

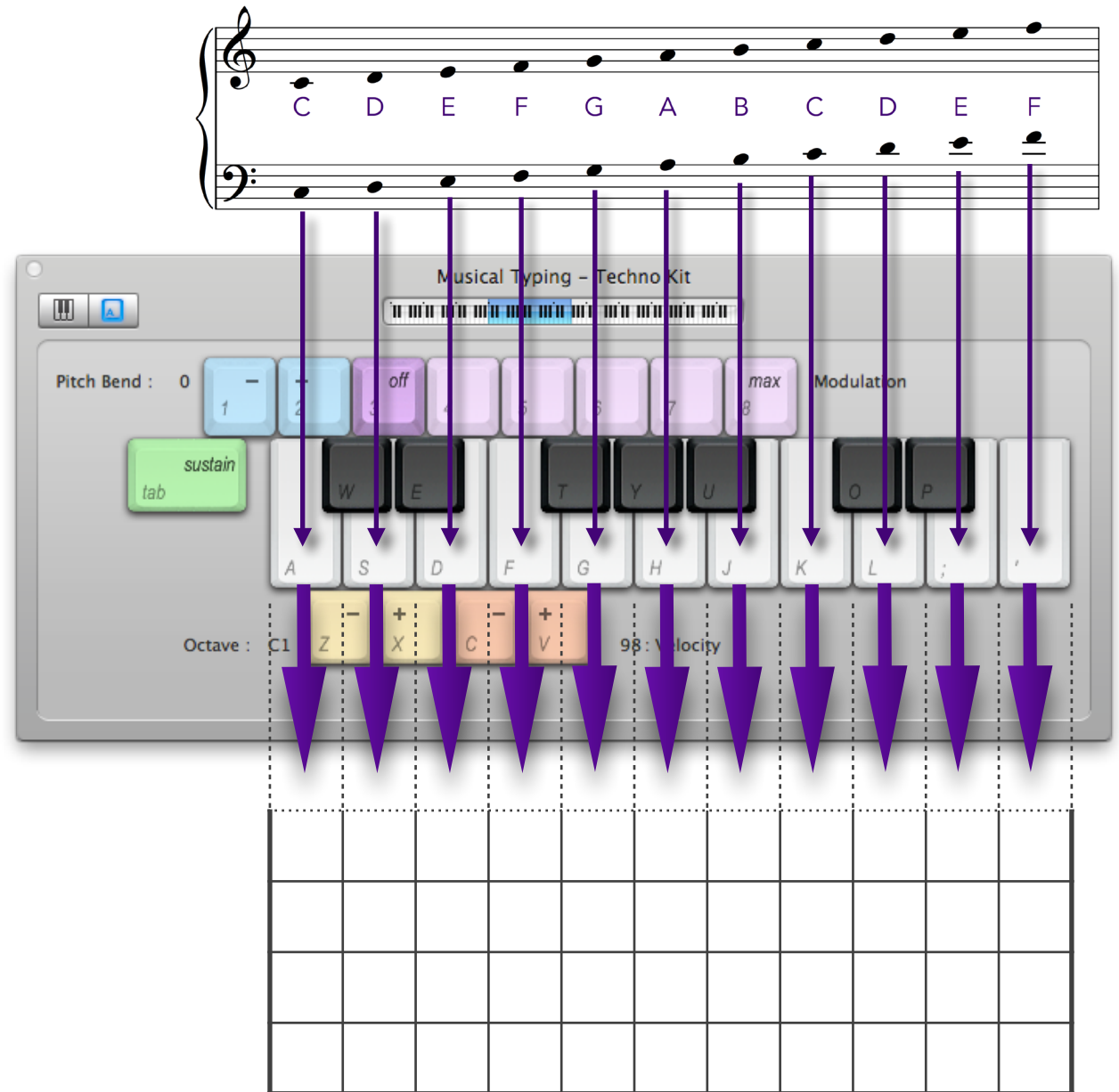
MUSICAL CRYPTOGRAPHY

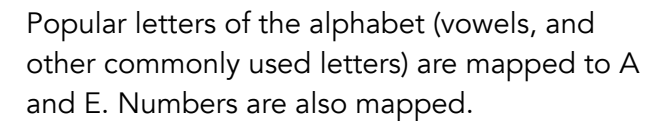
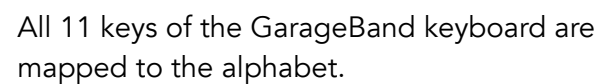
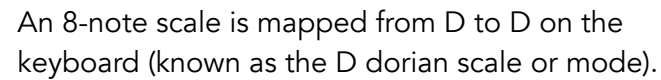

Instructions for creating your own code, then
using that code to hide your message as music!

