



Development Element 2b

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Contents

1. Introduction
2. The Instrument what's it made of?
3. The Recording Process
 - 3a. Method one
 - 3b. Method Two
 - 3c. Method three
4. How the instrument works
 - 4a. The Kinks
 - 4b. The Round Robins
 - 4c. The Arpeggiator
5. Mo' Buttons Mo' Problems (*Issues and resolutions*)
 - 5a Arpeggiator
 - 5b Knobs, Buttons, and Sliders
6. Reflection upon the results of the instrument
7. Improvements
8. Compare and contrast
 - 8a. Glassworks by Soniccouture
 - 8b New Glass Marimba by 8Dio
 - 8c Glass + Steel by Spitfire Audio
9. Conclusion
10. References
11. Bibliography

1. Introduction.

To create this instrument a few options were considered. At first, the desire to create an analogue instrument was of great interest, however, the knowledge and skillset to create a stringed instrument made out of a lamp shade was not available. Instead, the idea of a software instrument was explored.

After some experimentation with different programming environments such as HISE, Reaktor and Logic Pro's sampler, the decision was made to utilise Native Instrument's Kontakt to invent this software instrument.

According to soundonsound.com *"One of Kontakt's most powerful features is the Kontakt Script Processor (KSP). It enables you to write Scripts, which can be thought of as lists of instructions that manipulate the way a Kontakt instrument works."* (Wherry, 2010).

With this in-built script editor from Kontakt, any beginner may be disillusioned in the thinking that this would be an easy feat. This was not. From the very beginning of the project, one has to think about what to record, how to record it, and then how to get it into the sampler and start experimenting and editing.

This paper will discuss the research that was carried out, the many issues which were encountered when creating the instrument along with the resolution of how those issues were tackled and what adaptation was implemented to overcome these problems.

Comparisons against other similar commercial software instruments will be discussed to gain an understanding of how other developers created their samples and what could/should have been implemented in this project.

We will also discuss the results of the beta test performed by fellow students and music makers to see how the instrument can be further developed.

2. The Instrument what's it made of?

Following on from the ideas of Benjamin Franklin (One of the founding fathers of the U.SA), the decision was made early in the project to make an instrument of glass but made with contemporary equipment and programmes.

Franklin's 1761 invention consisted of concentric glasses spanning three or more octaves.

Laid on its side and operated by a mechanical wheel that rotates the mechanism, the

Armonica was played by wetting the fingers/hands and lightly touched on the edges as it spins in rotation. This friction created a lovely resonance which can be played as single notes or complete chord structures.

Figure 1



(Benjamin Franklin's Armonica)

To put a modern-day spin on it, this software instrument will be recorded as singular articulations and then modified within Kontakt.

At first, the use of the ordinary wine goblet was considered. When the attempt was made to record the goblet however, it was found to be dull and lifeless without much resonance.

This was the first stumbling block, how to brighten the sound?

Figure 2 (*Ordinary Wine Goblet*)



The samples were tracked using Logic pro X, after which some heavy High shelf EQ of +7.4db's on the high end at around 4K upwards was applied to the samples.

This, however, did not resolve the dullness or length of resonance, it just made the top end louder. The thought of using an envelope on the sample was considered to lengthen the resonance however, this was quickly discontinued as it was found that the sample had lost its original sound and now resembled something very processed and unlike a glass.

To overcome this initial roadblock, a new set of crystal glasses were purchased.

Figure 3



(*Crystal Glass set*)

According to an article by Kathy Adams “*Genuine crystal, especially thin pieces such as stemware, emits a distinctive, clear tone when struck gently. Tap the piece gently along the rim with your fingernail; if the piece is real crystal, it will ring out with a pleasant tone. Glass emits more of a clinking sound. If unsure, test the questionable piece, followed by a piece of similar shape that you know is either glass or crystal. The difference between the sounds of the two materials is distinctive.*” (Adams, 2018)

When researching Benjamin Franklin’s glass Armonica, the web page of David Mauldin was discovered, on his site are a few video re-enactments of the original glass Armonica where David is playing Benjamin Franklin using his invention. (Mauldin, 2013).

Figure 4

(David Mauldin’s Re-enactment of Benjamin Franklin’s Glass Armonica)



(Mauldin, 2013).

After viewing these video clips, it was determined that the wheel didn’t need to be reinvented, just the roads that the wheel can travel down.

With this in mind the recording process of the new crystal glasses commenced.

3. The Recording Process

3a Method one

Having purchased a brand-new set of six crystal glasses, the initial idea was to fill each glass with increments of water, the thought process was that the tuning of the glass would tune upwards in scale as the glass filled however, this was not the case as it was apparent that the tuning was going down the scale as the glass filled with water. The solution for this was to reverse the process and have the highest note (an empty glass) descending the scale to the lowest note (a full glass) but again this would not work because it was exhibited that each glass in this set of six were tuned differently.

Two were tuned to G, one was tuned to a Bb, three were tuned to an A. This pretty much nullified this approach, and it was back to the drawing board.

