Supplemental Figures:

Figure S1, associated with Figure 1.

Figure S2, associated with Table 2.

Figure S3, associated with Figure 3.

Figure S4, associated with Figure 4.

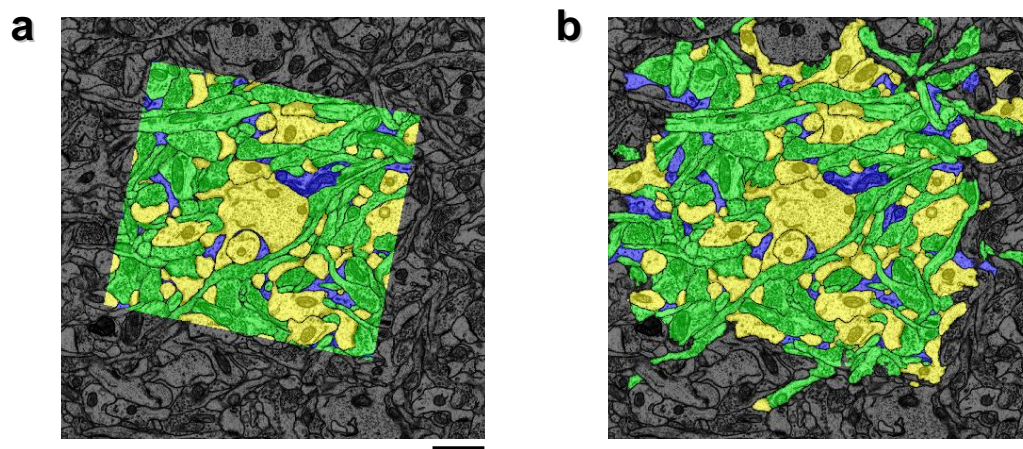Figure S5, associated with Figure 6.

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Figure S1: Comparison of manual and automated reconstructions in V3. a) Colorized region was manually reconstructed. b) Automated reconstruction with the colorized objects extending beyond the manual cube to unambiguously identify portions of those same structures that entered the analyzed volume on adjacent serial sections. Scale bar is 1μm.
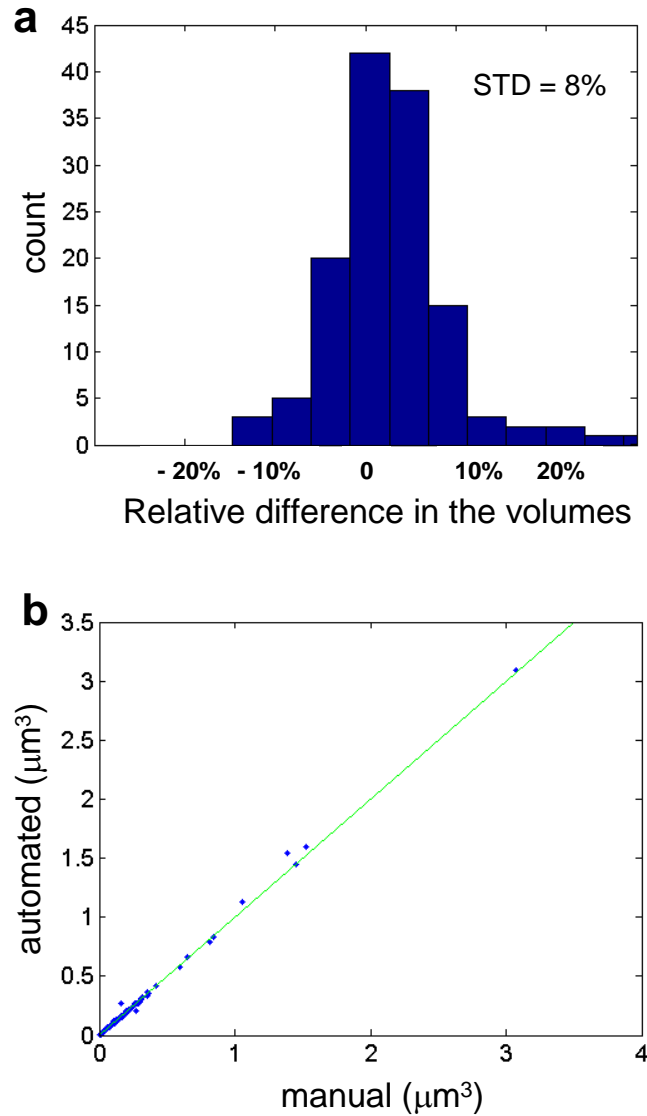
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a

