Supplementary Materials: Dynamic Image Representation in a Spiking Neural Network Supplied by Astrocytes

Sergey V. Stasenko * and Victor B. Kazantsev

S1. Cases with numbers from database MNIST

S1.1. Number 0 from database MNIST

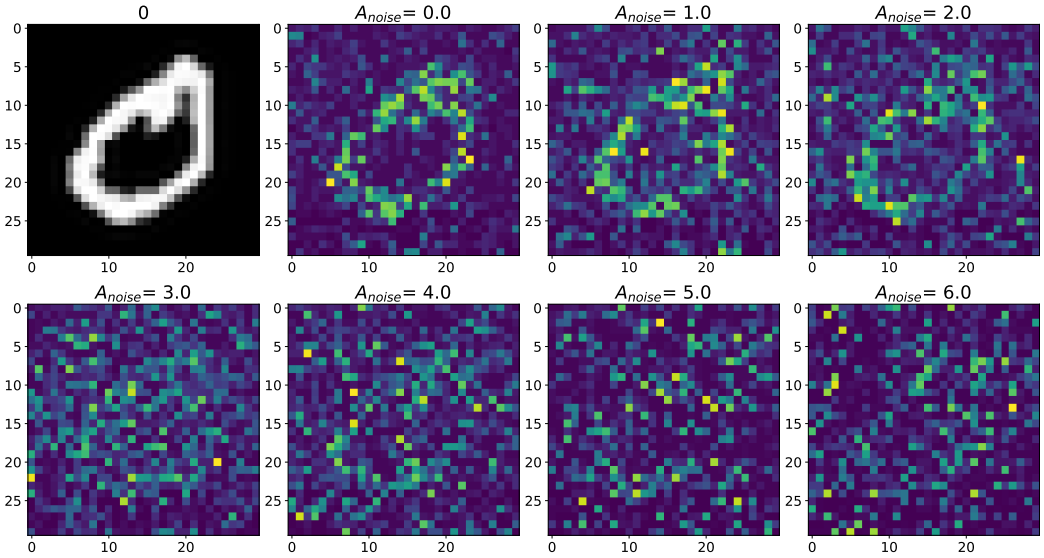

Figure S1. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 0 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

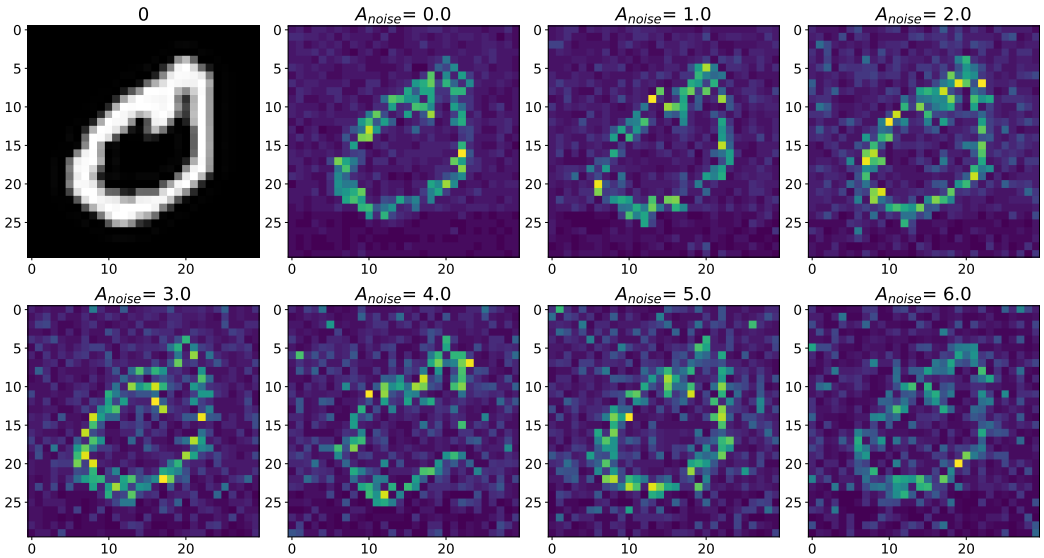

Figure S2. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 0 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

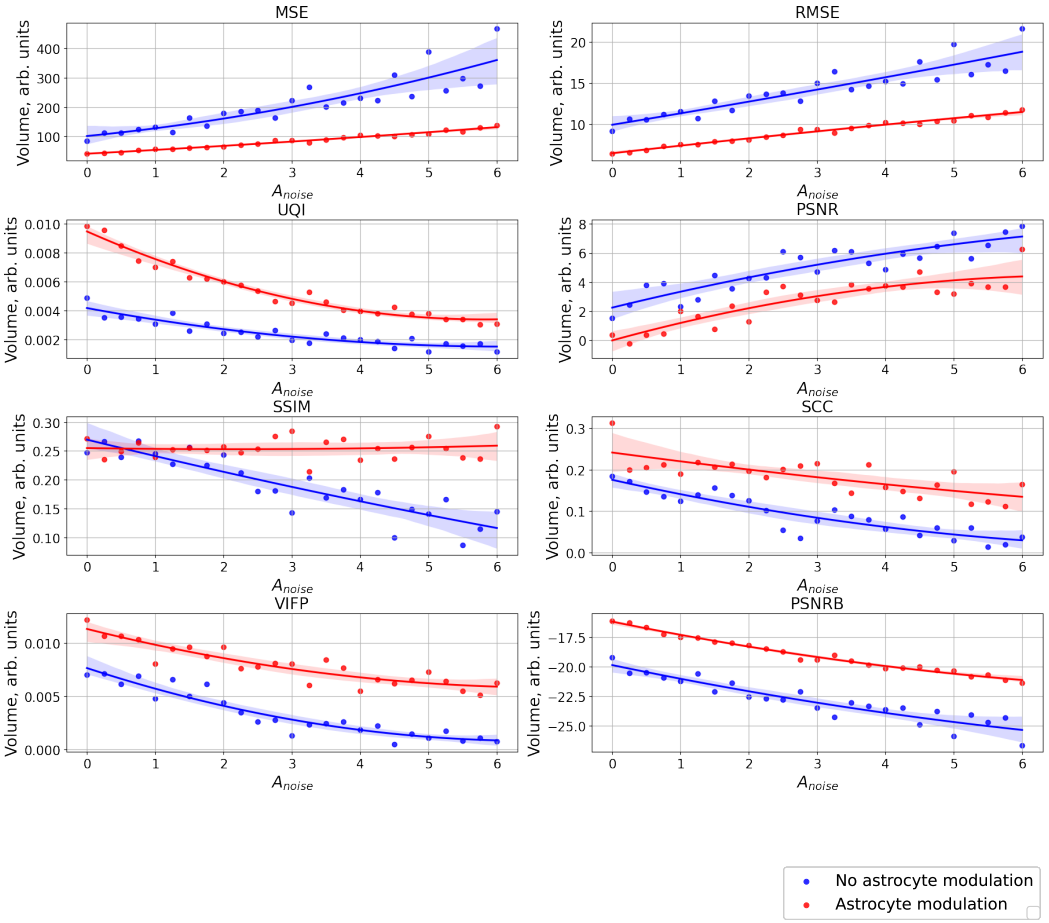

Figure S3. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S1 and Figure S2 with an image 0 from handwritten database MNIST [1] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S1.2. Number 1 from database MNIST

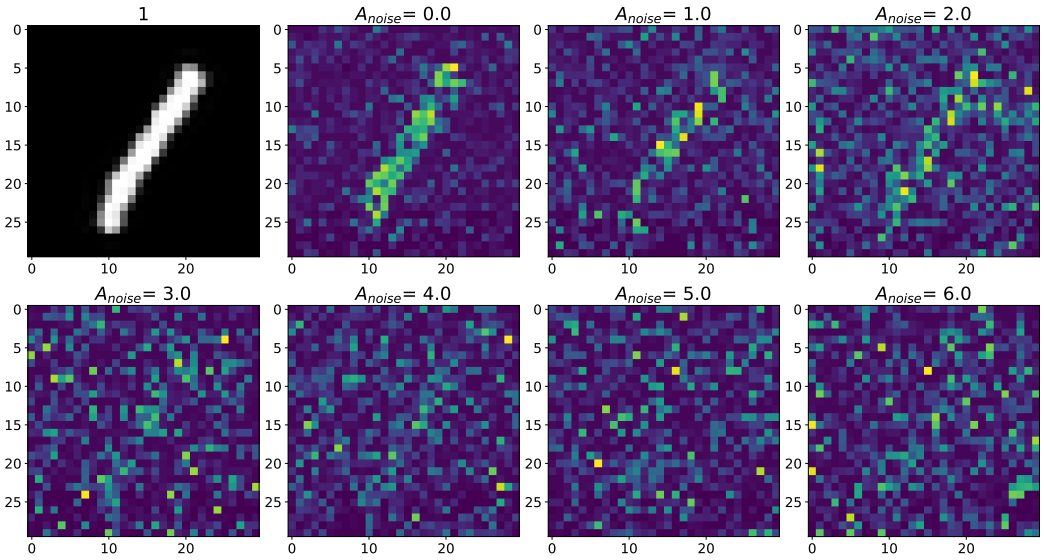

Figure S4. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 1 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

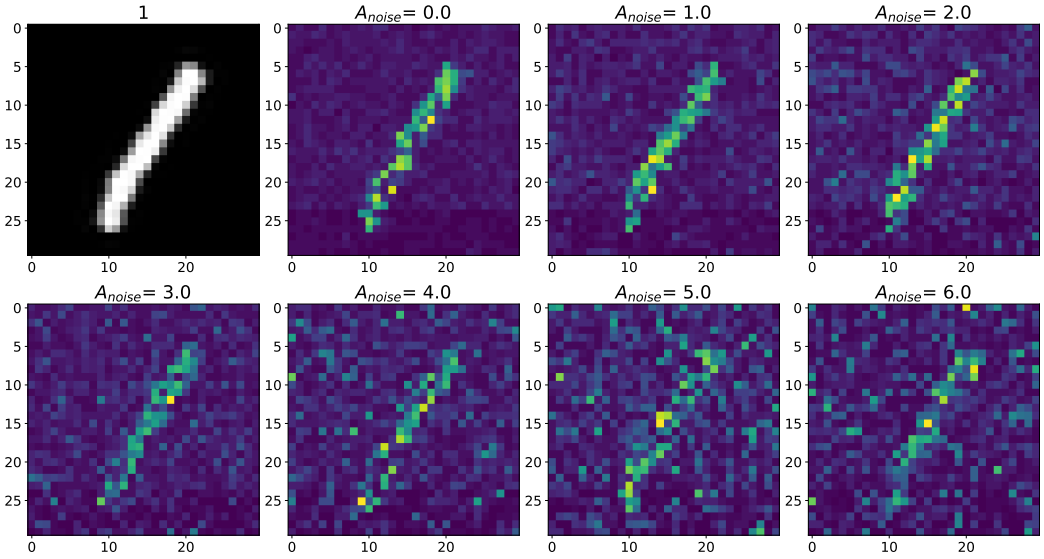

Figure S5. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 1 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

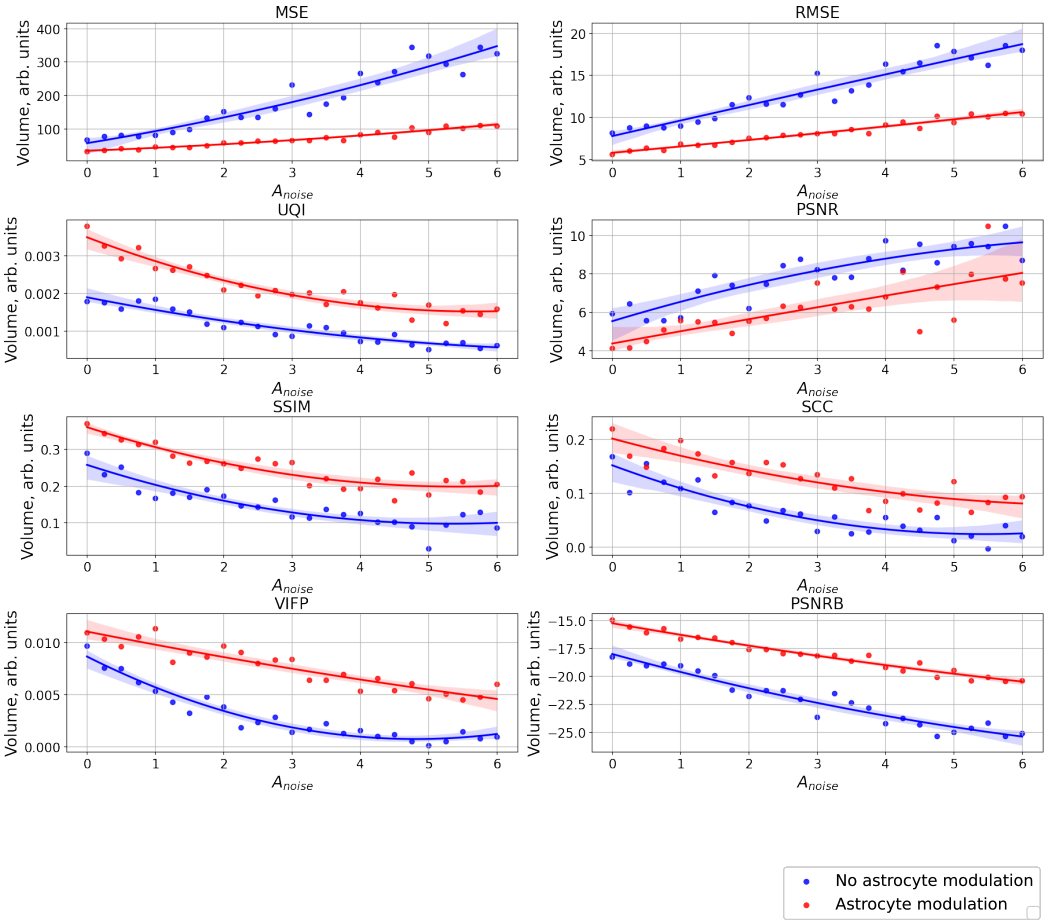

Figure S6. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S4 and Figure S5 with an image 1 from handwritten database MNIST [1] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S1.3. Number 2 from database MNIST

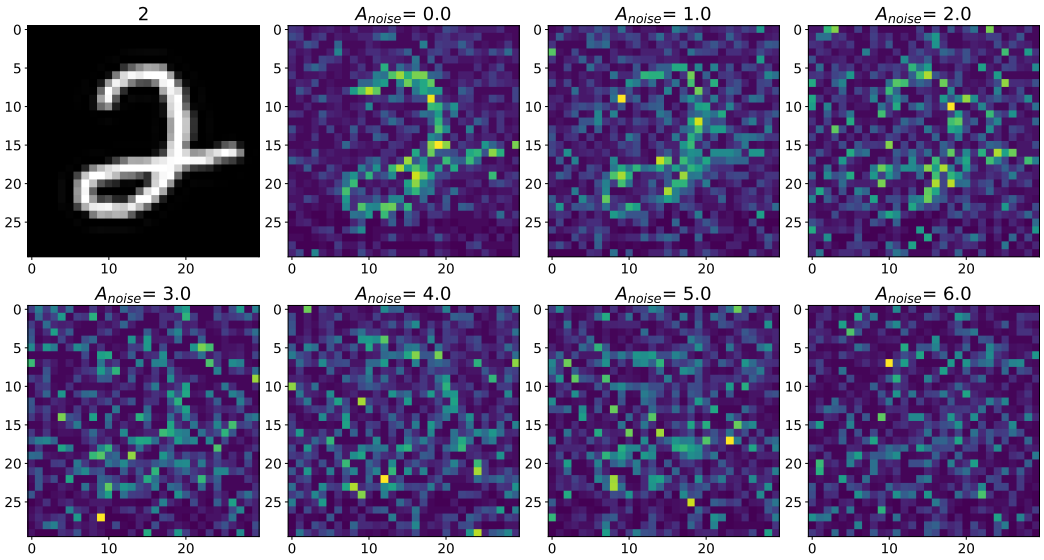

Figure S7. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 2 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

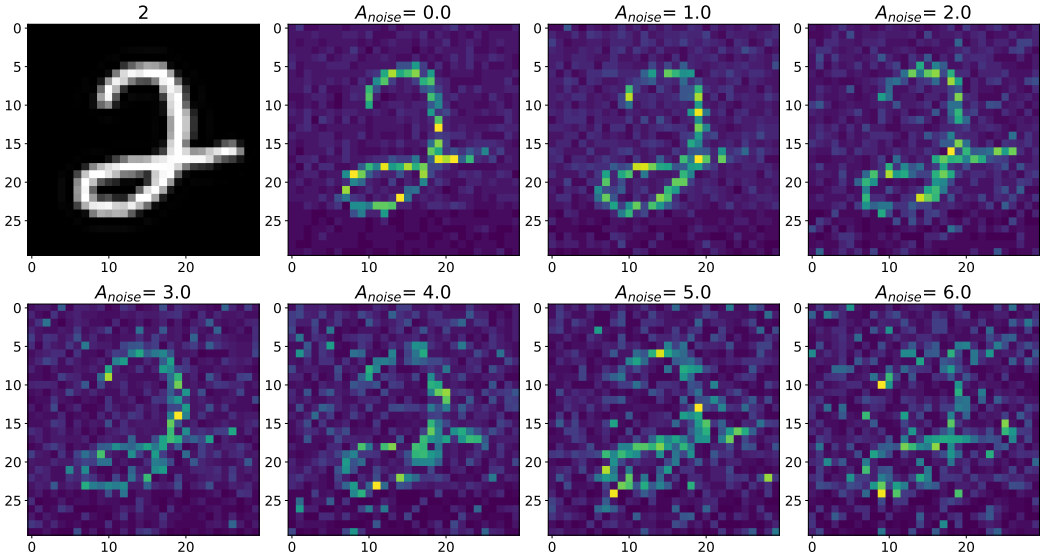

Figure S8. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 2 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

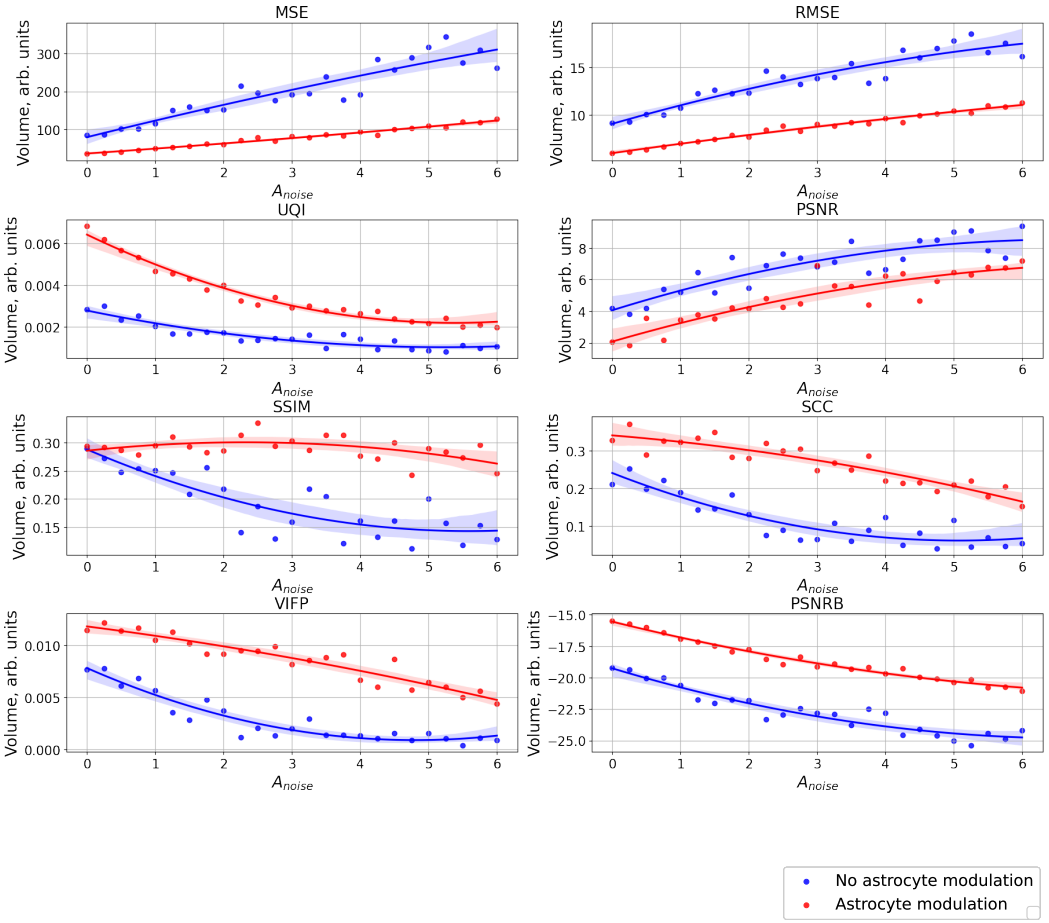

Figure S9. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S7 and Figure S8 with an image 2 from handwritten database MNIST [1] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S1.4. Number 4 from database MNIST