Figure 5



(Crystal Glasses Water Increments)

3b Method Two

The second method applied was to record the three sets of glasses A, Bb, and G. This was then to be transferred over to the Kontakt mapping editor to their respective notes, then drag each section to fill in the empty notes until we had a full scale and then copy that scale a few

times to make up several octaves. This however, presented a new challenge. When the samples were mapped to the octave higher, the tuning was completely off, and although Kontakt does have an in-built tuner, when attempting to re-tune the glasses an octave higher or lower, this added quite a bit of artefacts which conflicted with the overall sound of the instrument.

It was also around this time when a very useful YouTube vlog by a creative named David Hilowitz was unearthed. In one of his tutorials, he walks the viewer through how to make a software instrument from start to finish. At timestamp 0:59 – 1:02 he stated, *“he will record each of the notes five times because he wants to do ‘round robins’”* (Kontakt Tutorial: Creating an instrument from start to finish + Free Kalimba Kontakt library, 2018).

Having no clue as to what he meant by this, further research was performed, and according to an article found on the yummybeats blog *“With samplers (or other software instruments) round robin basically means sound variations. Imagine you are picking a guitar! Your single picks will never sound the same since you always pick the strings slightly different. We can simulate that “humanization” by simply randomly varying between a few sound variations which we all have to recorded of course. So, each time you hit a key on your keyboard another sound variation is played. Thereby the same variation shall not be played twice one after another.”* (Unknown, 2020).

This opened up a new chapter of understanding. To be able to achieve a more realistic and humanized sound, the samples needed to be recorded multiple times, grouped in Kontakt, then adding the round robin in the scripting process so that each time a note is played, it's a different variation of the note lending to that natural feel which is desired for this instrument.

3c Method three

The previous method failed because of an oversight regarding the use of a pre-amp, one was not used fearing it may add too many harmonic distortions onto the resonance of the glass.

This fear was quickly dispelled when experimentation began by utilizing Universal Audio's 'Neve' pre-amp. This gave the samples a more rounded sound adding body and just a touch of harmonics along with a bit more volume than the previous iteration, so these were the samples that were used for the instrument's first articulation.

The 'dinged' articulation was recorded five times on each velocity i.e. Five soft, five medium and five hard hits using a citrine crystal.

Using the same method as before with the 'Neve' pre-amp the 'rimmed' articulations was recorded the same number of times, the only difference being the velocity. It was not possible to record this element at varying velocity levels as there was no control over that element.

4. How the instrument works

This is a Kontakt Player instrument. Meaning, you do not need to have the full version of Kontakt 5.7 or above to use it. It will run as a plug-in instrument in any VST/AU/AAX/compatible program or DAW eg., Logic, Ableton Live, Cubase, Pro-Tools. Just like any other VST plugin, the user would download the package which is saved as Kontakt Files i.e. nki, nkc, and nkr files, they can then load the instrument either by double clicking the 'nki' file which will open Kontakt player as a standalone instrument, alternatively, they can open the instrument directly from their DAW as a Kontakt player instrument.

Due to lack of knowledge about KSP scripting, this instrument is very basic and simple. It has two standing articulations (The dinged and the rimmed) controlled by a volume slider. The user has the choice of which articulation they would like to utilise in their music, they can even use both articulations simultaneously (which is actually recommended).

It also has an arpeggiator that the user can interface with creating patterns to suit their style of production. The user simply plays whichever chords they would like, using their midi controller keyboard.

4a The Kinks

There are many imperfections with this instrument.

- ***4b The Round Robins***

Essentially, round robins work on various groups so that when a note is played, the ‘RR’ selects alternative notes. The problem with this instrument is that during development, there were two sets of ‘RR’ i.e. the dinged articulation has two groups and the rimmed articulation has two groups.

As a result of the ‘RR’ (and this could easily be a misunderstanding of how to script them properly), the alternatives are being played also, so at times when the user plays a (Dinged) note, the instrument does play the ‘Dinged’ note however, it also plays one of the alternate rimmed articulation.

This can be avoided by simply turning down the volume slider on the articulation the user does not want to hear. The problem with this approach is that every so often, there would be silence when the note is played because the ‘RR’ has selected one of the other articulations which is currently on 0db.

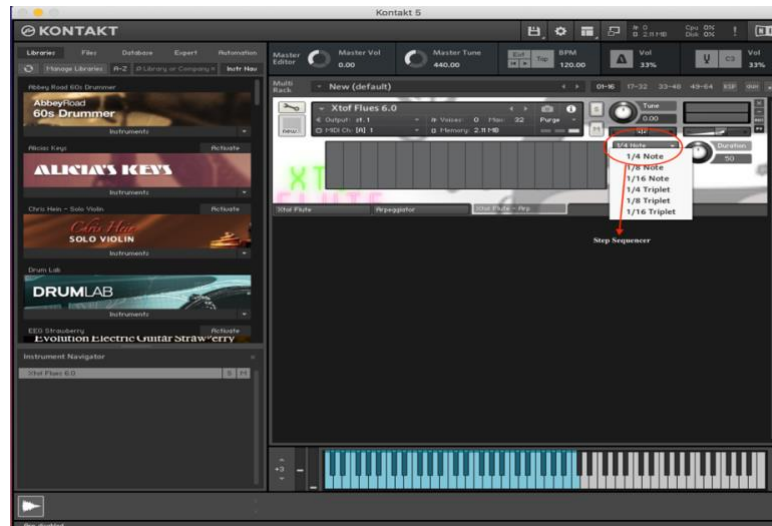
- ***4c The Arpeggiator***

When the developer considered using an arpeggiator as part of this instrument, the thought was to have everything on one window (all the control knobs and sliders along with the arp controls).

