ERRATUM

Erratum to: Some Joys and Trials of Mathematical Neuroscience

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At the end of Sect. 2.2 I state that, as input current I increases, the first Hopf bifurcation occurring in the Fitzhugh-Nagumo (FN) equation is supercritical. This is incorrect. For neurally-relevant values of the time constant ratio $\tau_v/\tau_r \ll 1$, it is *subcritical* and is preceded by a saddle-node bifurcation in which the stable limit cycle and an unstable cycle appear, as in the full Hodkin-Huxley equations. (The values $\tau_v = 0.1$, $\tau_r = 1.25$ were used to produce Fig. 4, and in Eqs. (8a)–(8b) the bifurcation is supercritical only for $\tau_v/\tau_r \in (0.75, 1.250)$.) As I continues to increase a similar sequence occurs in reverse. Thus, FN *does* capture the qualitative behavior of the HH equations near the first Hopf bifurcation, but fails to do so at the second one, which is supercritical for HH. In fact the "quasi-threshold phenomenon" noted in FitzHugh's papers (FitzHugh 1960, 1961 [especially Fig. 1, pp. 448–449]) provides a clue to the possible existence of unstable limit cycles, and to their relation to "canards" in relaxation oscillations (Izhikevich 2007).

I am indebted to Gene Katsevich for alerting me to this error.

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