

*DEVELOPMENT-
ELEMENT 2B:
SAMPLER
INSTRUMENT
ESSAY*

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Introduction

In this essay I will detail my research, discussion, work and feedback conducted to create my first sampler instrument.

First, I will discuss the inspiration behind the instrument's concept, then I will detail my initial research and my chosen recording and DAW setup. I will detail the issues I encountered in the process and explain how I overcame these, before reflecting upon the results of the instrument and how I would do things differently in the future. Finally, I will explore the commercial viability of the instrument, detail some feedback, and conclude my essay with my final thoughts. Final word count: 4357.

Inspiration behind my sampler instrument

My initial idea was to sample a harp, as I am a pop music producer, and have often been inspired by successful records with a harp like 'Telephone' by Lady Gaga (Gaga, 2009) or more recently 'Don't Play' by Anne-Marie, KSI and Digital Farm Animals (Anne-Marie, 2021). These records show a commercial viability to the instrument, yet I've always found it hard to find quality harp samples that are budget friendly for producers who cannot afford to pay for £149 packs from established companies such as Spitfire Audio ([spitfireaudio.com](https://www.spitfireaudio.com)). However, upon doing some research, I came across an instrument called a 'Guitarp'. This instrument is designed by Phil deGruy and was originally built in 1983 by Jimmy Foster in New Orleans. It's a hybrid instrument consisting of a 7-string (electric) guitar and 10 short strings tuned to the upper register of a harp (deGruy, 2001).

Since I do not own this instrument, I thought it would be challenging and interesting to create a hybrid instrument inspired by the 'Guitarp', by recoding a guitar and a harp separately and manually mixing to the two together to create a synthesized new instrument. The aim is not necessarily to duplicate the sound of deGruy's creation but rather something new that builds upon his initial idea.

I must note here that although my initial inspiration was the 'Guitarp', a hybrid of electric guitar with added harp strings, my instrument is more similar to a 'harp guitar', an instrument categorized as a guitar, but with unstopped, open strings. These are mostly acoustic, yet also exist in an electric guitar form (Miner, 2020).

Initial research on recording both instruments

I had personally never recorded a harp before and it seemed like this was going to be the biggest challenge, so I researched this first. Most research detailed the importance of the room in which to record, as when listening to the instrument, you would generally be at some distance away and pick up both the harp's sounds and its reflections of the room. When experimenting with the microphone set-up and finding the right spot in the room, not much post-production elements such as compression or equalization need to be added (Kleemann, 2015). This would be my preference, to establish a 'true' sound. Even a studio environment that does not have a large enough room might result in an unsatisfactory tonal balance. According to Ralf Kleemann, writer at DPA microphones, the harp is best positioned in a corner of the room, whilst the mic is best placed somewhere towards the middle of the room, and to avoid reflections from the ground, should not be placed too low.

The consensus on what microphone to use leans towards a large diaphragm condenser mic in cardioid pick-up positioning for single mic recording (Martinovich, 2019). Since putting up a mic on either side of the strings doesn't produce much of a variation in sound and a double mic setup can easily cause phasing problems, a single mic set-up is preferred (Varda, 2013).

Kleemann follows a basic rule of placing the mic at the distance equal to the length of the instrument to capture the various components and enough of the room reflections. Another microphone could be placed closer to the instrument to capture more of the details such as the fingers picking at the strings, but unwanted components can be an issue here, such as too much hitting or damping the strings, or perhaps pedal noises (Kleemann, 2015). This gave me the idea to use a contact microphone, as detailed below.

Much of the abovementioned principles are the same when recording a guitar. The room choice is important. An acoustically treated room is preferred, as sounds reflecting from hard surfaces might make the recording sound powerless or far-away or cause some notes to be much louder than others. However, for acoustic guitar a favourable sound can be produced in a typical furnished room, as curtains, furniture and even bookcases can absorb sound and aid in damping unwanted reflections. Large rooms are preferred, so a living room is often a good choice (Young, 2019).

Assuming a single mic set-up, the most obvious microphone placement is the 'vanilla' position. In this position, the mic is pointed at the middle between the body and the neck, to achieve a good balance between body and panel resonances, whilst also capturing the animation of the strings (Senior, 2010). This can result however in too much pick-up of the strings.