This proved to be very tricky especially with the lack of knowledge about scripting and coding.

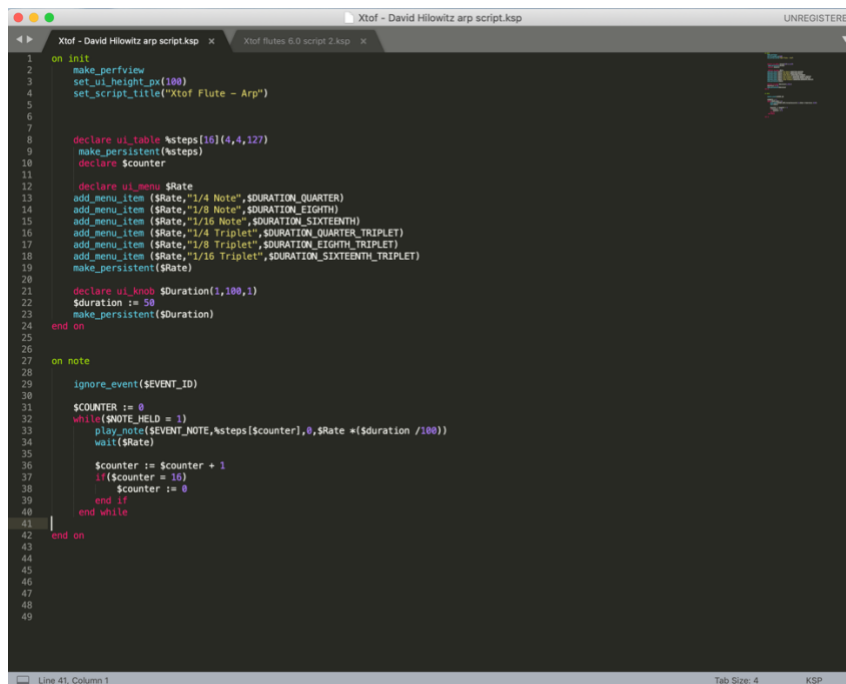
When researching how to compose an arpeggiator script many tutorials presented themselves. Following David Hilowitz's step by step guide on YouTube, a simple arpeggiator was created by first scripting it inside of the 'Sublime Text' programme, then transferring that script into the Kontakt script editor.

Figure 6



(David Hilowitz Simple Arpeggiator)

Figure 7



(David Hilowitz Simple Arpeggiator Script)

The issue with learning from YouTube videos and online tutorials is that often, the person presenting the tutorial is simply working on coding/scripting that particular thing. E.g., on David's, ADSR, Xtant Audio, yummybeats blog and various other tutorials, they would work on a script for making an arp, or how to script FX knobs and sliders or how to script round robins but using a complete blank canvas with no explanation of how to incorporate the tutorial into your own instrument.

So, although the developer rigorously attempted to incorporate these new scripts within the Xtof Flutes instrument, there was always an 'error' message in the kontakt script editor because of a syntax error, and with little to no information on how to solve the issue, the problems went unsolved, or an alternative method had to be found.

With the arpeggiator, this was no different. The developer learned the script and wrote out each syntax according to the instructions, when entered into the Kontakt script editor, it worked perfectly however, it was on a separate page defeating the object of wanting only one page for the instrument.

5. Mo' Buttons Mo' Problems

Issues and resolutions

- **5a Arpeggiator**

Initially the David Hilowitz arpeggiator was used. The issue was that it was persistent meaning, there was no on off switch. Using the ADSR YouTube tutorials, an 'on note' callback was scripted. According to the Nil's Liberg script tutorial "*Scripts have four main parts called callbacks. A callback represents a task that is to be performed when some event occurs (eg. A note is pressed, or the script is loaded). The word callback indicates that it's not up to*

you to decide when these tasks are performed, instead KSP triggers them for you (for a real-world analogy think of someone calling you back on the phone letting you know something has happened, prompting you to do something). But it's still your task to say what should happen. E.g., when a note is pressed KSP triggers the note call-back where you have specified what then should happen. The following script illustrates how these four parts are written:

on init end on, on note end on, on release end on, on controller end on". (Liberg, n.d.)

This allowed the developer to place a switch which triggers the arpeggiator.

When incorporating this 'on note' call-back into the Xtof Flutes script, again, an 'error' message occurred.

The solution was found because new information came to light that Kontakt has its own arpeggiator script as a factory preset in the script editor. The good thing is, Kontakt has five slots for running multiple scripts simultaneously.

Figure 8



(Kontakt scripting 5 slots)

According to David Healey “Kontakt comes with a whole bunch of premade scripts that you can and should make use of in your projects. These factory scripts offer all kinds of functionality such as arpeggiators, sequencers, delays, and harmonizers and by following the techniques in these videos you’ll be able use the factory scripts effectively, saving countless hours.” (Healey, 2016).