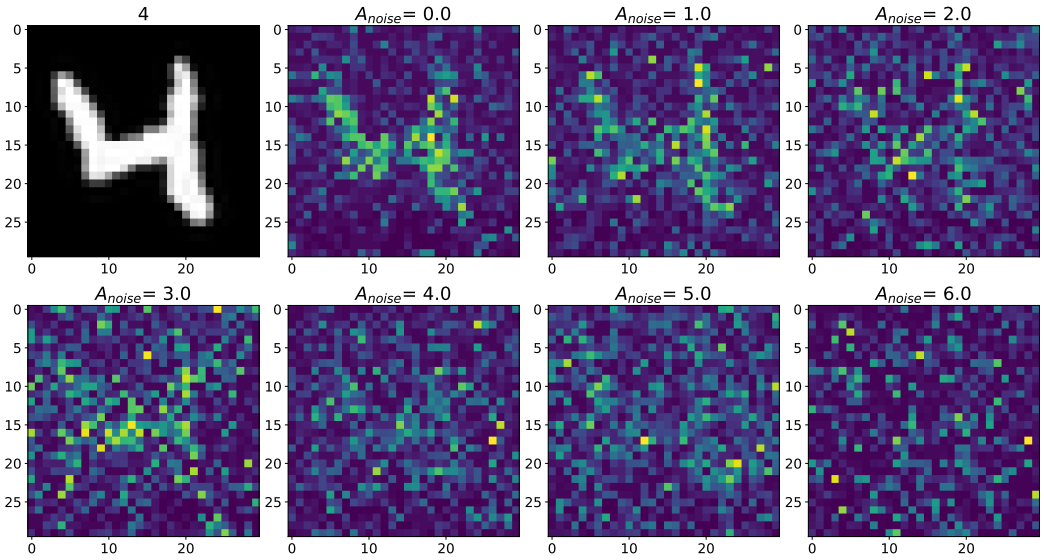

Figure S10. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 4 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

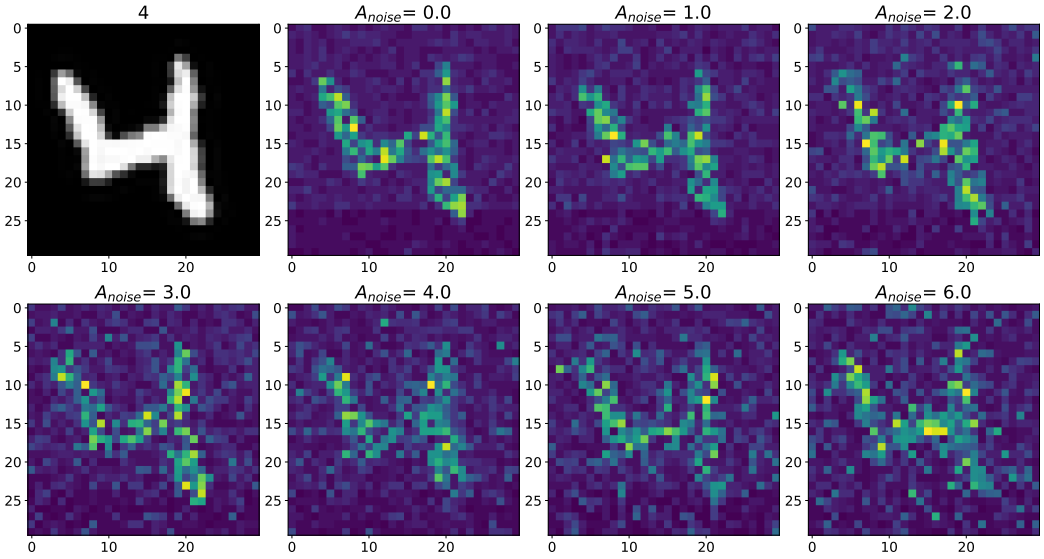

Figure S11. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 4 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

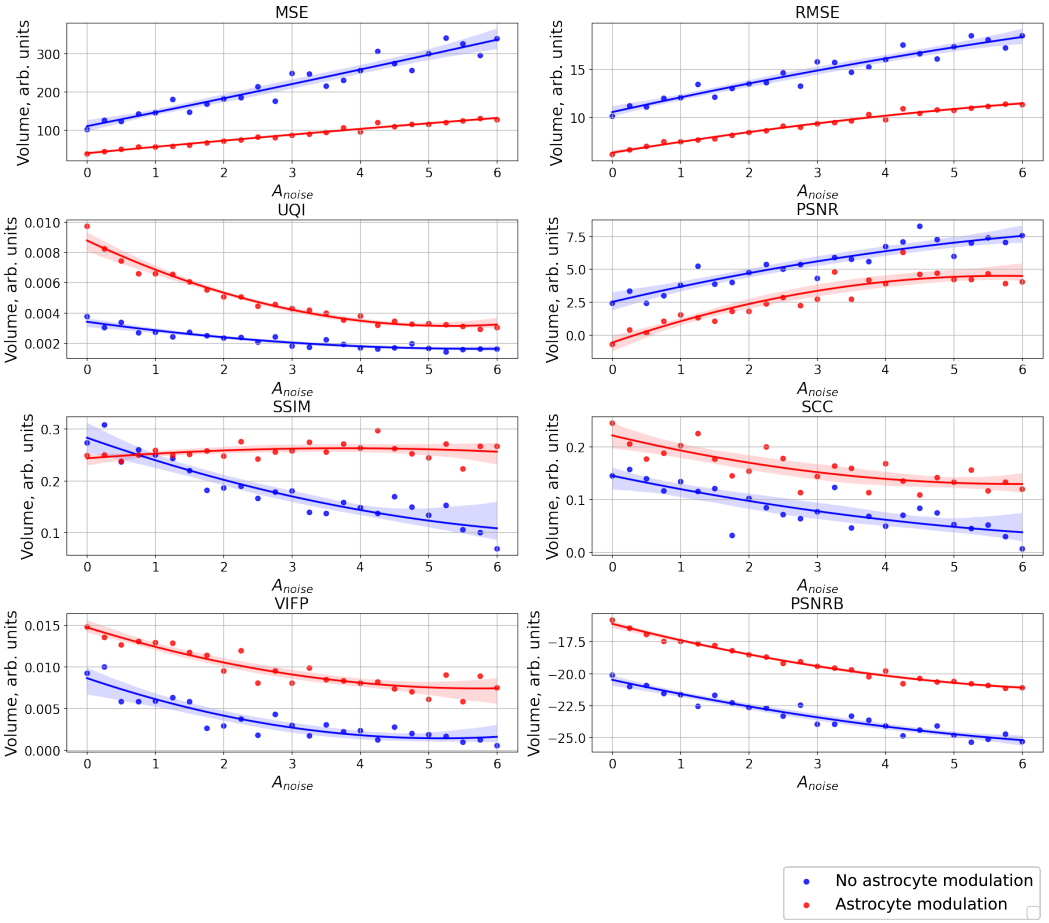

Figure S12. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S10 and Figure S11 with an image 4 from handwritten database MNIST [1] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S1.5. Number 6 from database MNIST

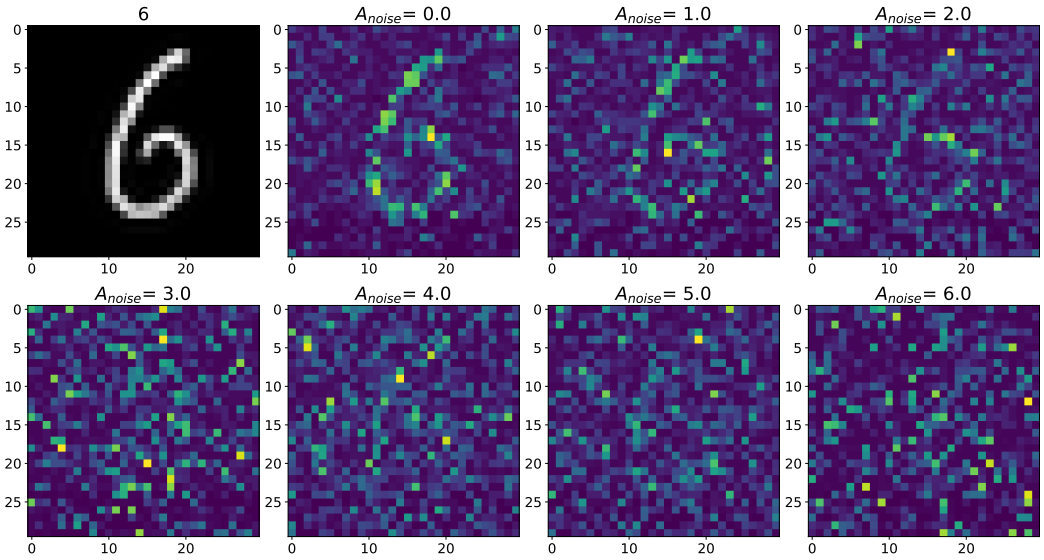

Figure S13. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 6 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

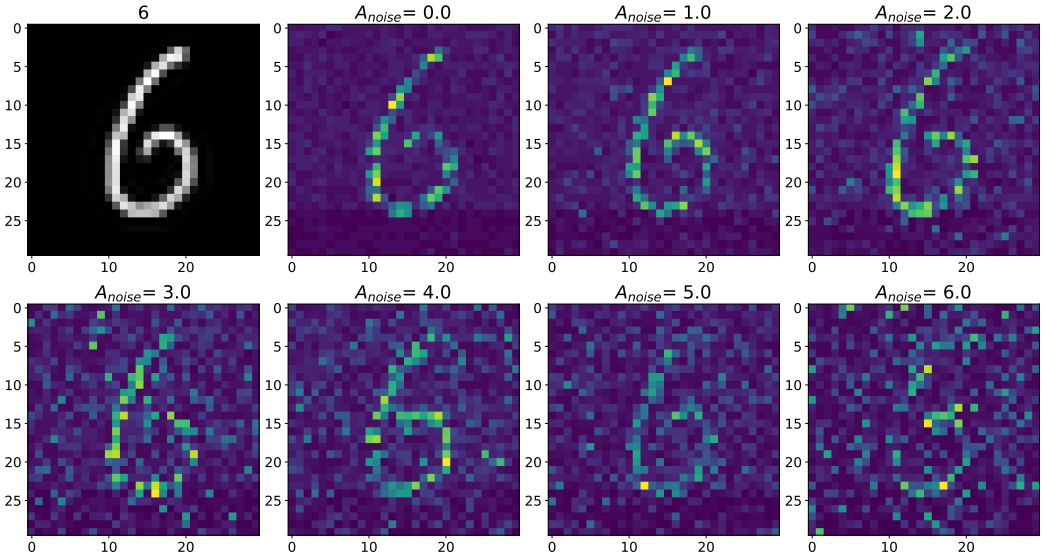

Figure S14. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 6 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

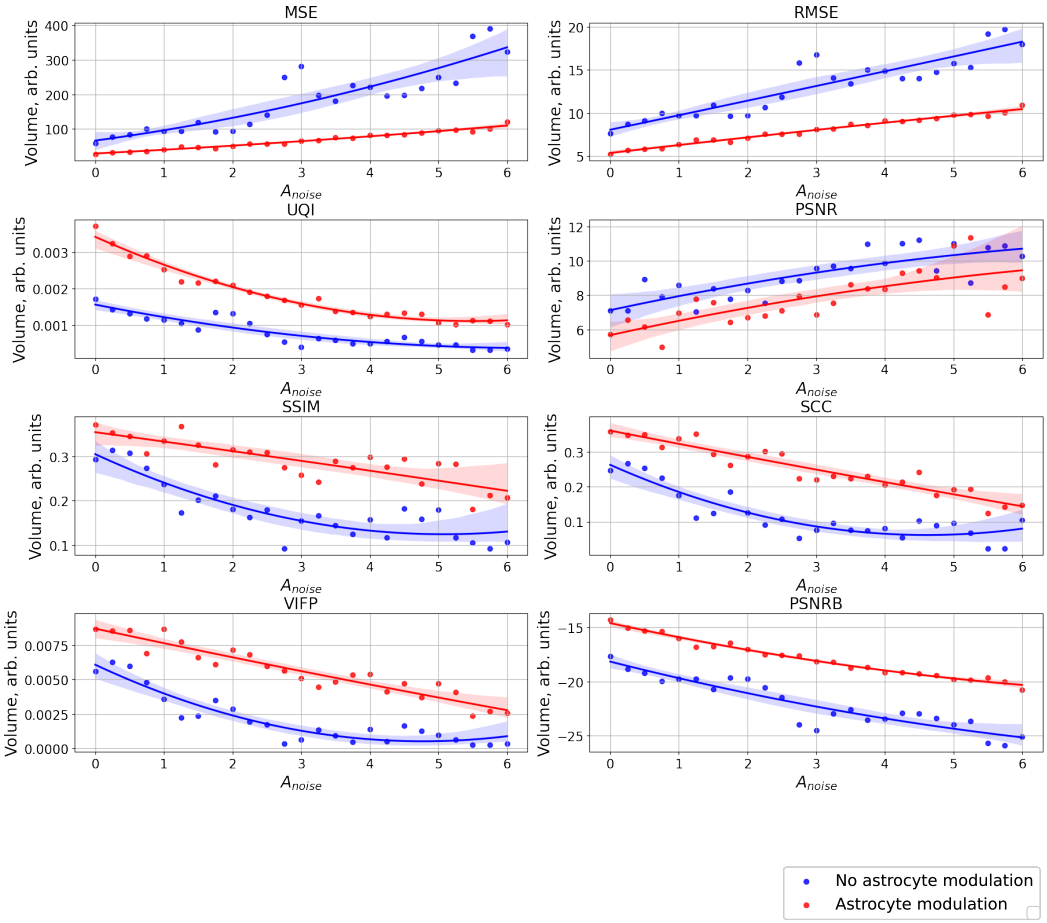

Figure S15. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S13 and Figure S14 with an image 6 from handwritten database MNIST [1] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S1.6. Number 7 from database MNIST

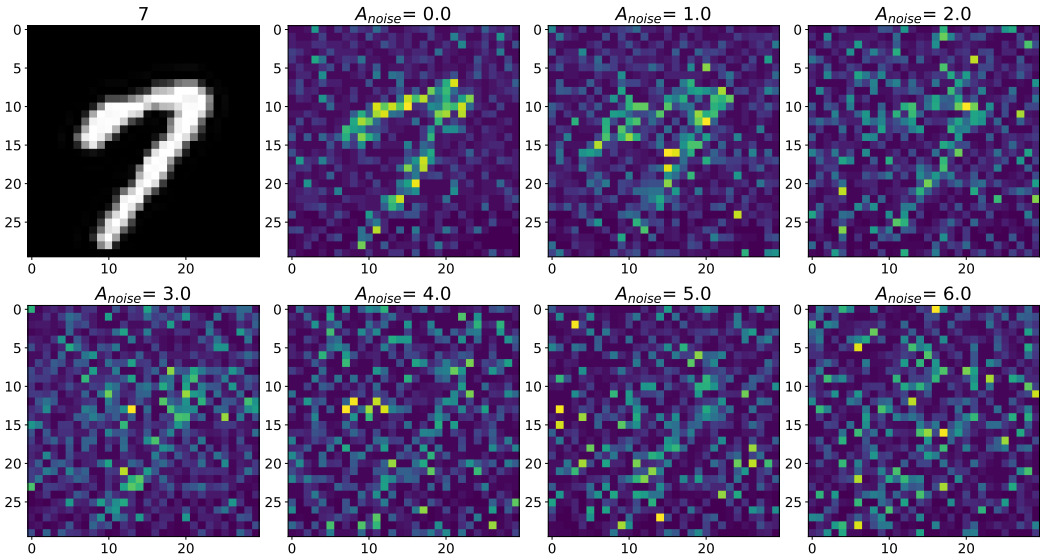

Figure S16. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 7 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

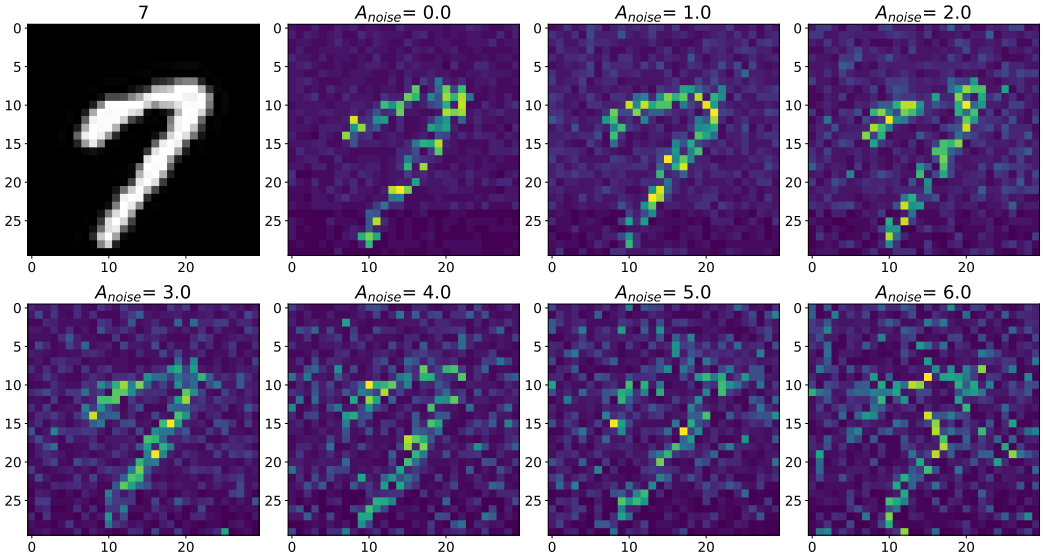

Figure S17. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 7 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

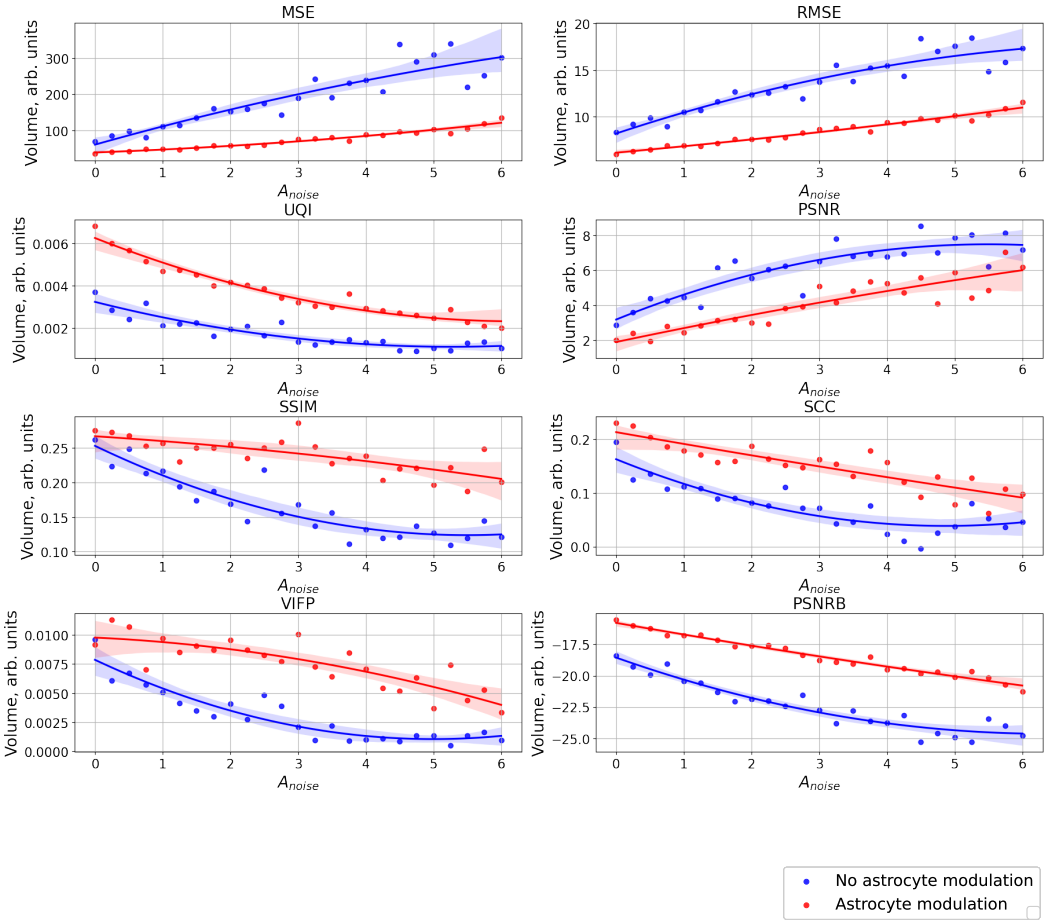

Figure S18. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S16 and Figure S17 with an image 7 from handwritten database MNIST [1] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S1.7. Number 8 from database MNIST

