus song, which may have distorted refrain perception anyway. Third, results for the AABAABAc version were difficult to be interpreted, because in hindsight it did not have a clear AABABA pattern, and the deletion of the sixth A creates an unresolved rhyme, because in the original version, the third lines of the fifth and sixth A rhyme with each other. Fourth, after the results were published, the second B section in the AAAABAABc version turned out to be a repetition of the first B section, whereas it was meant to be the second B section of the original. As a consequence, the B section was not only in a chorus position but also repeated verbatim, which may have enhanced the section's appearance as a chorus. What is more, the extra repetition may also have positively affected the appreciation of the song version [11, 19] and may have further enhanced a B-section-oriented interpretation of its meaning. After all, verbatim repetition of words supports processing fluency of those words [19].

In the live experiment [25], 40 participants listened to two AABA songs which were performed as AABABA songs, just by repeating the B section and one of the A sections. After the fourth, the fifth and the sixth song section, an assistant indicated with a hand gesture that a song section was finished, and it was time to answer a few questions. After the fourth section, the only question was whether the song could have been finished by then. After the other two song sections, the same question was asked, followed by the questions whether the last section has been an acceptable addition, and whether it has been a meaningful addition. After listening to the whole song, there were three extra questions: which section would make up the best song ending, was there a 'refrain' and which was the 'refrain' (where participants could choose either the B section or a refrain line taken from the A section)? Most of the answers indicated that both songs are predominantly perceived as AABA(BA) songs and not as verse-chorus songs. However, B sections of both songs were perceived as the 'refrain' by thirty per cent of the participants, and 10 and 16 participants, respectively, even thought that the B sections of song A and B would make up the best song ending. Finally, the fact that most participants judged that either the fifth or the sixth section would make up the best song ending indicates that these song sections were perceived as acceptable and meaningful additions to the song, although they were verbatim repetitions of earlier song sections.

Of course, several participants did not see the assistant's gestures and were not able to identify section divisions, so they did not answer the section-specific questions. Furthermore, it may be hard to answer the question whether a section makes up a good song ending when the song is already going on, and finally, it cannot be excluded that the performers (the author and a guitar player) have influenced the answers through specific accents or flaws in their performance. Nevertheless, the results of this experiment show that the difference between AABA songs and VC songs needs further investigation.

1.2 *Current Experiment*

As a follow-up to the experiments summarized above, a listening experiment quite similar to the one reported on in the author's dissertation [27] was conducted, in which several of the limitations mentioned above were resolved. This experiment involved two songs.

Song 1 was the same song as the one used in the former online experiment, except that in this case, the AABAABAc variant was not used and the second B section in the AAAABAABc version was indeed the second B part of the original and not a repetition of the first one. Thus, the differences between the ABABAAAAC and the AAAABAABc version could become more clear, and the possible effect of just putting the B sections of the song in 'chorus positions' could be compared with both putting the B sections in chorus positions and replacing the second B section with a verbatim repetition of the first one.

Song 2 was one of the songs used in the live experiment. As this was originally created as an AABA song, it can be considered a straightforward AABA song. Thus, the hypothesis that a B section will be perceived as a chorus if it is placed in a chorus position could be assessed more effectively. Three versions were created: an AABA version, an AABAB version and an AABABA version. The latter was added in order to assess the effect of mere repetition. If the B section would change in a chorus through mere repetition, this would hold in the AABABA version as well. However, if the fact that a song ends with an A section, would turn it into an AABA song, no matter the chorus quality of the B section, the B section will not be perceived as a chorus in such a song version.

Regrettably, funding did not allow for large sample sizes; therefore, the negative effect of late repetition in the ABABAAAAC version of song 1 was again unlikely to be significant. However, if the same pattern would occur, this would at least indicate a certain tendency.

