11 Lagniappe

Definition. *lagniappe n.* 1. A small gift presented to a customer with his purchase by a store owner. 2. **An extra or unexpected gift**; a gratuity. [Louisiana French, from American Spanish *la ñapa* : *la*, the + *ñapa*, lagniappe, from Quechua *yápa*, addition.] (See [Mor].)

11.1 Bigger picture

In defining LtL, we have restricted ourselves to the set of rules whose parameters define intervals which determine birth and survival. How do these rules fit into the larger parameter space that admits *or* type rules? That is, rules such as High Life, which admit birth and survival if the number of live sites lies in one interval *or* another. From the few such points we have looked at, the indication is that these rules also exhibit rich dynamics. Indeed, High Life admits gliders as well as the one-dimensional replicator called the bow tie pasta. The following range 5 rule is also fascinating, admitting bug makers easy to come by and thus its dynamics do not seem to die out. Nor do the dynamics fill in the universe. Rather, robust digital creatures explode throughout the system. Let us define this rule.

- $$\xi_{t+1}(x) = \begin{cases} 1 & \text{if } \xi_t(x) = 0 \text{ and } |(x+\mathcal{N}) \cap \xi_t| \in \{9\} \cup [30,35] \\ & \text{or} \\ & \text{if } \xi_t(x) = 1 \text{ and } |(x+\mathcal{N}) \cap \xi_t| \in [9,13] \cup [40,50] \\ 0 & \text{otherwise} \end{cases}$$

Translated into words, if an unoccupied site sees either 9 or between 30 and 35 occupied sites in its neighborhood at time t, it will become occupied at time $t+1$. If an occupied site sees either between 9 and 13, or between 40 and 50, occupied sites (including itself) in its neighborhood at time t, it will remain occupied at time $t+1$; otherwise it will become unoccupied at time $t+1$.

11.2 Record Holders

In the spirit of the 1996 Summer Olympics, we include a couple of the LtL record holders.

- Slowest bug, known as the *circle bug* – $(2, 6, 7, 6, 8)$. The bug has $\tau = 30$ and $\vec{v} = e_1 + e_2$. (It got its name because it moves so slowly that it appears to be going in circles.)

circle bug

- Periodic object with the longest period – Bosco (see Section 7.2).

- Coolest periodic object from range 3 (before Bosco it held the record for longest period) – $(3, 14, 19, 14, 23)$

period 31

- LtL rule with the most intriguing dynamics – $(2, 4, 4, 5, 5)$ (see Chapter 9 for a picture of a bug maker admitted by this rule).