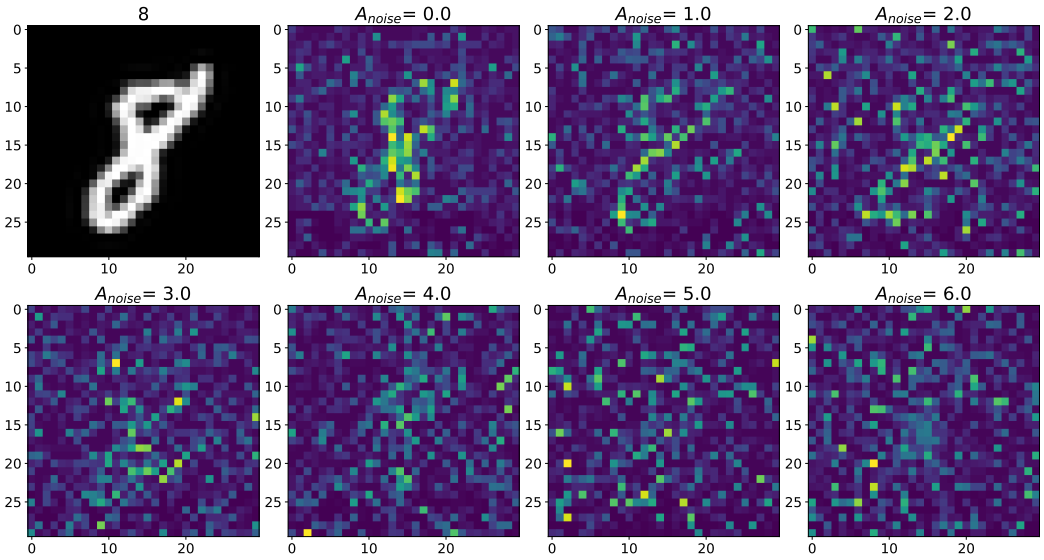

Figure S19. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 8 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

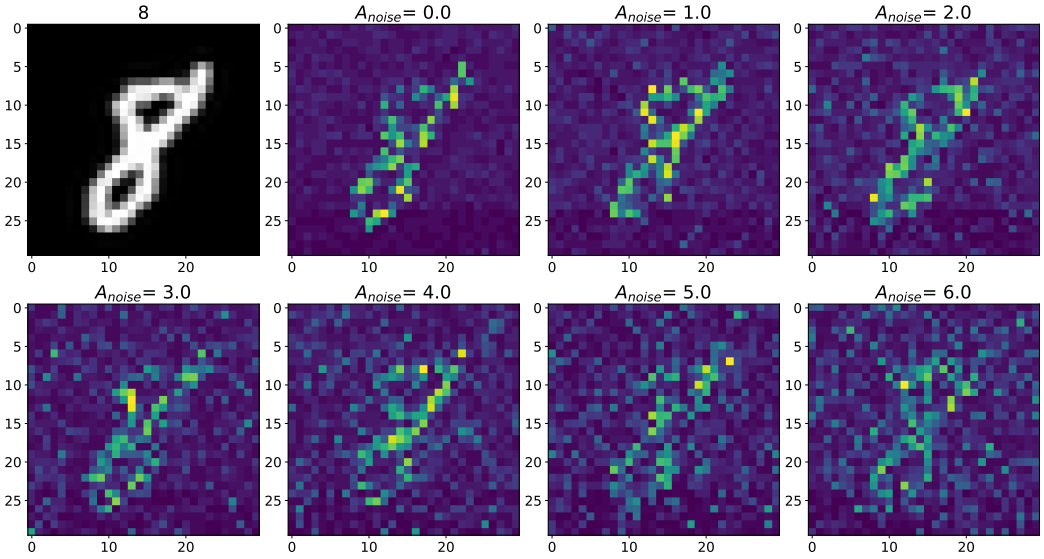

Figure S20. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 8 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

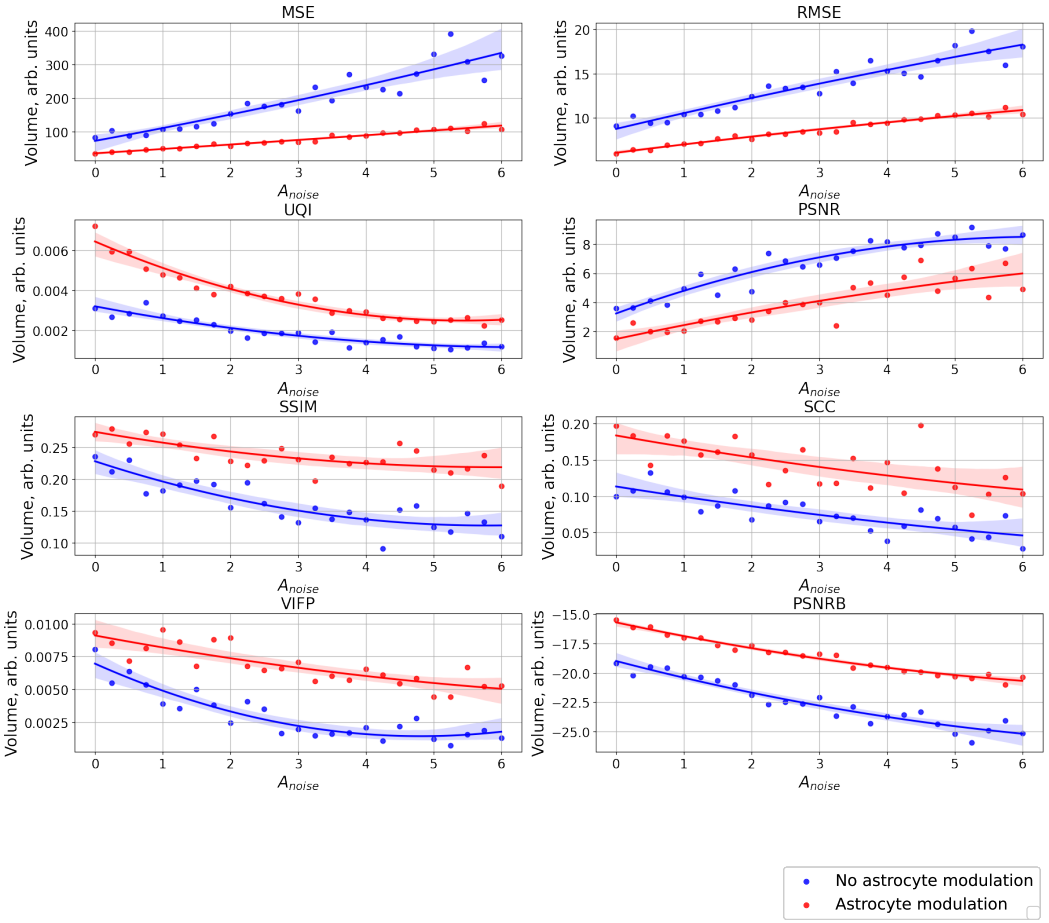

Figure S21. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S19 and Figure S20 with an image 8 from handwritten database MNIST [1] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S1.8. Number 9 from database MNIST

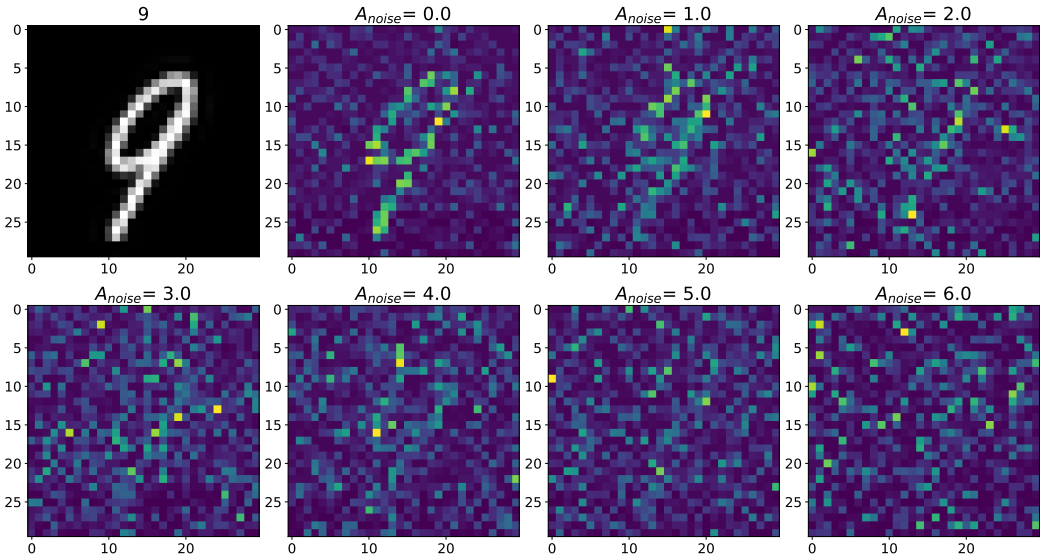

Figure S22. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 9 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

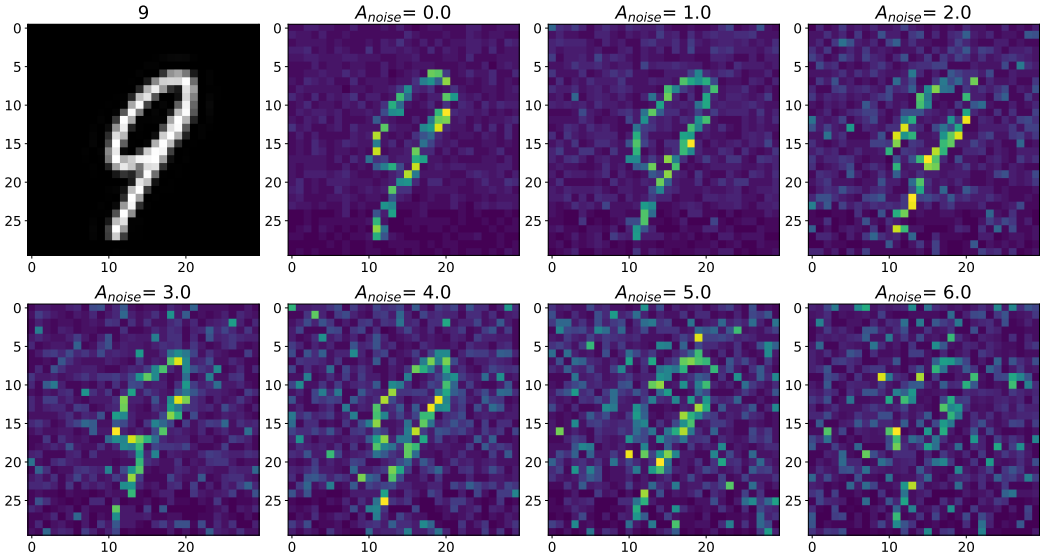

Figure S23. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 9 from handwritten database MNIST [1] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

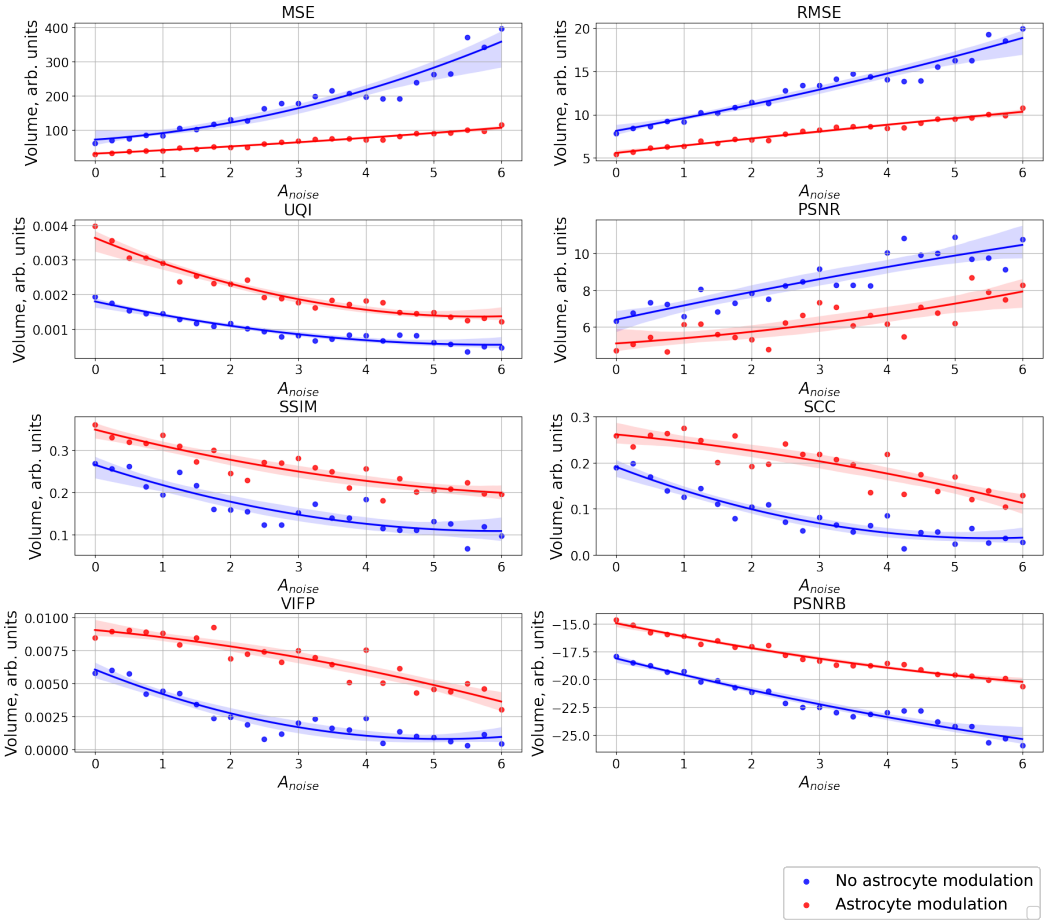

Figure S24. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S22 and Figure S23 with an image 9 from handwritten database MNIST [1] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2. Cases with category from database Fashion-MNIST

S2.1. Category 0 from database Fashion-MNIST

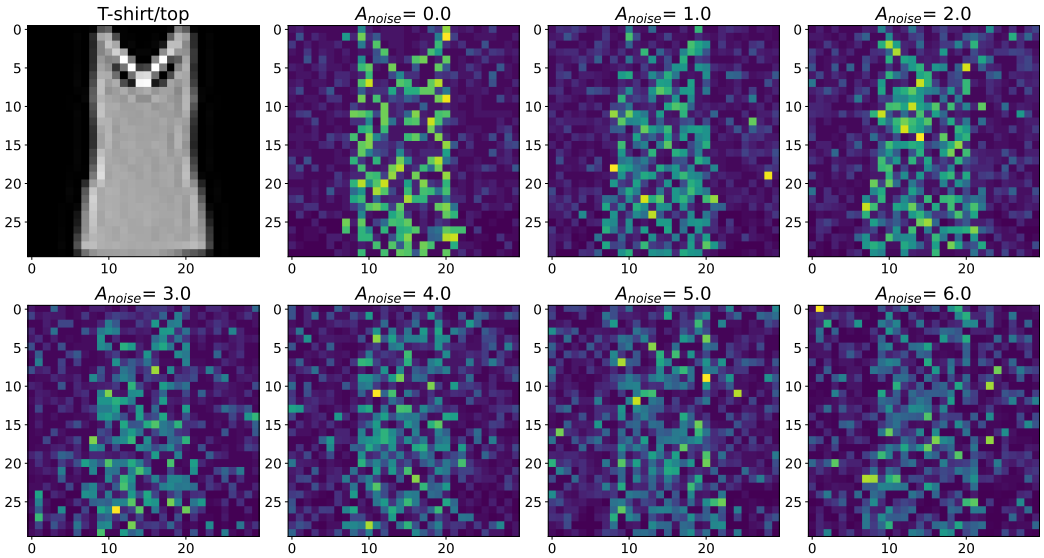

Figure S25. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 0 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

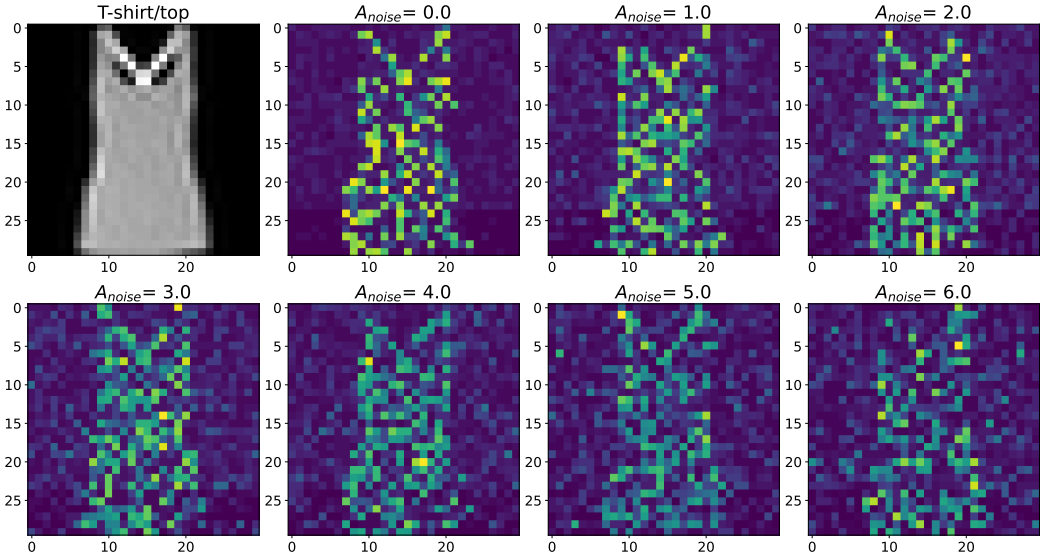

Figure S26. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 0 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

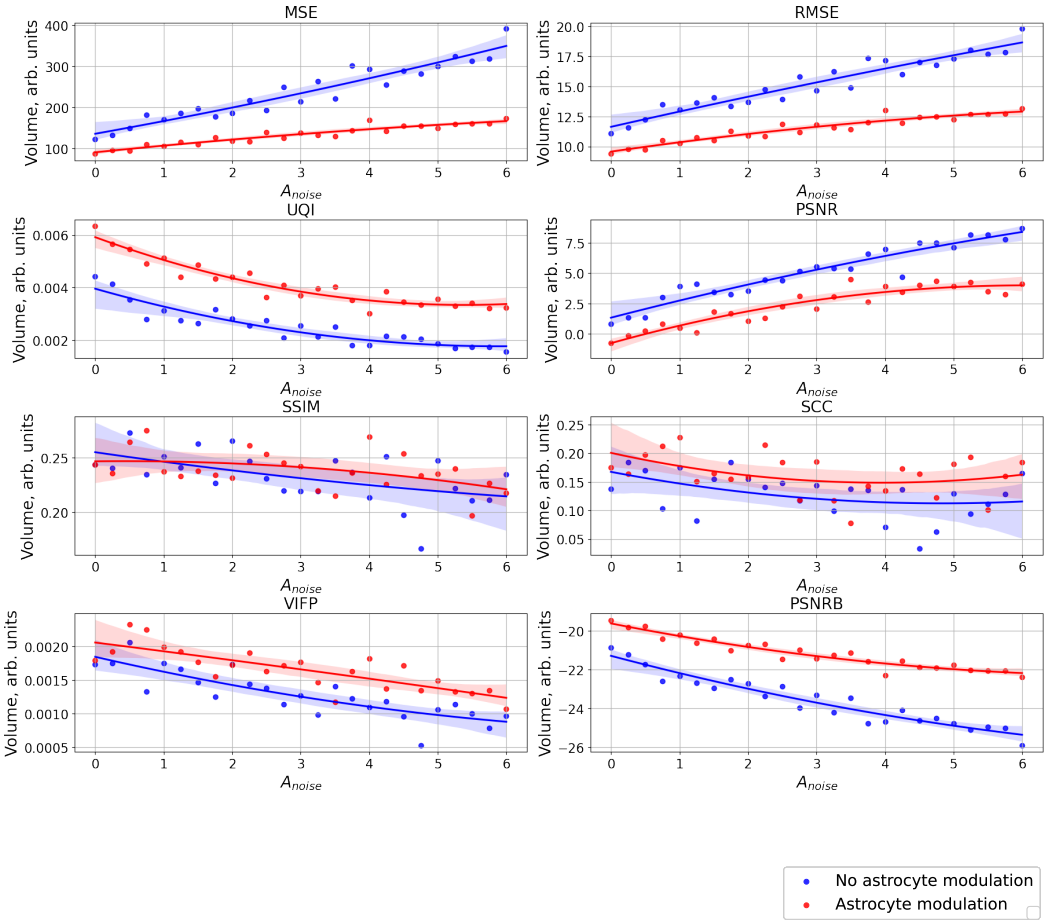

Figure S27. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S25 and Figure S26 with an image category 0 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.2. Category 1 from database Fashion-MNIST