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Instructions for creating your own code, then
using that code to hide your message as music!

1. The scales that we're used to in Western Music use patterns of 8 notes (including the repetition of the first, called the *tonic*. If you want to use a "regular" scale, choose a starting note, and fill the grid in only 8 notes with the alphabet or numbers, then move onto the next line.
2. Note that starting on different notes makes a big difference to the sound of your piece.
3. You don't have to include all notes, or you can include the extra occurrences of the notes that appear on the GarageBand keyboard twice.
4. You don't even have to write out the alphabet in order - you could randomly place notes all over the grid, or see what happens if you put letters that appear most often (e.g. vowels or letters such as S, R, or M).
5. See the examples overleaf.



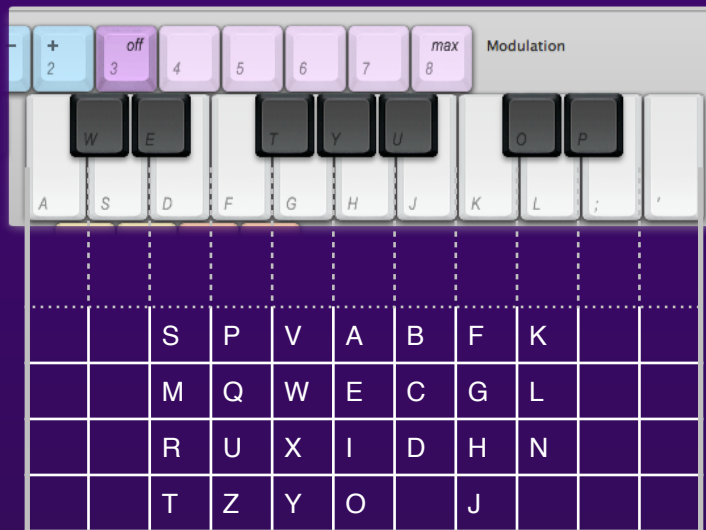


Turn over to see how these grids can then be used to encode your message.

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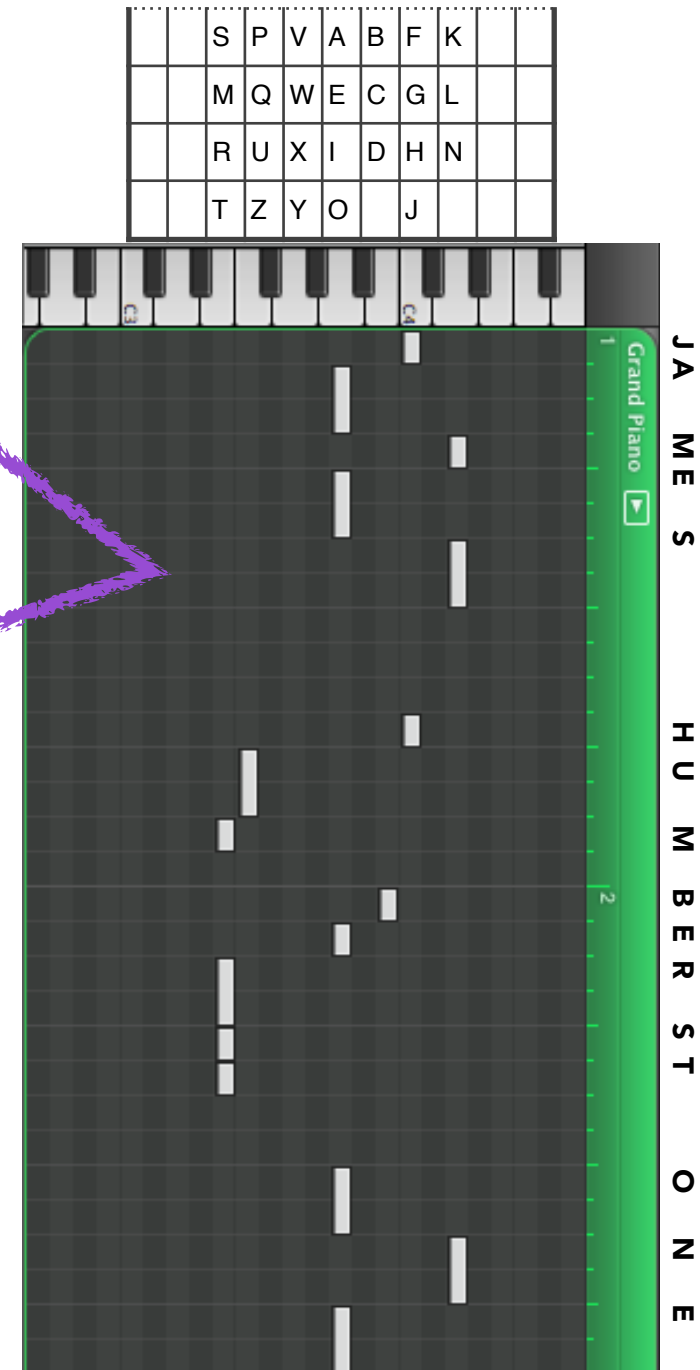
To encode my name, as an example, using the grid I have created below, I simply play the pitches in the order they appear (with any rhythm).