In short, these were the hypotheses at stake:

1. A song section will be perceived as a chorus or a bridge dependent on its position.
2. Chorus perception is different across song versions in which the same song sections occur in different positions.
3. In the AAAABAABc version of song 1 and the AABAB version of song 2, refrain or chorus perception will be more B oriented than in the other versions.
4. The interpretation of a song is different across song versions in which the same song sections occur in different positions.
5. A participants' interpretation of a song is mainly based on the participants' idea which song part is or contains the 'refrain'.
6. The interpretation of the AAAABAABc version of song 1 is more B oriented than the interpretation of the ABABAAAAC version of that song, and the AABAB version of song 2 is more B oriented than both of the other versions of that song.

7. The appreciation for a song is different across song versions in which the same song sections occur in different positions.
8. The interpretation of the AABA version of song 2 is different from the interpretation of the other versions of song 2, although the only textual difference is that parts of the lyrics are repeated.
9. Appreciation for the ABABAAAAC version of song 1 is relatively low.
10. Appreciation for song versions including verbatim repeated song sections is equal to or higher than appreciation for song versions in which all song sections are different from each other.

2 Method

2.1 Participants

A total of 111 participants recruited via Prolific Academic completed the survey and were paid for their work. They were between 18 and 59 years old ($M = 25.96$; $SD = 7.91$), 65 female, 36 male. Most of them (84) were native speakers of Dutch, 17 were not but claimed to be fluent speakers of it. All participants were presented with two songs. Each individual heard one of three versions of each. The version of song 1 was randomly assigned to them first, which was followed by a random version of song 2. After each song, they were asked a few questions about it. Between the songs, they answered a series of questions concerning their musical and literary sophistication, i.e. the complete Gold-MSI questionnaire [2, 17], and 11 items concerning literary sophistication. A principal axis factoring analysis of the latter, the details of which can be found online [26], yielded three factors with an eigenvalue larger than 1, literary activity; 2, passive literary enjoyment; and 3, nonliterary writing activity. Completing the whole survey took about 19 minutes on average.

2.2 Stimuli

The participants all heard one of three versions of the same two songs, all of which can be found online [26]. Both songs were pre-existing cabaret songs in Dutch, composed and sung by the author and accompanied, recorded and digitally altered by Christan Grotenbreg, using a keyboard, connected to ProTools 10 (desktop recording), a Neumann TLM 103 microphone, an Avalon VT 737 SM amplifier and an Apogee Rosetta converter, and in addition, Waves Tune, Renaissance Vox compression and Oxford Eq. voice-treatment software.

The first song, 'Hou'en zo' (Keep it like that), was an AABAABAACoda song, which was changed and an ABABAAAACoda song. This could be done without

harming the rhetorical logic of the lyrics, because in this song, all A sections mention examples of disasters that did not hit the singer, and in the B sections and the coda, the singer wonders who he should thank for that. The B sections can therefore follow any of the A sections.

Note that the B sections are bridges rather than choruses, as they are longer and more complex than the A sections, have varying lyrics and neither start nor end on the tonic. Moreover, the B sections end with a one-word refrain ('geluk', 'luck'), and have another one-word refrain ('danken', 'say thanks') at the end of the first line, whereas the A sections start with a three-word refrain ('alweer een dag' 'another day') and end with an immediately repeated catch phrase: 'Hou'en zo' ('Keep it like that'). It is therefore unlikely that the B section will be perceived as a chorus, although there is a clear musical contrast with the A sections because it starts and ends on the dominant, and is partly in a different key (i.e. in B flat minor instead of B flat major).

The second song 'Mijn ogen' ('My eyes') was originally written as an AABA song but has developed over time to an AABABA song in which the second B section is exactly the same as the first one, and the fourth A section is the same as the first one, except for one or two minor changes in the wording. The song was recorded at once as an AABABA song, and after that an AABA and an AABAB version were created by deleting the final sections in such a way that there is a sense of completeness because at least the accompaniment ends on the tonic.

All A sections start with 'Mijn ogen' ('My eyes') and end with a variation on the refrain line 'Maar dan kijk ik met mijn handen naar jou' ('But then I look at you with my hands'). After the fourth A, this refrain line is repeated once. By contrast, the B section is repeated integrally if it occurs twice, which can give it a certain chorus quality. However, it begins and ends on the dominant pitch and is partly in a different key (i.e., E major instead of A minor). In the AABAB version, harmonic tension is resolved by a final A in the base at the moment where in the AABABA version, the last A section begins.