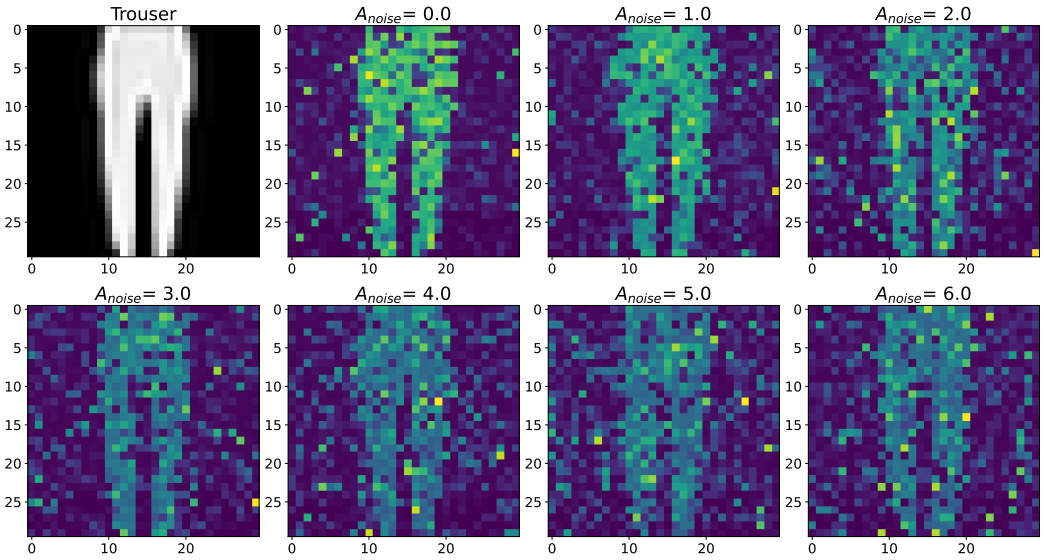

Figure S28. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 1 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

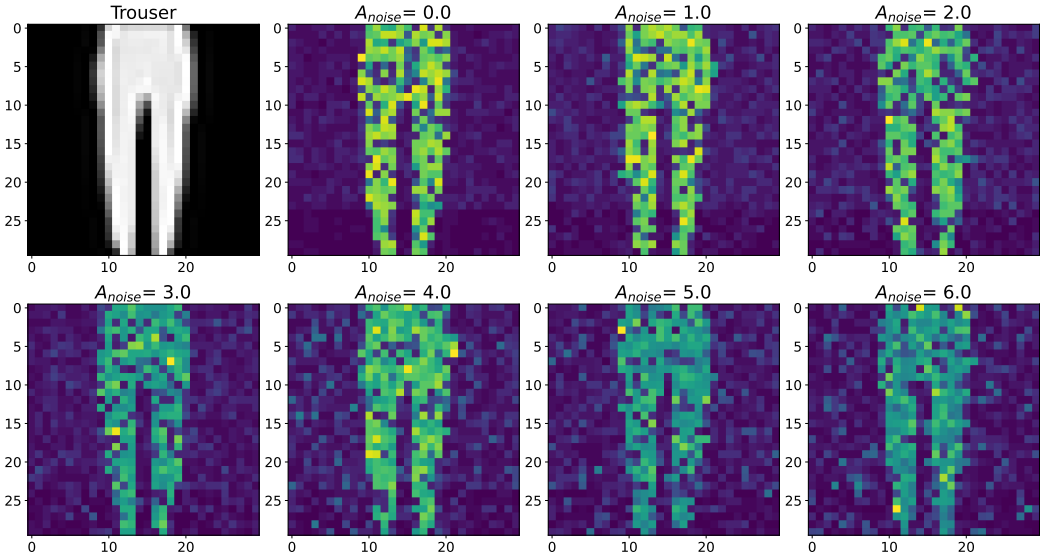

Figure S29. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 1 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

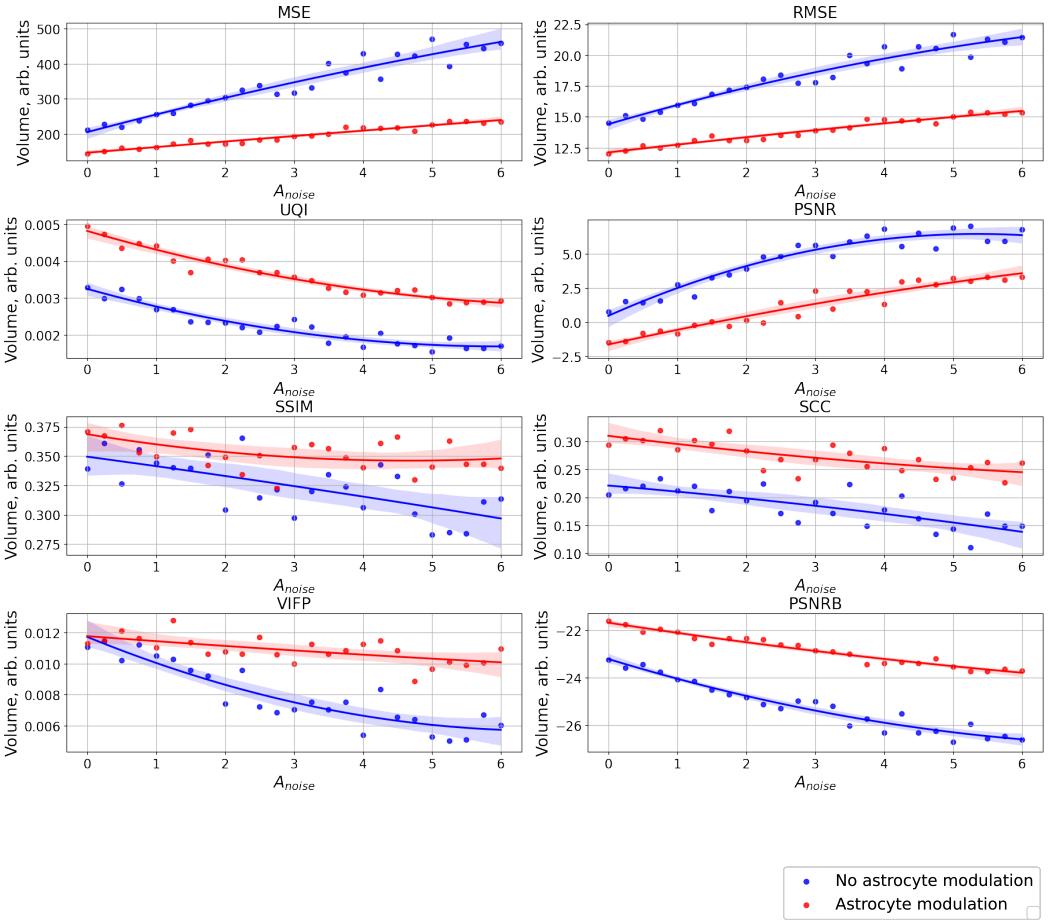

Figure S30. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S28 and Figure S29 with an image category 1 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.3. Category 2 from database Fashion-MNIST

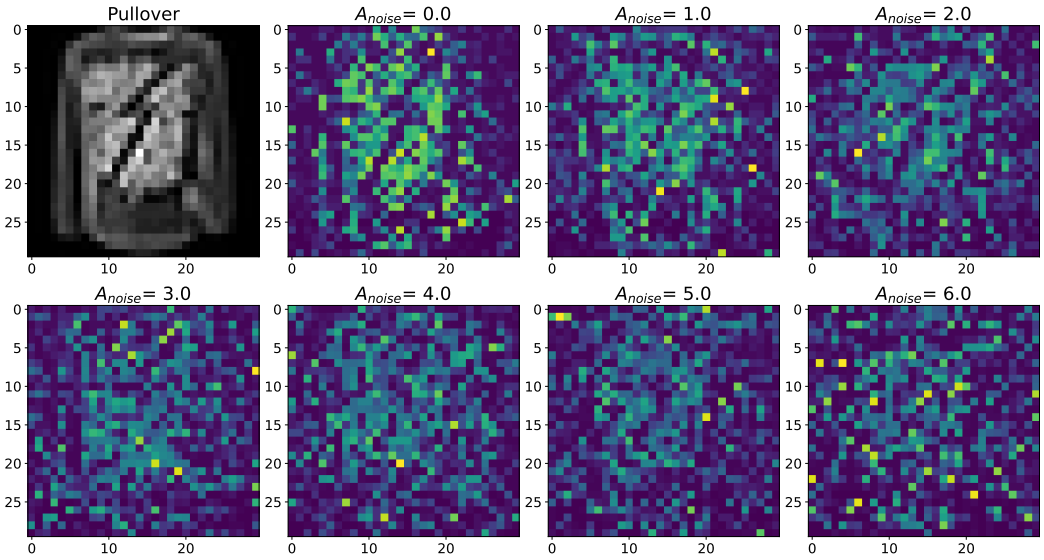

Figure S31. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 2 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

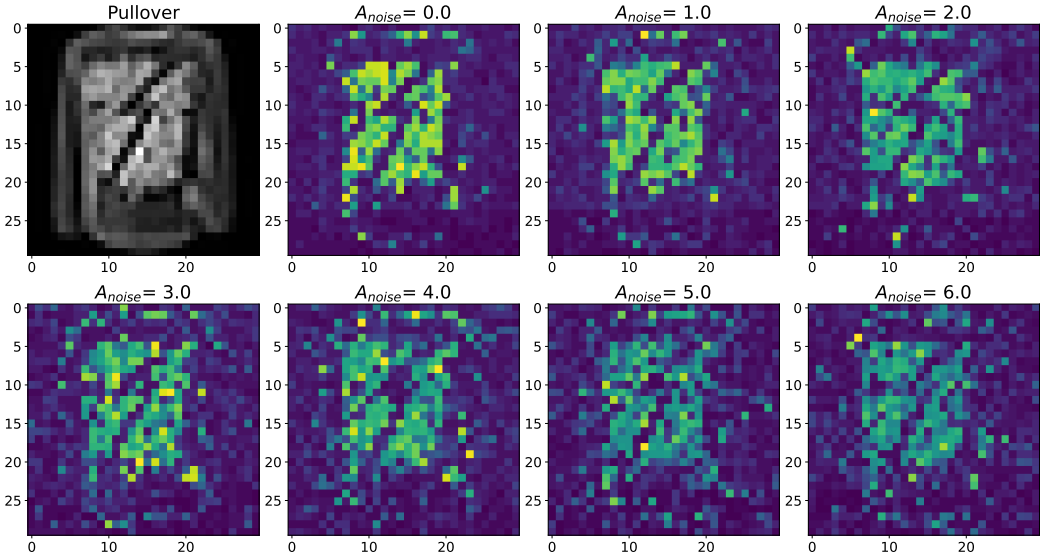

Figure S32. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 2 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

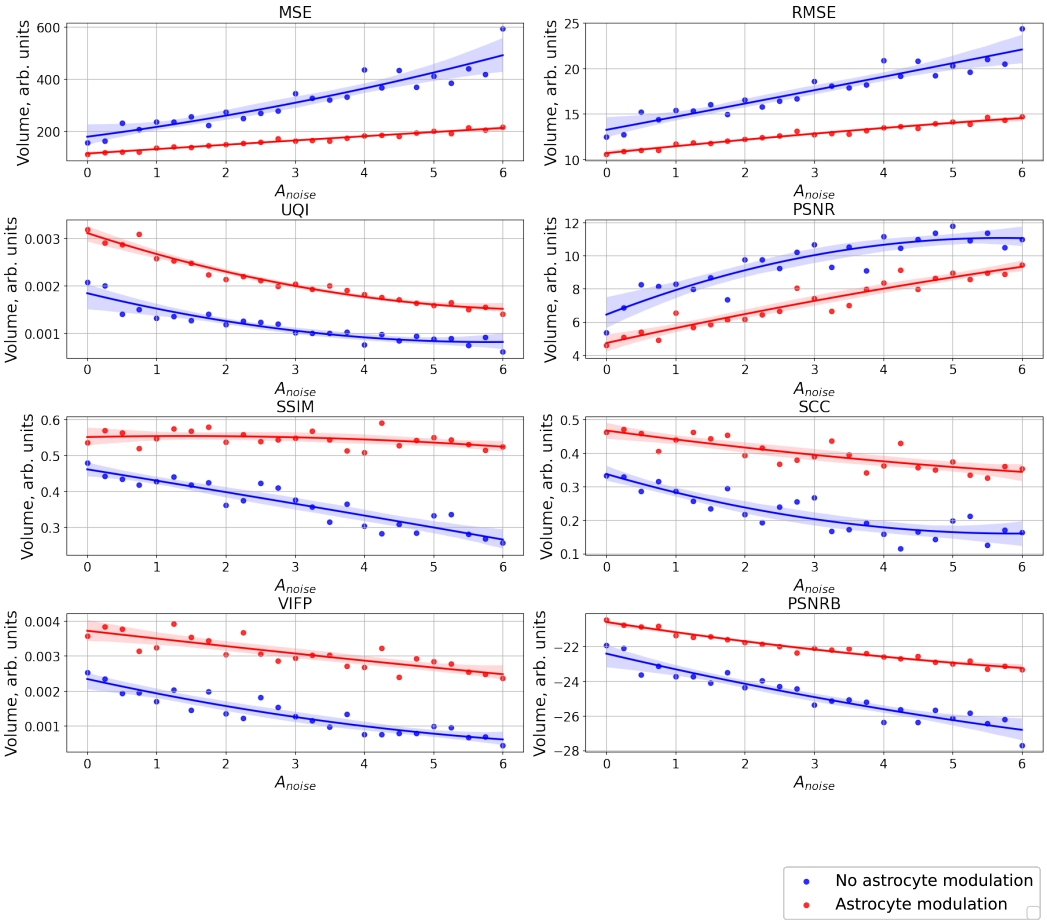

Figure S33. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S31 and Figure S32 with an image category 2 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.4. Category 3 from database Fashion-MNIST

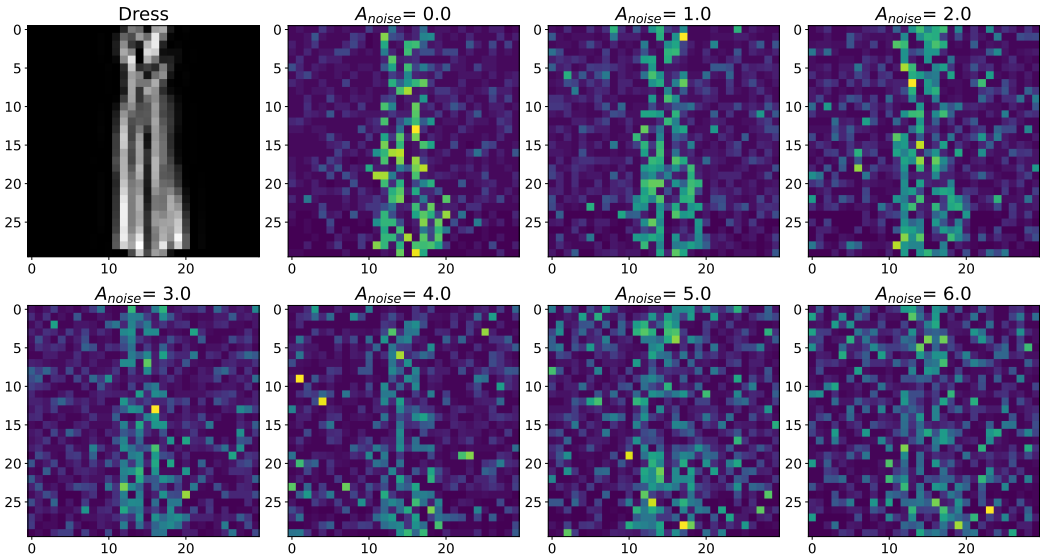

Figure S34. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 3 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

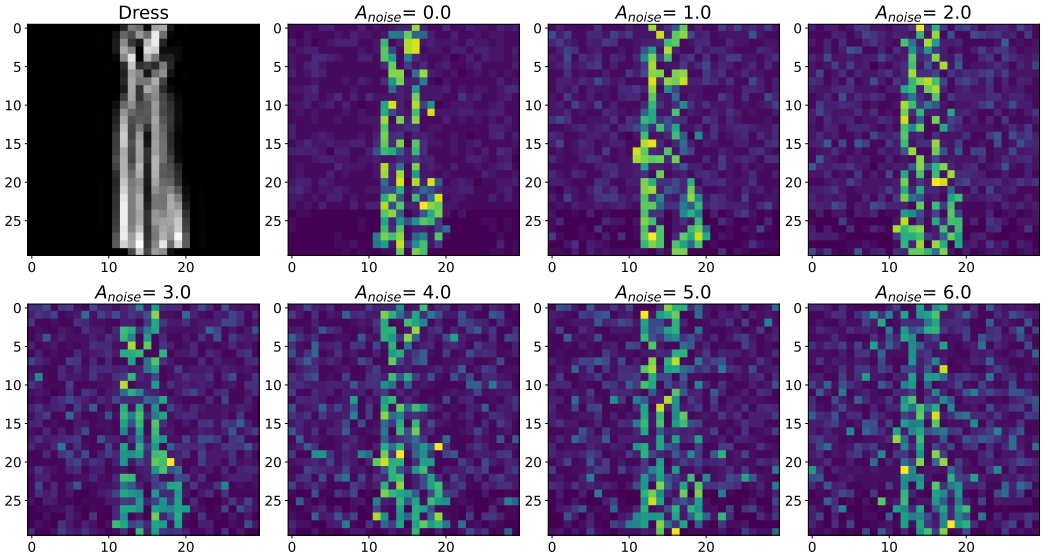

Figure S35. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 3 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

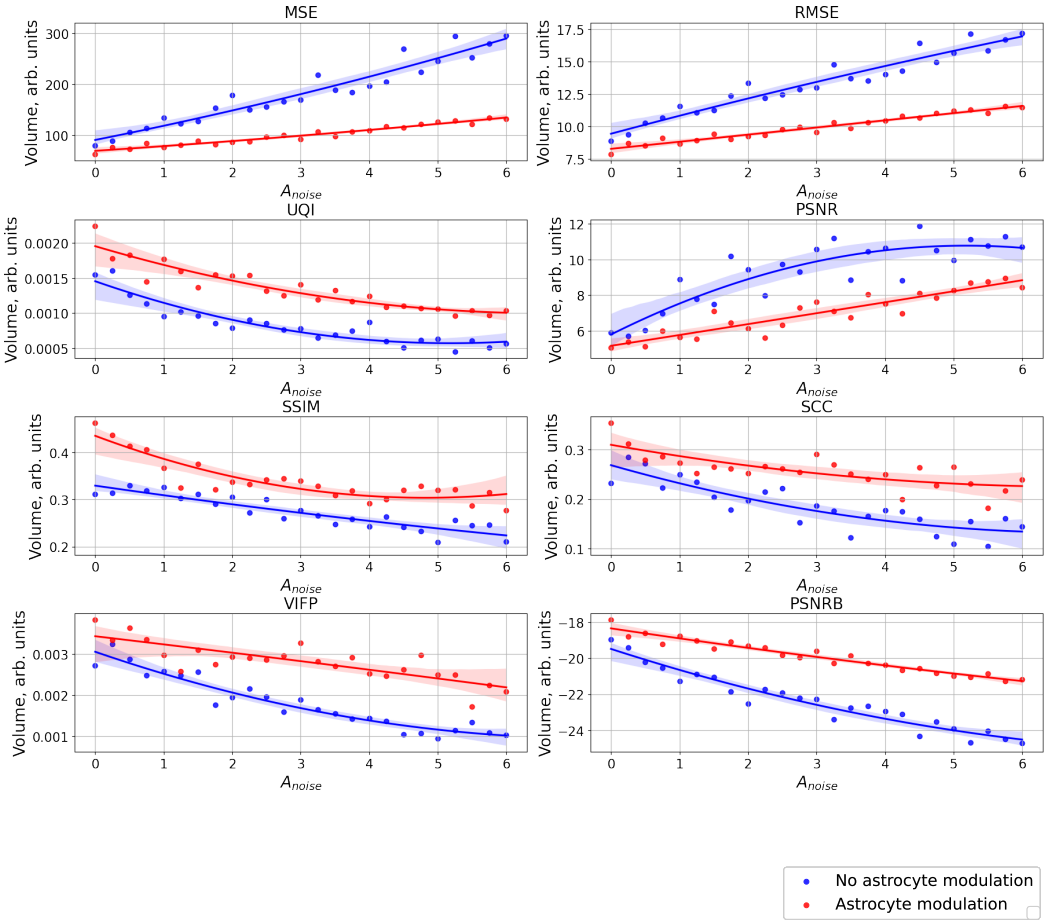

Figure S36. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S34 and Figure S35 with an image category 3 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.5. Category 4 from database Fashion-MNIST

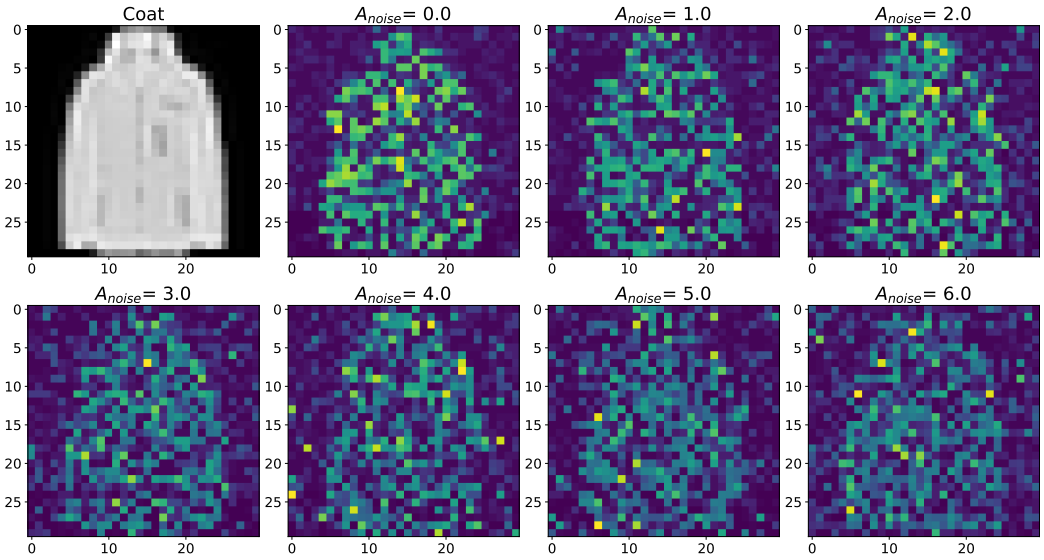

Figure S37. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 4 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