To record an acoustic guitar, a condenser mic with large cardioid pick-up is frequently preferred (Young, 2019), and as detailed below, this was also my choice.

My chosen set-up

Based on this initial research I decided to record both guitar and harp in our living room. Even though we have a dedicated (not acoustically treated) studio space, I found that the living room had a more desirable acoustic sound because of its size and the furniture inside. As I didn't have that many microphone options available to me, I chose to use the Rode NT2A in cardioid position.

For the guitar, an additional contact mic was positioned on the lower body, to capture a close-up sound that was hopefully very clear and detailed. This was a Runcci-Yun microphone. For the harp, we decided to use a similar approach, yet used a different brand of contact microphone, as this was one that had been used by the harpist before, with good results, so I trusted him on this and we placed it on the harp's soundboard, roughly in the middle of the octave range that we were about to record. This was a Fisher microphone.

Both the harp and the guitar were run through a Focusrite Scarlet 2i4 interface, as this is the only one I have at home, and I recorded in Logic Pro X, compared to my usual DAW Ableton, as I deemed it more accessible for audio recordings and audio editing. I placed both instruments and players on a chair in the corner of the room, facing towards the middle, as I found that this gave the best sonic results. This again was in line with my previously conducted research (Kleemann, 2015).

I recorded the guitar with the microphone pointed towards the junction between the guitar body (the hole) and the neck, at a fairly close distance (about 20cm), in line with the practice described above (Senior, 2010).

For the harp, the condenser microphone was placed more towards the top of the harp, angled towards the soundboard, to capture both the resonance of the soundboard, the room, and some of the detailed finger picking (Galloway, 2021).

For my sampler, I decided to use Kontakt 5, as I had never used it before and I wanted to challenge myself in the learning process, and because it would be easier to access for people with different computer operating systems, as opposed to just using Logic's Sampler for example. This could also ensure more of a commercial viability.

Issues encountered while making the instrument and how I overcame them

The first main issue I encountered was that I had never recorded a harp before, and I was nervous that I wasn't going to have the right tools or knowledge to do this. However, this was quickly resolved by doing some research into common techniques on how to record harp and how other engineers had done it before. I was also able to rely on my harpist, Noah, for useful information on how to properly conduct the recording, as he had quite a bit of experience in the field (Horne-Morris, 2021). Talking to the instrumentalists proved very insightful and helpful. One of the main struggles we overcame was that we didn't have too much space in the living room to try out different positions for both the harp and the main condenser mic, because our large sofa was unmovable. This is why I ended up having the mic with its backend facing a wall, rather than in the middle of the living room. It probably resulted in some unwanted frequency reflections that were picked up by the mic, but we made sure to take our time to still find a spot that we were both happy with, as it is important that the instrumentalist likes the way their instrument is being recorded too (Martinovich, 2019).

I initially started recording the guitar first, but since a single note can be played in many different placements, me and my friend, Laura, on guitar, were struggling to find out how to play the scales note by note. Neither of us are naturally guitarists. We found what we thought was a useful 'cheat sheet' online that showed finger placements for how to play from the C1 to the C4 octave (Graham, J. and Vigil, K. 2008). However, whilst recording our second octave in the 'piano' velocity, we quickly realised that what

we were hearing was in the wrong octave. This confused us and I resolved this problem by switching recording strategies and decided to record the harp first.

As the harp is easily tuned to a chromatic scale, I could record all of the harp first, and then later on record the guitar and figure out the right octaves by ear. This proved to be the right solution, as it saved me a lot of time and effort. In hindsight, we were seriously overthinking it and should have just started recording at the lowest note of the guitar, E2, and move up fret by fret instead of trying to start at C1. I ended up recording the harp with E2 as the lowest note anyway.

Whilst recording the harp, I quickly realised that we were going to have noises from our surroundings bleed into the microphone. The gain was turned up quite a bit on the interface to capture the soft pick up of the harp's strings, but at times it started to pick up sounds like people walking up and down the stairs, or the sounds of cutlery in the kitchen. I resolved this issue by alerting my housemates I was recording and asking them politely to be wary of unwanted noises. On top of the living room door that was already closed, I closed the kitchen door. I emptied my clothing rack from my bedroom, took it down to the living room, and threw blankets on it, then placed this between the instrument and the door, to dampen any unwanted sounds (Martel, 2019). I had used this improvised technique before, with great success, and also this time it proved to be a stellar solution. However, because we live close to an airport, sometimes an airplane would fly over the house, and the mic would capture its low rumble. In this instance, no immediate solution could resolve the issue, so I just re-recorded those takes and practiced patience.

