

INSTRUMENTS

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FOR NEW EARS

Live electronics, movement sensors, new interfaces and instruments: we can no longer imagine contemporary composed or improvised music without them. And yet in ordinary music education they still only play a minor role, if any. The possibilities offered by new instrumental technologies today are hardly broached in the education on offer to children and amateurs. When they do crop up, it is mainly outside the musical curriculum under alternative names such as sound art, sound de-

sign or media art. The growing attention paid to such disciplines is praiseworthy. However, their emancipation weakens the need to consider new instrumental approaches within existing music education programmes. It is far from unthinkable that musical sound explorers of the future are more likely to be guided towards new, autonomous disciplines that keep a safe distance from the musical canon. Conversely, splitting into new specialisations entails the risk that future generations of sound or media artists will no longer come into contact with musical expertise.

This is what makes it worthwhile to rethink the position of the musical instrument in arts education as a whole, across disciplinary borders and styles. First and foremost, we need to analyse the way present-day music education thinks about instruments. My point of reference for this is Flemish part-time arts education (the official, state-subsidised colleges providing non-compulsory arts education to children and adults, called Deeltijds Kunstonderwijs and abbreviated to DKO). This is where the vast majority of amateurs and pre-professionals receive musical training in Flanders. Then I will investigate what space might be found in the music education of the future for new instrumental approaches and technologies that are already commonplace in today's composed or improvised music.

LEARNING MUSIC

Ask beginning musicians why they have enrolled in the DKO and you are bound to hear about musical instruments: they want to learn to play the guitar, or the saxophone, or another of the instruments on offer. With young children the choice has sometimes not yet been made, but for older students the desire to learn music is usually embodied in an instrument that is immediately familiar to everyone: a characteristic sound, the way it is played, a musical genre. People go to music school to learn music, but above all to learn to play an instrument. Composing and improvising can also be motivations, but most people only feel that desire after several years, once they have instrumental training behind them. Hence learning to compose usually means learning to make music for an array of familiar instruments. Consequently we can state that instrumental identity and idiomatic playing culture precede musical creation at the DKO. Music education mirrors musical culture here. Despite certain beliefs about music as a universal language or an abstract art form, it is generally very difficult to think about music without immediately imagining the sound of very real instruments or mentally seeing them played.

After all, a musical instrument is more than just a means of making musical ideas audible. It is the carrier of a cultural identity and embodies both a characteristic sound profile and a model of sound interaction (striking, bowing, strumming, blowing etc.) In this capacity, standardised music instruments act as inspiring models that constantly challenge and delineate musical creativity.

If we link this train of thought back to music education, the question arises as to whether musical instruments are only seen as a tool within broad-based musical schooling, or whether they are the lens and mould by means of which students learn to think about and experience music. Most righteous musicians and educators will defend the view that it is ultimately about the music, not the instruments. And yet it is abundantly clear that both in terms of the time invested and curriculum contents, the structure of current music education is for the most part constructed around the nature and requirements of a limited range of historical instruments that require craftsmanship to master. Other optional or compulsory subjects such as reading music, music theory or general musical culture are usually seen as supporting elements, necessary or not, to the core of the music education business: learning to play one instrument, or a couple at most. The students themselves certainly take this view.

We seldom consider the impact that the presence of instruments in music education has on the musical development of students. It is only in confrontation with new technologies and alternative instrumental approaches that it becomes clear how thoroughly musical thinking has become entangled with the characteristics of a historic set of instruments.

THE INSTRUMENTAL LENS

A strengthening factor in the link between standardised instruments and musical curricula is that the instruments learned have a stable identity, both in terms of their construction and the techniques used to play them. This stability

enables a long-term learning process with a powerful motivational structure: students have to practice for years before they really get the hang of an instrument, but from the outset they are surrounded by inspiring, living and breathing role models, beginning with their teachers. The latter provide living proof that practising hard can lead to success over time.