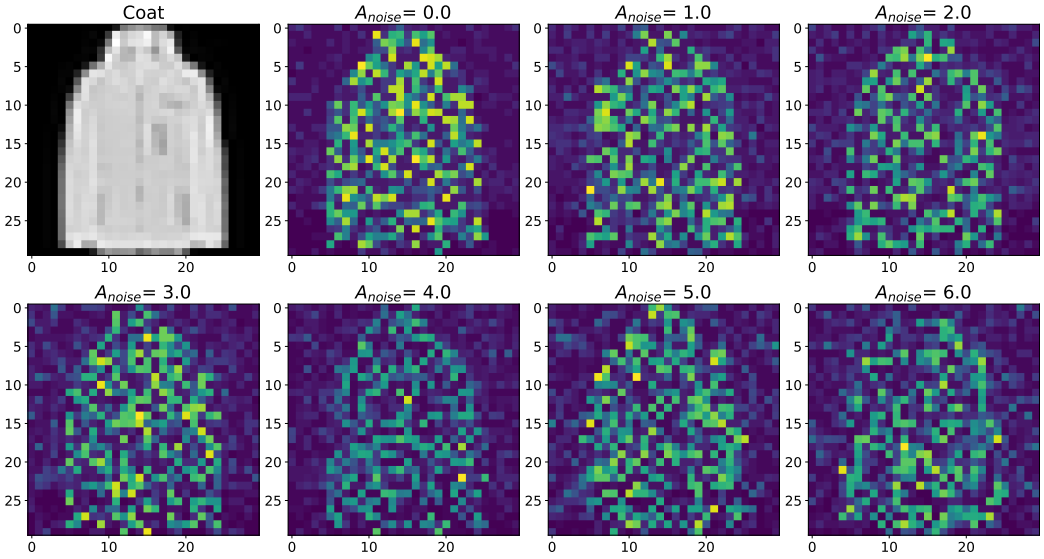

Figure S38. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 4 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

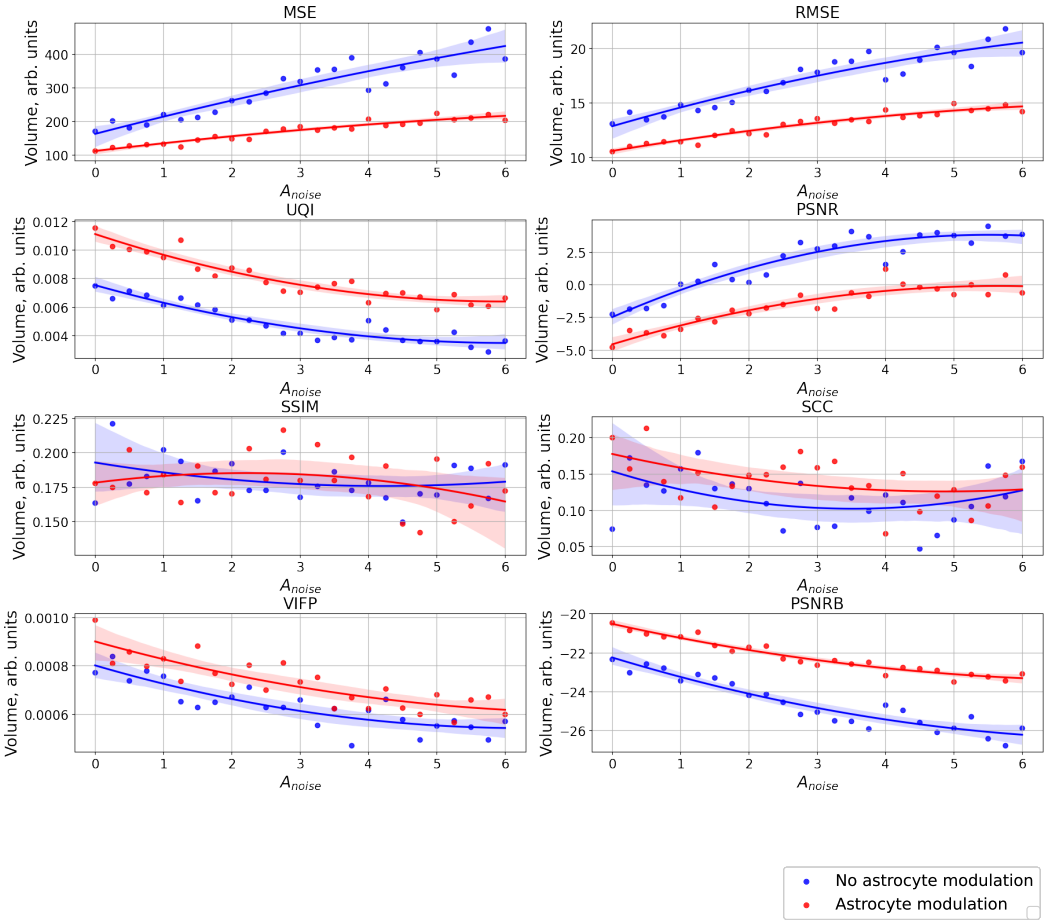

Figure S39. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S37 and Figure S38 with an image category 4 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.6. Category 5 from database Fashion-MNIST

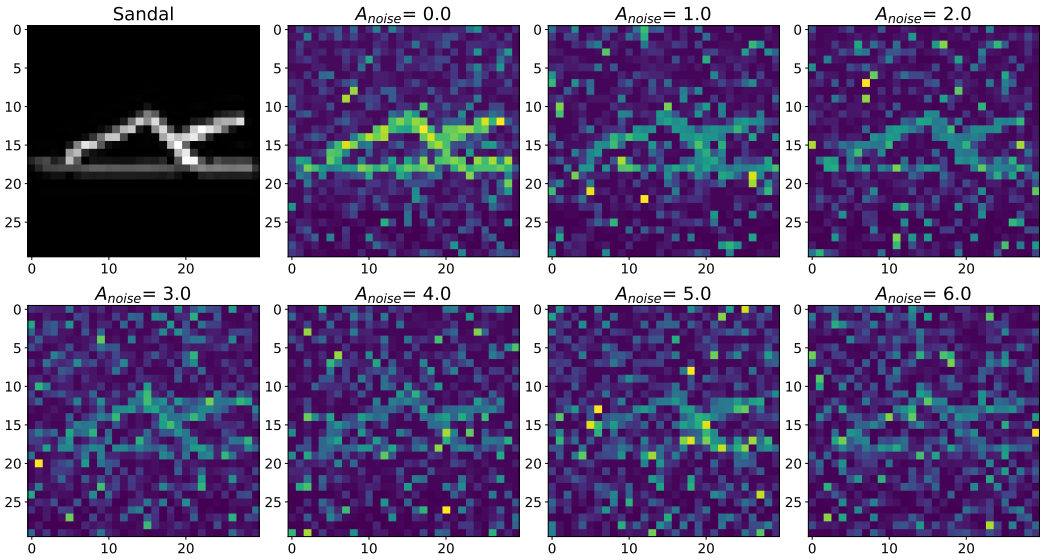

Figure S40. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 5 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

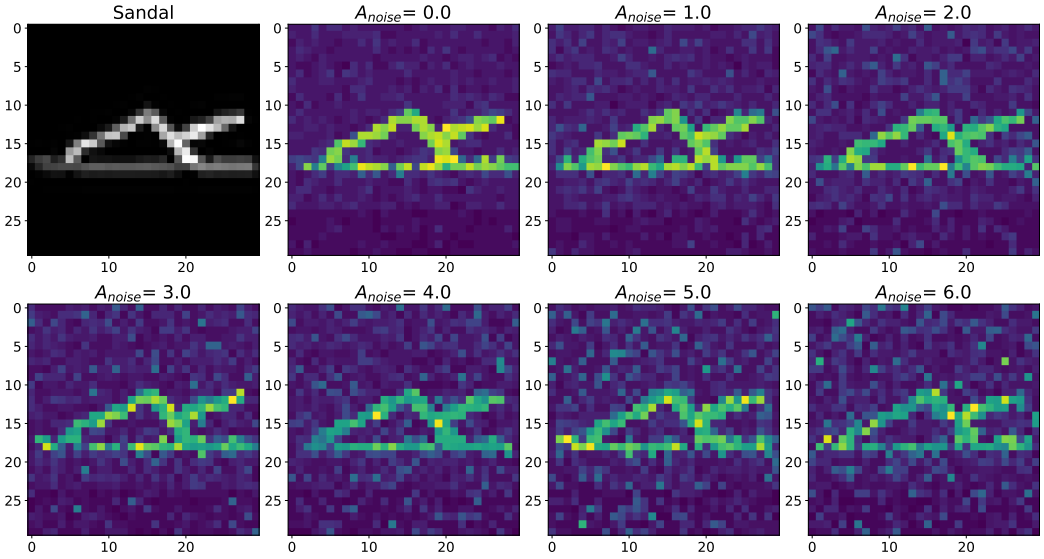

Figure S41. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 5 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

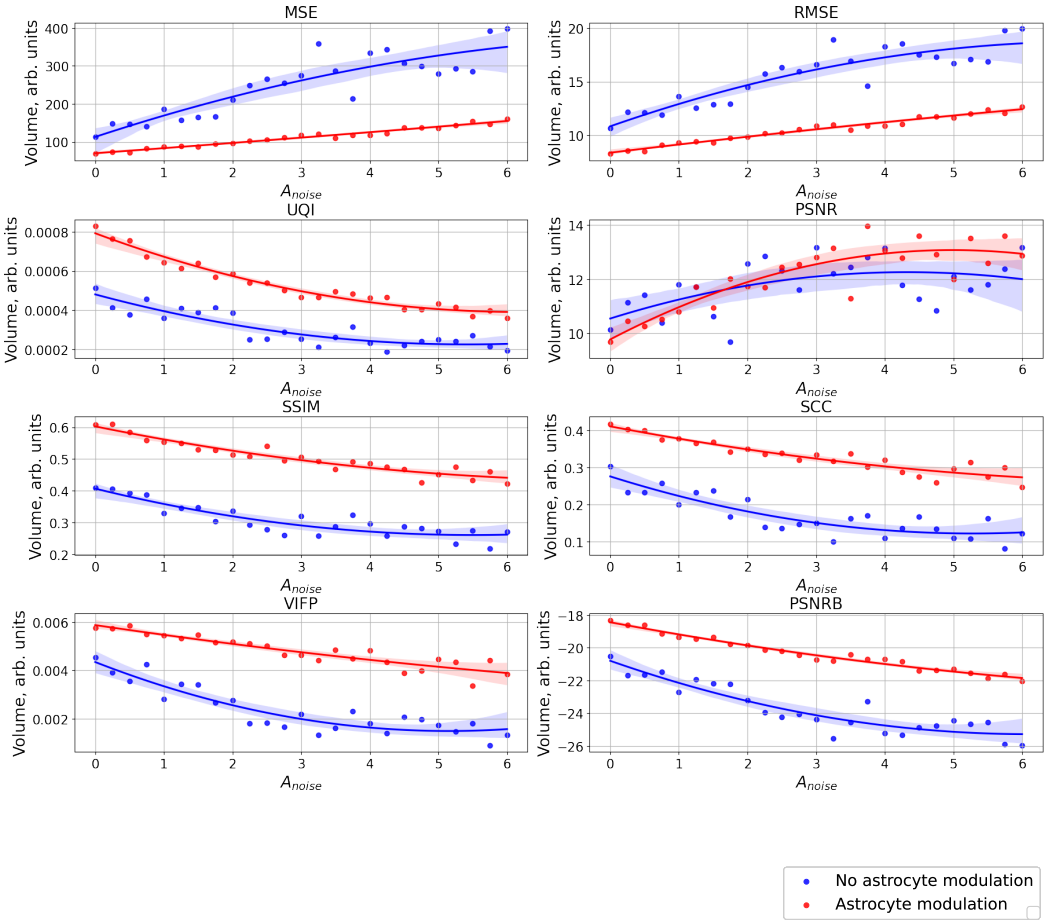

Figure S42. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S40 and Figure S41 with an image category 5 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.7. Category 6 from database Fashion-MNIST

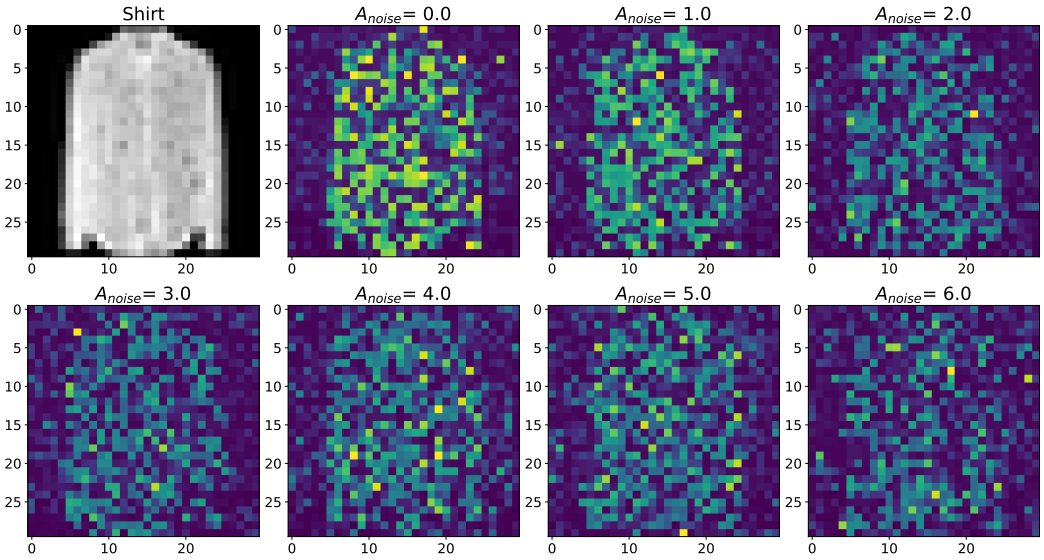

Figure S43. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 6 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

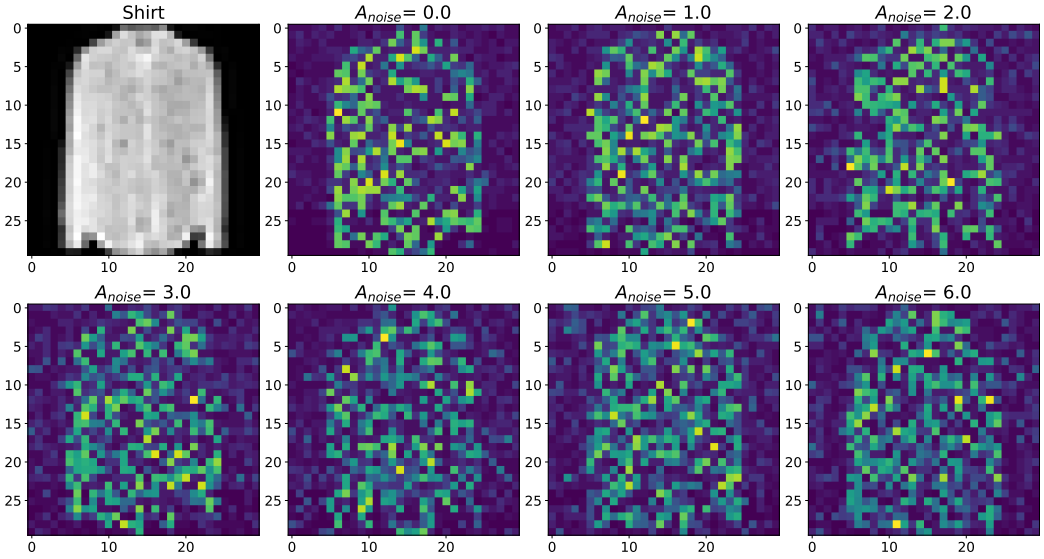

Figure S44. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 6 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

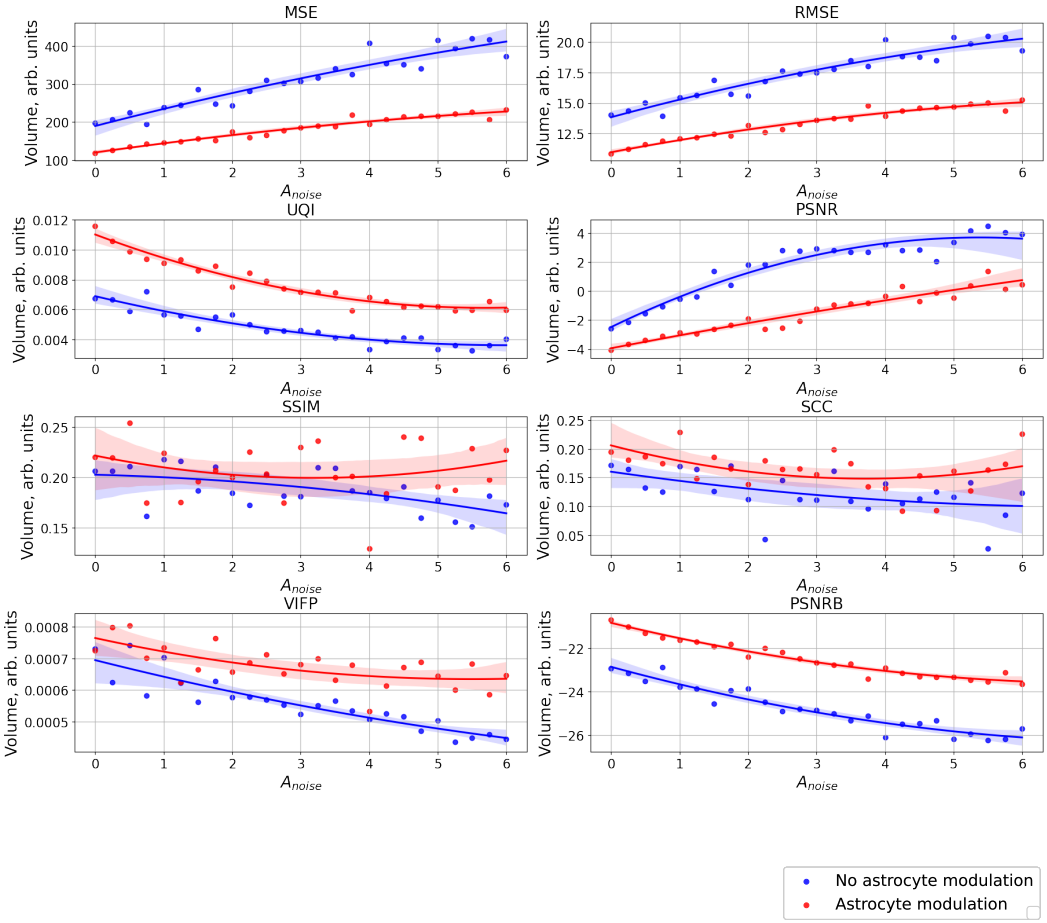

Figure S45. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S43 and Figure S44 with an image category 6 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.8. Category 7 from database Fashion-MNIST

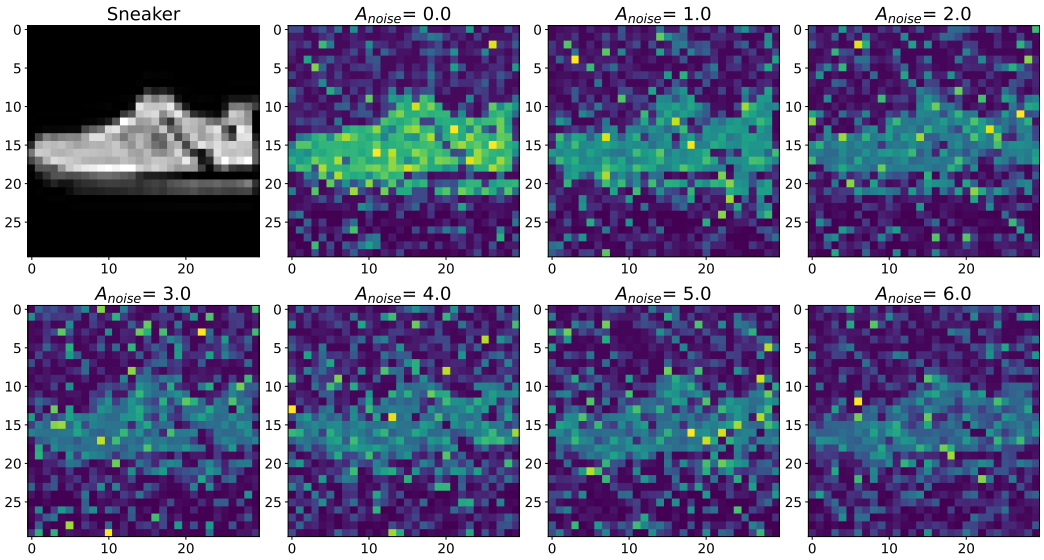

Figure S46. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 7 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