By using pre-existing songs, written by the author, it was possible to work with ecologically valid stimuli which were, nevertheless, very likely to be new to the participants. It also allowed the author to create several alternative versions of them, based on one recording, without copyright issues and such.

2.3 *Questionnaire*

Apart from the abovementioned general questions concerning, age, gender, musical sophistication and literary experience, there were several song-specific questions. There were two multiple-choice questions per song concerning 'refrain' perception, one multiple-choice question concerning semantic interpretation and a series of Likert-scale questions concerning appreciation and, in the case of song 2, ethic valuation. Finally, there was also a six-item fill-in-the-blank recall test for each song,

but this was used only to get an impression of the participants' attitude towards the survey. Therefore, these questions will not be reported on here.

Concerning 'refrain' perception, the participants were asked whether they thought there was a 'refrain' (i.e. a refrain or a chorus), and after that they were asked to choose from several options which part was the 'refrain', or which part they would choose if someone would urge them to indicate a 'refrain' although in the first instance they did not think there was one.

For song 1, the options were as follows: (1) 'Hou'en zo' ('Keep it like that', i.e. the last line of the A section); (2) 'the part that begins with "Alweer een dag" ["another day"] and ends with "Hou'en zo"' (i.e. the entire A section); (3) 'the phrase "Het is geluk"' ('It's all about luck', i.e. the last line of the B section); (4) 'the part about feeling grateful and lucky' (i.e. the entire B section); (5) a combination of 1 and 3; and (6) a combination of 1 and 4.

For song 2, the options were as follows: (1) 'The line "dan kijk ik met mijn handen naar jou"' ('and then I look at you with my hands', i.e. the last line of the A section); (2) 'The part that begins with 'Mijn ogen' ("my eyes") and ends with 'dan kijk ik met mijn handen naar jou"' (i.e. the entire A section); (3) 'The words "Mijn ogen"' ; (4) 'The part that begins with "Mijn vingers verkennen..." ("My fingers explore...") and ends with "Ik voel dat je mij echt voelt"' ('I can feel that you really feel me', i.e. the B part); (5) A combination of 1 and 4; and (6) A combination of 3 and 4.

Concerning (semantic) interpretation, the participants were asked to choose one of five or six interpretations of the song's content. For song 1, these were as follows: (1) 'The singer thinks life is full of difficulties and dangers'; (2) 'The singer realizes how fortunate he is, and enjoys this feeling'; (3) 'The singer sees a lot of threats which he hopes to escape'; (4) 'The singer is grateful because he realizes how lucky he is'; and (5) 'The singer is careless, nothing will happen to him'. Interpretation 3 is clearly A-section oriented; interpretation 1 is also more A-section oriented although it does not refer to the repeated catch phrase at the end of it; interpretation 2 is somewhat more B-section oriented; interpretation 4 is clearly B-section oriented; and interpretation 5 is neither B nor A-section oriented; it may occur as a result of overemphasizing the song's ironic tone of voice.

For song 2, the options were as follows: (1) 'The singer assumes that with his hands he can see his partner just as good as with his eyes'; (2) 'The singer thinks bodily contact is at least as important as appearance'; (3) 'The singer thinks beauty can be experienced not only with the eyes but also with tactile sense'; (4) 'The singer is totally immersed in his fantasies about sex with the other'; (5) 'The singer mainly describes how intense contact can be if one does not look but feels'; and (6) 'The singer thinks his partner is so beautiful that he would love to touch her'. Options 1 and 3 are A-section oriented, because they focus on the comparison between looking with eyes and looking with hands; for the same reason, option 2 is predominantly A-section oriented, although it includes the B-section-oriented word 'contact'; option 4 and 5 are clearly B-section oriented as they focus on the action of 'looking with hands'; and option 6 is neither A-section oriented nor B-section oriented as there is

no reasoning in it, and it combines the notions of beauty and touching from the A sections with the sense of lust or desire in the B section.