We had a few issues with the contact mic we used for the harp, mainly that it wasn't picking up a lot of the sound. The incoming transients were at a low volume, yet when turning up the gain, it would pick up a lot of the familiar hissing sound associated with this. I tried different cables and different mic placements on the harp's soundboard, but these weren't the issue. I then did more research and found out that contact mics aren't well matched to typical audio inputs, and since I had no other gear around, there was no better solution then to end up settling for a middle ground of moderate gain and a low volume input (Mudhar, unknown). During the recording, the contact mic started vibrating and resonating with one of the strings on the higher octave register. This was audible on the recording and undesirable. However, the issue was quickly

resolved by finding a place to adhere the mic slightly further away from that string and this resolved the problem for the remainder of the recording session.

Whilst recording the guitar on a separate day, several new issues came up. Whilst playing the guitar at the higher velocity rate, it would vibrate and add a lot of unwanted noise into the recording. It took us a while to figure out where this was coming from, which set us back valuable recording and editing time. I assumed it must be the contact mic that was vibrating with the guitar, as I had it adhered with tape rather than the adhesive that comes with it, as this can chip the paint of the guitar. However, upon trying without, the issue persisted, until we finally came to the conclusion that it must be an issue with the neck of the guitar. We proceeded to record with Laura plucking the strings, and me holding the neck and the tuning pegs, and this drastically removed the unwanted metallic rattling. We also tried holding a cloth on top of the neck to reduce the sound, but we had better results when I held the guitar down with my hands (Balow, 2018). In some parts of the recording, the rattling is still audible, yet mixed in with the harp, I think it adds a special analogue character to the sampler instrument. At other times, whilst plucking the middle strings, some of the other strings would vibrate too loud and this made the recording messy, so I had to dampen the other five string by softly placing my finders on the top fret, and this resolved the problem.

The biggest challenge of the whole project proved to be editing and comping the samples. I had recorded all the samples on a single track in Logic (1 track per microphone), in the order of lowest octave to highest octave. I had spoken to my instrumentalist Laura and Noah (2021) and we had agreed we would record all the notes in 3 octaves in a single velocity first before moving on to all the notes of the 3 octaves in the next velocity. We agreed this would probably produce the most uniform results in velocity differences between the samples and it would be the most convenient for them to play. However, I forgot to start recording the different velocities on new tracks, so I had all the recordings on 2 single channels (Rode NT2A and contact mic). This proved to be a nightmare to edit in Logic Pro X, as I had to manually cut them, place them in order, align their waveforms, fade, and colour code them. Looking back on this, I would have probable chosen to use ProTools, as they have a key command called 'tab to transient' that locates the start of each transient fairly easily, compared to doing it manually in Logic Pro X. I mainly resolved the issue by

trying to find a certain 'swing' during the editing, yet it was still a very exhaustive and labour-intensive task. It has been argued that successful production of a sample pack is often a combination of a streamlined workflow, system and curation, although each sound designer has their own approach, and I definitely had to find an effective workflow to complete these monotone tasks in a concentrated manner. (Bull, 2018). I manually edited 7 round robins per note in order to mimic the sound of a real instrument, in 3 octaves and 3 velocities, for 2 instruments (Computer Music, 2015). I then proceeded to manually mix the guitar and harp tracks together. All the transients had to be properly aligned enough to be able to export them as WAV's 1 by 1. I had to manually export 756 samples.

I had never made a Kontakt Instrument before, so this proved a challenge too, however, I found many great sources detailing the process from recording the samples to creating a new instrument (Melin, 2020), creating and editing groups (Hilowitz, 2018), scripting (Xtant Audio, 2015) and using the script editor to create interactive knobs and change the interface (Hilowitz, 2018).

