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Quantum Cellular Automata: A Corrigendum

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Abstract. For technical reasons, the quality of the figures in our recent publication (*Complex Systems*, **2:2** (1988) 197–208) was insufficient. Figures of satisfactory quality are presented here.

The numbers of the figures are the same as those in our original publication [1]. The reader is requested to consult the text of that publication together with the figures presented here.

For reasons of clarity, we also point out that the matrix of equation (1.1) is a $N \times N$ square matrix with zeroes in the main diagonal.

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References

[1] G. Grössing and A. Zeilinger, "Quantum Cellular Automata," *Complex Systems*, **2:2** (1988) 197–208.

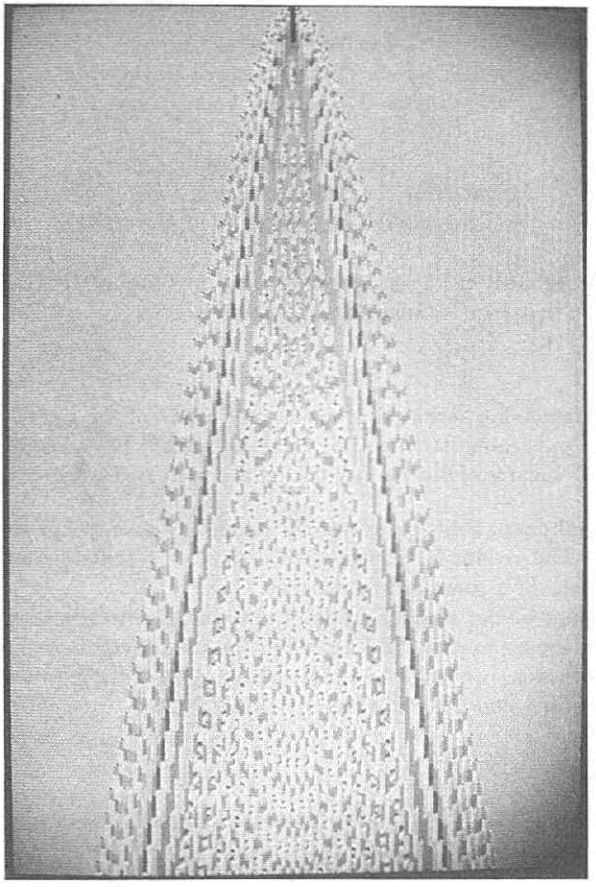
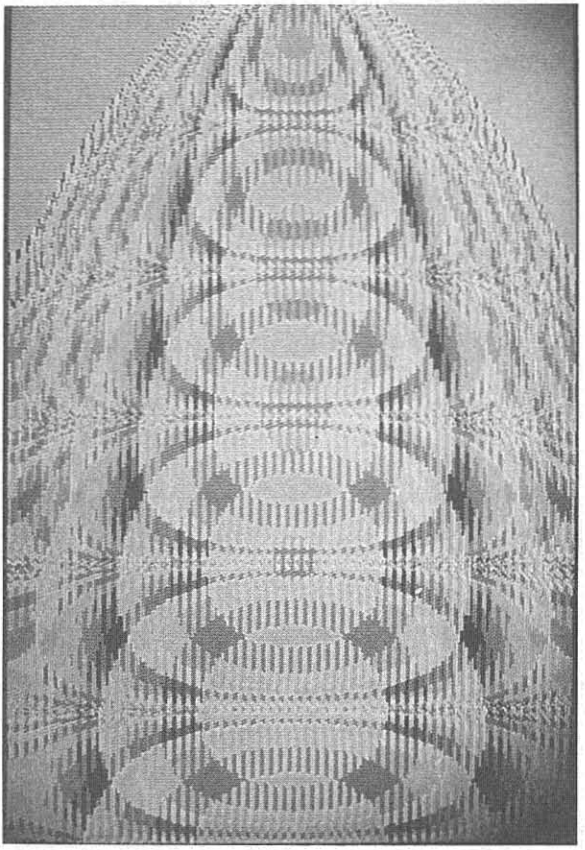
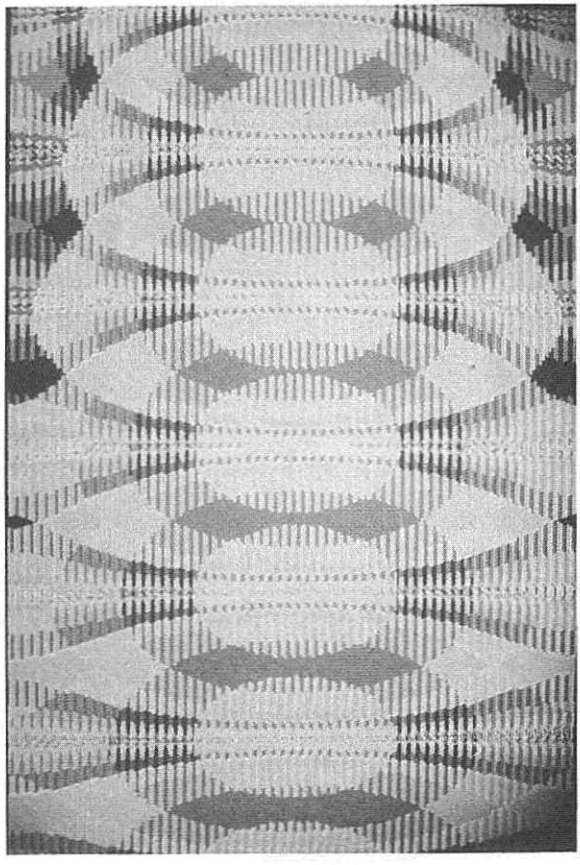