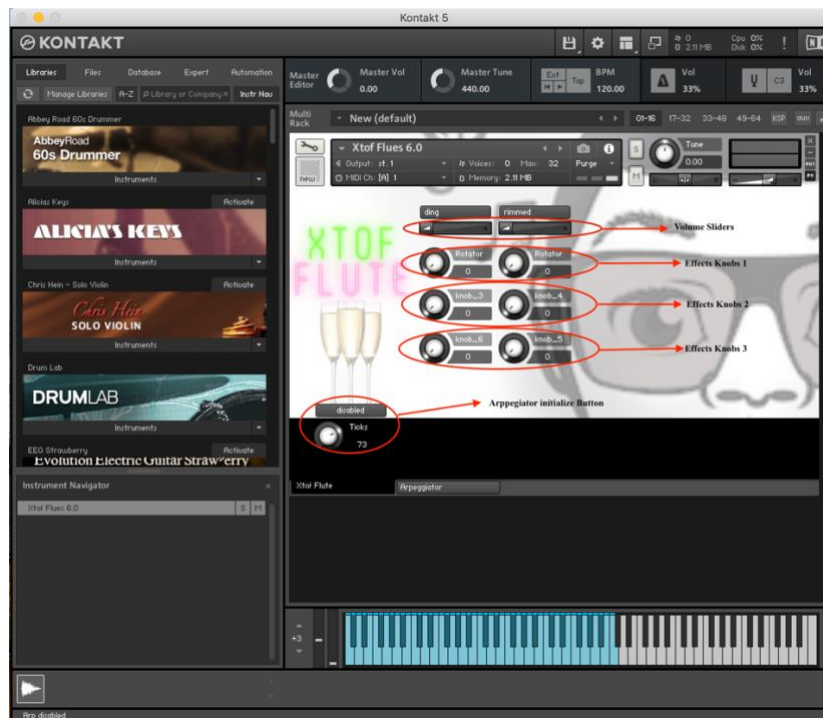
Utilizing the Kontakt factory arpeggiator script in conjunction with the ADSR YouTube tutorial, a button was scripted to enable and disable the arpeggiator. This section of script was placed in main instrument script i.e., script slot one. The Factory Arpeggiator script was placed in slot two.

Figure 9

```
73
74 on ui_control ($Arp)
75   if ($Arp = 0)
76     set_text($Arp,"disabled")
77     message("Arp disabled")
78   end if
79
80   if ($Arp = 1)
81     set_text($Arp,"Enabled")
82     message("Arp Enabled")
83   end if
84 end if
85
86 end on
87
88 on listener
89
90   if ($NI_SIGNAL_TYPE = $NI_SIGNAL_TIMER_MS and $Arp = 1)
91     if ($direction = 0)
92       inc($tick_counter)
93     else
94       dec($tick_counter)
95     end if
96
97     $knob_counter := $tick_counter
98
99     if ($tick_counter = 99)
100       $direction := 1
101     end if
102
103     if ($tick_counter = 0)
104       $direction := 0
105     end if
106   end if
107
108 end listener
109
110 end on
111
112
113
114 end on
```

(ADSR Tutorial [creating the arp enable/disable switch]).

Figure 10



(Xtof Flutes – Arpeggiator initialize button/switch).

The downside to using the factory preset, was that it creates a separate page where all the arpeggiator functions are located. This is somewhat of a compromise from the initial notion of wanting everything on one page. According to David Hilowitz in the aforementioned YouTube tutorial regarding writing an arp script, he mentions at the very end of the video that there is a way to copy and paste the factory script into one's own script however, he did not mention how to do this. So, this compromise was unavoidable.

- **5b Knobs, Buttons, and Sliders**

This was a very tedious and probably the most frustrating part of the process of creating the instrument. Not so much the scripting for the buttons, knobs, and sliders, this part was pretty straight forward. The issue was with the syntax.

In a blog post by yummybeats.com, they provided clear instructions which consisted of graphic design and math calculations, neither are strong attributes possessed by the developer, so this took quite a while to comprehend.

There were several options on how to create the knobs, slider, and buttons. The most common practice is to use Adobe's 'Photo Shop' to design the buttons etc. As the developer does not own a copy of Photoshop nor could afford to purchase a copy an alternative free programme called 'Knobman' was utilized to create these elements.

According to the instructions *"1. We must arrange the single knob states either vertically or horizontally (we prefer vertical). Whereas each "line" represents an animation step (see left image). We can draw each animation step manually in Photoshop, Gimp etc. Or we can use KnobMan to automatically create those animation steps. The more animation steps we do, the smoother the knob movement feels later on. However, we don't need to exceed more than 100 animation steps for a 360° knob turn. Even 64 steps are already smooth enough.*

2. we then store the knob image into "Resources -> Pictures"

*3. we create a standard *.txt file (with any text editor) and name it exactly like the knob's image file name. In this case "Knob1.txt". We put this txt file into "Resources -> Pictures" as well. Kontakt needs this extra text file to retrieve additional info about the image like the number of animations. We can do as many animation steps as we want but we always have to declare the correct number at "Number of Animations" in our text file."*

(Beats, 2020).

Upon following this guidance however, creating custom pictures for the knobs, sliders, and buttons was unsuccessful. After several days experimenting with different tactics, in the end,

it was decided that the sound of the instrument was more important than the aesthetics and the focus shifted from the design element to how the instrument sounded.

