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Composer's Note

THE USE OF IOS DEVICES IN RECENT COMPOSITIONS OF MIXED MUSIC

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ABSTRACT

Live-electronics have been a central part of my compositional practice since 1982. My working methods over the years always adapted to new available technology. Since 2010 I have been composing works for instruments/voices and iOS devices. I was interested in their portability, quick set-up and in the possibility that musicians can easily rehearse with the electronics. The paper will outline specific features for the different compositions. 1At the time of writing, seven compositions have been finished:

- *Irrgärten* for two pianos, two iOS devices, four loudspeakers (2010)
- *Behind the light* for string quartet, one iOS device, two loudspeakers (2011)
- *entwurzelt* for six singers, one iOS device, two loudspeakers (2012)
- *under* for nine instruments, one iOS device, two loudspeakers (2013)
- *Still Air 1* for bass clarinet, one iOS device, two loudspeakers (2013)
- *Still Air 2* for oboe, one iOS device, two loudspeakers (2014)
- *Still Air 3* for oboe, bass clarinet, two iOS devices, four loudspeakers (2014)

All of them use either iPads or iPods to provide the musicians with a visual interface. In Irrgrten and Still Air, the built-in microphone is used to track features of the live part and adapt the pre-composed electronic sounds.

1. INTRODUCTION

Over the past 30 years I have been working with electronic devices to improvise, to compose and to perform works of acousmatic and mixed music. Besides enhancing the sound pallet of traditional instruments through live processing, I researched also the gestural relationship between instruments and electronics.

This paper will concentrate on a series of compositions using iOS devices to perform and render the electronic part.

The integration of the electronic components during the rehearsal process of mixed music remains a difficulty. Many interpreters are not equipped with appropriate microphones, sound cards, computers etc. to work with the electronics during the study of the pieces. They rely on the expertise and technology of sound technicians. Those resources are often only available a few rehearsals before the concerts, sometimes only at the performance venue. This situation gives musicians not enough time to integrate the electronic component into their interpretation.

While using the fairly common iOS devices for the rendering of the electronic component, musicians can rehearse with them easily. This solution also facilitates the set-up during concerts. Besides the iOS devices, only small monitors are used, which are placed near the performers on stage and directly connected to the sound output of the device.



Figure 1. in *entwurzelt* the iPod is performed by one of the singers and two small speakers are placed in front of the ensemble

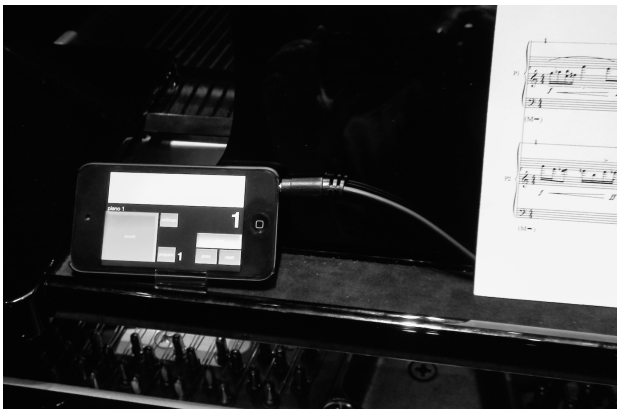


Figure 2. in *Irrgärten* each pianist uses one iPod



Figure 3. two small speakers are placed inside each piano

2. THE USE OF THE BUILT-IN MICROPHONE

In *Irrgärten* and the pieces of the series *Still Air*, the built-in microphone is used to track aspects of the live playing. In *Irrgärten* each of the two pianos interacts with a separate iPod. The microphone detects specific attacks in the piano part and triggers synchronously the corresponding sound files.

Previous research for my compositions *Das Bleierne Klavier* (1999) and *Zellen-Linien* (2007) for piano and live-electronics experimented with different methods of attack-detection in Max/MSP. Instead of working with an absolute threshold, I'm using a floating threshold, which takes into account the average amplitude of the past 500 ms. I'm therefore tracking amplitude differences between previous piano notes and new attacks. This seems to give performers more freedom in their musical interpretation of dynamics and leads to more accuracy in detecting the attack points. For *Irrgärten* I'm also measuring the slope of the signal and combine it with the threshold information during the decision-making process.

In *Irrgärten* the microphone is exclusively used to determine attacks for purposes of synchronization with the electronics.

In the compositions of the series *Still Air* the microphone signal is used in a very different way. The electronics are composed of two layers of pre-composed sound files. One layer could be compared to a traditional tape component and provides sounds, which are independent of the live instrument. The second layer depends entirely on the continuous amplitude tracking of the instrument. The bass clarinet, and respectively the oboe, must play closely into the microphone of the iOS device.

The intensity of the live instrument is used to control the amplitude and pitch of the second layer of sound files. Without input from the instrument, that layer is not heard at all.

When a wind instrument plays a crescendoing multiphonic, higher partials are produced and the pitch often rises slightly. I'm using the model of this phenomenon to modulate the pre-composed sound files.

The live players dynamics are mapped to continuously alter their intensity and pitch. This process produces the illusion of a live treatment, which follows closely the interpretation of the instrumentalist and creates a strong gestural link between instrument and electronics.



Figure 4. placement of the iPod for *Still Air 1*

3. INTERACTION BETWEEN INSTRUMENTS AND ELECTRONICS

I'm experimenting with different control mechanisms in the various compositions. The most intricate set of actions happens in *Irrgärten*. The pianists need to arm the attack-detection process at various moments during the piece and have also to trigger certain events manually. This all depended on the composed musical structures and the acoustic properties needed to safely detect played notes. All actions are clearly marked in the score and need to be rehearsed alongside with the piano music.