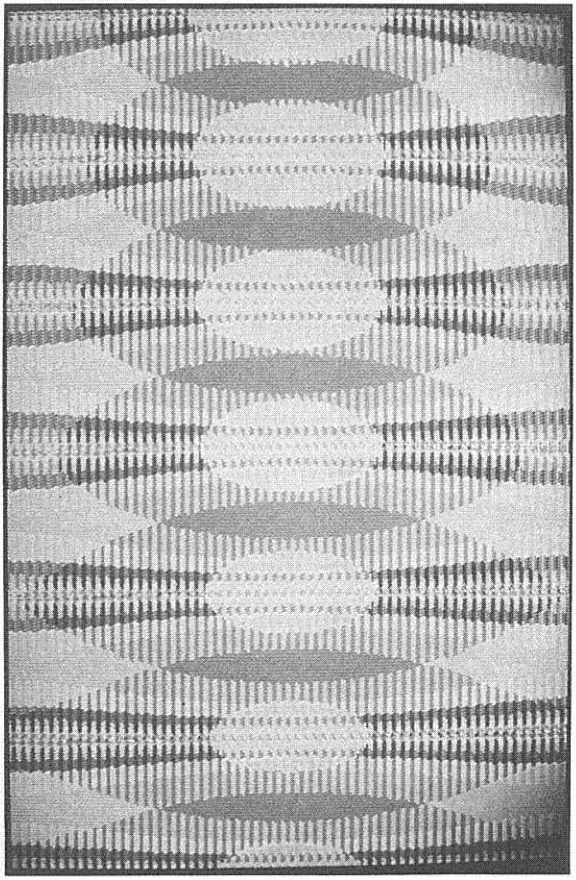
Figure 1: Quantum cellular automaton with $\delta_c = 0.02$ and one initial point. The resulting pattern exhibits a striped wave-like structure with interferences around the edges.



(a)



(b)



(c)

Figure 2: (a) through (c): Quantum cellular automaton with $\delta_c = 20$ and one initial point. The ellipses typical for this range of δ_c gradually flatten with time and eventually form "plane wave surfaces."

