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Crowds as an Excitable Medium for Spiral Wave Dynamics[1] ANDREA WELSH, EDWIN GRECO, FLAVIO FENTON, Georgia Institute of Technology — Spiral wave (SW) patterns are studied in many physical, biological, and chemical excitable systems. Of particular importance are SW of electrical activity that develop in the heart and give rise to arrhythmias such as tachycardia (single SW) and fibrillation (multiple SWs). We investigate if a crowd of people given simple rules for activation and deactivation, modeled on cardiac cells, can act as a living simulation for SW dynamics. For group sizes ranging from 50 to 650 people we demonstrate, experimentally, the existence of stable spiral waves and of spiral wave breakup leading to chaotic dynamics. Numerical simulation predicts the simple rules lead to well define wave fronts. People, however, respond with various degrees of anticipation and misinformation. This human behavior can lead to smoothed fronts or even lead to spiral wave breakup and chaos. We present a new cell model that includes variations in reaction to account for the observed behavior in crowds. This model may be useful in the study of coupling and decoupling of cardiac cells that lead to arrhythmic behavior.

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