

Entropy, Meshalkin, and Determinism

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ABSTRACT: A little part of the talk I gave, at Matt Foreman's invitation, at UC Irvine, on Thursday, 23 May 2002.

Meshalkin's example

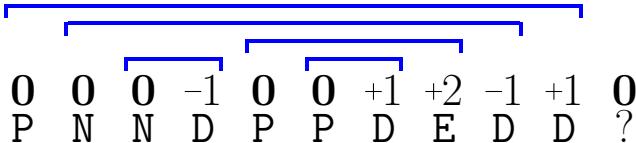
Let \mathbb{X} be the, doubly-infinite, shift-space over “**digit** alphabet” $\{0, +1, -1, +2, -2\}$. Let $S: \mathbb{X}^\circ$ be the independent $(\frac{1}{2}, \frac{1}{8}, \frac{1}{8}, \frac{1}{8}, \frac{1}{8})$ -process on \mathbb{X} .

And let $T: \mathbb{Y}^\circ$ be the independent $(\frac{1}{4}, \frac{1}{4}, \frac{1}{4}, \frac{1}{4})$ -process over “**letter** alphabet” $\{E, D, P, N\}$; Even, oDd, Positive, Negative.

Each of $+1, -1, +2, -2$ is a **NZD**; a Non-Zero Digit. Given a point x

... **0** **0** **0** -1 **0** **0** $+1$ $+2$ -1 $+1$ **0** ...
 ... ((() (()))) (...

regard each **0** as a left-parenthesis, and regard each NZD as a right-parenthesis; this is shown above, in the lower line. I.e, for each pair of the form **0 NZD**, [i.e $x_n = 0$ and x_{n+1} is an NZD] link up the pair, then mentally “delete” these pairs. Apply this idea recursively.



Below each **0**, write “P” or “N” as the **0** is linked to a *positive* or *negative* digit. And below the other digits, write “E” or “D” as the digit is *even* or *odd*. So the upper string is mapped to the lower strip.

Cylinder sets. A (*basic*) **cylinder set** is specified by listing symbols at an interval of coordinates. E.g

$$\mathbf{C} := [[+2 \ 2 \ -1 \ \mathbf{0} \ \mathbf{0} \ +1]]_7$$

is the set of $x \in \mathbb{X}$ st.

$$x_7 = +2, x_8 = +2, x_9 = -1, x_{10} = \mathbf{0}, x_{11} = \mathbf{0}, x_{12} = +1.$$

We define the probability, $\Pr(\mathbf{C})$, to be the product of the probabilities of the individual symbols. Here,

$$\Pr(\mathbf{C}) = \frac{1}{8} \cdot \frac{1}{8} \cdot \frac{1}{8} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{8}.$$

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