Moreover, the instruments in the DKO are almost without exception those of the nineteenth century or earlier, with a correspondingly well-developed performance culture and an idiomatic repertoire. There are a few borderline cases such as accordions and drums, and there are the electric versions of guitars and keyboards, but even these are generally – and sometimes even more emphatically – taught in a way that emphasises craft and the conservation of culture. The combination of stable, standardised instruments and the idiomatic repertoire that surrounds them creates an environment into which you need to be initiated by experienced experts, by *masters* who teach you all the virtuoso tricks of the trade and special fingerings, and help you to decipher hidden musical messages. Instrumental culture provides numerous points of reference for listening and playing techniques, making it easier to recognise the progress you are making. Consequently it is an environment well-adapted to placing markers of educational achievement, to progressive paths of learning, competitions and examinations.

The progress made by a student in classical instrument lessons can be measured thanks to the stability of the instrument. If we compare musical results after one year of musical schooling with what the student can present at the end of the course, it will be clear that they have come a very long way. However the instrument itself will have remained more or less the same. Over the years it takes to learn an instrument (in the DKO it currently takes nine years under normal circumstances), it is therefore only the instrument player who adapts. A bird's eye view of that learning process could resemble a slow bending and 'tuning' of the student's body to

the form of the instrument, until ultimately, in the best case, the instrument is experienced as an extension of the body.

When students choose an instrument, they are also opting for a specific musical repertoire. An instrument does not only embody a typical sound, but a specific musical style as well, a musical identity. That is not just a question of cultural developments, but also a result of the interaction between cultural preferences, physical limitations and technological developments. Mechanical, acoustic instruments have certain sound and playing possibilities built into them, but above all they exclude many others. This is expressed in an idiomatic repertoire with a larger or smaller range of variations in style, depending on the instrument and the culture in which it developed. Pianists are the most richly endowed, whereas recorder players or accordionists usually have to make do with a much more limited repertoire of early, folk or contemporary music. Given that in Flemish music education, playing two or more instruments is a privilege for the most talented students, choosing an instrument has an enormous impact on the development of children's musical frame of reference. Each instrument gives a specific perspective, a narrow focus through which children learn to listen to and 'speak' the language of music. Both hearing and musical imagination are to a great extent developed by playing an instrument oneself (including the voice).

From a contemporary perspective, then, it is strange that instrumental education pays so much attention to the analysis of learning problems, adapted working methods and practice schedules but that the musical instrument itself is rarely a subject of discussion. Technical problems in music performance have to be solved from the user's side, by the student, for whom suitable exercises need to be provided. It is clear that such an attitude is completely at odds with current social developments in which technology is becoming more and more human, turning invisible and adapting itself to the possibilities, limitations and preferences of individual humans.

It is a development that severely erodes the bedrock of long-term, dedicated practising.

Of course people in music education are well aware of this shift in the bedrock. This is why the repertoire is adjusted more and more often. An enormous market has (once again) grown up in musical transcriptions and adaptations that circumvent the problems caused by less adept bodies and can give the players of historical instruments the experience of 'real music' with as little effort as possible. This amateur-friendly market is understandably mainly oriented towards arrangements of film music and pop music that are easy on the ear, plus a limited number of hits from the classical repertoire. Simplified arrangements of classical music still encounter resistance from instrument teachers educated in a tradition where respect for the repertoire remains important. The result is that the 'iron repertoire' becomes more and more exclusively accessible to the few students who can manage the necessary perseverance.

Things are perhaps even worse with twentieth century or contemporary composed music. Schönberg and Webern in any case have never got a foot through the door of music school, but the same applies to most contemporary composers – unless they are active in lighter music. The reasons are obvious: not only does the sound profile of contemporary composed music usually fail to resonate with the world students live in, but most instrumental music that we can classify as 'contemporary composed' music is simply unplayable for amateurs, even advanced amateurs. This had also been the case earlier, in the Romantic virtuoso tradition, but in contemporary composed music, production is oriented towards professional performers in an extremely exclusive way.

Nonetheless, there is one contemporary element that does sometimes pop up in instrumental teaching and which is strongly associated for many people with instrumental experimentation in musical modernity: what are called 'extended

techniques': percussive sounds on string instruments, clusters on keyboards, preparations for the piano and guitars, noise and multiphonics on wind instruments etc.: everything that might be considered 'improper use' of the instrument.

