EXPLORING VISUALISATION OF CHANNEL ACTIVITY, LEVELS AND EQ FOR USER INTERFACES IMPLEMENTING THE STAGE METAPHOR FOR MUSIC MIXING

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ABSTRACT

This short précis outlines a collection of different strategies for visualising simple audio features for a GUI-based audio mixing interface that uses the *stage metaphor* control scheme. Audio features such as activity, loudness and spectral centroid are extracted in real-time and mapped to different visual cues that can be adapted to the circular widgets most often found in implementations of the stage metaphor. An initial evaluation suggests that while the visualisations are generally intuitive and provide information about activity of audio channels, they are not used directly. When implementing these kinds of dynamic graphical visualisations it is thus important to consider how intrusive they are compared to their usefulness in a real mixing context.

1. INTRODUCTION

Recent studies have showed that the *stage metaphor* (see Figure 1)*,* first suggested by Gibson [1], outperforms the traditional channel-strip metaphor in several different ways [2, 3]. However, because the stage metaphor represents channels as circular widgets scattered around the 2D GUI space, there are often issues to do with clutter and lack of overview - especially when the amount of channels is high. Additionally, there are no standard visualisations of track activity, monitoring of levels or frequency content for single channels using this configuration. Drawing upon suggestions from earlier studies [4], we here present a collection of different graphical visualisation strategies. Common for these strategies is that they conform to the graphical style of the circular widget, as seen in for instance [5], and that the information they provide is to be used *at a glance*. Several related studies deal with visualisation of musical features in different contexts [6, 7]. What is important here is, that the visualisations should downplay the artistic expression of the graphics to be simplistic and useful, while still being both intuitive and aesthetically pleasing.

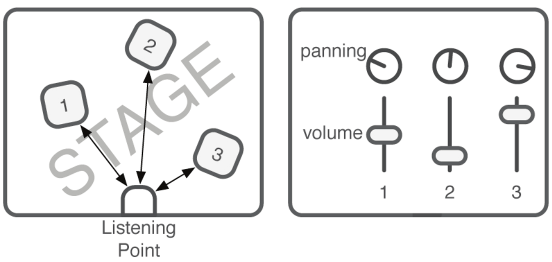

Figure 1: Left) Stage metaphor, where volume and panning are represented by distance and angle relative to a listening point. Right) Channel-Strip Metaphor, as seen in traditional mixing consoles.

2. VISUALISATIONS

The visualisations presented here attempt to represent three overall audio properties for each channel: activity in terms of whether the channel is playing or not, instantaneous loudness of the channel and a representation of spectral brightness (here we compute the spectral centroid). In order to explore different strategies, several variation over the same prototype were designed and implemented:

- **Channel activity** - to increase the perception of which channels are currently active, channels that have levels below a certain threshold are dimmed down. See Figure 2.
- **Monitoring of levels** - here three prototypes are developed that map real-time audio levels of each channel to 1) size, 2) length of an angular line around each circle and finally 3) brightness of the circle. See Figure 3.
- **Monitoring of frequency** - here three prototypes are developed that visualise the spectral centroid of each audio stream. One prototype maps the centroid to brightness. The other two prototypes implement a line around the circle that is induced with noise. This noise is increased with an increase in centroid brightness. One prototype represents a thin line around the circle - the other fills out the space entirely. See Figure 4.

A great concern when dealing with visualisation in a mixing situation is the issue of overburdening the user with visual information, thus removing attention from listening. Therefore a prototype with no level, activity or frequency metering was made as well for user evaluation. The different features were built as an add-on to an existing iPad app presented in an earlier study [4].

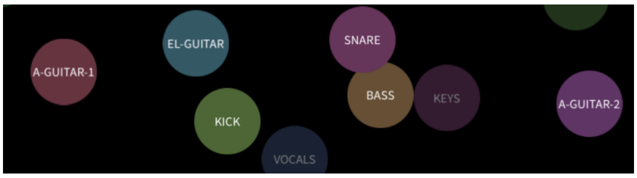

Figure 2: Channels that are inactive (below an amplitude threshold) are dimmed down. Here vocals and keys are inactive.

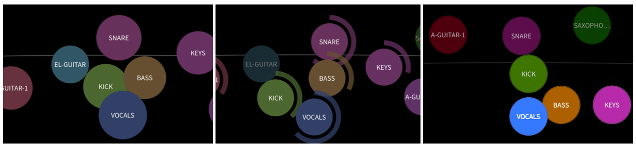

Figure 3: Mappings of instantaneous loudness: size, angular ring length and brightness.

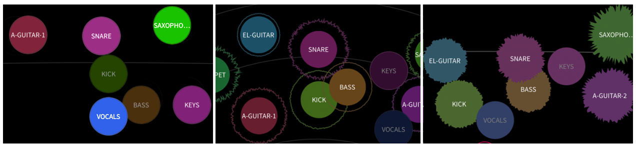

Figure 4: Mappings of spectral centroid: brightness, rings induced with noise, same rings but filled out.

3. INFORMAL EVALUATION

An informal exploratory evaluation was carried out where 6 professional audio engineers (average age: 33, average mixing experience: 12 years) were asked to first explore the mixing interface without any visualisation, while commenting on their experience. This session had three main purposes: 1) to let the participants get a feel for how the mixing interface worked, 2) to elicit any shortcomings of the interface that might be related to the lack of monitoring and 3) to serve as a reference in order to assess the importance of the different visualisation features to be tested. After having gained initial experience with the interface, test participants proceeded to explore the different variations presented earlier in a randomised order.

For each variation they were asked to provide feedback as to how they experienced the different prototypes. At first they were not instructed to focus on the visualisations themselves. This was important in order to judge whether they naturally emphasised these visualisations in the feedback they provided or whether they put more emphasis on other features of the interface. If they would not mention the visualisations at all they would be explicitly asked whether they noticed them and what their thoughts were about them. At the same time, the fact that participants did not notice the visualisations would indicate to us that these particular visualisations were not important in that context.

3.1. Results

In general, results indicate that the visualisations proposed were not used directly (i.e. for identifying absolute differences between channel loudness or frequency content in the mix), but were regarded as pleasant and intuitive, and for the most part as supporting the audio. First indications suggest that brightness has to be used with care as especially rapid changes in brightness draws attention – attention, which is not desirable when for instance working on a different channel. While brightness *can* be used to represent loudness it is not a good representation of spectral brightness in this context, where the instantaneous spectral centroid shifts rapidly back and forth. This seemed unintuitive to most of the participants. Likewise, size changes (while being intuitive in terms of how they map to loudness) also can draw too much attention away from what the user is working on at a particular moment in time. Furthermore, channel widgets of different sizes also contribute to a cluttered interface. Channel inactivity, which was represented by dimming down the channel widget, was highly used for indications of which channels were currently playing and felt natural to the users. Spectral centroid mapped to a line induced with noise was intuitive though perhaps too subtle to be of direct use. Finally, loudness information mapped to both size of outer ring and angular ring length was appreciated for providing a *sense* of dynamics – again not as a direct tool. Whether that *sense* is important or takes away focus from listening would be interesting to test.

4. REFERENCES

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