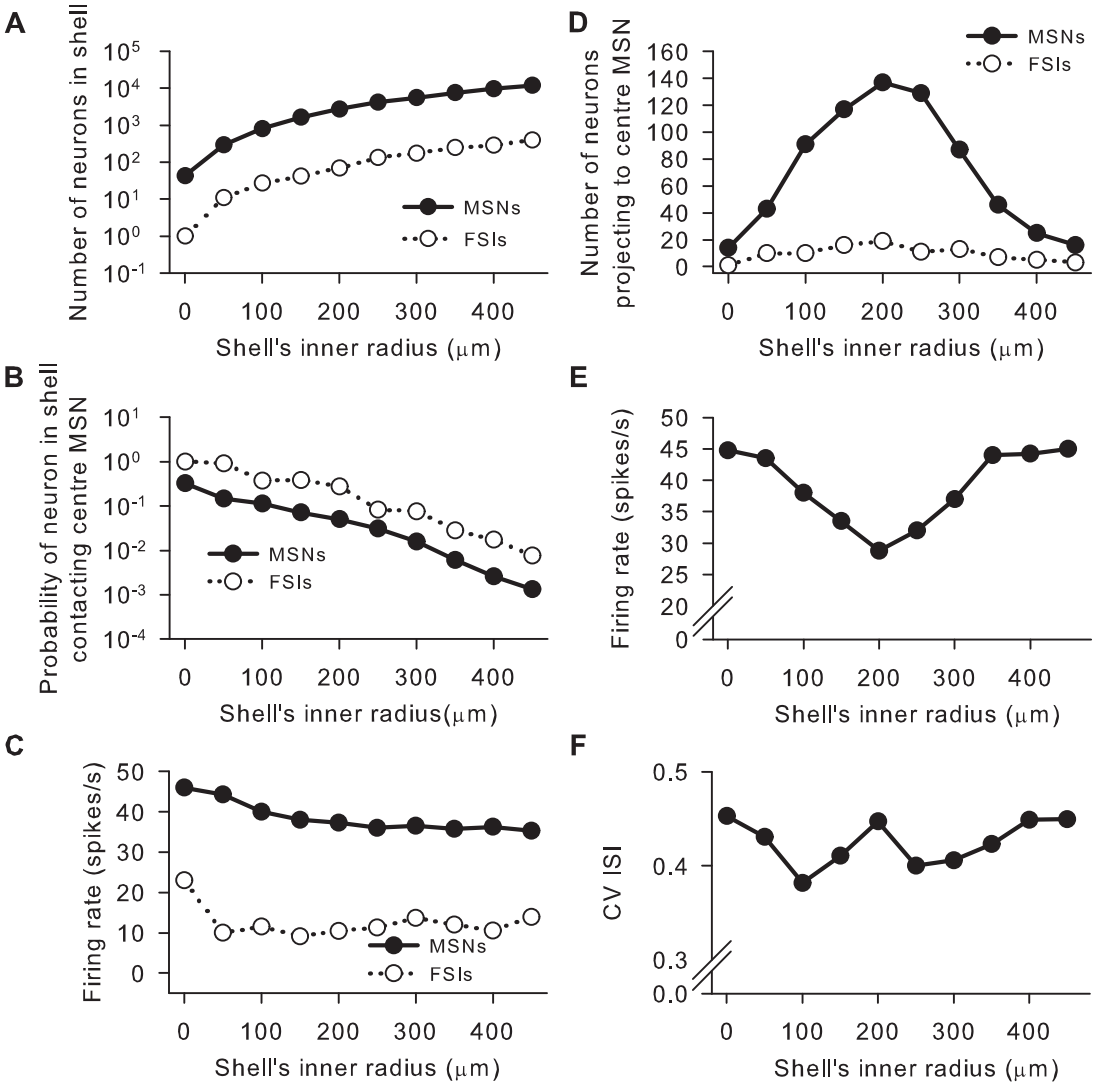

Figure S1. Implications of distance-dependent connections for MSN output. We stimulated all neurons within a 50μm wide spherical shell at varying distances from the centre of a 1mm-on-the-side cube of striatum (84900 MSNs). Here we used a network with an FSI density of 3% (2547 FSIs) to check that the effects on the centre MSN were consistent even with increasing numbers of FSIs. **A** The total number of neurons per shell increases exponentially with increasing distance from the centre; here and in all other panels we plot distances as the inner radius of the shell. **B** The probability of any chosen neuron in that shell contacting the central MSN falls exponentially with increasing distance. **C** All stimulated neurons received approximately 1250 spikes/s excitatory input for 4 seconds. The mean firing rate of MSNs in the shell fell slightly with increasing distance; the mean firing rate of FSIs in the shell was roughly constant (the first shell contained only one FSI). **D** The number of neurons projecting to the centre MSN peaked at the same distance for both MSN and FSI afferents. **E** In response to the same input as the stimulated neurons, the centre MSN's firing rate follows the inverse of the distribution of inputs across the shells. **F** The centre MSN's inter-spike interval (ISI) coefficient of variation (CV), indicating the irregularity of the spike train, was more modulated by the distance of the afferent input than for the 1% FSI network.