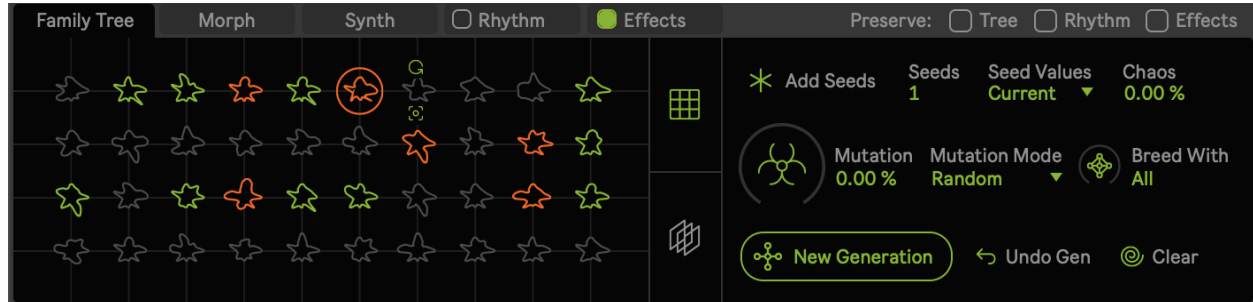**Natural Selection S User Manual**

Device and Concept by Dillon Bastan
Design by River Marchand

To install:
Unzip the folder and drop the folder called "Natural Selection S" in this exact location in order for presets to load correctly: *ableton/user library/presets/instruments/max instrument*
For best results or if you are having issues, make sure you are using the latest version of max/msp. You do not need to have a license if you are using Live suite. Download the newest version here: https://cycling74.com/downloads and once downloaded go to the ableton Preferences > Library and set the newly downloaded version of max to the one ableton should use. (Also you can try to see if it works fine with your bundled version first).

Synopsis
Natural Selection S is one of two devices (the other being Natural Selection P) that applies an evolutionary system on sound design. It treats the parameter values of presets an internal poly synth as DNA values which are mixed together and mutated over generations to create new sounds. You play the role of the environment, selecting preferable sounds to continue to pass their DNA to the next generations. And over the generations the sound will evolve closer to your preferences. So to rephrase: this device can mix and mutate presets of an internal versatile poly synthesizer (also an internal rhythm/note generator and FX chain) to discover new sounds and combinations.

A brief

Sections

At the top of the device there are tabs and functions. The tabs on the left are the sections of device parameters. *Family Tree* tab deals with creating and evolving presets. *Morph* tab allows you to blend between up to 8 different presets. *Synth* has all the parameters of the internal synthesizer and its modulation system. *Rhythm* is the internal note generator. *Effects* are the