Finally, concerning valuation, there were questions at two instances. First, while listening to the songs, the participants were asked to rate the statement 'I think this is a beautiful song' on a seven-point scale from (1) 'absolutely disagree' to (7) 'totally agree'. Later on, a series of statements to rate on a similar scale followed.

For song 1, the statements were the same as those in the previous experiment [27]: 'The song was cheerful'; 'The song was well structured'; 'The melody was dull'; 'The lyrics were humorous'; 'The lyrics were comprehensible'; 'There were unexpected twists and turns in the song'; and 'I was captivated till the end'.

For song 2, the question about twists and turns was deleted, as it is not a question about appreciation of either lyrics or music, and consequently in the earlier experiment, it did not contribute to one of the factors emerging through a factor analysis on all items. However, three statements were added: 'The tone of voice is light'; 'The song is pornographic'; and 'The song is respectful to women'. These statements were added because the tone of voice in the bridge section is quite erotic and may be perceived as less light, more pornographic and less respectful towards women. In the A sections, the singer only tells his lover that he does not have to look at her with his eyes, because he can also look at her with his hands, but in the B section, he actually describes what looking at her with his hands is like. On the other hand, the B section ends with the line 'en ik voel dat je mij echt voelt' ('and I can feel that you really feel me'), which makes it less male-'gaze' focused.

2.3.1 Analyses

The results were analysed in SPSS using principal axis factoring analyses with oblique rotation (direct oblimin) for the ratings, generalized linear regressions for the factors and both binomial generalized linear regressions and binomial generalized estimating equations for interpretations and 'refrein' perception. In order to run binomial regressions, the multinomial variables representing the choices concerning interpretations and 'refrein' perception were reduced to binomial variables representing or not representing an A-section-oriented bias. In these variables, the value '1' was assigned to all interpretations that were described above as A-oriented interpretations, and all answers referring to 'refrein' candidates from A sections only, and the value '2' to all other options.

3 Results

3.1 'Refrein' Perception

For both songs, the question whether there was a 'refrein' or not was answered significantly different across song versions ($Wald X(\text{song1}; df 2) = 7.22, p = 0.027$; $Wald X(\text{song2}; df 2) = 8.92, p = 0.012$). Binomial generalized linear regressions on this variable showed a significant effect of song version, which is mainly due to the AAAABAABc version of song 1 and the AABA version of song 2. As Table 1 shows, these song versions were remarkably less often thought to have a 'refrein' than the other versions. The differences between the other song versions were marginal, although it is striking that the AABABA version is even more often thought to have a 'refrein' than the AABAB version.

For song 1, the answers to the question which part of the song is the 'refrein' if there must be one are not significantly different across song versions. For song 2, they are. However, a binomial generalized linear regression on the original variable indicating an A-section-oriented bias could not be conducted because of a quasi-complete separation within the data. As Table 2 shows, none of the answers concerning the AABA version involved the B section or a part of it. However, after extending the category of answers involving the B part with answer option 3 (an option which was rarely chosen for all song versions), the effect of song version was still significant ($Wald X(\text{song2}; df 1) = 10.28, p = 0.006$), indicating that the B section is less likely to be perceived as a 'refrein' (i.e. as a chorus) in the AABA version than in the other versions. The difference between the other versions was not significant.