Reflection on results of the instrument and what I would do differently in the future

I am pleased at how the instruments blend together so seemingly. In a way the instrument sounds like a normal guitar or a normal harp, with a different sonic colour, depending on how you listen to it. In the lower registers the guitar samples take centre stage, whilst in the upper registers the harp is more audible.

The actual instrument I created has a very analogue, vintage, and even medieval feel to it. The combination of the rattling of the guitar in certain takes and the classical feel of the harp almost place the instrument in a different time.

Although I am moderately pleased with my instrument, it does not sound the way I desired or imagined it to sound. When I initially had the idea, I thought it would have a more unique timbre. Even though I recorded 7 round robins per note in order to create a realistic feel when it is played, there is too much of a difference between the velocities and the quality of the takes for it to sound pleasing. About 30-40% of the

samples have an audible click or 'pop' at the beginning, suggesting they have in some way been cut off at on the waveform. I don't understand how this happened, as I manually aligned all the waveforms and cut the samples before the start. The only explanation for this that I can think of is that when manually exporting them 1 by 1 via the 'cycle range' option in Logic, that the cycle start must have been slightly off the grid (as this is quite easy to do), and that I didn't realise this until I had exported 756 samples. This was hard to process for me, as I had put so much work in the editing already, and at that stage it was too late to go back and redo all the exports. I spent a few more hours re-exporting samples (mainly in the soft velocity range), but due to the time pressure, I had to move on. Perhaps it can be argued that the clicks add a vintage colour/crackle to the overall sound, much like when using the Waves Plugin 'Vinyl' or XLN Audio's RC-20 Retro Color, a sound I use very often and something that is used in contemporary songs for example in Ariana Grande's 'thank you, next' (Genius, 2017).

Adding some EQ, reverb and a preset with a flanger in Kontakt made the instrument more pleasurable to listen too, yet it still doesn't quite feel natural enough to me. However, it puts it even more into a vintage place, making it more conjunct in nature.

Next time I create a sampler instrument, I will not record two instruments separately and mix them together in my DAW. First of all, all the time spent on recording the second instrument is vital time I could have allocated to editing the samples of a singular instrument and trying to fix issues there. I didn't realise how time consuming both the recording and the editing was. Perhaps I could have recorded them together from the start.

Next time I would try and reduce the amount of manual editing, as this monotone task can ask a lot of your concentration, and as a result, you can hear some slip-ups in the instrument. If I had not chosen to manually edit and export 756 samples, and perhaps found a more efficient way of doing this, I could have spent more time on troubleshooting some of the exported files. Next time, I will use ProTools and its 'tab to transient option', for an easier process and perhaps use a plugin such as iZotope RX for batch processing samples (Multiplier, 2019).

Commercial considerations

In this section I detail some research that formed my reasoning to create a sampler instrument as a commercially viable product.

As the music industry grows, and the amount of bedroom producers with a DIY approach increases, so does that part of the industry that provides the creators with their samples, rising up to the demand. Big companies like Native Instrument's Sounds, Splice, Tracklib and Beatport cater to this market. It was reported in 2019, that since its start-up in 2013, Splice had paid its sample pack creators around \$15 million, indicating this can be a lucrative income stream for a commercial producer (Gustafson, 2019).

The door into the sample library industry seems fairly easy to open, as samples can be easily made with limited tools at hand. It can be argued that all that is needed is a computer, a DAW, an interface, a set of speakers or headphones and some sort of microphone set-up (Spitfire Audio, 2016).

Not only can sample packs be a great way of making an income but they can also help spread your name around the market and increase your visibility to collaborators or companies. A growing number of producers aren't backed by a label and don't have an excess amount of money behind them to clear samples for their productions. They turn to royalty free sample libraries instead, like Splice or they buy sampler instruments from individuals or companies like Spitfire Audio. This way they can use sounds at an affordable price and avoid legal issues. When you distribute and sell samples through an established library like Splice, you make a royalty percentage of the downloads, whilst if you market your pack by yourself, you can keep 100 percent of the profits (Burchell, 2020).

One of the more interesting things about selling samples is that it can be a passive form of income. Once the samples have been created and your library is online, every download can grow your income whilst you focus on new ventures.