6. Reflection upon the results of the instrument

The Xtof Flutes as it is now, is of great disappointment. There are many flops, and nothing went to plan when designing, recording the samples or even mapping the samples in the Kontakt sampler.

When opening the instrument initially, the arpeggiator is active, this means the user has to navigate to page two of the instrument to turn off the arpeggiator. This isn't ideal if someone just wants to get creative straight away. Also, because of the complete lack of knowledge in regard to scripting in the Kontakt KSP, there are many flaws. The most irritating being the volume sliders. When the instrument initializes, both of the sliders are at 0db, one might think that because the sliders are on 0db there would be no sound however, both the Ding and the rimmed play. To ensure that they are on 0db one has to move the sliders up and down to initiate the slider behaviour which is very confusing for a first-time user.

Another aspect which causes much anxiety are the round robins. If the user just wants to play one articulation for example, because of the way the developer has scripted the 'RR' (Incorrectly) they would find it very annoying because every other note is missing.

The only way around this would be to remove the 'RR' part of the script, this approach though would mean that both articulations will play at the same time, defeating the objective of wanting to give the user the choice.

The instrument also has some knobs on it which were intended for effects like reverb, delay and the rotator, but when it came to scripting these effects, it was far too complicated to figure out with absolutely no support or guidance.

In the end the developer decided to leave them there as homage to what might have been.

The one positive that can be taken from this experiment is that when both articulations are played simultaneously, they actually don't sound too bad.

7. Improvements

Upon reflection, everything about the Xtof Flutes needs improvement. From the 'round robin' and knowing how to properly script them to the arpeggiator. From the recording of the samples, to the mapping of the samples within Kontakt.

What may have been interesting, is if the developer thought about different objects in which to strike the glasses with. He could have experimented with different types of mallets i.e., cotton mallets to create a softer sound of the dinged articulation, using the ridges that are cut into the glass as a sort of glass guiro and even the microphone choice. The developer could have also recorded a variety of glasses from the normal wine goblet, a glass bowls, glass rods and glasses with different clarities could have also been utilized.

One of the main improvements could have been the basic knowledge of scripting and coding, this is fundamental and a difficult one to maneuverer because if one doesn't know something and there is no assistance or guidance in any aspect of the development of the instrument, how can one expect to learn and develop a skillset that is completely foreign? It was literally trying to learn a new language with no one to teach you the basic alphabet.

Other areas of improvement include:

- Effects sends within the instrument.
- Utilizing the empty script slots, as it stands, only two of the five slots are being used.
The developer could think of how to incorporate the different factory presets that come with Kontakt e.g., the various sequencers and modules.
- Recording/Tracking not just the actual hit of the glass but the resonance also to add some depth and body and overtones to the overall sound.

8. Compare and contrast

There are several existing commercial glass instruments on the market currently. The main three this section will focus on will be:

- Glassworks by Soniccouture
- New glass Marimba by 8Dio
- Glass + Steel by Spitfire Audio

8a Glassworks by Soniccouture is a collection of rare glass instruments. According to their website “*Glass Works is a set of Kontakt instruments which collects together 3 rare musical instruments which use glass to generate sound:*

Le Cristal Baschet, The Glass Armonica, and a set of Cloud Chamber Bowls.

We travelled to Paris to record with Thomas Bloch, a virtuoso musician who specialises in rare instruments, and Glass Works is the result. Cinematic, creepy and cool.”

(Soniccouture Sound design LTD, 2009)

After viewing the product preview on Soniccouture’s YouTube page, the instrument has three pages for ‘Options, Instrument and effects. The ‘options’ page gives the user several choices of how to interact with the instrument e.g., they have a glissando option where users can change the behaviour and sonic of the instrument along with different mallet preferences and

keyswitches. There is also a section on the ‘Options’ page, which allows for the user to automate things such as the mod wheel, timings, velocity, and the tuning of the notes. It also has a page dedicated to the articulations, ADSR and filter settings making the instrument very interactive and user friendly.

Figure 11



(Glassworks By Soniccouture)

8b New Glass Marimba by 8Dio is a modification of the classic Marimba but instead of wooden bars they have use glass bars. It has four main articulations, (fingernails, hard and soft mallets as well as a muted option). It also has nine ambiances which according to their YouTube demo “*Work really when used as base for the core articulations*”.

(8Dio Productions, 2018)

Kontakt 5.7 or higher is required to utilize the glass marimba which has a beautifully designed user interface, jam packed with thousands of samples, thirty custom presets, and quite a few effects the user can experiment and interact with. The main attraction of this instrument is that it's free so the opportunity to demonstrate this instrument was well taken advantaged of. A lot of time and effort must have gone into the scripting of this thing because there are some real intricate mixing the user can perform within the instrument which makes it all the more user friendly. Unfortunately, the script is locked however from first glance and having a play, the user is able to do many articulations, they can filter add effects such as reverb, delay, distorter, a degrader, a transform button and so many other tools.

The instrument's UI has two pages, a main page and an effects page both with plenty of knobs and buttons to alter the sound as much as the hearts content. As a result of the scripts being lock by password, no investigation could be carried out on how they scripted it, nevertheless they do utilize three out of the five script slots, it would have been educational to this user to see how they scripted their 'round robins' in fact all of the callbacks. Regardless, it is a very nice instrument which will come in very handy when scoring for ambient pieces of music.