So JAMES HUMBERSTONE becomes



The keyboard interface shows a custom keymap where the top row of keys (W, E, T, Y, U, O, P) is mapped to the letters S, P, V, A, B, F, K. The bottom row of keys (A, S, D, F, G, H, J, K, L, ; , ') is mapped to the letters M, Q, W, E, C, G, L, R, U, X, I, D, H, N, T, Z, Y, O, J. Below the keyboard is a 4x10 grid of letters used for encoding.

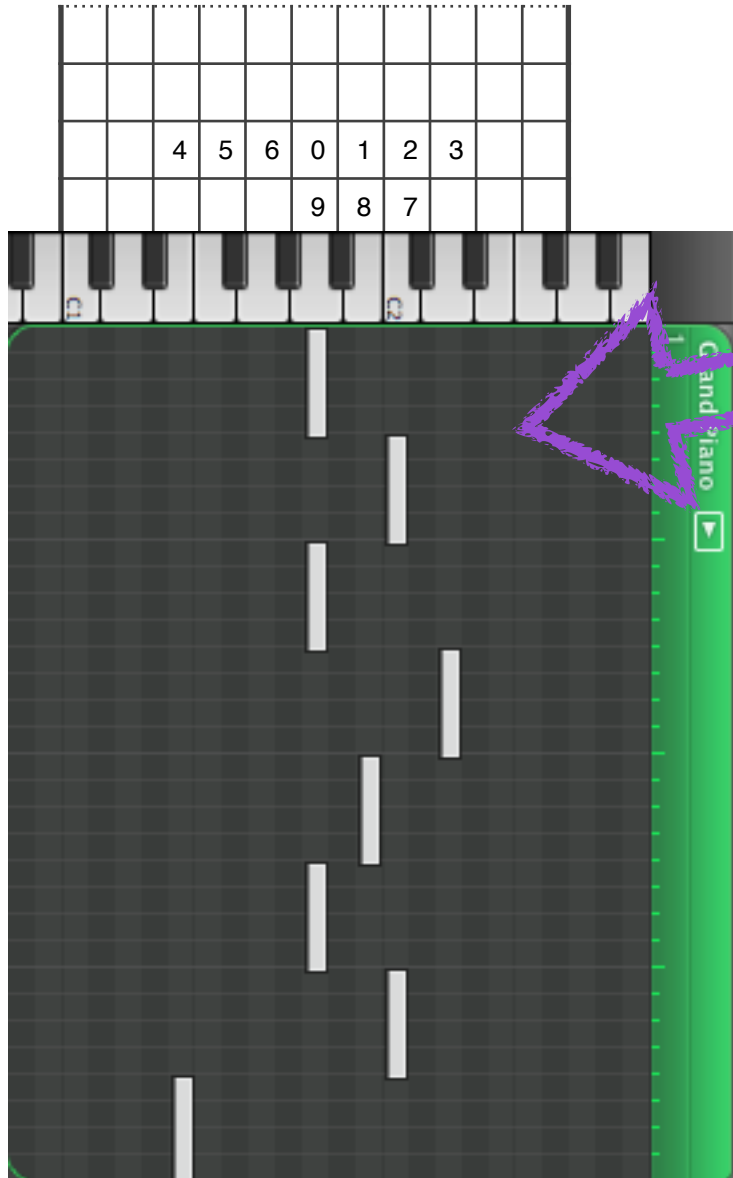
		S	P	V	A	B	F	K											
		M	Q	W	E	C	G	L											
		R	U	X	I	D	H	N											
		T	Z	Y	O		J												



The piano roll shows the encoded sequence of notes for 'JAMES HUMBERSTONE'. The notes are represented by vertical bars of varying heights on a grid. The sequence of notes corresponds to the letters in the name, as defined by the keymap and grid. The piano roll is labeled 'Grand Piano' on the right side.