3.2 Interpretation

The question whether section order can change the (semantic) interpretation of a song was assessed by a multiple-choice question in which participants had to choose between several interpretations of the song, some of which were more or less A-section oriented, while others were at least partly based on the content of the B section. The results indicate that the interpretations of song 1 were not significantly different across song versions, whereas those of song 2 are. A binomial generalized linear regression on a variable indicating an A-section-oriented bias or not showed a

Table 1 'Refrein' or not

	Song 1			Song 2		
	AABAABAAC	ABABAAAAC	AAAABAABc	AABA	AABAB	AABABA
Yes	29	20	12	13	20	24
No	12	10	18	22	12	9

Table 2 Numbers of times a ‘refrein’ candidate is chosen per song version

Song	Song part	Version		
Song 1		AABAABAAC	ABABAAAAC	AAAABAABc
	Last line A section	16	13	15
	A section	18	11	9
	Last line B section	1	0	2
	B section	0	2	0
	Combination or 1 and 3	6	2	3
	Combination or 1 and 4	0	2	1
	Total A	34	24	24
	Total B or A+B	7	6	6
Song 2		AABA	AABAB	AABABA
	Last line A section	16	5	9
	A section	13	9	10
	First words A section	6	5	3
	B section	0	10	6
	Combination or 1 and 4	0	2	2
	Combination or 3 and 4	0	1	3
	Total A	35	19	22
	Total B or A+B	0	13	11

significant effect of song version ($Wald X(\text{song2}; df 2) = 8.23, p = 0.016$), indicating that the interpretation of the AABAB version was significantly more B oriented than the other versions, particularly the AABA version. See Table 3 for more details.

Although the interpretations of song 1 were not significantly different across song versions, those of song 2 were; a binomial regression using generalized estimating equations with song as the within-subject variable, A-section bias in interpretation as the target value and A-section bias in ‘refrein’ perception as predictor showed that there is a significant relationship between ‘refrein’ perception and interpretation across songs ($Wald X(df 1) = 11.14, p = 0.001$).

3.3 Appreciation

For each song, a principal axis factoring analysis was run on the Likert-scale items concerning aesthetic valuation of the songs and their lyrics. For the second song, the additional items related to ethical issues were also included in this factor analysis. For both data sets, both the KMO statistic and the measurements of sampling adequacy (MSA) were above 0.5 (KMO song 1 = 0.80; KMO song 2 + 0.774), the determinants were larger than 0.0001, and Bartlett’s test of sphericity was significant. However, in the analysis of the items concerning song 1, the item regarding twists and turns was deleted, because MSA was relatively low, i.e. very

Table 3 Numbers of times an interpretation is chosen per song version

Song	Interpretation	Version		
Song 1		AABAABAA	ABABAAAA	AAAABAAB
	Life full of difficulties and dangers	6	8	4
	Fortunate and happy	7	3	5
	Hope to escape threats	10	5	7
	Grateful because of luck	18	13	13
	Careless	0	1	1
	Total A	16	13	11
	Total A or A+B	25	17	19
Song 2		AABA	AABAB	AABABA
	Hands as good as eyes	4	1	7
	Bodily contact important	4	2	0
	Beauty with tactile sense	18	10	15
	Immersed in fantasies about sex	1	1	0
	Intense contact when feeling	7	12	9
	Beauty raises wish to touch	1	6	2
	Total A	26	13	22
	Total A or A+B	9	19	11

close to 0.5. For song 1, two factors with eigenvalues larger than 1 were retained: positive value (PV) and comprehensible lyrics (CL); for song 2, three of those factors were retained: good song (GS), pornographic song (PS) and good lyrics (GL). As Table 4 shows, there are parallels between PV and PS on the one hand, and CL and GL on the other, but there are striking differences as well, hence the differences in naming.

Although the differences between factor means per song version were not likely to be significant given the sample size, it is still interesting to explore the differences. As Table 5 shows, PV is relatively high for AAAABAABc version compared with the ABABAAAAc one, whereas CL is relatively high for the AAAABAABc version compared with the AABAABAAC version. Furthermore, GS is relatively high for the AABA version of song 2 compared with the AABAB version, PS is relatively high for the AABAB version compared with the AABABA version, and GL is relatively low for the AABAB version. However, none of these effects were significant. Having said that, two covariates did show a significant effect. The Gold-MSI Emotions scale turned out to be a significant predictor CL and GL, and the factor Passive Literary Enjoyment a significant predictor of CL.