When I compare my instrument to other sampler instruments that are on the market, I can make a few observations. Firstly, as I have recorded the harp, a classical instrument, it can be argued that I will most likely be competing with companies who have established themselves as masters of this niche, such as Spitfire Audio,

Cineharps or the Kontakt Factory Library. Spitfire's harp was recorded by London's leading Harpist, Skaila Kanga, and recorded in the hall at AIR studios and I assume they had a set-up that included a range of high-end microphones, pre-amps and studio gear (Spitfireaudio.com). It is hard to compare or even compete with industry giants like this, considering I had a living room set-up with blankets thrown over a clothing rack, however, my strength lies in the originality of the instrument.

There are plenty of packs online that are qualitative 'harp guitar' recordings, however, I believe my pack might stand out of the crowd because of its original approach to synthesizing both instruments to create one. Whilst a 'harp guitar' is an actual existing instrument that is categorized as a guitar with harp-like strings, it doesn't seem like anyone has ever tried to create a hybrid instrument in the same way that I approached it, by recording them separately and combining the samples in the editing process.

Although the end product is more similar to a 'harp guitar' than deGruy's invention, the 'Guitarp', due to the fact I had to use an acoustic guitar instead of an electric guitar, I still believe my sampler instrument can compete in the market. Since this category of instruments comes in many different shapes and forms, I think there is room for one more, as the story and the originality of its creation process could not just be an interesting marketing force, but it has allowed me to create a sound that is distinctly different from any original 'harp guitar' sampler instruments. Therefore, evaluating on my decision to create this instrument, I think I made a successful choice.

I have not been able to share my Kontakt instrument for others to use, as most people in my immediate surroundings do not own the software. However, I have played the instrument for others, mostly other musicians, and showed them the demo tracks I created, and their initial responses were that they liked the hybrid sound. Their feedback was positive. I detailed to my listeners how disappointed I was at the clicks in the sample exports, but no one seemed to have an issue with these, although we discussed it would be best to remove any unwanted clicks, pops or noise if it was to be distributed. Someone noted that it sounds like a Koto, a Japanese string instrument and I can certainly hear that comparison.

Conclusion

In conclusion, I must say that I am pleased with the work I did, as it was all new to me and there were many challenges I had to overcome. I was pleasantly surprised at how well the two instruments blend together, even though the final product was disappointing to me in its quality due to the errors in exporting the files, and how the velocity differences didn't fully create the feel of a real instrument. However, I am very happy with the learning process and how I was able to explore and educate myself in different fields, for example by creating my first script in Kontakt. I learned that next time I will execute certain elements differently, such as using ProTools instead of Logic Pro X, and allocating more of the recording time to editing. I decided to name the product the G-HARP, and even though I probably wouldn't use it often in its current form, I think it has a lot of commercial potential for its conceptual originality.

Bibliography

Amos, L. and Horne-Morris, N. (2021). Conversation with Prins Fimmers, 20 March 2021.

Anne-Marie, KSI, Digital Farm Animals (2021). 'Don't Play' [CD]. Asylum, Warner.

Balow, B. (2018). *Three easy fixes to improve your guitar tone when recording*. Available at: <https://blog.discmakers.com/2018/02/improve-guitar-tone-when-recording/#:~:text=To%20dampen%20these%20vibrations%20most,tape%20or%20a%20paper%20clip>. (Accessed: 25 March 2021).

Bull, R. (2018). *How to make a sample pack*. Available at: <https://blog.native-instruments.com/how-to-make-a-sample-pack/> (Accessed: 23 March 2021).

Burchell, C. (2020). '5 ways to make a living as a beat maker'. *Routines & Process* [blog]. 23 September. Available at: <https://splice.com/blog/make-living-beat-maker/> (Accessed: 23 March 2021).

Computer Music (2015). *How to avoid the machine gun effect using round-robin sampling*. Available at: <https://www.musicradar.com/tuition/tech/how-to-avoid-the-machine-gun-effect-using-round-robin-sampling-632302> (Accessed: 19 March 2021).

DeGruy (2001). *The Guitarp*. Available at: <http://guitarp.com/guitarp.html> (Accessed: 23 March 2021).

Gaga, L (2009) 'Telephone'. On *The Fame Monster*. [CD] Interscope.