internal audio effects. To the right are some toggles, which might make more sense after reading through how the device works (you may want to revisit this explanation). These toggles are to preserve certain parameters to avoid changing them when loading presets. *Preserve Tree* preserves the current tree (data) of presets for whenever you hotswap load a new instance of Natural Selection S. The purpose of this is so that you could load in presets with sounds that you like to add to the current tree (set of presets) in order to mutate and evolve with. If this toggle is not enabled and you hotswap load a preset then it will erase your entire tree and load in the one associated with the (.adv) preset! *Preserve Rhythm* & *Effects* deal with preserving the Rhythm and Effects parameters whenever a child/seed preset is loaded or morphed. This way you can retain a certain rhythm or effects setting while changing the sound of the synth alone. Again, this section will make more sense after you've read more below!
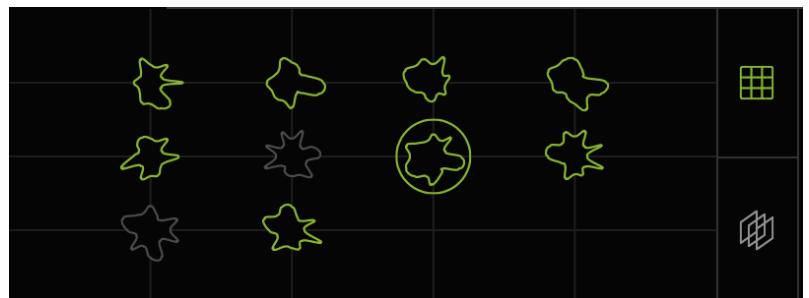
Family Tree
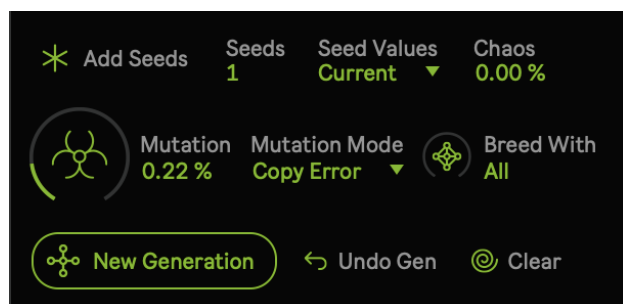
First I'll go over the right side of this section to clarify the functions. As mentioned you evolve presets in this device of the internal synth/rhythm/effects. And how that happens is by treating presets as children/parents that give birth to more children. What that means is that two presets mix their DNA (parameter values) together at random to create a new child in the New Generation (meaning the child gets a parameter value from one of their parents which is chosen randomly). BUT at the very start there are no initial child/parents to start mixing from. And so the first generation is composed of "Seeds" instead of children. Essentially they are exactly the same, except that seeds have no parents and so they have different creation options. Let's look at the image in this section. *Add Seeds* adds a new seed(s) to the first generation. If your Family Tree has no seeds/children you have to add seeds before you can do anything. Next to *Add Seeds* you can choose the amount of *Seeds* you want to add (usually you just add one at a time but it depends). *Seed Values* determines where the seed gets its preset (parameter values) from. "Current" means that it gets its values from the currently set values of the internal synth/rhythm/effects. For this option there is a *Chaos* parameter which is just the random spreading from the current values. Choosing the "Current" values option has tremendous power as you could potentially load in different .adv/.adg presets of this device and for each one add a new seed to the tree to evolve from (this is where the "Sources Only" preset section comes in handy ;))! Ok backtracking… the other *Seed Values* option in "Random" which just sets completely random values. Careful with this one! Could causes explosions, etc (use with a limiter!) But also this could lead to some of the coolest unpredictable seeds to evolve from!

Second row down now. *Mutation* sets the mutation probability. So if it at 5%, then when a new generation is created and parents are mixing their DNA to create a new child 5% of the time a mutation happens on one of those parameter values that are given to the child. *Mutation Mode*

determines what type of mutation happens. "Random" just means when a mutation happens the child gets a random value for that parameter. "Copy Error" means that when a mutation happens, the child gets a parameter value of an adjacent parameter of the parameter in question, similar to actual copy error mutations. *Breed With* sets a generational breeding limitation. When set to "All" then when a *New Generation* is created every selected seed/child from every generation mixes their DNA to create a new generation of child presets. However, if set to "Last X Gen" then instead only the last X generations with participate in mixing their DNA. Bottom row now. *New Generation* triggers the creation of a new generation of presets by mixing all selected child/seed presets together. At least two seeds/children of the latest generation must be selected in order for a New Generation to be created! *Undo Gen* removes the last generation. *Clear* clears all presets/children/generations. When pressed, you are first given an option to double click select any seeds/children you would like to preserve and start a new seed generation with after clearing.

Now I'll talk about the left side of this section. This displays the Family Tree and all the children/seed presets in it. There are two views which are selected by the toggle you see on the right side of this image. The top view (what we see here) is the view of an open generation of children/seeds. The other view (below) is the view of all


generations in the Family tree. In the open generation view, you can see all the different blob shapes which are the different children/seeds. Their shape comes from their preset parameter values. You can click children to load their preset values into the internal synth. Double clicking toggles their selection for passing their DNA in the next generations. Clicking and dragging changes their rating (which is displayed as thickness). This is so you can remember which ones you liked more. Additionally, if a new generation is created with over 40 children (the max number per generation) then higher rated parents give their child a higher likelihood of being created. Clicking in an empty space switched to the full tree view. If you hold shift and hover over a child/seed then two function buttons appear. The top button for a seed causes it to be remade according to the seed settings, but if it is a child then the top button remixes to create a new child preset in its place. The bottom button sets the current values of the internal synth/rhythm/effects into the current child seed. This could be useful for a number of scenarios. For example, the volume of your child is too high, you can adjust the volume parameter (or any) and then resave all those values back into the child/seed with a more preferable sound.
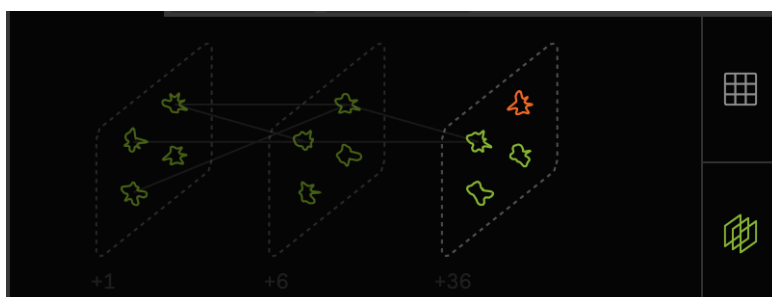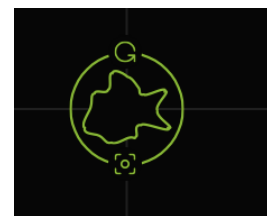
Here we see the full tree view. Clicking on a generation opens it into the generation view. Only relevant children appear in this