Figure 12



(New Glass Marimba by 8Dio Productions Main page [Ambient setting])

Figure 13



(New Glass Marimba by 8Dio Productions Effects Page [Ambient setting])

8c Glass + Steel by Spitfire Audio is an incredible instrument boasting 45 different items ranging from crystal glasses, ceramic bowls, brandy glasses with multiple variations of articulations, the folk at spitfire spent years developing this instrument and just from the demo videos on the Spitfire Audio website this instrument looks and sounds phenomenal.

According to their website and press release it is “A collection of tuned percussion sounds created from ‘found’ glass, metal and china, morphed, warped and sequenced into metallic hits, rhythmic tension beds, distorted sub basses and epic, shimmering pads. Recorded on our dry stage at Spitfire Studios, 45 instruments and objects ranging from metal bowls to wine glasses were played by world renowned percussionist Paul Clarvis in innovative ways to achieve a variety of unidentifiable sounds and glistening overtones. Presented in our versatile eDNA interface for instant playability and inspiration, we also give you 235 presets, designed to inspire and take your compositions to new places”. (Spitfire Audio, 2018)

Figure 14



(Spitfire Audio Glass + Steel)

There are no comparisons that can be made in regard to these three examples and the Xtof Flutes, they far surpass the knowledge and understanding of Kontakt scripting and even sample recording. The Spitfire audio instruments for example has so many functions and varieties of articulations from a myriad of found glass works that it's really hard to draw any resemblances. It is clear these companies have spent a lot of time effort and money into developing their instrument ready for markets. That and the fact that these companies are also equipped the best programmers, world renown producers and composers along with top of their game engineers who specialize specifically in script writing and editing.

From reviewing these three case studies some correlation can be made with the Xtof Flutes, and it's afforded insight into the UI itself especially regarding the use of multiple scripts and using all five of the Kontakt scripting slot to really develop and add many other features as exemplified by Sonicculture, 8Dio Productions and Spitfire audio.

The massive takeaway after reviewing the three is that it isn't necessarily a bad thing to have multiple pages because its opportunity to have more effects and a wider range of articulations and samples.

9. Conclusion

As it stands, the Xtof Flutes was an introduction into creating a sample instrument, if the developer so chooses, he could further develop the instrument by recording many other samples of glasses, different mallets and objects to strike them with, way more articulations, along with the use of different mic techniques with various mics not just the Se2200ii.

The case studies showed that the Xtof Flutes was thinking too small, but having said that, the case studies also revealed the absolute lack of knowledge and understanding as it pertains to script editing in particular. The feat also exposed to the developer of the Xtof Flute that this is

not an area of interest, not so much the recording element nor the mapping component, but more so the scripting and working with Kontakt KSP. Although the use of 'Sublime text' was much more aggregable than KSP, it was still quite rage inducing to repeatedly see the 'error' messages of an incorrect syntax with no way or direction in how to rectify it.

Most of the user feedback received from the beta testing proved that so much more work is needed to remedy all the issues with the instrument.

One person did say *"It's cool if being used on horror movies score because it has an eeriness to it, very strange especially when both articulations are played simultaneously"*.

(Lawrence, 2021).

In the early stages, when the instrument was shown to another creative, it was their idea to add something else so that the notes can be sequenced. This is when the developer added (or at least tried) to implement to arpeggiator.

Many new skills, and knowledge has been developed. Some of these are as follows:

There are three basic callbacks.

1. The 'on init' (on initialization) = When a given thing happens, initialize this code, this is also known as the 'ICB'. This is where you place variable declarations, additional parameters, declaring UI elements such as knobs sliders faders etc., skinning the UI elements and a whole range of other initializations which are currently yet unknown.
2. The 'on ui_control' (on user interface) = when this certain knob, slider, button is touched, activate this code.
3. The 'on note' = every time a new note is played, activate this code.
4. All callbacks must end with 'end on'.

Everything in Kontakt scripting is zero indexed e.g., arrays (%), parameters

(SET_CONTROL_PAR), this means that the lowest value is lowest value is zero and not one.

You could use macros to shorten the number of times one has to repeat lines of coding e.g.,

When creating the Xtof flutes there was a desire to move all the knobs and sliders to a different position on the UI, this was painstakingly done on the individual knobs which meant the developer had to tediously trial an error placing the different X, Y positions which are in px format, and without a grid this was pretty time consuming. With the use of macros this could have been avoided if the developer knew how to script the macros, because of this lack of knowledge and the constant 'error' messages received when trying to script them, this option was not viable.

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When tapped, lead crystal makes a ringing sound, unlike ordinary glasses. Consumers still rely on this property to distinguish it from cheaper glasses. Since the potassium ions are bound more tightly in a lead-silica matrix than in a [soda-lime glass](#), the former absorbs more energy when struck^{[[dubious](#) – [discuss](#)]}. This causes the lead crystal to [oscillate](#), thereby producing its characteristic sound.^[1] Lead also increases the solubility of [tin](#), [copper](#), and [antimony](#), leading to its use in colored enamels and [glazes](#). The low viscosity of lead glass melt is the reason for typically high lead oxide content in the [glass solders](#).

https://en.wikipedia.org/wiki/Lead_glass

One of Kontakt's most powerful features is the Kontakt Script Processor (KSP). It enables you to write Scripts, which can be thought of as lists of instructions that manipulate the way a Kontakt instrument works. You might write instructions to add harmonies for notes that are played, control the built-in effects used in an instrument, or even create your own arpeggiators and step sequencers. And although I wouldn't go so far as to use a cliché like "anything is possible", KSP can certainly make a large number of your ideas for sample-based instruments achievable.