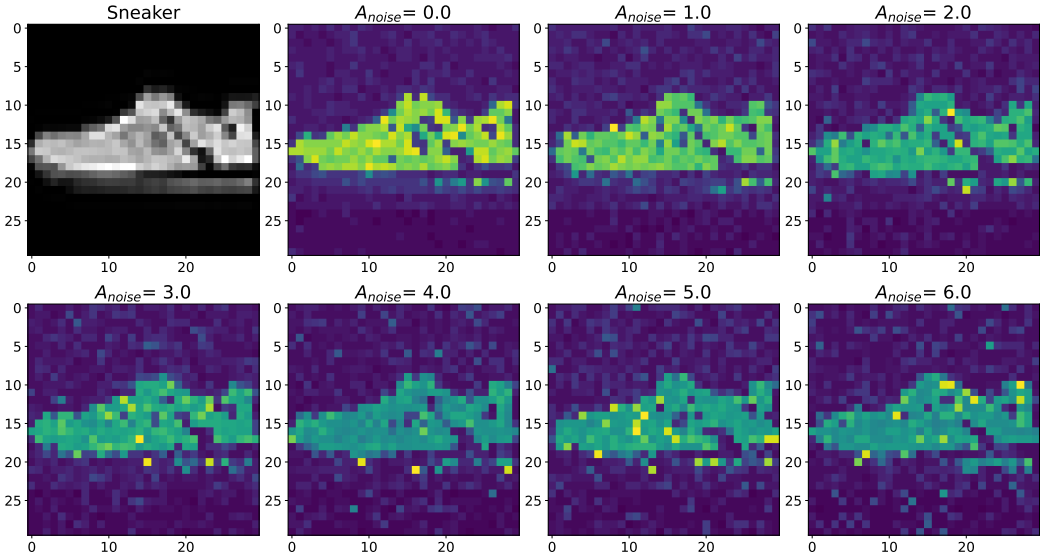

Figure S47. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 7 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

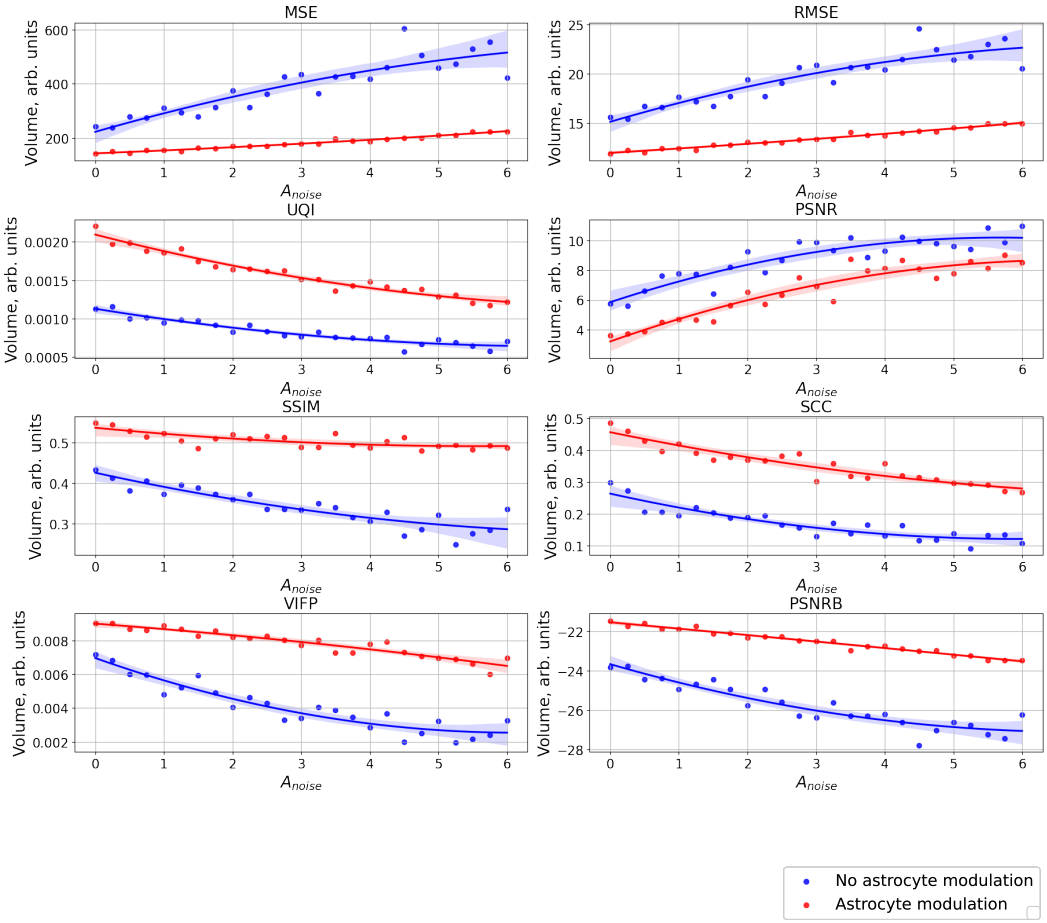

Figure S48. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S46 and Figure S47 with an image category 7 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.9. Category 8 from database Fashion-MNIST

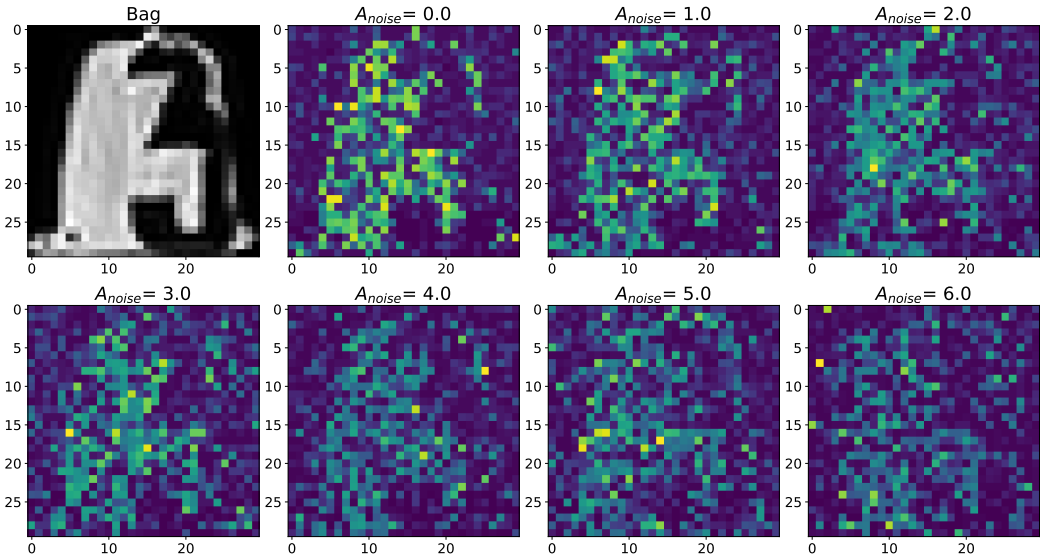

Figure S49. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 8 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

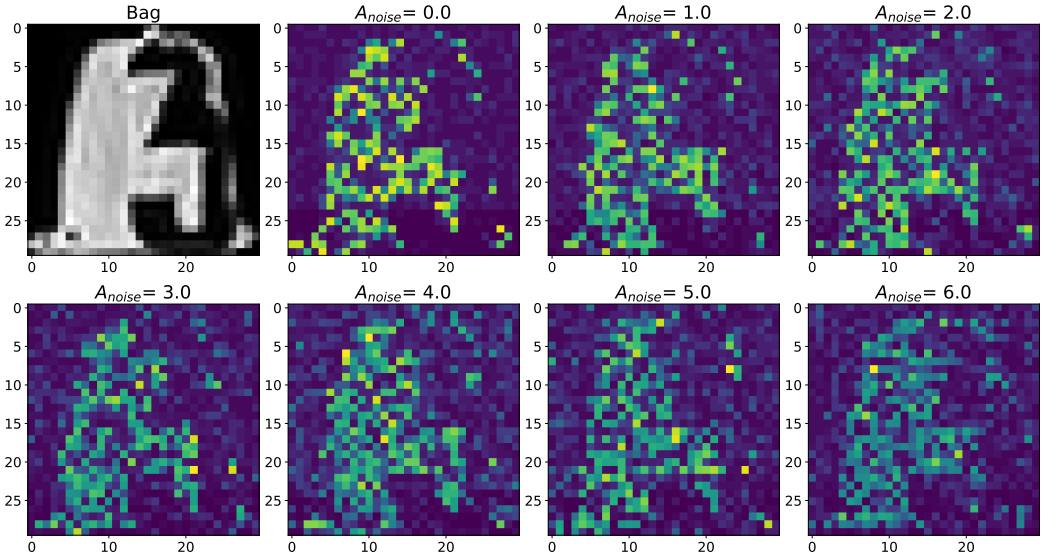

Figure S50. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 8 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

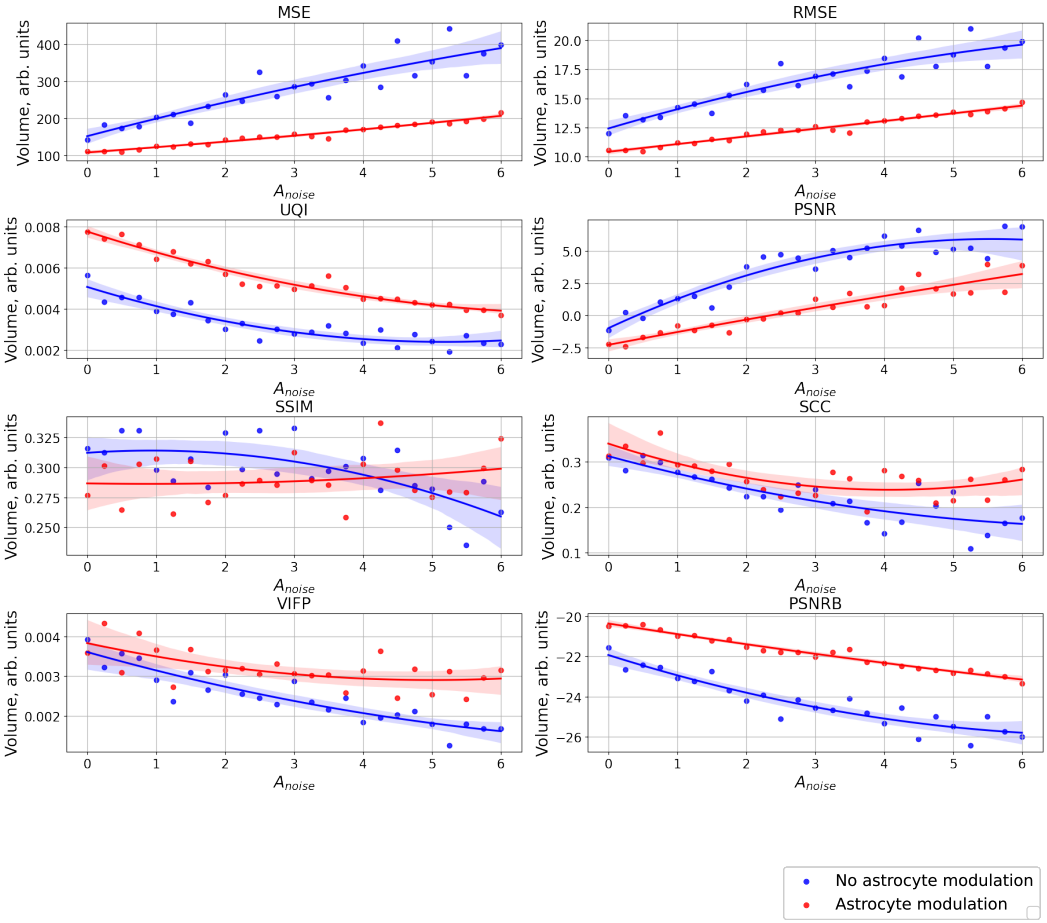

Figure S51. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S49 and Figure S50 with an image category 8 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S2.10. Category 9 from database Fashion-MNIST

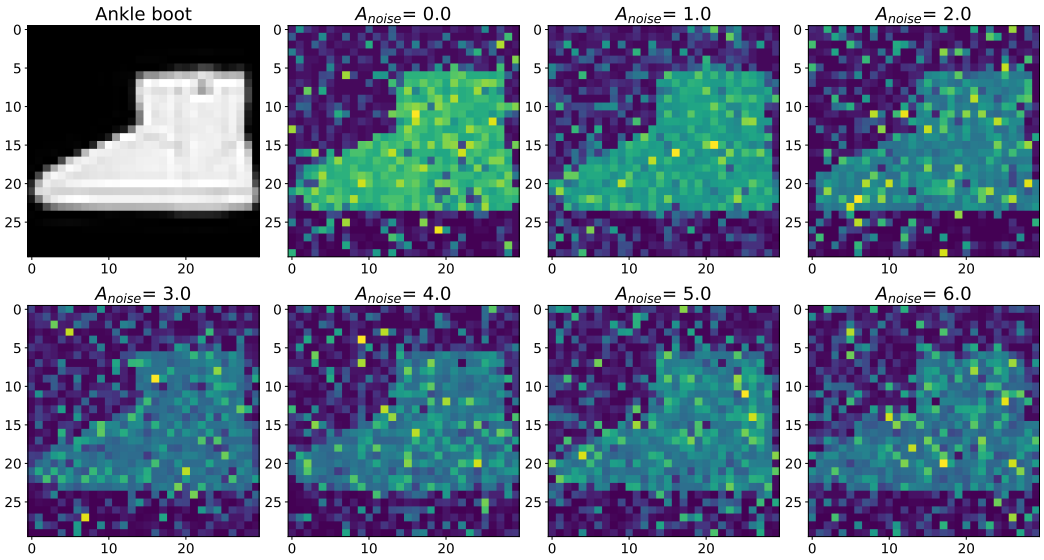

Figure S52. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 9 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

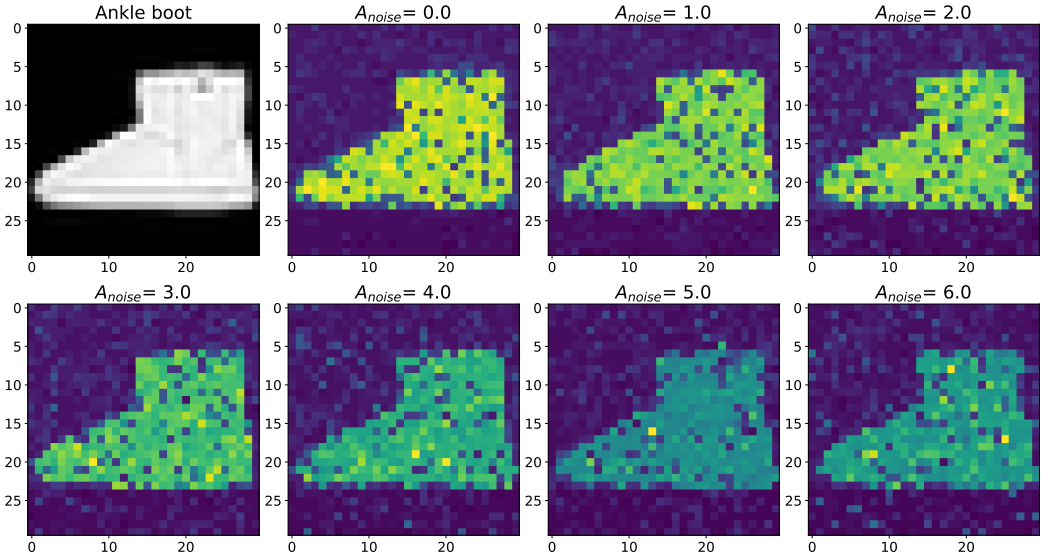

Figure S53. Changes in the spatial sweep of the spike neural network during the representation of the supplied image category 9 from database Fashion-MNIST [2] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

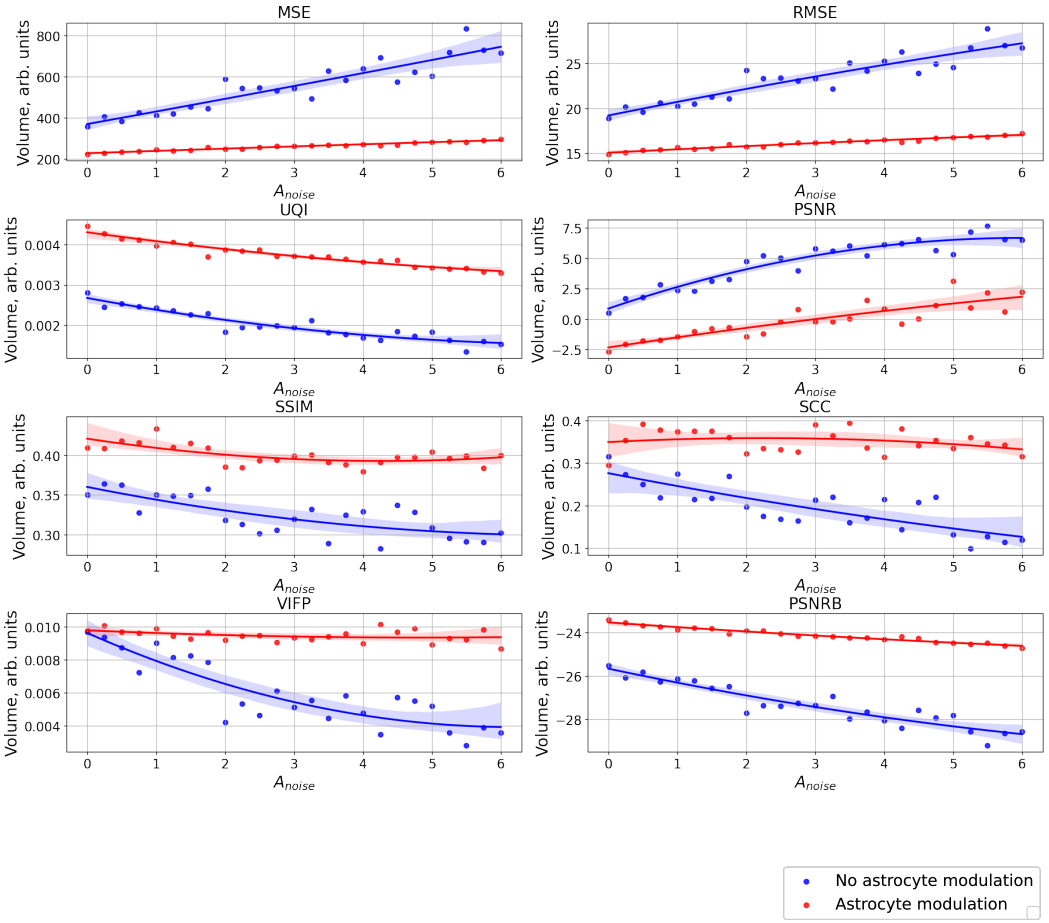

Figure S54. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S49 and Figure S50 with an image category 9 from database Fashion-MNIST [2] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3. Cases with numbers from database SVHN

S3.1. Number 0 from database SVHN

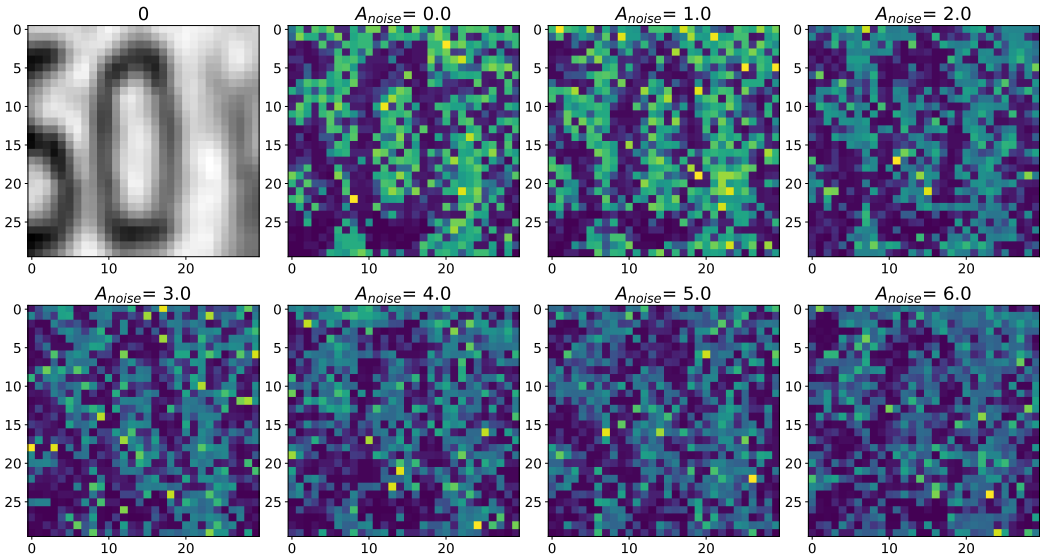

Figure S55. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 0 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