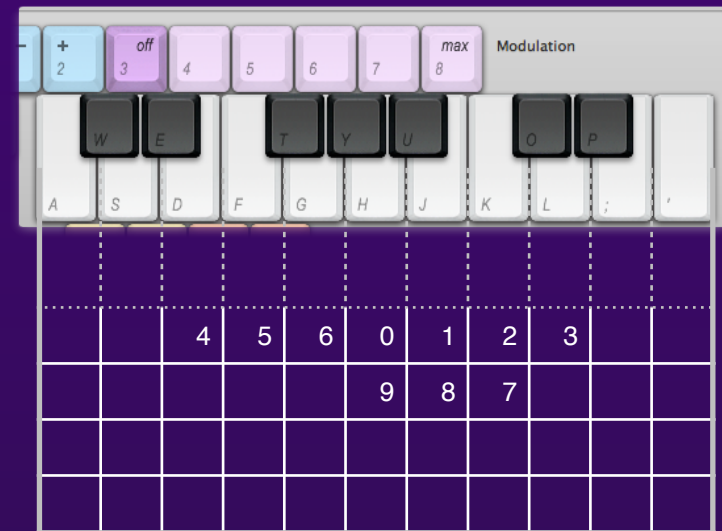
Letter	Key	Pitch (approx. MIDI)
J	O	46
A	S	44
M	Q	42
E	E	40
S	S	44
H	H	42
U	U	44
M	Q	42
B	B	46
E	E	40
R	R	44
S	S	44
T	T	46
O	O	46
N	N	48
E	E	40

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In this grid I have mapped just the numbers 0 to 9, so that I can encode my birth date into my piece. I was born on March 7th, 1974, so numerically that is 03071974.

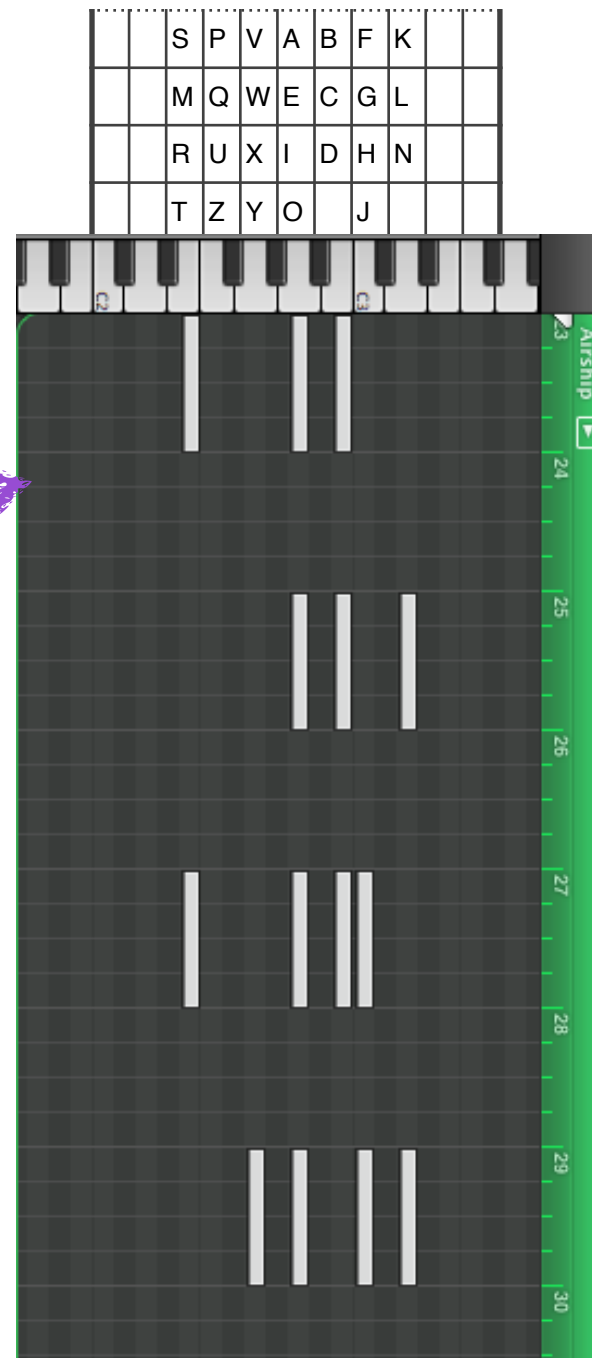
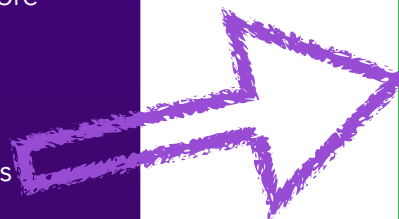
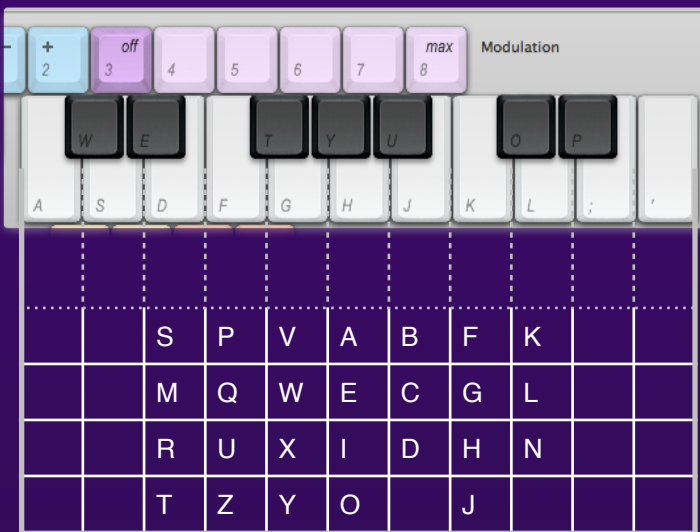
That sequence then becomes...



