

The Effect of Ancillary Gestures on Audience Perception of Music Performance Quality.

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Abstract— The purpose of this study is to test the hypothesis that when a musician moves in sympathy with the music being played, this increases the perceived quality of the sounded performance.

Ensemble performances (duos) were video recorded. The performers were instructed to play with differing levels of movement, playing the same music in each take. For each piece of music two videos were made, with differing levels of movement, but exactly the same audio track. Participants (27) were asked to make a forced choice comparison of which performance sounded better played.

Results gave a clear indication that performers accompanying movement has an effect on the perception performance quality. Overall 72% of votes cast were in favor of videos with the most movement.

Index Terms—Ancillary Gestures, Movement, audience perception.

I. INTRODUCTION

Music and movement are fundamentally related to each other. Whether one considers the movements that are required to produce a sound, or how a film soundtrack can drastically change the emotional impact of the film itself. It is no wonder that this is a broad area of research, encompassing scenarios as diverse as assessing the impact of music on the apparent character of abstract animation, to the mapping of gestures to musical structure in clarinet players. [1]

When a musician steps onto a stage, or posts a video online, they are immediately opening themselves up to the judgement of an audience. This judgement is not limited to an evaluation of the sound that the musician or musicians are producing, often the physical appearance and movements of the performers has an effect. The spectator may not always be consciously aware of this. For example, the facial expressions of conductors have been shown to have a significant effect on the perceived expressivity of the entire ensemble [2]. In fact, it appears that the audience can discern a great deal about the quality of performance from visual clues: A study from 1993 [3] shows that expressive intent can be determined from visual stimuli alone, in certain cases, with greater success than when combined with audio.

The physical gestures of a performing musician can, according to Delalande, [4] be broken down into three overlapping categories:

- Effective Gestures – those that actually produce sound.
- Figurative Gestures – only apparent to the audience

through audition.

- Ancillary gestures – visible bodily movements that have no direct link to sound production.

This study is intended to highlight the effect of ancillary gestures on the perception of the quality of a musical performance. With intuition alone one might reasonably assume that this is the case. Performers of popular music have long been aware that they should be able to convey emotion through gesture and bodily movement as well as through their chosen instrument. This is so much a part of music culture that studies have been made as to how performers such as Robbie Williams and Peter Gabriel use gesture to communicate their feelings. In some cases, certain movements have been mapped to particular words. [5]. In 2014, a study found that the body movements of a trombone quartet [6] “significantly affect(ed) listeners’ ratings of perceived style and expressivity”. – In a study very similar to the one presented in this paper, participants were asked to give ratings for appropriateness of style and expressiveness when presented with videos of a performing trombone quartet. The videos all had the same audio content, but varied in terms of the movements of the musicians.

II. EXPERIMENT

A. Equipment and Software

Video was recorded on a Samsung S6 phone using the front facing camera and stock android video application. Audio was recorded using either the line in inputs, or the built in microphone on a zoom H4 handheld digital audio recorder. The video was edited using Adobe Premiere Elements 10 and uploaded to youtube.com as unlisted videos.

The survey forms were designed online and hosted via surveymonkey.com. A splash page for the survey was made using Wordpress and hosted at peterwilliams.dk.

The recordings were made in private living rooms.

B. Procedure and Selection

A selection of musicians were asked to take part in this experiment. They were chosen to reflect a range of abilities and performing styles. Due to availability constraints, only two - three including the author, of the five musicians invited to take part were able to do so.

- Peter Williams – videos 1-6, has been a professional bassist for fifteen years.
- Jens Fulgsang – videos 5-6, has been a professional guitarist for thirty five years.
- James Walford – videos 1-4 has been a dedicated amateur drummer for five years and started to play cajon (as he does here) a few months before this experiment.

The invited musicians were asked to choose a piece of music, or improvise a style that they were familiar with. The only constraints on their choice were that the piece should be short (eight bars or so, and that it should include a clear ending with no tempo variations. This was done to make video editing easier. The chosen music was then performed and recorded in three different states:

- as little movement as possible,
- moving freely to the music,
- with exaggerated movements.

Each of the three states were repeated until the invited musicians were happy with the result.

The invited musicians were then briefly interviewed about how they felt about their performance and their comments were noted for discussion.

The video was reviewed without listening to the audio, in order to find the best examples of each level of movement for each piece of music. These video clips were then dubbed using the first audio recording of each piece of music, resulting in three sets of two videos, each set of videos having exactly the same audio (although video 3 is shorter than video 4, by four bars, as a result of error in experimental procedure). The video footage was chosen to present a varying discrepancy in movement within each video pair. Video 3 and Video 4 demonstrated the greatest difference, Video 5 and 6 the least, and Video 1 and 2 were in between the two. None of the videos contained their original audio recording.

	Musicians / Instruments	Style	Level of Movement
Video 1	Williams: Bass Gtr Walford: Cajon	Latin	Moderate
Video 2	Williams: Bass Gtr Walford: Cajon	Latin	As still as possible
Video 3	Williams: Bass Gtr Walford: Cajon	Funk	Exaggerated
Video 4	Williams: Bass Gtr Walford: Cajon	Funk	As still as possible
Video 5	Fulgsang: Guitar Williams: Ukulele bass	Swing All of me	Moving slightly
Video 6	Fulgsang: Guitar Williams: Ukulele bass	Swing All of me	As still as possible

A survey was created where participants were asked, via forced choice, to state which video they most preferred out of each of the video pairs. They were also invited to state why they made this choice.