view. Ancestral lines are visualized for the last loaded child in this view.

Morph
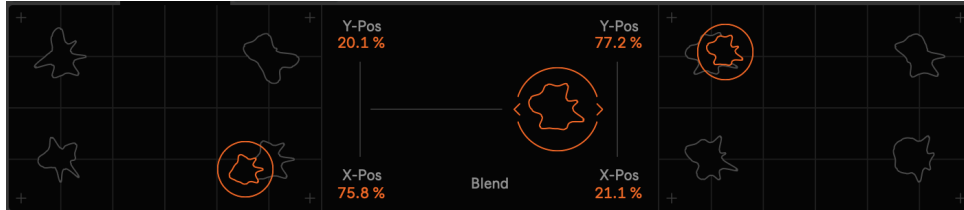
In this section up to 8 children/seeds can be blended together in order to discover new sounds or do some crazy modulation. NOTE: that blending presets means updating every parameter value so it may be a heavy process on your system! In this section there are two XY quadrants where for presets can be blended, and a center slider that blends between those groups of presets. Each quadrant corner preset is set by clicking the "+" button in each corner. When you press "+" it takes you to the Family Tree where you can select a child/seed to assign to that corner.

Synth
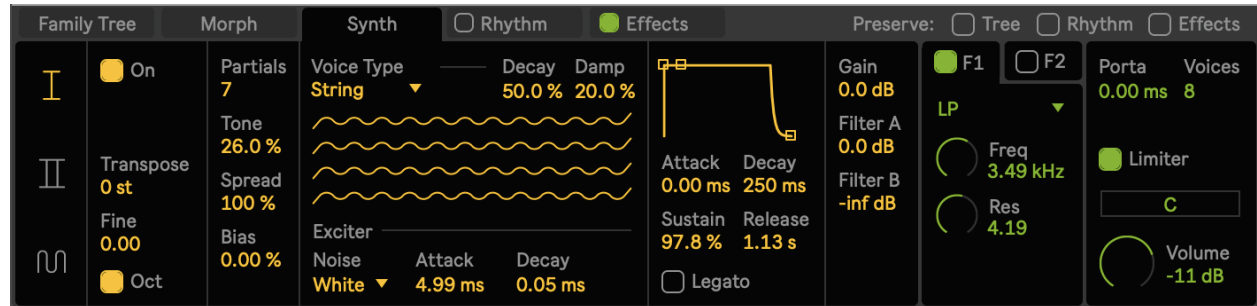
The internal synth is a pretty straightforward poly synth with some goodies. There are two sources ("I" and "II" on the left tab) and a modulation section on the bottom tab. I'll just describe parameters that need clarifying here, the rest is straightforward. There is an Octave Lock (*Oct*) that locks transposing to octaves only. The *Partials* set the number of partials (duplicate voices). This could definitely increase CPU if there is a lot! The *Tone* sets the volume balance between partials (low to high frequency). If *Spread* is at 100% and *Bias* at 0% then these partials are tuned as expected: each successive partial is tuned at "p(n) = f + f*n" where "f" is the fundamental and "n" is the partial index starting at 0. *Spread* scaled the second "f" value and *Bias* slopes it exponentially allow for all kinds of different harmonics/inharmonics/unison/experimental sounds and really good for quick and dirty physical modeling! The true equation is more like "p(n) = f + (f*Spread*n)^Bias"

In the center you can select the *Voice Type* and the parameters for each type. The options:
-   (Basic) a basic morphable oscillator shape with FM options
-   (Resonator) resonant BP filter with mallet exciter

- (String) karplus trojan with mallet exciter
- (Wavetable) wavetable oscillator with wavetable file choices (including user files with you can drag and drop on the file menu), and FM options. Change the wavetable size to your preferences or as is correct for the wavetable you are using. Index controls the position.
- (Noise) white noise oscillator