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Your piece will benefit from harmonic material, probably made by chords. Of course, adding a chord just means playing more than one note at a time.

Here I've used my first grid again, but I wanted to create an political message, so I've encoded "ACTION ON CLIMATE CHANGE NOW". By then playing three or four letters/notes together, I can create a series of chords. If they don't sound good in this order, I just reorder them, thus jumbling up my message.



MUSICAL CRYPTOGRAPHY

Rhythm from code

As you may remember from the *Inspector Morse* theme, Morse Code is a series of dots and dashes that has its own, musical process.

You can use the table to the right to encode a word as Morse Code, and then literally give all "dots" a short note value and all "dashes" a longer note value, or you can have a little more artistic license.

If you're going to do it literally, here's a suggestion for you...

A . _	B _ ...	C _ .	D _ ..	E .
F .. _ .	G _ _ .	H	I ..	J . _ _ _
K _ . _	L . _ ..	M _ _	N _ .	O _ _ _
P . _	Q _ _ .	R . _ .	S ...	T _
U .. _	V ... _	W . _ _	X _ ..	Y _ . _ _
Z _ _ ..				

My favourite living composer is Howard Skempton. Here I've mapped written out his surname as Morse Code, then created a rhythm where dots are staccato quavers and dashes tenuto crotchets. There is also a quaver rest between each letter. Next you can see this rhythm written out in GarageBand's matrix editor, where a dot is a quarter of a beat and a quarter-beat rest, a dash is a whole beat, and there is a half-beat gap between each letter.