b

Figure S2: a) Relative percentile differences in the volumes of the same neuronal processes reconstructed manually or following the automated procedure in V3. b) Scatter plot of manual reconstructions versus automated reconstructions in V3. Each data point represents the volume of one object - i.e. dendrite, axon, or glial process in 3D.
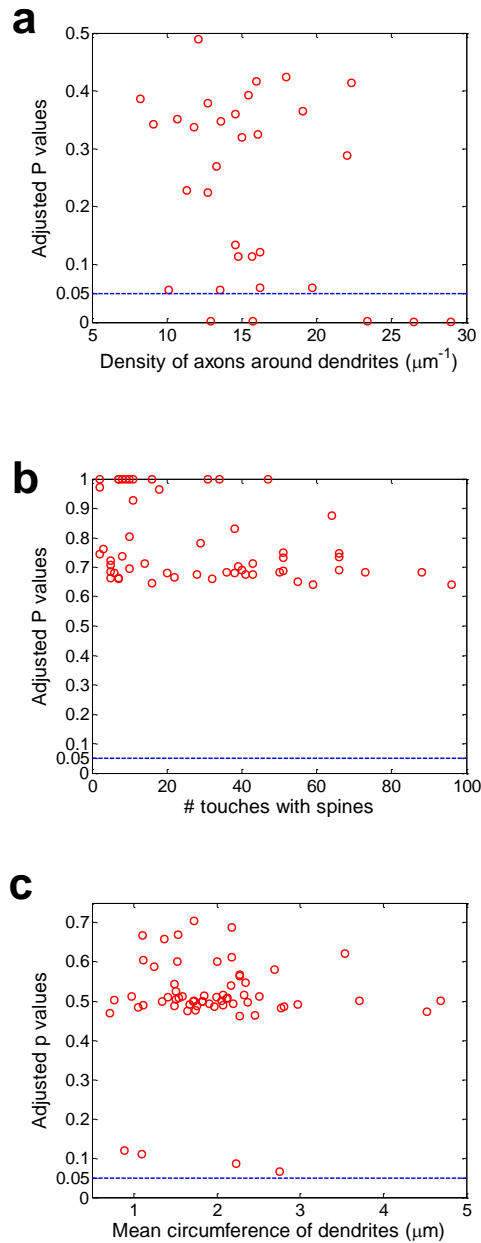
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a

b

c

Figure S3: Probability that the observed vs. predicted variance in synaptic density on a dendrite arises from the discrete count of synapses is given by the minimum p-value adjusted for multiple comparisons (Benjamini and Hochberg, 1995). a) Probability for the variance of predictions based on the maximum-reach connectivity fraction to arise by chance is below 0.05. b) Predictions based on the number of touches with spines are well within the variance ($p>0.05$) expected by chance. c) Predictions based on the dendritic caliber are within the variance ($p>0.05$) expected by chance. Each point represents one dendritic segment. Dotted lines are at $p=0.05$.
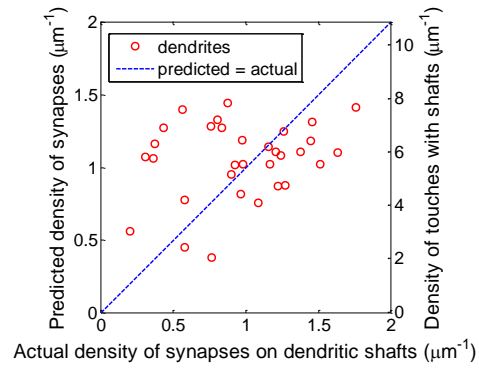
Figure S4: Plot of the actual density of synapses on dendrites from V1 and V3 vs. the density of synapses predicted as proportional to the density of touches of dendritic shafts and axons. Density of axon touches with dendritic shaft is a weak predictor of the actual density of synapses.
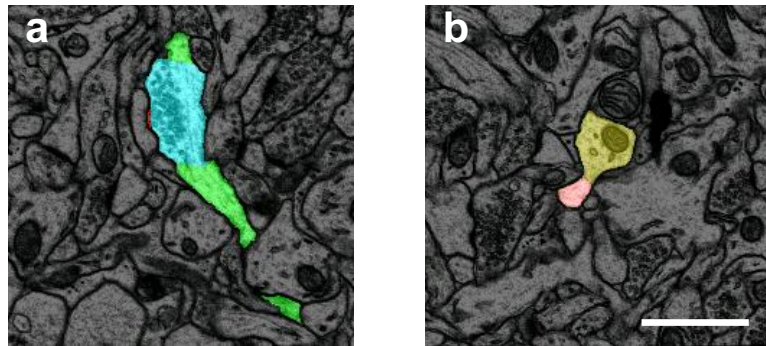
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Figure S5: (a) Example of a bouton (cyan) segmented out of an axon (green). (b) Example of a spine (purple) segmented out of a dendrite (yellow). Scale bar: 1μm