There is a standard ADSR envelope for the volume. There are also two filters accessed by both sources (controlled by the volumes sent to each filter). The filters have a number of options for basic filter shapes, ladder filter shapes, and a vowel filter at the bottom! *Slope* affects the vowel filter bandwidth. The *Limiter* on the far right is mostly to control explosions from random child creation and mutation but feel free to turn it off if it is affecting the sound.
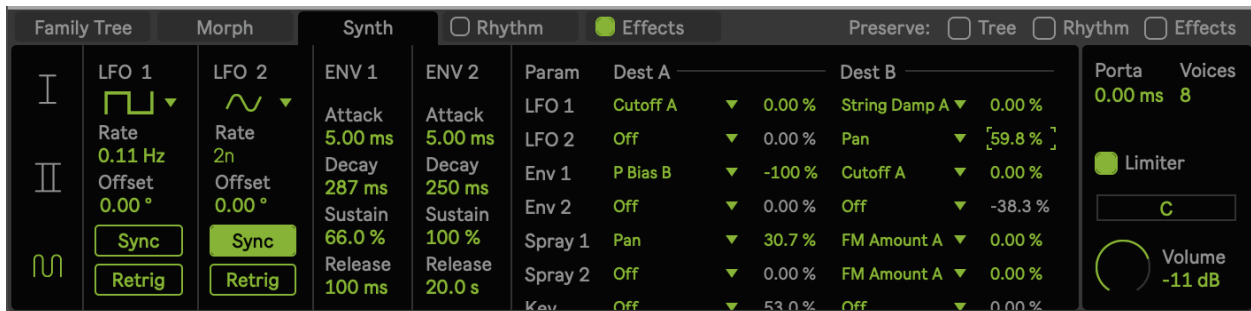
The modulation system is also pretty standard. Two mappable LFOs, Envelopes, and other sources such as sprays (random values generator at the start of a voice) and MIDI values. Two destinations per source.

Rhythm
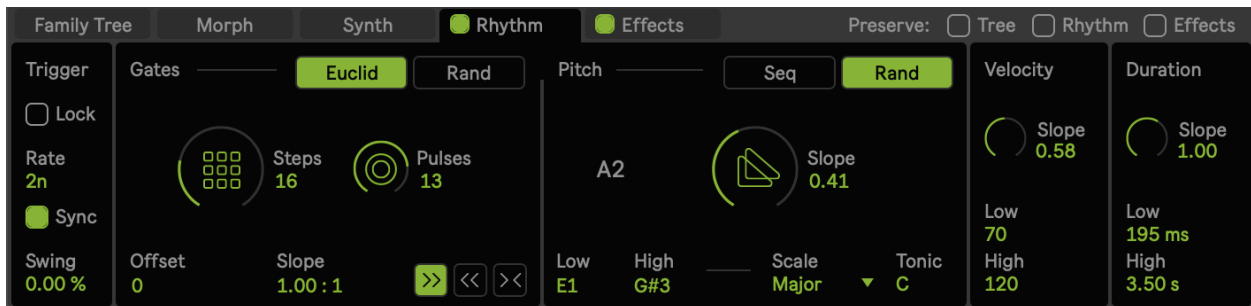
If enabled this section generates notes to trigger the synth internally to set rhythms. On the far left is the trigger (pulse) settings. The *Lock* allows you to lock running it to Live's transport. The Gates section controls whether to allow a trigger to actually trigger a note. You have two modes, one for a basic Euclidean sequencer and one for random gating. The euclidean sequencer has one novel parameter which is *Slope* that exponentially balances the sequence to cluster notes either at the beginning or end of the sequence. The random section has a *Bias* parameter that determines the probability that a trigger will be gated or now, and that bias can be modulated with an lfo. The Pitch section controls the pitch generated. Seq is a standard linear step sequencer of pitches. The other mode is random pitch generation with a min/max range and an exponential *Slope* of that range. There are also scale options. Velocity and Duration of the note generated have the same random settings as random pitch mode.

Effects

And there are some basic effects included. Pretty straightforward parameters… Remember you can enable and preserve the effects and rhythm settings at the top!

Keep in mind there is another version of this device that applies this evolutionary preset process to external devices/racks! (Natural Selection P)

I hope you enjoy this device! Please email me if you have bugs or other issues:
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More: http://dillonbastan.com