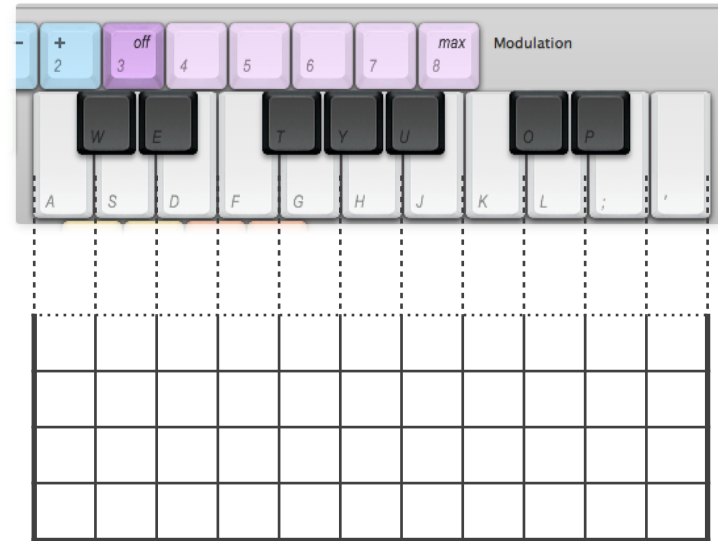
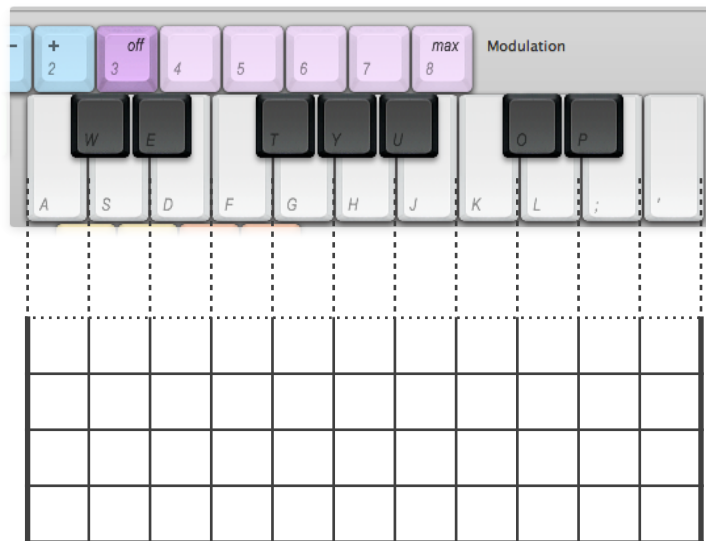
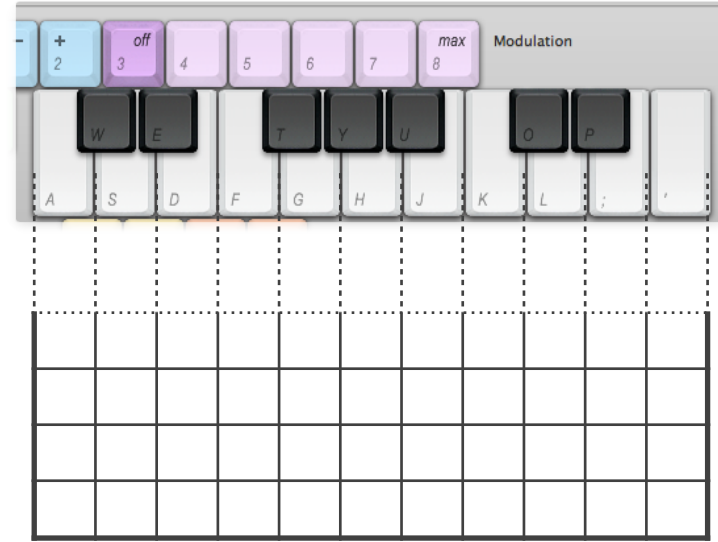
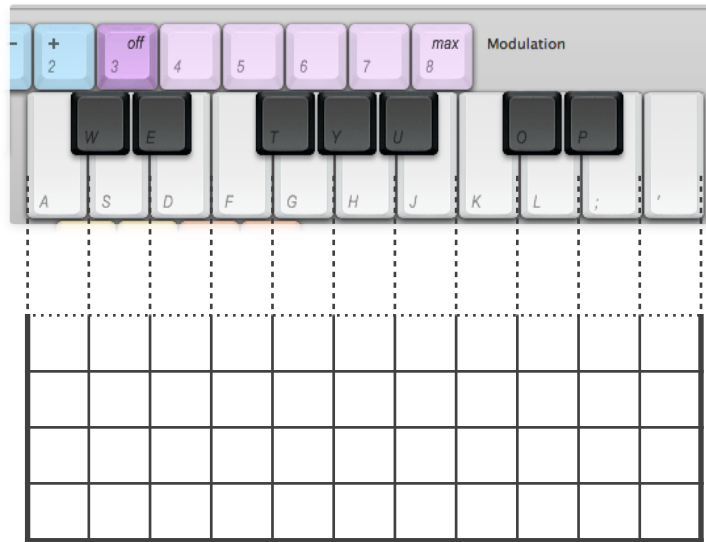
S	K	E	M	P	T	O	N
...	-. -	.	--	.-	-	--	.-

Howard Skempton:

Snare Drum

1 2 3

Extra templates for you to experiment with...



Extra templates for you to experiment with...