Galloway, J. (2021). *How to Mic a Harp*. Available at: <https://mikingdesign.com/what-is-the-most-popular-mic-placement-for-live-and-recording-a-harp/> (Accessed: 25 March 2021).

Genius (2019). *The Making Of Ariana Grande's "thank u, next" With Social House & TBHits | Deconstructed [video]*. Available at:

<https://www.youtube.com/watch?v=svPUzPiBqLs&t=115s> (Accessed: 25 March 2021).

Graham, J. and Vigil, K. (2008). *Octave Identification System for the Guitar*.

Available at:

<https://www.lcps.org/cms/lib4/va01000195/centricity/domain/2608/octaveid.pdf>
(Accessed: 20 March 2021).

Gustafson, N. (2019). *Is Selling Samples a Viable Career?*. Available at:

<https://reverb.com/news/how-artists-make-money-by-selling-samples> (Accessed: 24 March 2021).

Hilowitz, D. (2018). *Intro to Kontakt Scripting: Adding your First Knob + FREE KONTAKT INSTRUMENT [video]*. Available at:

<https://www.youtube.com/watch?v=uYghRBv1piE> (Accessed: 23 March 2021).

Hilowitz, D. (2018). *Kontakt Tutorial: Creating an Instrument from Start to Finish + FREE KALIMBA KONTAKT LIBRARY [video]*. Available at:

<https://www.youtube.com/watch?v=B2iEhJcrHxI> (Accessed: 19 March 2021).

Horne-Morris, N. (2021). Conversation with Prins Fimmers, 20 March.

Kleemann, R (2015). *How to mic a harp*. Available at:

<https://www.dpamicrophones.com/mic-university/how-to-mic-a-harp> (Accessed: 20 March 2021).

Martel, V. (2019). *How to Soundproof a Room with Blankets: 9 Best Ways!*. Available at: [https://quietlivity.com/soundproof-a-room-with-](https://quietlivity.com/soundproof-a-room-with-blankets/#6_Hang_the_Blankets_Over_the_Doors)

[blankets/#6_Hang_the_Blankets_Over_the_Doors](https://quietlivity.com/soundproof-a-room-with-blankets/#6_Hang_the_Blankets_Over_the_Doors) (Accessed: 25 March 2021).

Martinovich, A. (2019). *How To Record A Solo Harp - Expert Tutorial*. Available at: <https://www.pro-tools-expert.com/production-expert-1/2019/4/9/how-to-record-a-solo-harp-expert-tutorial> (Accessed: 20 March 2021).

Melin, S. (2020). *How to Create a Kontakt Library (ft. Horror Harp)* [video]. Available at: <https://www.youtube.com/watch?v=8LdIDFeiNno> (Accessed: 19 March 2021).

Miner, G (2021). *What is a Harp Guitar?*. Available at: <https://www.harpguitars.net/history/org/hgorg.htm> (Accessed: 23 March 2021).

Mudhar, R. (Unknown). *Using Piezo Contact Mics right*. Available at: <http://www.richardmudhar.com/blog/using-piezo-contact-mics-right/> (Accessed: 25 March 2021).

Multiplier (2019). *How to Create Sample Packs: Batch Processing Tricks* [video]. Available at: <https://www.youtube.com/watch?v=jLtAZCyKWzI> (Accessed: 25 March 2021).

Senior, M. (2010). *Recording Acoustic Guitar*. Available at: <https://www.soundonsound.com/techniques/recording-acoustic-guitar#top> (Accessed: 20 March 2021).

Spitfire Audio (2016). *Grow Your Own Samples - How To Make A Sample Library* [video] Available at: https://www.youtube.com/watch?v=Yvco_DWMV_g (Accessed: 25 March 2021).

Spitfire Audio. *Spitfire Harp*. Available at: <https://www.spitfireaudio.com/shop/a-z/spitfire-harp/> (Accessed: 23 March 2021).

Xtant Adio (2015). *Scripting coarse and fine tuning knobs in Kontakt* [video]. Available at: <https://www.youtube.com/watch?v=uVb3M7wwXpg> (Accessed: 23 March 2021).

Young, D. (2019). *Home Recording for Acoustic Guitar: The Best Ways to Capture Your Music*. Available at: <https://acousticguitar.com/home-recording-for-acoustic-guitar/> (Accessed: 20 March 2021).