EXTENDED TECHNIQUES

In the context of music education, extended techniques can shatter or nuance quite a few instrumental dogmas and prejudices in a direct, physical manner. In traditional music education ideals of sound production can be highly compelling and even take on mythical allures. Just think of the cultivation of a certain 'touch' for pianists or voicing for singers. The potential of extended techniques for instrumental music education is therefore not only an extension of sound possibilities, but above all in the possibility to put instrumental culture temporarily aside. It can be a liberating impulse for the student to experience their instrument with 'new ears', to discover its sonic potential by groping and experimenting.

Extended techniques can be integrated into instrument lessons right from the start. Playing clusters on a keyboard instrument is an obvious starting point for the beginner piano student whose motor coordination is not yet highly developed. The same applies to producing noise sounds on a wind instrument or scraping, scratching sounds on a string instrument by varying the bow pressure. Although only a few instrument teachers will encourage such playing techniques in beginners who have not yet got the 'correct' position and tone under control, there are enough arguments for allowing 'incorrect' playing techniques in instrument lessons from early on and for approaching them from their own sound potential. The conscious exploration of alternative playing techniques leads to a better understanding of and feel for the instrument, a more direct and physical comprehension of the relationship between physical effort and tone production, and in this way can even reinforce feeling for conventional tone production.

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The relationship between physical input and sound production remains linear with extended techniques. Change in tone quality can only be achieved by changing the motor input. From an educational perspective, the extended techniques approach does not therefore need to differ fundamentally from 'normal' tone production. The tone possibilities of extended techniques are equally within the physical limitations and possibilities of the instrument and player, which also means that they are just as susceptible to canonisation and optimisation. Just as with the production of a 'good tone', there are better and less efficient ways of playing noise on a cello or getting a clarinet to produce a specific multiphonic.

And yet the context of alternative tone production usually allows far more room for variation and experimentation. And this is precisely where the educational relevance of extended techniques in instrumental education may lie: the discovery of alternative sound possibilities demands an adventurous attitude of students. It takes them into sound terrain with other norms and values, often leaving them far more reliant on themselves. Furthermore, the sound results of an alternative playing technique may be different from one instrument to another (more than with conventional tone production for which the instrument has been optimally constructed). This means that extended techniques also require closer listening to the relationship between action and sound result. This need for attention to the intimate interaction between the instrument and player is where a task for the teacher lies.

Extended techniques will never replace the 'proper' way of playing the instrument. The desire mainly to make the instrument sound the way its construction intended, to produce a sound that is already familiar to students from their musical culture, will usually remain stronger than the desire to discover new ways of playing. Pleading for a better integration of extended techniques into instrument teaching does not therefore necessarily imply equal attention to normal and alternative tone production. It is in

relation to existing instrumental culture that extended techniques can prove their worth. Above all, extended techniques provide access to musical terrain where factors other than the familiar tonal, melodic and harmonic parameters play an important role. They open the ears to the timbre and sound envelope and stimulate consciousness of the relationship between action and sound result. In doing so they increase students' sensitivity to parameters that have gained enormously in importance in contemporary composed music. Examples from twentieth-century music literature (such as John Cage's compositions for prepared piano or Helmut Lachenmann's *Musique Concrète Instrumentale*) can help make it clear to students that alert ears and an investigative attitude can make musical creativity possible beyond the traditional ways of playing. Extended techniques can be introduced through existing compositions, but mainly provide enticing work material in improvisation or creation. Making room for other forms of tone production also belongs within any ambition to give improvisation and exploration of aural, non-score-based approaches a more important role in the instrumental learning process than is usually the case, and to do so right from the start.

LIVE ELECTRONICS

It is only a small step from extended techniques to connecting the acoustic instrument to 'live electronics'. Applications for live electronics are seldom covered in traditional music education. Although they have been commonplace for decades in contemporary music practice, the transition to amateurs has not occurred. Yet there are few obstacles beyond the technical equipment and the knowledge required of the teacher. In theory it is possible to work with live electronics right from the first year without students needing much extra knowledge. A contact microphone on the instrument body linked to a sound card and a laptop with appropriate software is enough to make the acoustic instrument the source of potentially unlimited sound

effects of all kinds: from adding reverb, echo and distortion to the whole array of electronic techniques: modulations, granulation techniques, (live) sampling etc.