Table 4 Factor analyses Likert-scale items, factor loadings and factor specifications

Item/Factor property	Song 1		Song 2		GL
	PV	CL	GS	PS	
Song was beautiful	0.86	0.26	0.96	-0.12	0.32
Song was cheerful	0.57	0.35	0.59	-0.07	0.55
Song was well structured	0.75	0.14	0.74	-0.02	0.54
Melody was dull	-0.64	-0.02	-0.67	-0.11	-0.29
Lyrics were humorous	0.37	0.28	0.29	0.41	0.41
Lyrics were comprehensible	0.25	0.89	0.34	-0.06	0.60
I was captivated till the end	-0.71	0.26	0.78	0.02	0.52
The tone of voice was light			0.56	0.15	0.62
The song was pornographic			-0.05	0.71	0.03
The song was respectful towards women			0.09	-0.40	0.23
Initial eigenvalue	3.25	1.11	3.99	1.48	1.06
Percentage of variance predicted	46.36	15.90	39.72	14.78	10.55
Rotated sum of squared loadings	2.74	1.11	3.36	0.88	2.01

PV = positive value; CL = comprehensible lyrics; GS = good song; PS = pornographic song; GL = good lyrics

Table 5 Factor means per song version

Song	Song version	Mean (SD)		
Song 1		PV	CL	
	AABAABAAC	0.02 (0.93)	-0.10 (1.03)	
	ABABAAAAC	-0.13 (0.96)	0.02 (0.73)	
	AAAABAABc	0.11 (0.92)	0.12 (0.86)	
Song 2		GS	PS	GL
	AABA	0.10 (1.09)	0.06 (0.86)	0.06 (0.86)
	AABAB	-0.09 (0.91)	0.15 (0.75)	-0.10 (0.82)
	AABABA	-0.01 (0.95)	-0.21 (0.71)	0.03 (0.84)

PV = positive value; CL = comprehensible lyrics; GS = good song; PS = pornographic song; GL = good lyrics

4 Discussion

In a small two-part listening experiment, a series of hypotheses concerning the effect of section order on 'refrain' perception semantic interpretation of a song and appreciation of a song were tested. The latter, however, was assessed only in an exploratory way.

4.1 *'Refrain' Perception*

Concerning 'refrain' perception, the results for both songs are in line with the main hypotheses that section order affects 'refrain' perception and, consequently, that the question whether a song part is perceived as a 'chorus' or a 'refrain' is at least partly dependent on its position within the song. The results are also in line with the hypothesis that the B section of song 2 is more likely to be perceived as a chorus in the AABAB version than in the other versions of song 2, although many listeners who have heard this version still think the 'refrain' is in the A sections. This indicates that section order is an important factor in 'refrain' perception, but that, nevertheless, there are essential differences between an AABAB song and a verse-verse-chorus-verse-chorus song.

The results for song 1 are not in line with the third hypothesis. The B section was not more likely to be perceived as a 'chorus' or as a song section containing the 'refrain' in the AAAABAABc version of that song. Conversely, many participants turned out not to recognize a 'refrain' in this version at all. However, these results do show that the AAAABAABc form has made it less likely that the A section is or contains the 'refrain'. The fact that in the second instance the B section was not a good alternative to the A section or parts of it may be due to the fact that the second B section was not a verbatim repetition of the first one. As mentioned before, the second B section of the AAAABAABc version in the first experiment was a verbatim repetition of the first one [27], and in that experiment, the B section or a part of it turned out to be chosen more often as the 'refrain'. Moreover, the fact that in all song versions of song 1 have urged at least some participants to designate the B section as a 'refrain', while this is not the case for the B section in the AABA version of song 2 shows that the mere fact that there is some alternation between A and B sections can 'turn' the B section into the 'refrain', at least for some persons.

These results indicate that both position and verbatim repetition are important features of a 'refrain'. Verbatim repetition of an entire song section can even overrule the more frequent verbatim repetition of a refrain line, although the results for both songs show that also song sections with varying lyrics but including one or two refrain lines or words can be perceived as 'refrain' (in the sense of chorus). This raises the question as to whether AABA songs in which the As and Bs represent separate sections and not parts of a verse or a chorus should be considered chorus-chorus-bridge-chorus songs. However, it seems to be more likely that A sections in AABA songs or related songs such as the AABAABAAC song in this experiment are neither verses nor choruses.