While the idea of writing your own Scripts for Kontakt may seem appealing, you might be worrying about the complexity of such an endeavour. However, you don't need to be a programming wizard in order to write a Script. The whole idea of scripting is that it allows you to add functionality to Kontakt without having to know anything about the program's

code. And while scripting for Kontakt can, indeed, become quite complex, even the most seemingly cryptic Script is built on simple fundamentals that are easy for anyone to learn.

<https://www.soundonsound.com/techniques/customise-kontakt-patches-how-create-scripts-ni-kontakt-part-1>

A Tone of Distinction

Genuine crystal, especially thin pieces such as stemware, emits a distinctive, clear tone when struck gently. Tap the piece gently along the rim with your fingernail; if the piece is real crystal, it will ring out with a pleasant tone. Glass emits more of a clinking sound. If unsure, test the questionable piece, followed by a piece of similar shape that you know is either glass or crystal. The difference between the sounds of the two materials is distinctive.

<https://homeguides.sfgate.com/test-crystal-glasses-authenticity-102944.html>

Background

Glasses have been used for making music since the Middle Ages. The first musical instrument made of upright wine glasses was called the glass harp and was invented around 1750. About 10 years later, Benjamin Franklin—one of the founding fathers of the United States—invented a mechanical version of the glass harp, called the glass harmonica.

<https://youtu.be/0sC6u98hWFM> (Glass harmonica Youtube)

Both of these instruments are based on the principle of generating musical tones by means of friction. What does that mean?

<https://www.scientificamerican.com/article/singing-glasses1/>

David Mauldin has been performing as Benjamin Franklin and performing on Benjamin Franklin's musical invention, The Glass Armonica, for schools, museums, DAR and SAR meetings, Churches and a variety of clubs in the southern California area.

<http://www.history-alive.com/DavidMauldin.html>

<https://youtu.be/0sC6u98hWFM>

With samplers (or other software instruments) round robin basically means sound variations. Imagine you are picking a guitar! Your single picks will never sound the same since you always pick the strings slightly different. We can simulate that “humanization” by simply randomly varying between a few sound variations which we all have to recorded of course. So each time you hit a key on your keyboard another sound variation is played. Thereby the same variation shall not be played twice one after another.

<https://blog.yummybeats.com/ksp-kontakt-scripting/kontakt-scripting-ksp-custom-scripts-basic-round-robin-function-groups-keys/>

Call backs

Scripts have four main parts called *callbacks*. A callback represents a task that is to be performed when some event occurs (eg. a note is pressed or the script is loaded). The word callback indicates that it's not up to you to decide *when* these tasks are performed, instead KSP triggers them for you (for a real world analogy think of someone calling you back on the phone letting you know something has happened, prompting you to do something). But it's still your task to say *what* should happen. Eg. when a note is pressed KSP triggers the note

callback where you have specified what then should happen. The following script illustrates how these four parts are written:

- **on init**

end on

- **on note**

end on

- **on release**

end on

- **on controller**

end on

<https://www.nilsliberg.se/ksp/scripts/tutorial/>

Arpeggiator is a fully featured arpeggiator.

Mode: Select the basic arpeggiator mode:

- *On* enables the regular arpeggiator mode.
- *Hold* will latch all played keys.
- *Hold+-* latches all played keys and subsequently played keys will be added or taken away from the note buffer.
- *Off* turns the arpeggiator off.

MIDI Thru: When activated, played notes will be merged with the arpeggiated notes.

Note Order menu: The behavior of the note order is selected from this menu.

Octave: Sets the octave displacement, i.e. the distribution of the arpeggio pattern in various octaves. The arpeggio pattern cycles from the played octave to the octave set upwards.

Strike: Sets the number of strikes of each note in the note buffer. For values greater than 1, the note buffer will be repeated by the amount specified.



KONTAKT Library Scripts – 32

Rate: Sets the rate of the arpeggiator in fractions of a beat related to the Master Clock.

Duration: Sets the duration of the arpeggiated MIDI notes in percent. This will change the length of the MIDI notes and not the volume envelope.

Swing: Sets the amount of swing in the groove.

Steps: Sets the number of steps in the rhythmic pattern.

Fix Velocity: When enabled, played velocities are ignored and taken from the columns of the rhythmic grid. When off, played velocities will be scaled by the columns of the rhythmic grid.

Rhythm Grid: Sets the rhythmic pattern of the arpeggiated notes. The columns set the velocity of each note. If the column is set to zero, the step will not be played. The actual velocity depends on the Fix Velocity button.

<http://crosstalk.arizona.edu/Data/Kontakt%205%20Factory%20Scripts%20English.pdf>

Factory Scripts

Kontakt comes with a whole bunch of premade scripts that you can and should make use of in your projects. These factory scripts offer all kinds of functionality such as arpeggiators, sequencers, delays, and harmonizers and by following the techniques in these videos you'll be able use the factory scripts effectively, saving countless hours.

