Playing the QWERTY Keyboard

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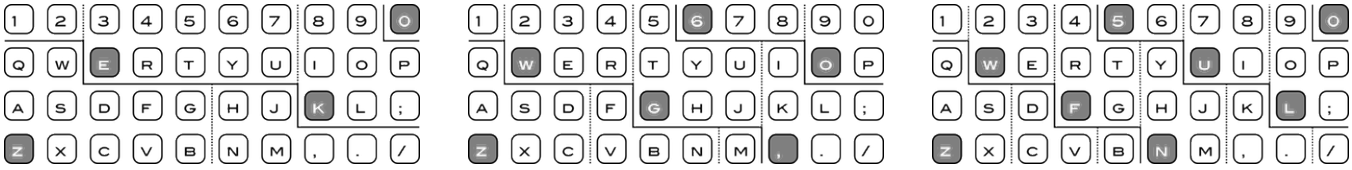

Figure 1: *Chromatic-scale (a), heptatonic-scale (b) and pentatonic-scale (c) keyboards.*

Computer hardware and music softwares have evolved to such a level that, in our days, it is possible to compose high quality music using only a simple laptop equipped with the proper applications.

However, the interface for entering musical notes in softwares running on laptops has not evolved. If music writers and performers want a reasonable way to interact with musical applications, they usually have to make use of an external MIDI Keyboard, i.e., a piano-like interface (Figure 2(a)), what can be a problem when mobility is a concern.

This work has two purposes. First, to introduce a simple mapping between the keys of the QWERTY keyboard and the notes of pentatonic and heptatonic musical scales, thus presenting an alternative to the external musical interfaces. Second, to urge computer manufacturers to implement the necessary properties for the QWERTY keyboard to be fully used as a musical input device, especially regarding polyphony and key-down velocity.

Our keys-to-notes mapping is an extension of the idea called *fret-based pitch selection*, presented in [Fiebrink et al. 2007]. Simply put, their mapping consists in observing the distribution of the chromatic scale notes in a fretted musical instrument tunned in fourths, as shown in Figure 2. In other words, for each octave there is a corresponding 12-notes tile (Figure 3(a)), and the mapping is obtained from the tessellation of the plane using those tiles, as depicted in Figure 1(a). The solid lines seen in Figure 1(a) indicate the boundaries between bands of tiles whose notes are taken from the same octave. Dashed lines indicate boundaries between tiles.

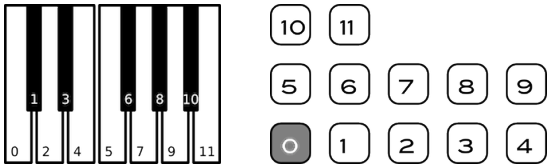

Figure 2: *Chromatic scale as seen in the piano interface (a) and in fretted musical instruments tuned in fourths (b).*

In our previous work [Cicconet et al. 2010], we have extended the idea of tessellating the plane with musical-scale tiles to scales other than 12-note chromatic, namely, the Blues Major, Blues Minor, general heptatonic (7 notes) and general pentatonic (5 notes) scales. Fortunatelly the disposition of keys in the QWERTY keyboard is compatible with the tessellations corresponding to the heptatonic and pentatonic scales. Moreover, most of the modern songs (at least regarding Western music) are written using scales of 5 or 7 notes [Hewitt 2008].

The tiles for the heptatonic and pentatonic scales are shown in Figure 3 (b) and (c), and the mappings obtained from the corresponding tessellations are depicted in Figure 1 (b) and (c), respectively.

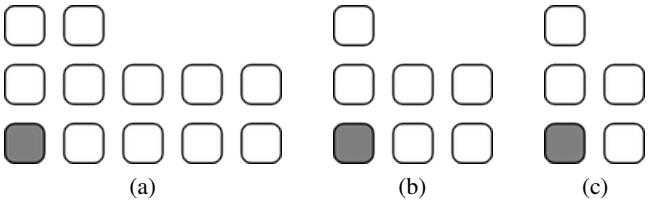

Figure 3: *Chromatic (a), heptatonic (b) and pentatonic (c) tiles.*

It is worth mentioning that what is shown in Figure 1 are just three of many realizations of mappings between keys and notes which are based on the tessellations just described. In Figure 1 the Z key is being used as pivot, but, obviously, this is not mandatory. Any other key of the 4×10 grid could be used as well. Besides, the note and the octave corresponding to the pivot key are also variable.

In our implementation of the discussed mappings, some hardware-related limitations were verified. First, the used keyboard was unaware of key-down velocity, a feature that imposes some limits on the performance expressiveness. Second, polyphony is not the same over the keyboard, and there are combinations of three keys that cannot be played simultaneously.

Other performance limitation concerns the absence of a pitch wheel, very common on MIDI keyboards. But this issue could be circumvented by using the mouse or the trackpad. For a pitch shift of one or two semi-tons, up or down the chromatic scale, modifier keys (*ctrl*, *alt*, etc) could be applied. This would be especially useful to reach that particular note which is out of the chosen scale, but that the composer does not renounce to make use of.

References

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