Behind the light employs no interaction in a common sense. As note onsets on string instruments are not easily traced with an iOS device, I structured the musical segments for the electronics into shorter sequences, which are auto-triggered during the performance. The sole action on the interface is the triggering of the beginning of the piece. From there on the first violin is following the visual feedback of the interface and conducts the quartet.

In *entwurzelt* and *under* the iOS device is used like a sampler. In *entwurzelt* one of the singers is triggering the short sound sequences. Each of those sound files is composed for a slightly longer duration than needed to accommodate variations in tempo. If the singers perform with a slower tempo, the sound files continue to play and the electronics are re-synchronized with the singers at the triggering of the following event. In *under* an additional musician, sitting on stage, is triggering the sound files. That way he can closely follow the conductor.

This temporal flexibility worked very well during the



Figure 5. placement of the iPad for *Still Air 2*

rehearsals and performance.

The temporal relationship between instrument and electronics in the series *Still Air* is of different nature. The live part is written as temporal blocs, without measures.

The electronics are divided into sequences with corresponding durations to those time blocs.

The musician synchronizes his interpretation to the electronics by observing the iOS interface.

4. VISUAL FEEDBACK FOR THE PERFORMERS

The interface for all compositions provides the player with visual feedback about the position in time of the current event.

The interface contains also control elements to perform required actions and to navigate during rehearsals.

All applications have a progress bar at the top of the window, which indicates the relative temporal position within an event. The bar scrolls from the left to the right side of the screen over the duration of each event. Depending on the composition, there are several actions, which happen, when the progress bar reaches the right side:

1. manual triggering of the next event in *entwurzelt* and *under*
2. automatic triggering of the next event in *Still Air*
3. arming of the attack detection in *Irrgärten*

The resulting action of pressing the *touch* button also depends on the situation within a given piece. During rehearsals it starts a pre-counter before the desired event to

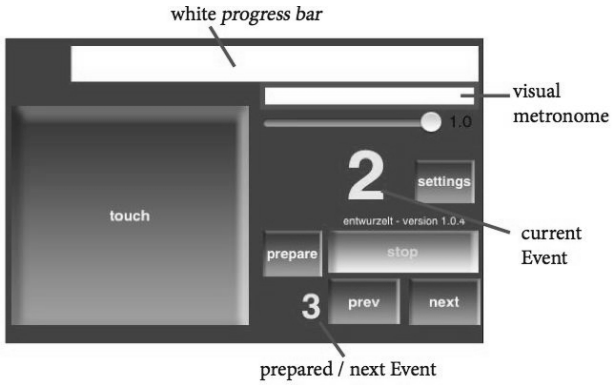


Figure 6. interface for *entwurzelt*

give musicians time to prepare for their onset. During performances it starts sounds or arms the attack-detection in.

The interface further provides buttons to navigate to events during rehearsals and to reach the settings page, which contains functions to test speakers and tune the electronics.

The interface for *entwurzelt* and *Behind* the *light* provides also an optional visual metronome.

5. CONCLUSION

The use of iOS devices in recent compositions of mixed music for the rendering of the electronics has been a fruitful approach. The devices are not used to remote control a computer, but contain the entire electronics. Only the iOS device and small loudspeakers are used. This helps musicians to incorporate the electronics from an early moment in their rehearsal process and makes set-up and strike easy.

There are of course many compositional limitations, as live treatment of the instruments has been avoided due to the limited quality of the built-in microphones. Further information on the individual compositions, their technical realization, as well as recordings of the works can be found on `www.tutschku.com`.

6. ACKNOWLEDGEMENT

My sincere thanks goes to the musicians, which were involved in experimentations, rehearsals and performances of these compositions. Without their invaluable input I would not have been able to develop the concepts for the music and technical implementations.

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8. AUTHOR'S PROFILE

Hans TUTSCHKU

Hans Tutschku was born 1966 in Weimar and has been member of the "Ensemble for intuitive music Weimar" since 1982. He studied composition of electronic music at the college of music Dresden and had since 1989 the opportunity to participate in several concert cycles of Karlheinz Stockhausen to learn the art of the sound direction. He further studied 1991/92 Sonology and electroacoustic composition at the royal conservatoire in the Hague (Holland).

1994 followed a one year's study at IRCAM in Paris. He taught 1995/96 as a guest professor electroacoustic composition in Weimar. 1996 he participated in composition workshops with Klaus Huber and Brian Ferneyhough. 1997-2001 he taught electroacoustic composition at IRCAM in Paris and from 2001 to 2004 at the conservatory of Montbéliard.

In May 2003 he completed a doctorate (PhD) with Professor Dr. Jonty Harrison at the University of Birmingham. During the spring term 2003 he was the "Edgar Varèse Gast Professor" at the TU Berlin.

Since September 2004 Hans Tutschku has been working as composition professor and director of the electroacoustic studios at Harvard University (Cambridge, USA).

He is the winner of many international composition competitions, among others: Bourges, CIMESP Sao Paulo, Hanns Eisler price, Prix Ars Electronica, Prix Noroit and Prix Musica Nova. In 2005 he received the culture prize of the city of Weimar. 2013/14 he received a Fellowship at the Radcliffe Institute for Advanced Study and a Stipend from the Japan-U.S. Friendship Commission.