Just as with extended techniques, the familiar instrument can remain the starting point for live electronics. The advantage of live electronics here is that the way they are played does not necessarily need to be adapted in order to explore new areas of sound. They can also be very simply applied to playing techniques that have already been acquired. The main obstacle to using live electronics in music education is not down to the student, but the teachers. Electronic sound techniques are absolutely not part of the basic training of music teachers.

And there is another problem that is intuitively felt. Classically trained musicians who come into contact with live electronics for the first time sometimes experience them as ballast, a technological intervention that distances them from their instrument. You don't need to look far for the cause: live electronics force a 'black box' between the instrument and speakers, thus theoretically – and often also in practice – disrupting the direct relationship between action and resulting sound. Linking live electronics to acoustic instruments therefore requires a clear consciousness of the impact of electronics on the relationship between performance and sound result. In the last decade the youngest generation of composers and musicians have greatly developed this consciousness. The one-sided associations that some classical musicians still make with live electronics as an alienating environment that ties musicians up in complex wirings and takes away all their musical freedom (think of the use, all but archaic now, of 'click tracks' intended to help performers synchronise with a tape or electronics) are nowadays outdated.

Live electronics even have didactic potential to increase consciousness of the relationship between action and sound result. For example, the student's sound input can be used directly to control electronic sound effects. Sound itself, rather than extra hardware, buttons or mixers, can be used as the interface. Audio software

can be programmed so that a specific sound effect only occurs when the input reaches a specific volume, pitch and duration. The intensity or modulation of digital sound processing can be controlled in real time by the input of an acoustic instrument. The extraction of relevant musical patterns out of acoustic data is a feature not yet available in commercial software programs, but even that will come increasingly within reach of the average music user in the near future, with the result that even more intuitive forms of musical interaction become possible.

Admittedly, even in new music such an approach is still far from established, but the technological possibilities and computing power are available today. Already some composers are experimenting with interactive software that does not limit the freedom of the musicians but instead reacts flexibly to the musician's creativity and allows him or her to generate different results each time within the same environment. Digitally controlled interaction models can stimulate listening and musical interaction between musicians in collective improvisations. Live electronics have the potential to become a musically 'intelligent' factor that supports and inspires performances and provides compositional form.

It is clear that there is still a long way to go before such use of live electronics can find its way into music education. The example of the model where the student's sound input is used to control the electronics (the principle of sound as interface), does show, however, that live electronics do not necessarily form an insurmountable obstacle for the students themselves. From a technological perspective, all the possibilities are available to develop educational instruments that can intuitively provide direct inspiration for the student's playing and listening through aural feedback.

Up to now we have concentrated on new instrumental approaches and technologies where the presence of standardised music instruments is still the starting point. The greatest benefit of integrating live electronics into music education is elsewhere, however. Live electronics create a context

in which the entirety of sound production can be understood as an input-output model. Unlike traditional instrument teaching where practice is always aimed at optimising motor input in relation to auditory feedback, what is between input and output becomes important here: how the instrument is connected to the speaker and what sound processes occurs between them. This intermediary area becomes a free playground for the student's design and conceptual thinking, where the familiar relationships between physical input and sound output can be completely rethought. Obvious relationships can be turned upside down: small actions can have big effects and vice versa. Playing very short, isolated notes on the instrument can generate long drawn-out drones or, conversely, long sustained notes can cause percussive sound effects.

As soon as you give students the freedom to intervene in the familiar sound relationships of a mechanical, acoustic environment, theatricality, a sense of space, audiovisual aspects of musical interaction and even humour come into view. This broad application potential makes it clear that live electronics do not have to be restricted to technologically-minded students. However, learning to work with live electronics does require specific technical training that is generally lacking in musical education for amateurs today. The integration of live electronics requires a structurally extended range of courses in electronic sound techniques and digital sound processing, and also greater attention to the basic scientific principles of acoustics and perception.