Invitations to take part in the survey were posted on Facebook and sent by email. The Facebook invitation was advertised, targeting people who are interested in music. Whether invited by email or through Facebook, the survey participants were given a link to a splash page. On the splash page, participants were asked to follow one of two links depending on their year of birth (odd or even), in this way a balanced set of data should have been obtained. The link corresponding to an odd year of birth led to a survey where all the videos with movement were shown first, the even link led to a survey showing videos with movement last. Unfortunately, this is not reflected in the results as Survey Monkey lost the results for one of the surveys.

C. Resulting data

The data from surveymonkey.com was copied into a spreadsheet. The votes for each video were summed. A percentage preference was then calculated for each video within, it's video pair. In the same way a percentage preference for the videos with movement as a whole was calculated. A subset of data was created. Those participants who commented directly about movement, or made any comment suggesting they had guessed that the audio was the same had their data removed from this subset. The results of these calculations can be seen in Fig 1, along with the binomial distribution function for these results for comparison against a random vote result.

All Results	With Movement	Without Movement	BDF
Movement First	68.42%	31.58%	0.22%
Movement Last	83.33%	16.67%	0.31%
Totals	72.00%	28.00%	0.01%

Filtered	With Movement	Without Movement	BDF
Movement First	67.86%	32.14%	2.57%
Movement Last	66.67%	33.33%	37.50%
Totals	67.74%	32.26%	2.07%

Fig. 1

The plot in Fig 2 was made to investigate the possibility that there might be a relationship between the extent of the difference in movement in each video pair, and the degree to which one of the videos was favored by the participants.

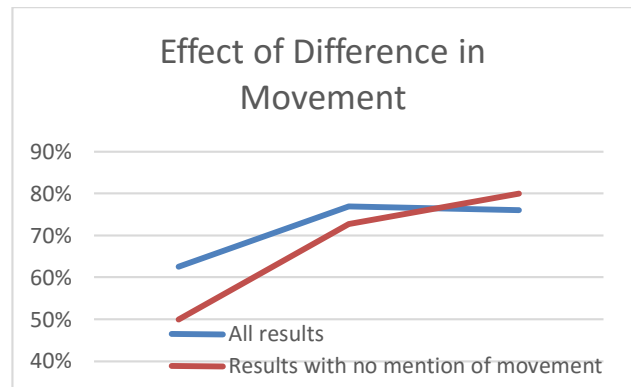


Fig. 2

III. DISCUSSION

Judging from the comments that were submitted when asked why they chose one video over another, a significant portion of the participants (around 60%) guessed that their reaction to movement was being evaluated rather than their reaction to audio. The data from these participants was removed to create a subset. Even within this subset there was a good indication that their opinion was influenced by the movement of the musicians rather than the audio. The audio was exactly the same, if participants' choice was random, the probability of the obtained data occurring is little more than two percent.

The participants were asked to explain their choice to gain some insight into whether they had guessed the purpose of the experiment, and if they had deduced that the audio was the same on each pair of videos. An interesting side effect though, was the range of opinion that this question brought to light. In addition to the comments about rhythmic accuracy (which had been expected), difference in movement actually gave the illusion of increased dynamic range, differences in perceived key and a difference in the balance between instruments.

The musicians had very different experiences to report when asked to comment on their experience of playing with different amounts of movement. James Walford, who played cajon, and was the least experienced musician, felt that it was more difficult to play whilst moving. Jens Fulgsang felt the opposite was true for him. The physical constraints of their instruments, varying familiarity with the music being played and different levels of general playing experience undoubtedly played a role in this discrepancy. It was the authors' intention to check for correlation between the musicians' appraisal of their own performance and the relationship with movement, but due to the fact that Jens and the author kept bumping into one another whilst recording, it was felt that the data would most likely have been skewed.

The video pairs were chosen to test the effect of differing degrees of difference in amount of movement. The assumption might be that the more movement, the higher the perceived quality of performance. However, it was found in a study of conductor facial expressions [2] that disapproving facial expressions resulted in a raised impression of expressivity when compared to neutral ones. It may therefore be possible, that exaggeration could be counterproductive. Equally, the extent to which a performer could, and should move, may well be dependent on the style of music they are playing. In this study the data points to the video pair with the least movement difference (Video 5 and Video 6) having the least effect on the participants, whilst the other two video pairs seemed to show similar results. However, many participants commented that the audio and video quality in Video 5 and Video 6 was poor. This may have skewed the data.

It would be interesting to repeat this experiment with certain adaptations. Silveira [6], in his study involving videos of trombone quartets in varying levels of expressive movement used short pieces of Renaissance orchestral music between video clips in order to, amongst other reasons, help reduce short term retention of the previous clips audio. Similarly, in this study, whilst an attempt was made to focus participants' attention on the sound rather than the video, some kind of distraction between clips could be employed to hide the intention of the experiment. For example, several video pairs could be used, varying a number of different parameters such as volume, key, exposure etc. This might distract participants enough that they would give a more instinctive response.

The focus of this paper has been on the effect of performer movement on the audience's perception. But no attempt has been made to examine the relationship of the movement itself to the music being produced, and to investigate how the nature of that relationship might affect the audience. This could be the basis of another experiment. Musicians could be

asked to move in unison with differing subdivisions of the beat, for example.

In conclusion, the effect of ancillary movement on perception of quality of musical performance was tested on a group of survey participants by asking them to compare manipulated video footage of ensemble performances. The hypothesis that movement has an effect on peoples' perception of sonic performance was shown to be plausible.

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