In this class you will learn how to get your scripts to interact with the factory scripts, giving you access to all this extra functionality without having to write the code.

<https://xtant-audio.com/product/kontakt-scripting-factory-scripts/>

CREATE & ASSIGN A KNOB IMAGE

To use custom knob images we need to use the ui_slider control, since we can't assign images to the ui_knob control. To create our image:

1. we must arrange the single knob states either vertically or horizontally (we prefer vertical).

Whereas each "line" represents an animation step (see left image). We can draw each animation step manually in Photoshop, Gimp etc. Or we can use KnobMan to automatically create those animation steps. The more animation steps we do, the smoother the knob

movement feels later on. However we don't need to exceed more than 100 animation steps for a 360° knob turn. Even 64 steps are already smooth enough.

2. we then store the knob image into “*Resources* → *Pictures*”

3. we create a standard *.txt file (with any text editor) and name it exactly like the knob's image file name. In this case “*Knob1.txt*”. We put this txt file into “*Resources* → *Pictures*” as well. Kontakt needs this extra text file to retrieve additional info about the image like the number of animation. We can do as many animation steps as we want but we always have to declare the correct number at “Number of Animations” in our text file.

<https://blog.yummybeats.com/ksp-kontakt-scripting/kontakt-scripting-ksp-custom-knob-images/>

Glass Works is a set of Kontakt instruments which collects together 3 rare musical instruments which use glass to generate sound:

Le Cristal Baschet, *The Glass Armonica*, and a set of *Cloud Chamber Bowls*.

We travelled to Paris to record with Thomas Bloch, a virtuoso musician who specialises in rare instruments, and Glass Works is the result.. cinematic, creepy and cool.

<https://www.soniccouture.com/en/products/35-rare-and-unique/g14-glass-works/>

Glass / Works Released

11th October 2009



Soniccouture are very pleased to announce that Glass / Works is finally available.

Glass Works is the first SC product to be packaged in Native Instruments' Kontakt Player, meaning that non-Kontakt owners can enjoy the enhanced scripting and control that Soniccouture instruments have become renowned for.

Glass Works is a sampled collection of 3 instruments which generate sound from glass. These are :

Le Cristal

A bizarre 'sound sculpture' designed in 1952 by Bernard and François Baschet. It consists of about 4 octaves of chromatically tuned glass rods, which are rubbed with wet fingers. The vibration of the glass is passed to a heavy block of metal, which itself is tuned and in fact determines the final pitch. The entire mechanism is amplified by a large steel plate, called the "flame". There are also three small fiberglass cones that amplify the higher frequencies.

The Glass Armonica

A musical instrument that uses a series of glass bowls or goblets graduated in size to produce musical tones by means of friction (instruments of this type are known as friction idiophones). The instrument was invented by Benjamin Franklin, who called his invention the

"armonica" after the Italian word for harmony. He worked with London glassblower Charles James to build one, and it had its world premiere in early 1762, played by Marianne Davies.

Cloud Chamber Bowls

The Cloud Chamber Bowls are Soniccuture's recreation of an instrument built in the 1960s by maverick American composer Harry Partch. It consists of hanging "bowls" which are sections of 12-gallon glass carboys. Both tops and bottoms of the carboys are used. Partch had 14 (later 13) bowls hanging from a large wooden frame he called a "tori".

The name "Cloud Chamber Bowls" arose from the fact that Partch found the original tops and bottoms at a Radiation Laboratory at UC Berkeley in 1950. The bowls were originally used for cloud chambers used in tracing paths of subatomic particles.

Availability and Pricing

Glass Works is available now on DVD and Download, priced GBP 99 / USD 159

<https://www.soniccuture.com/en/blog/glass--works-released/>

<https://youtu.be/LWmpo5mho0Q>

The New Glass Marimba is a custom 8DIO instrument and is a modification of the classic Marimba. We have taken a classic Marimba and replaced the wooden bars with glass bars, this gives a very warm and bright tone to the classic sound. This instrument is a type of xylophone where the bars are struck with mallets to produce musical tones, but with broader/warmer and lower tonal range. The origin of the marimba goes back Guatamala and Mayan culture and is not of African descent – though it sounds like it.

<https://8dio.com/instrument/the-new-glass-marimba/>

"Work really when used as base for the core articulations" (2:34 – 2:38)

<https://www.youtube.com/watch?v=EiqHwVExzhY&t=1s>

Discover Spitfire's secret weapon — a collection of tuned percussion sounds created from 'found' glass, metal and china, morphed, warped and sequenced into metallic hits, rhythmic tension beds, distorted sub basses and epic, shimmering pads. Recorded on our dry stage at Spitfire Studios, 45 instruments and objects ranging from metal bowls to wine glasses were played by world renowned percussionist Paul Clarvis in innovative ways to achieve a variety of unidentifiable sounds and glistening overtones. Presented in our versatile eDNA interface for instant playability and inspiration, we also give you 235 presets, designed to inspire and take your compositions to new places.

<https://www.spitfireaudio.com/shop/a-z/glass-and-steel/>