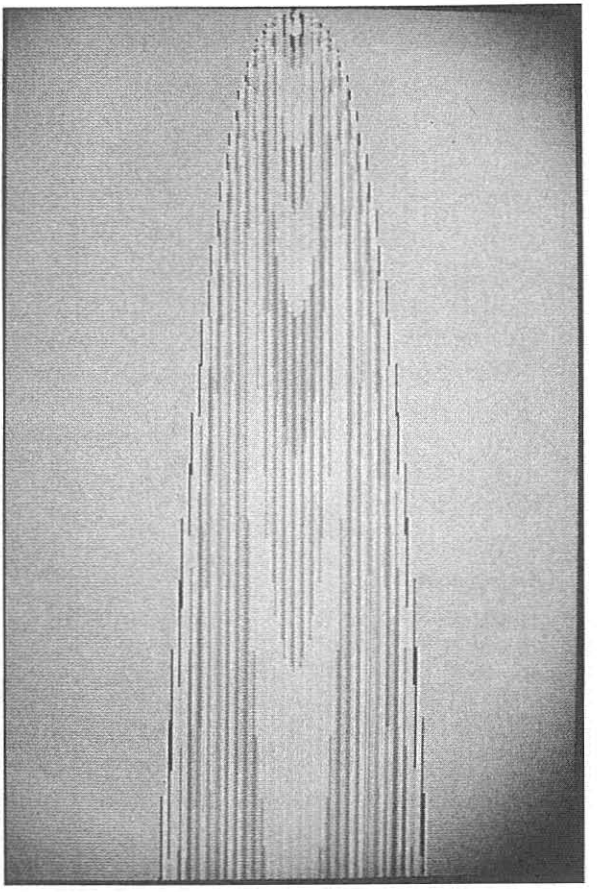


Figure 3: Quantum cellular automaton with $\delta_c = 4000$ and one initial point. Increasing the value of δ_c does not change the pattern. One can therefore speak of a "final state" pattern.

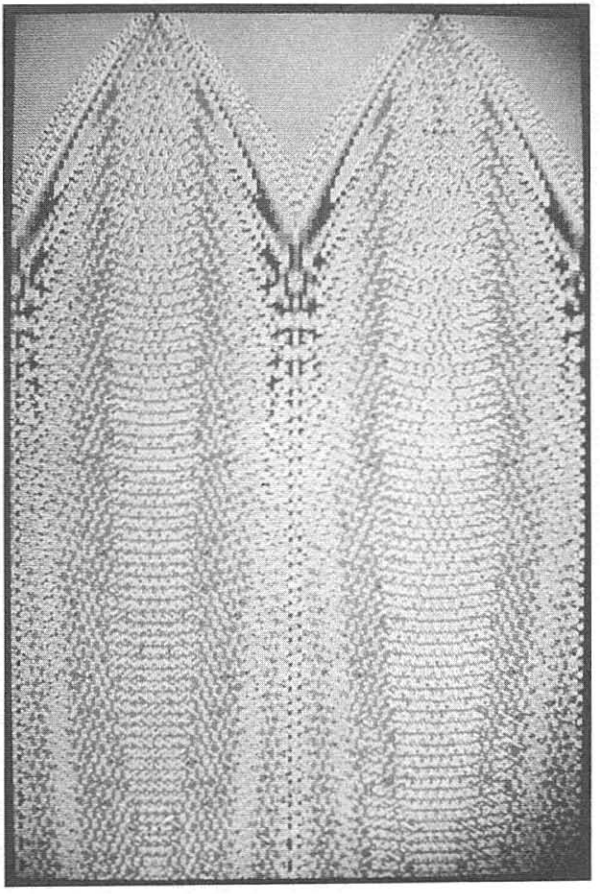


Figure 4: Quantum cellular automaton with $\delta_c = 0.08$ and two initial points at locations (I,J) = (1,30) and (1,90). The two initial amplitudes are chosen with slightly different values (1 and 0.9), and the resulting pattern shows corresponding slight differences in the intensity distribution. Note that the two evolutions never merge.