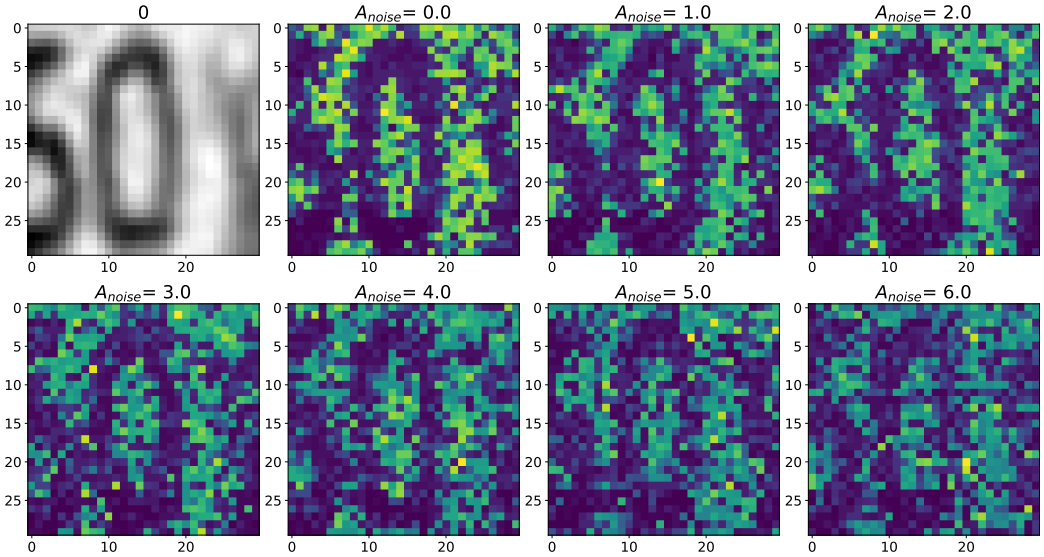

Figure S56. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 0 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

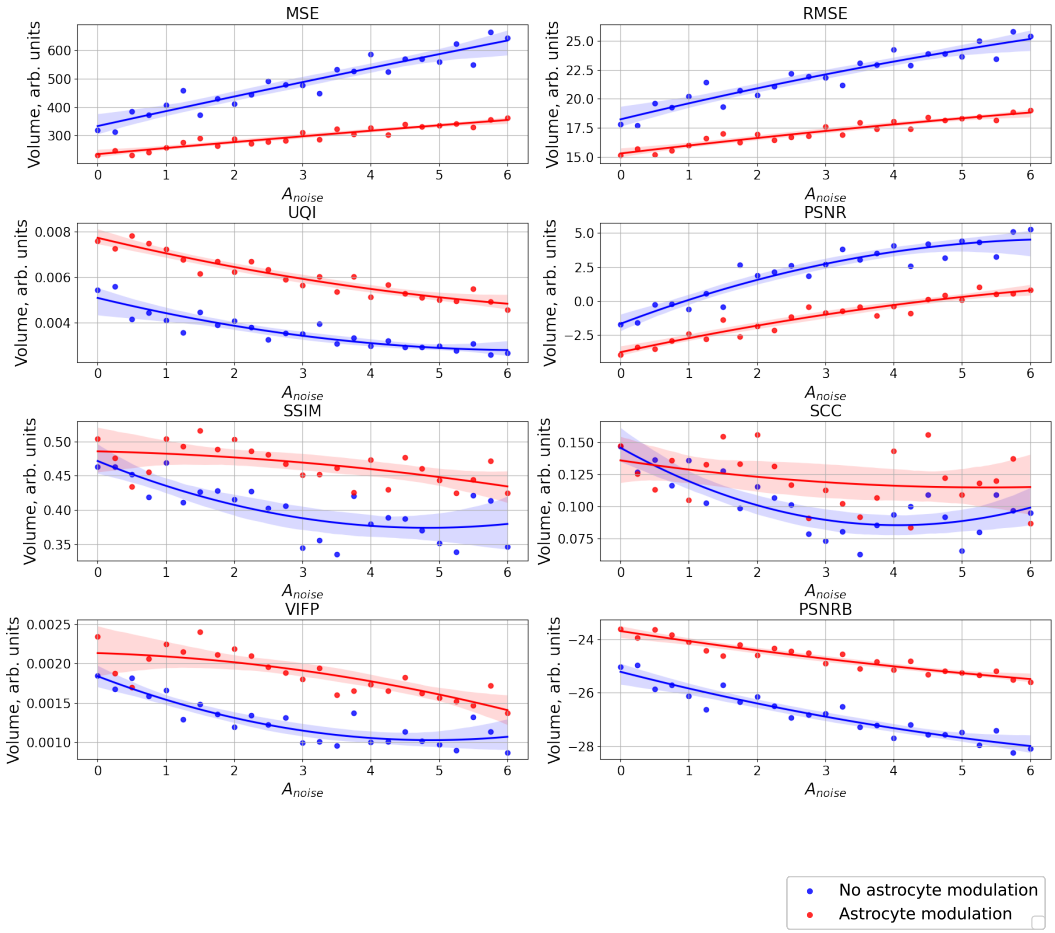

Figure S57. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S55 and Figure S56 with an image 0 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.2. Number 1 from database SVHN

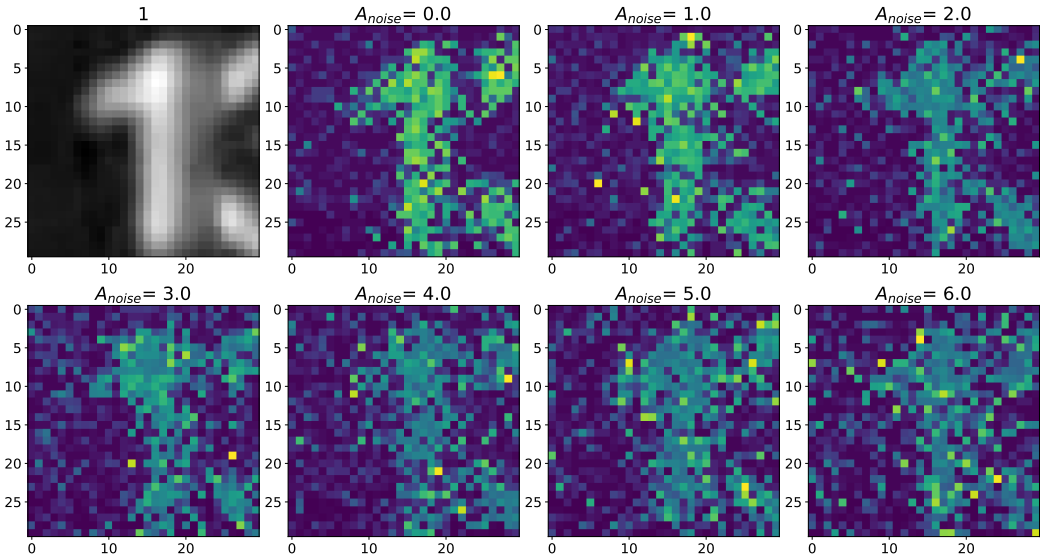

Figure S58. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 1 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

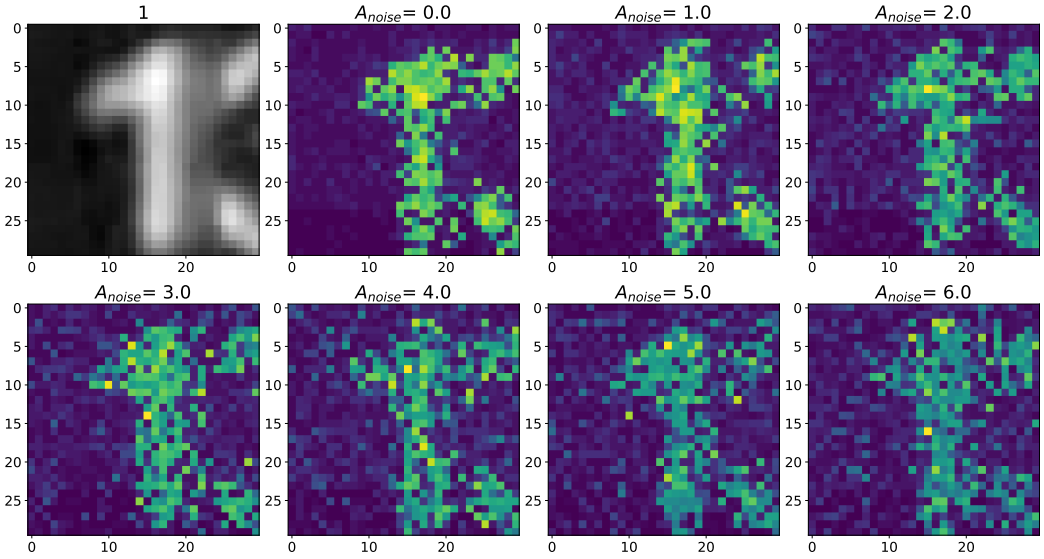

Figure S59. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 1 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

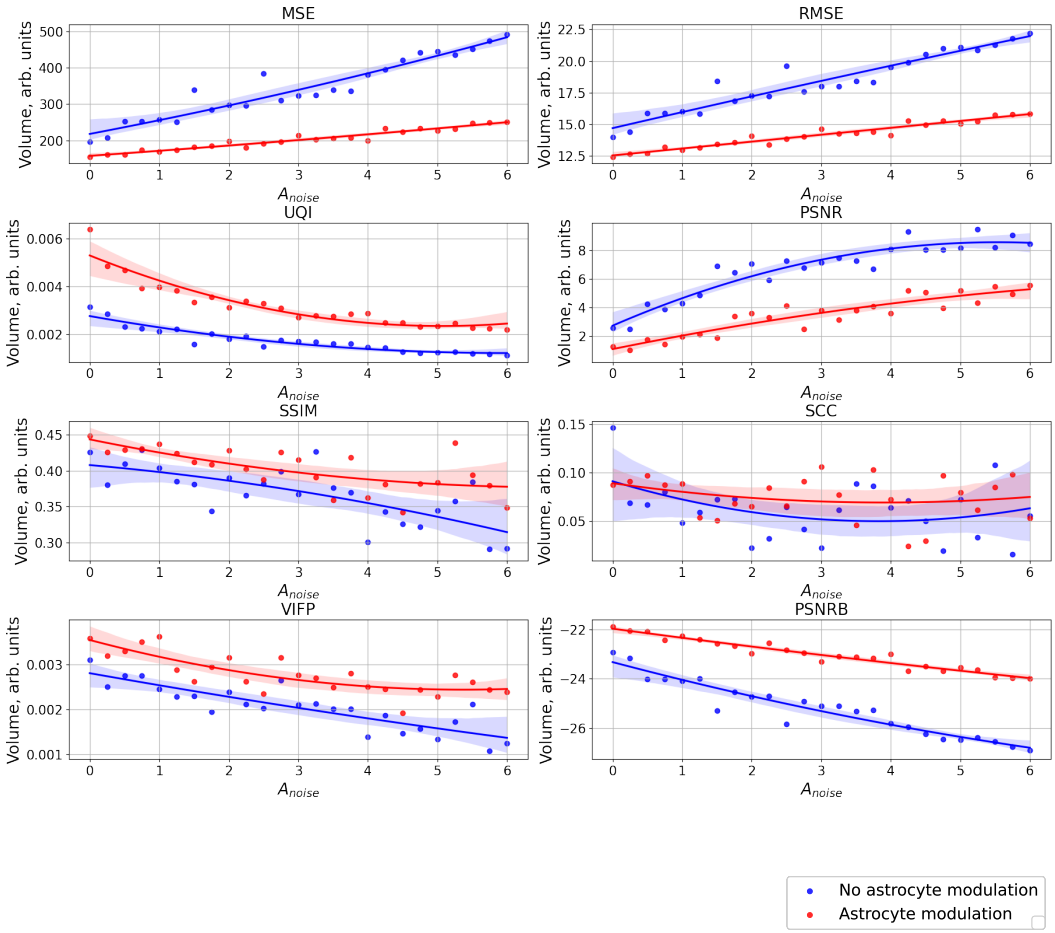

Figure S60. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S58 and Figure S59 with an image 1 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.3. Number 2 from database SVHN

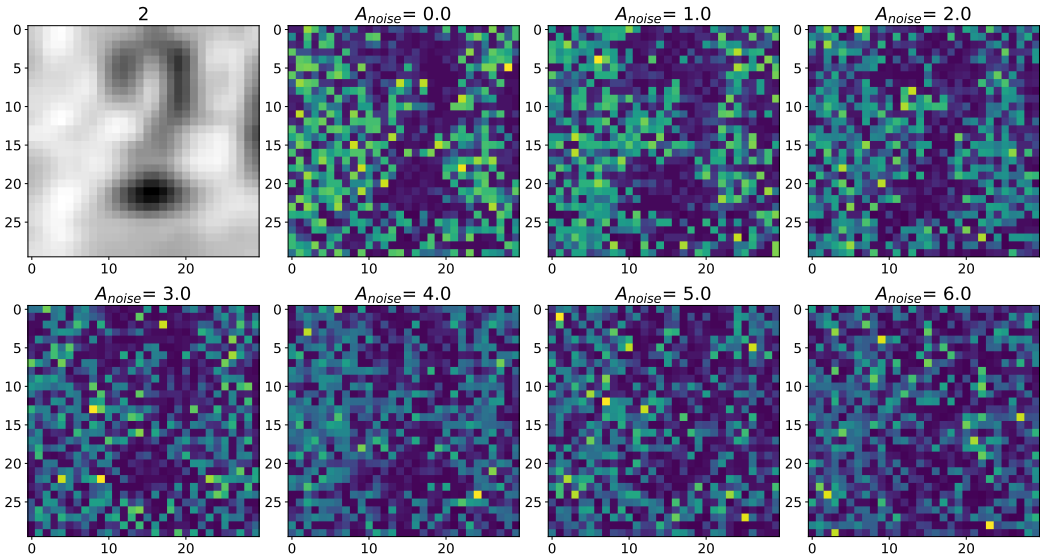

Figure S61. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 2 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

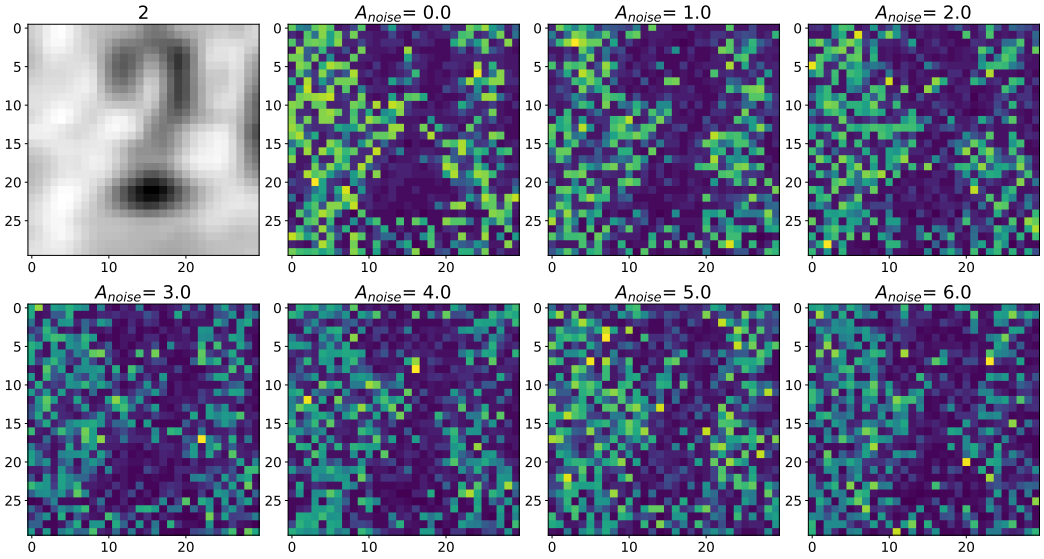

Figure S62. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 2 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

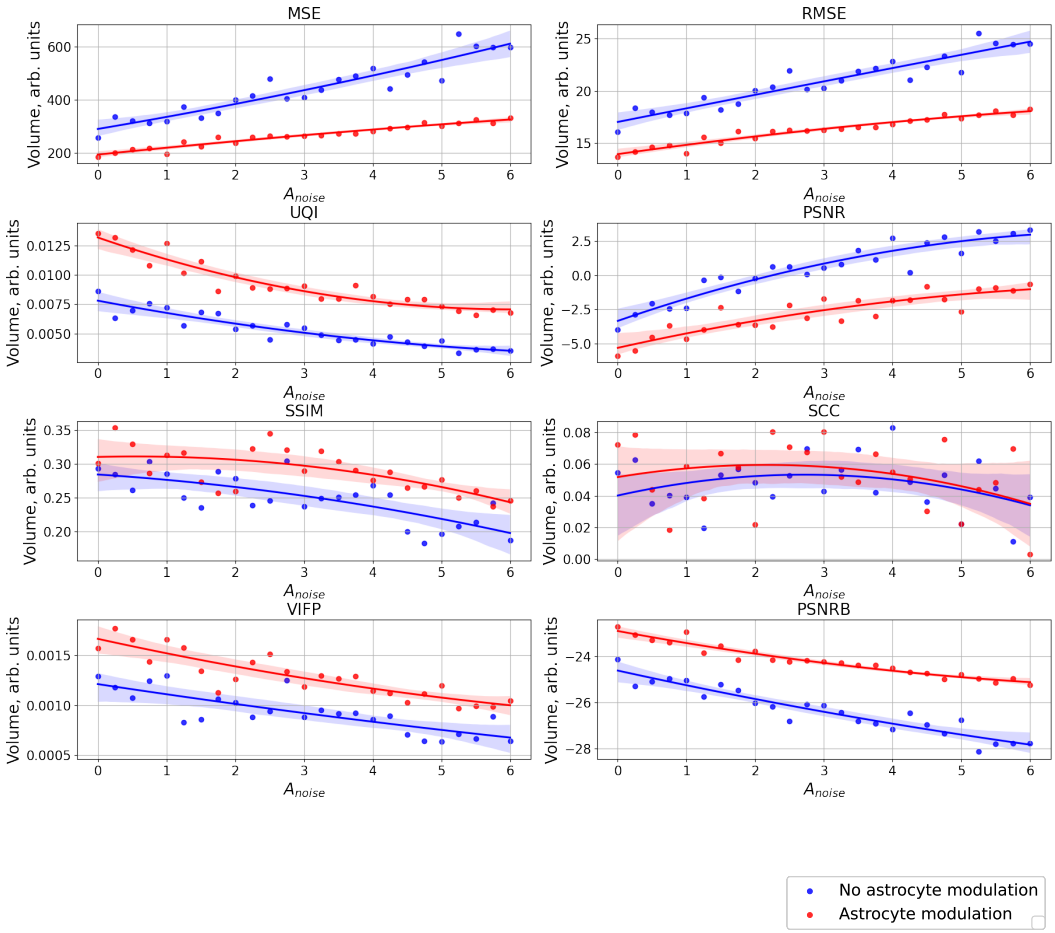

Figure S63. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S61 and Figure S62 with an image 2 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.4. Number 3 from database SVHN

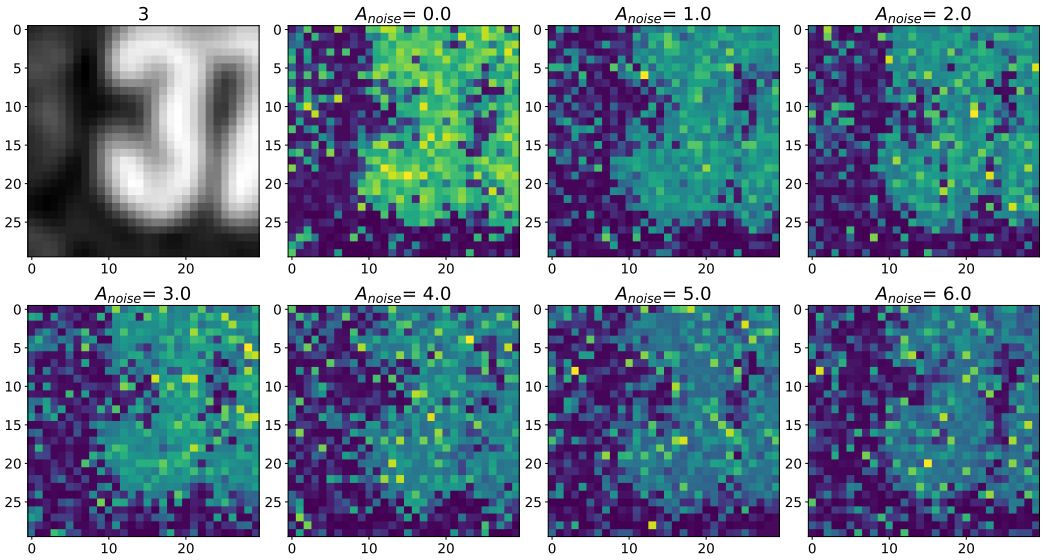

Figure S64. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 3 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