4.2 *Interpretation*

Concerning interpretation, only the results for song 2 are in line with the hypotheses stated in the introduction. Not only is there a significant effect of section order

on the interpretation of the song, but the interpretation of the AABAB version is also more B oriented than the interpretation of the other two versions. What is more, although the differences between the AABA version and the AABABA version are not significantly different concerning A-section bias, the A-section bias tends to be less strong in the AABABA version, and two interpretations are not chosen for that version at all. So, it seems to be the case that this version is interpreted slightly different than the AABA version, although there are no extra lyrics involved. Remarkably, the two interpretations that were not chosen in reaction to the AABABA version were interpretations which, according to the author, are at odds with parts of the lyrics. So, in his eyes, the AABABA version is interpreted not only slightly different but also slightly more correct.

The fact that the results for song 1 are not as predicted does not mean that they are totally at odds with all hypotheses regarding the effect of presentation order on interpretation. In fact, the hypothesis that the interpretation of the AAAABAABc version would be more B-section oriented than the interpretation of the other versions was based on the assumption that the B section of this song version or a part of it was also more likely to be perceived as a 'refrein' of the song in that version. As observed and explained above, this was not the case, so it would have been rather puzzling if the interpretation was more B-section oriented. However, just as the B section was designated to be the 'refrein' in all song versions of song 1 by at least some participants, also several participants have chosen an interpretation of the song which was more or less B-section oriented in reaction to all song versions. In line with that, and with hypothesis 5, a multilevel repeated measure analysis of the relationship between 'refrein' perception and interpretation showed that a participant who thinks the A section or a part of it is the 'refrein' also tends to choose for an A-section-oriented interpretation of the song, whereas participants who think that the B section, or parts of it, can be considered to be a 'refrein', whether or not in combination with the A section (or parts of it) tend to choose for a more or less B-section-oriented interpretation.

Future research could investigate the relationship between 'refrein' perception and interpretation in the data of the previous experiment with song 1 as well. Apart from differences in the judgments concerning the AAAABAABc version, there are also some other remarkable differences between the results of both experiments. Possibly, these differences have something to do with the participants' age (52 on average in the earlier study, versus 26 in the current one). Differences in life experience and musical culture may have caused other interpretations and other ideas of what a 'refrein' is.

4.3 Valuation

As expected, there were no significant differences in aesthetic and ethic evaluation, probably due to sample size. However, as expected, just as in the earlier experiment, appreciation for the ABABAAAAC was lower than for the AAAABAABc version,

which is in line with RAS rules. Additional research with a much larger sample size is required in order to investigate whether this is indeed an effect of late repetition. Other interesting differences are those concerning GS and PS. The fact that GS is higher but not significantly higher for the AABA version of song 2 than for the other versions is in line with the hypothesis that the verbatim repetitions in the other versions would not decrease the appreciation for these songs, but is at odds with literature suggesting that verbatim repetition of song lyrics would increase liking [19]. As other authors have argued before, it seems likely that the acceptability of repetition is limited, particularly if song lyrics are involved [11, 15, 21, 27]. Therefore, additional research with a larger sample size and more songs is required to investigate to what extent verbatim repetition of song sections is accepted. Finally, the differences in PS are in line with the assumption that the B-section-oriented, AABAB version is perceived as more pornographic and less respectful towards women than the other versions of song 2. If these differences would turn out to be significant in research with a larger sample size, this would show again that song section order affects the interpretation of a song in a predictable way.

4.4 Covariates

As reported in the results section, some of the variables concerning musical and literary sophistication, used as covariates, turned out to be significant predictors of variables indicating appreciation for lyrics, i.e. the factor representing passive literary enjoyment and the Gold-MSI Emotions scale. However, these effects did not affect the effect of song version.