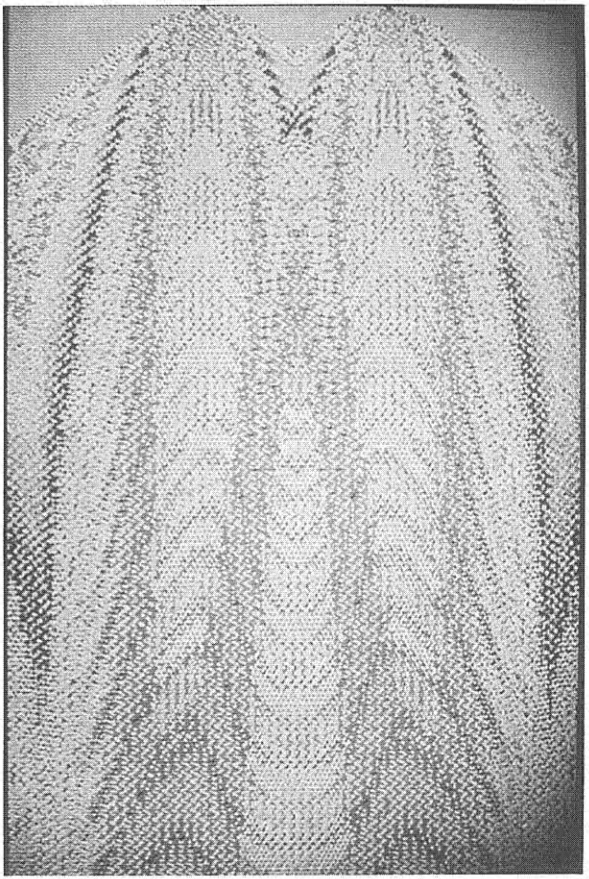


Figure 5: Quantum cellular automaton with $\delta_c = 0.2$ and two equal initial amplitudes at (I,J) = (1,40) and (1,80). Note that here the two evolutions merge to form one connected pattern.

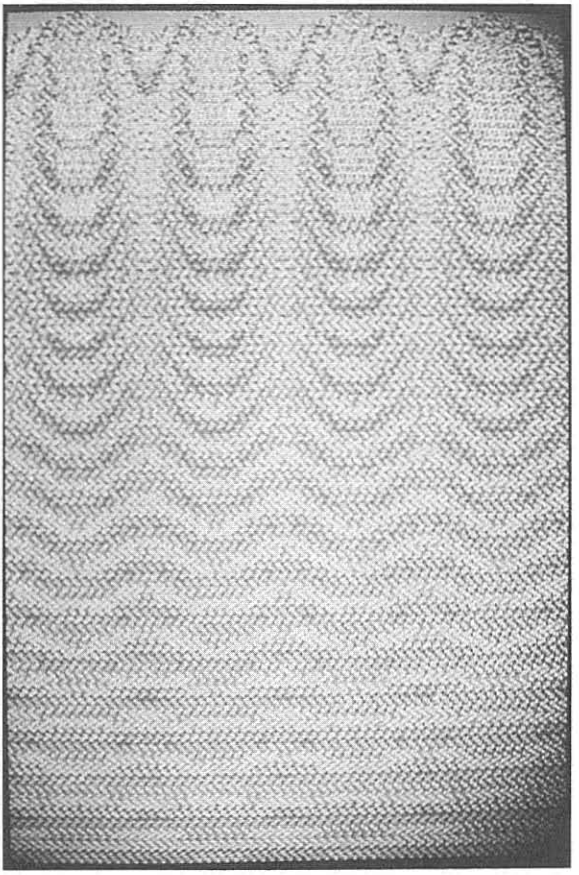


Figure 6: Quantum cellular automaton with $\delta_c = 0.5$ and four initial points with equal amplitudes. The initial points are located rotationally invariant with respect to the axis of the torus generated by the periodic boundary conditions. Consequently, the resulting pattern stabilizes after approximately 500 times steps and remains stable for all later times.