INSTRUMENTAL DESIGN

Once the student is familiar with an input-output model over which he or she has full control, it is possible to consider not only the interface between the instrument and output but also the sound source itself that is required to generate input. And then it soon becomes clear that the acoustic instrument, with all its finesse and historically evolved characteristics, forms a fairly arbitrary source of sound in combination with

live electronics, that does not necessarily produce richer or musically more interesting results than any other objects that can be used to produce sound. The neutrality of the digital medium means that just about any form of input, any form of information can be translated into a musical context. Game technologies (Wii, kinect etc.) nowadays provide the tools for converting physical movements directly into sound, just as all kinds of sensors (heat, infra-red, brainwaves etc.) can provide controlling signals for sound production.

And there we make the ultimate U-turn: the flexibility of the digital medium puts the definition of both input and output up for debate. As soon as the input model can become part of musical creation processes as well, we will be dealing with a learning process that may incorporate aspects of instrumental design (both in the technical aspects of sound design and interaction concept) as well as live electronics, musical interaction, composition, design or choreography. An open instrumental learning process in which all these aspects can be exposed to the student's creativity demands a completely new pedagogical and didactic framework. An important point of attention is that there is no longer any question of a hierarchical learning process where the instrument, repertoire and educational targets are necessarily set in advance, as they are in traditional instrument teaching. Hence the students may come into contact with numerous input models over the course of their education, instead of devoting years to learning to play a single instrument. This clearly has important consequences for the results of such a learning process. As we stated above, in traditional music teaching the stability of the mechanical, acoustic instrument forms an important factor in the development of progressive, quantifiable paths of learning. From a traditional instrumental perspective, giving up that stability may potentially lead to a loss of efficiency: the results of open instrumental learning processes are far less clear, and relatively less virtuosity will be achieved (overall less time is spent practising with one type of input), the path followed from the choice of input model to

a musically relevant result is complex, and the chances of success are not certain in advance. One does not build systematically and step-by-step on previously gained skills and knowledge as in conventional instrumental education, but nonetheless connection points are constantly possible with a wide range of technical, artistic or interdisciplinary skills.

However, it goes without saying that it is not possible to work in all areas at once when one is learning. Taking an undefined instrumental model as a starting point requires choices and limitations of the playing area depending on the target group and time invested. A musical learning process with young children can, for example, begin with the children themselves searching for appropriate sound objects and ways of making a noise with things. The interface between input and output can remain the responsibility of the teacher here, who can optimise the translation of input into output by observing the preferences and talents of the children. Some children might opt for small, concentrated manipulations (for example using objects amplified with contact microphones), others for a large action as their input model (e.g. movements of the arms and legs picked up by sensors). It is then up to the teacher's initiative to investigate with the children how these different actions can be converted into sound. After that the improvising, experimenting and composing group can aim for a musical result that is almost literally tailored to each child.

The greatest obstacle to such an approach is, again, the schooling of the teachers themselves. Insight into acoustics, electronics, motor coordination, audiovisual and theatrical effects, along with the ability to manage musical improvisation and creation: this might be an almost impossible task for the average music teacher. It should be clear that we are talking about a completely new approach here, that only has long-term chances of success when talents can be pooled. The multidisciplinary nature of the learning processes described above implies support from a team

rather than an individual instrument teacher. The question of how such a framework can be structurally implemented in the DKO in a realistic and feasible way is an issue for discussion. In any case, it is clear that a redefinition of musical learning goals will be required if we want to do more than look backwards, and instead to arm ourselves for the music of the future: music that, by definition, we do not yet know. Attention to the role and place of the instrument in music education seems to be vital in this debate. Numerous tendencies indicate that instrument design in the broad sense of the word is occupying an increasingly important place in the thinking of new music makers and sound artists. If music education wishes to connect to these developments, people need to become more aware that learning music does not need to be limited to learning to play a piece well or to place notes and rhythms correctly above and beside each other, but that the entirety of sound production right up to the design of the instrument can become part of the artistic learning process.