4.5 Limitations

Apart from the fact that sample size may have been too small to detect significant differences in either aesthetic or ethic valuation, sample composition may have affected the results as well. Differences between the results of the earlier experiment with song 1 and the results of the current experiment with the same song cannot be explained by the use of another AAAABAABc version only. Probably, the age of the participants, which was twice as high in the earlier experiment, has caused a different perception of the song.

Another limitation is that the results for the AAAABAABc versions with either a varying or a verbatim repeated B section are difficult to compare because they are in different studies with apparently very different participants. So, in hindsight, it would have been better to include both AAAABAABc versions in this study. For song 2, it would also have been helpful to include a fourth version, i.e. an AABABA version in which the last A section was not exactly the same as the first one (except for a few connectives) but in which it was really a new A section.

Apart from that, the fact that this study involves only two specific songs makes it impossible to detect general rules concerning the effect of song section order. However, as far as it falsifies existing assumptions, its results are of general interest in themselves. And as far as this study develops new hypotheses, it can give direction for further research involving more songs and including a straightforward verse-chorus song with a harmonically stable chorus turned into a VVCVCV song.

Another limitation may be that the effects of formal structure (particularly, of section order and repetition) on ‘refrein’ perception, interpretation and valuation can, or even should, be assessed in several other ways. Questions can be focused more on emotional meaning [28], can be targeted more on the effect of specific song sections (e.g. on the question whether a repeated song section is perceived as meaningful or not) [25] or can be measured through bodily reactions such as skin conducting and brain potentials [36].

Finally, one may argue that the results of this study are weakened by multiple comparison. In the target sections concerning ‘refrein’ perception and interpretation, there were seven regressions and only two of them showed a significant effect with a p factor small enough to resist a Bonferroni-like correction through multiplying it by 7. However, several of these analyses were conducted on strictly separated data sets, i.e. data concerning song 1, and data concerning song 2. Moreover, the insignificance of the regression regarding song version-dependent interpretations of song 1 could have been expected, because of the insignificance of a possible section-oriented bias ‘refrein’ perception. Finally, the results of the different analyses strengthen each other. For example, if ‘refrein’ perception in song 2 is significant, and the connection between ‘refrein’ perception and interpretation in both songs is significant, it cannot be the case that the section-oriented bias in song 2 is completely coincidental.

5 Conclusions

The results of a small listening experiment, following an experiment reported on earlier, showed that section order (including the use of verbatim repeated sections) affects ‘refrein’ perception and (semantic) meaning of a song. Several alternative song versions of two songs were created digitally. The original version of the songs consisted of several A sections containing several refrain lines or words and one or two B sections. Participants were less sure that the refrain lines in the A section or the A section as a whole was the ‘refrein’ of the song after hearing a song versions in which the B section was put in a chorus position, or in which the B section was repeated verbatim. Moreover, after hearing such a song version, they were less likely to choose an A-section biased interpretation.

An exploratory inspection of the differences in appreciation for the different song version showed some interesting tendencies, which require further investigation using a larger sample size.

These results show that formal structure in popular music is much more complex than is often assumed and cannot simply be categorized in terms of strophic songs, verse-chorus songs, AABA songs and verse-chorus-bridge songs. Refrain lines in A sections and repeated B sections (either verbatim or not) both can be perceived as the 'refrain' of the song and to contain its main message. As a result, the 'refrain' of a song cannot be detected on the basis of strict formal properties. For example, not every section which is repeated verbatim is a chorus. Apparently, the 'refrain' is a song part that is repeated at least once and is perceived as the core of the song semantically. These conclusions are strengthened by the fact that the stimuli were created digitally, avoiding performance-dependent confounding factors.

Acknowledgments This chapter builds on an earlier experiment, reported on in the author's doctoral dissertation [27], which will be summarized within the current chapter. This earlier research was supported by the Netherlands Organisation for Scientific Research (NWO, project number: 023.004.078). The author likes to thank his supervisors Emile Wennekes, Frank Hakemulder and Roel Willems, his participants and those who helped him to find these participants.

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