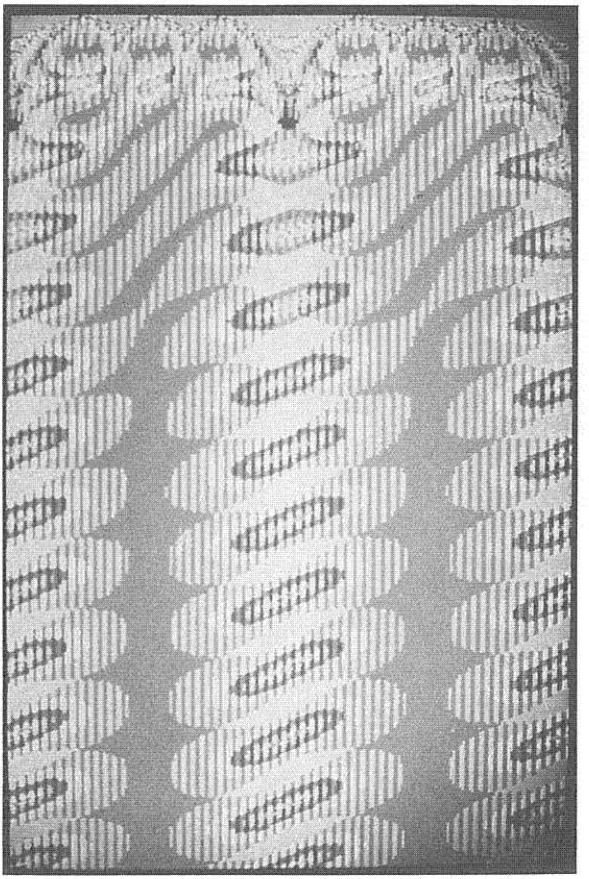
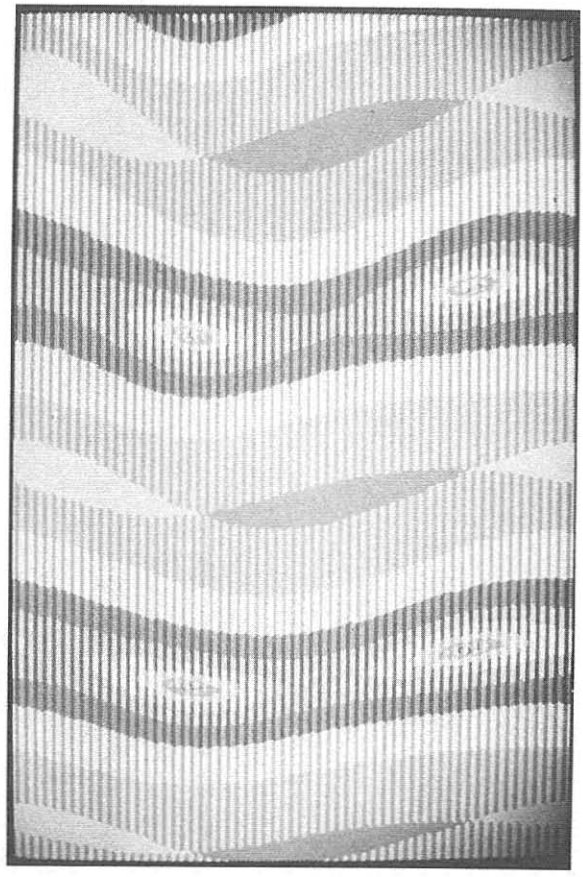


Figure 7: Quantum cellular automaton with $\delta_c = 10$ and six equal initial amplitudes at locations J = 15, 30, 45, 75, 90, and 105. The pattern stabilizes after a few initial time steps.

(a)

(b)



(c)

Figure 8: (a) through (c): Quantum cellular automaton with $\delta_c = 50$ and four initial points at J = 1, 40, 43, and 80, providing an irregular pattern that gradually becomes more regular.