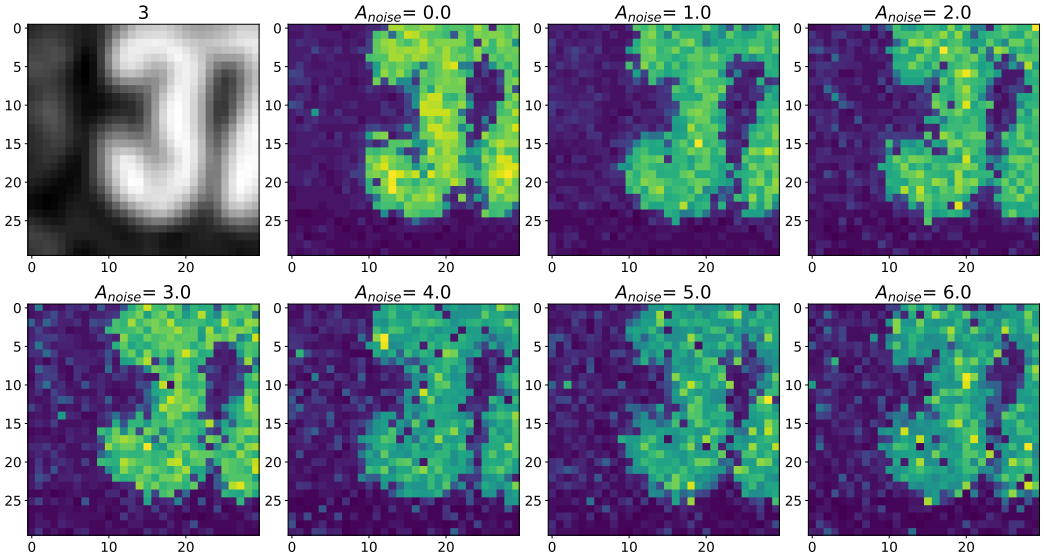

Figure S65. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 3 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

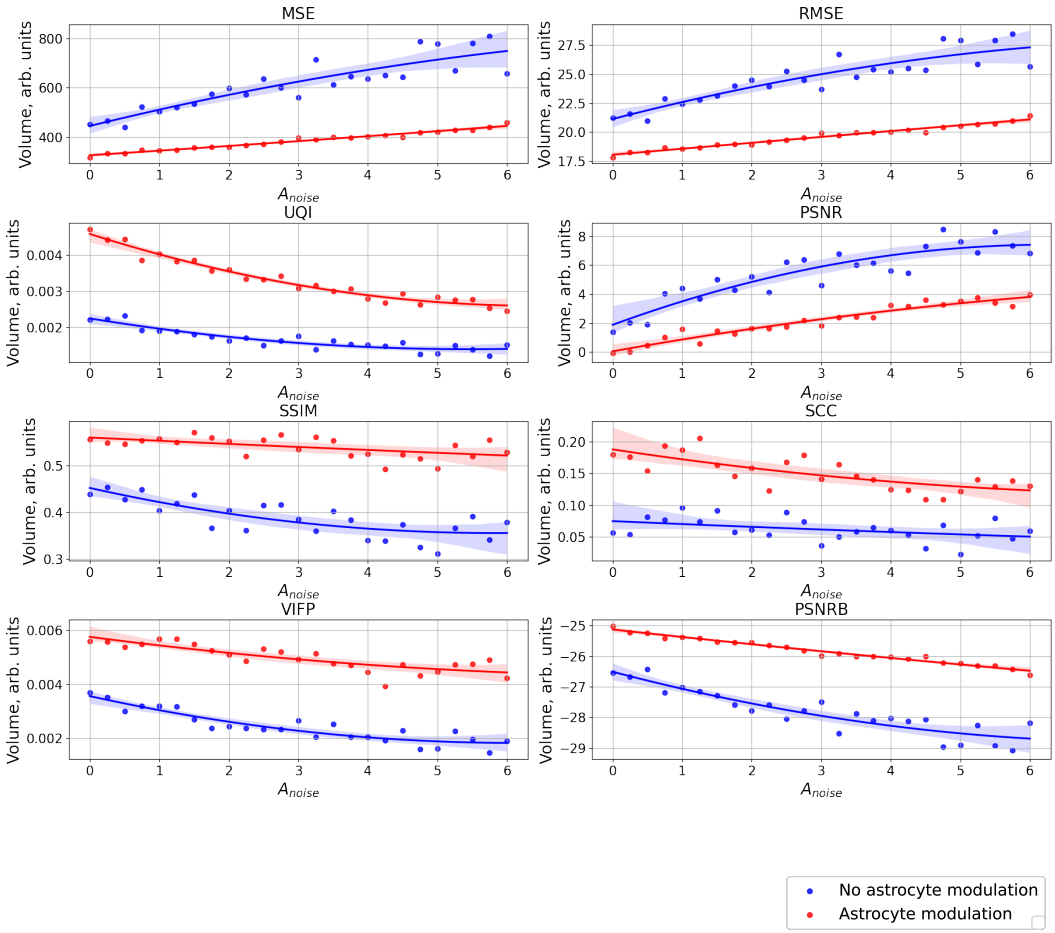

Figure S66. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S64 and Figure S65 with an image 3 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.5. Number 4 from database SVHN

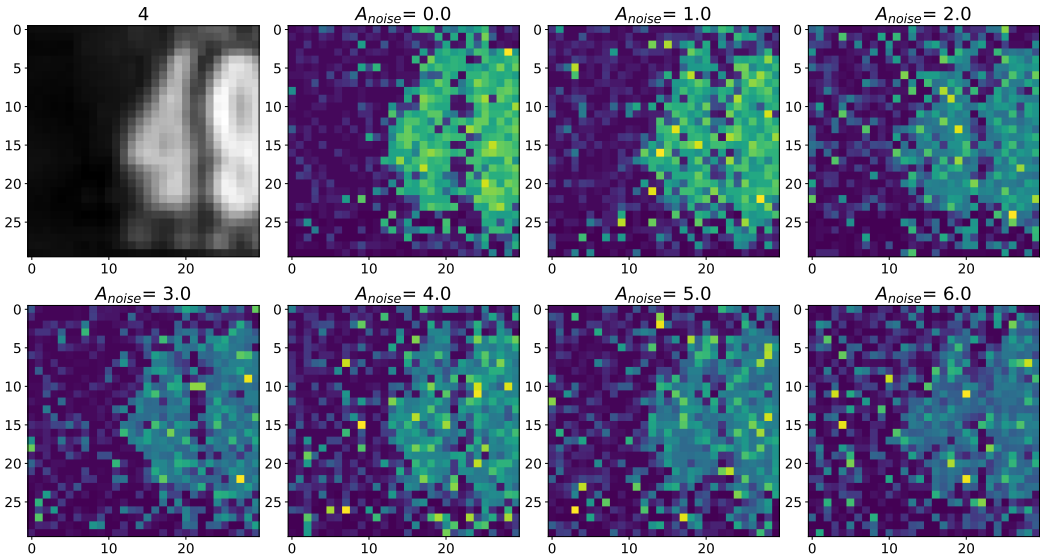

Figure S67. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 4 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

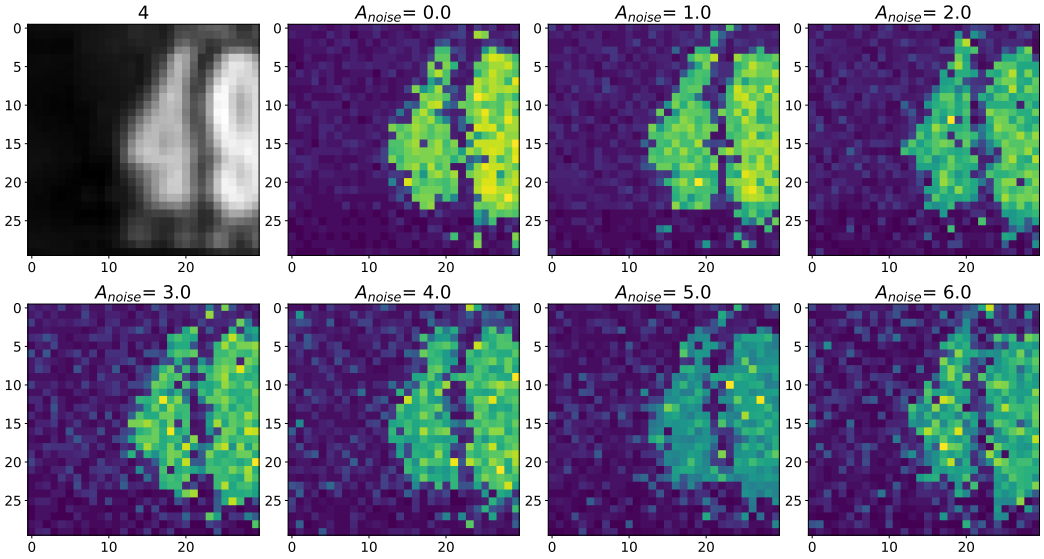

Figure S68. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 4 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

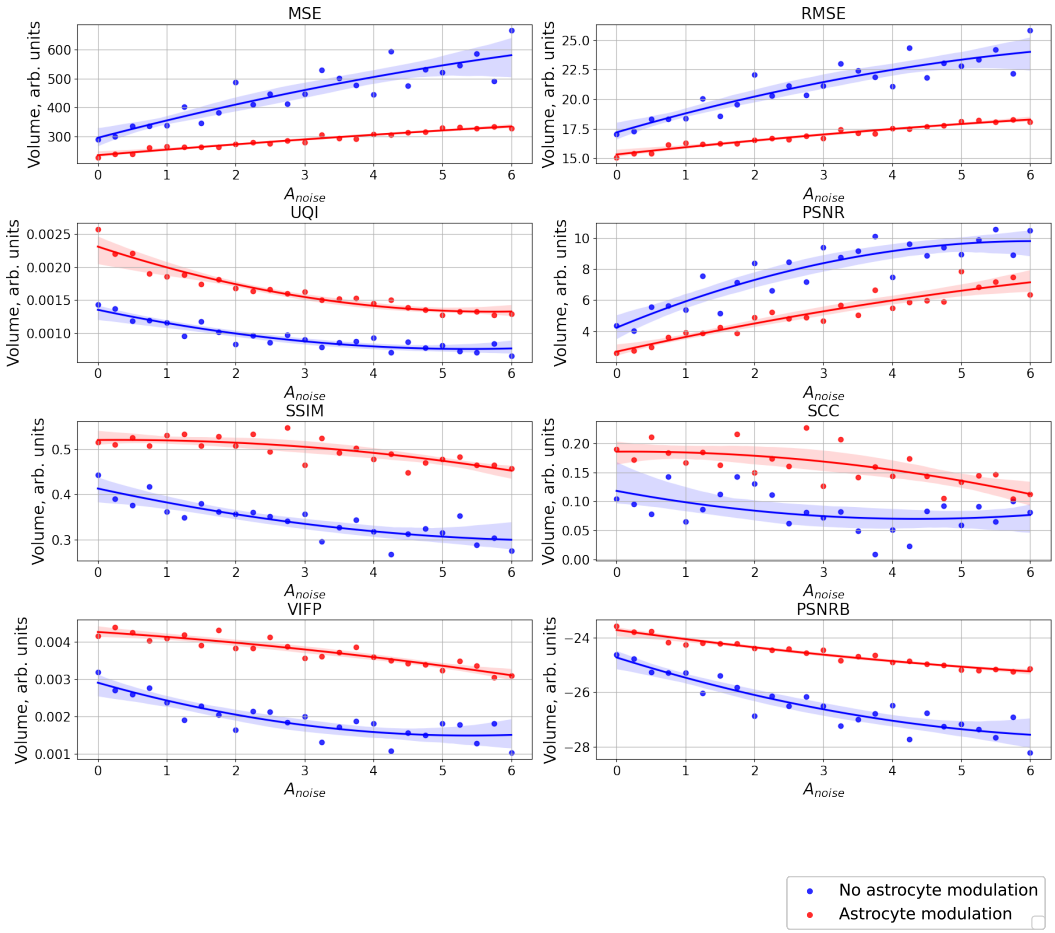

Figure S69. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S67 and Figure S68 with an image 4 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.6. Number 5 from database SVHN

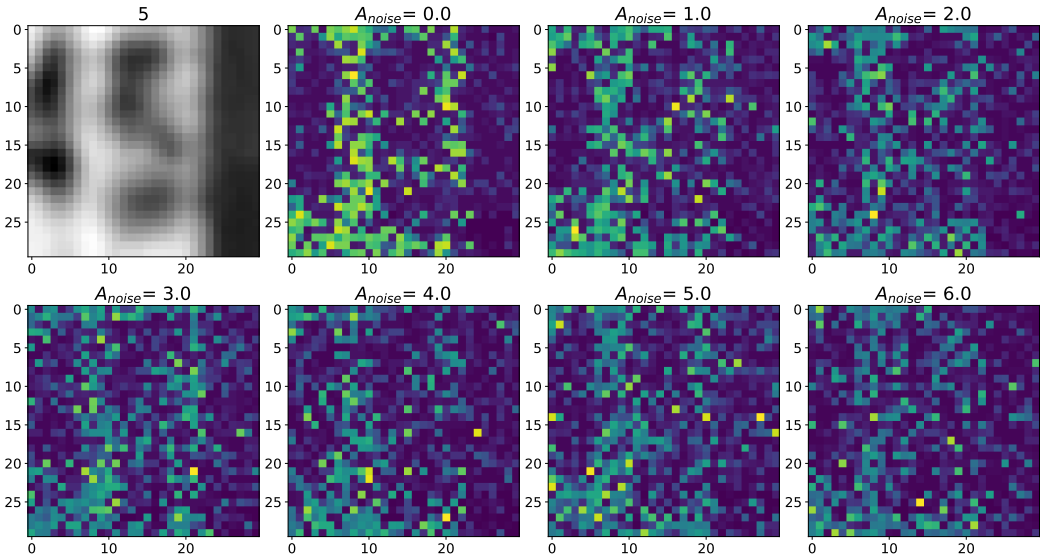

Figure S70. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 5 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

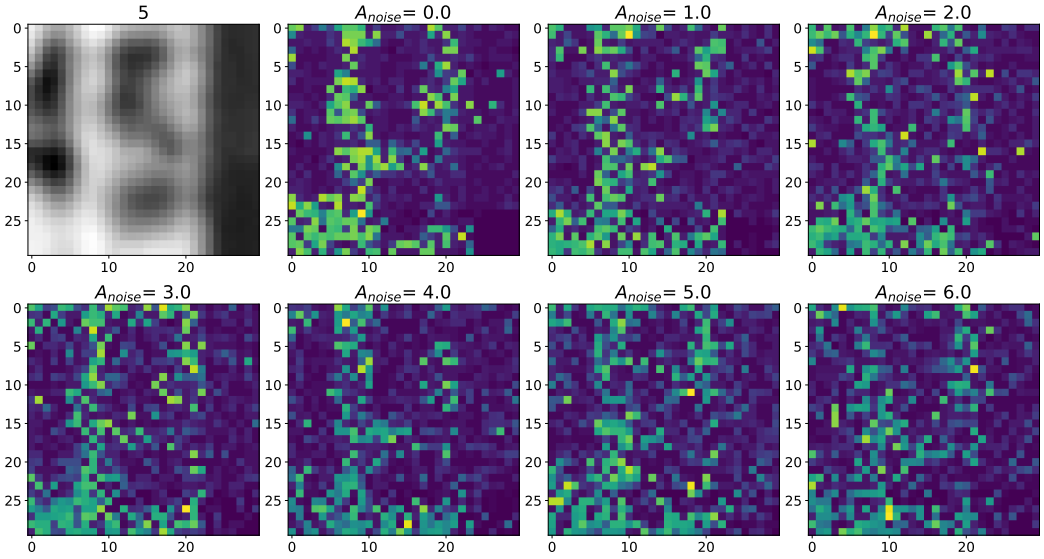

Figure S71. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 5 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

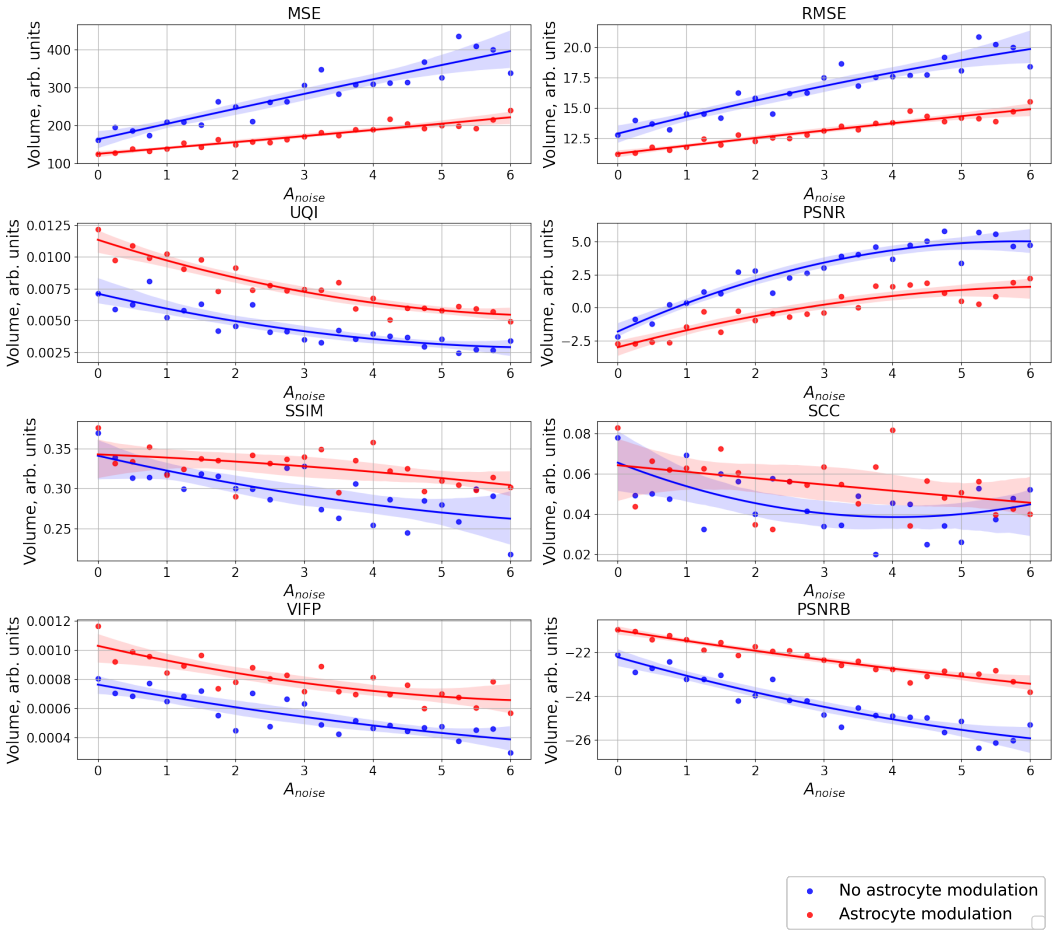

Figure S72. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S70 and Figure S71 with an image 5 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.7. Number 6 from database SVHN

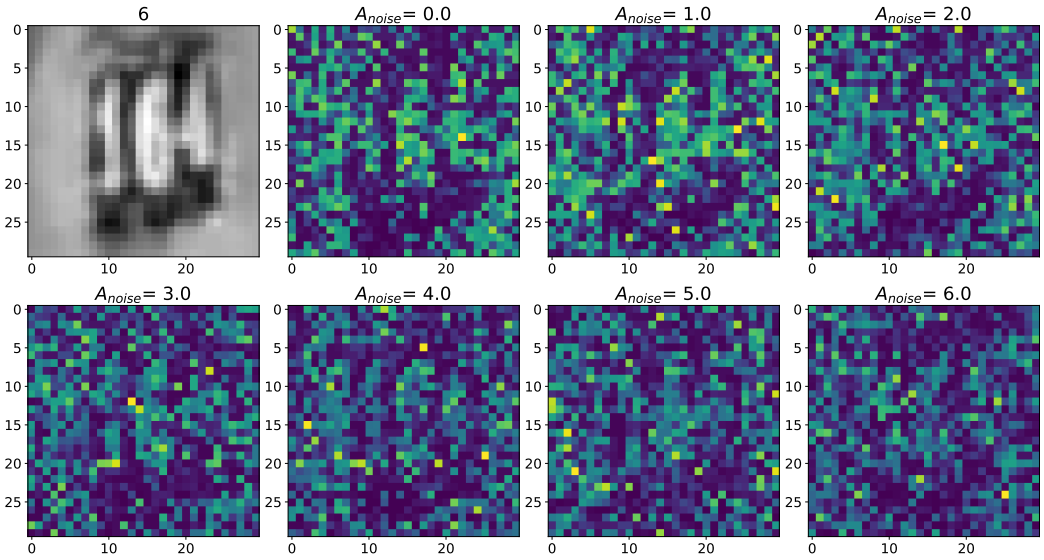

Figure S73. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 6 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

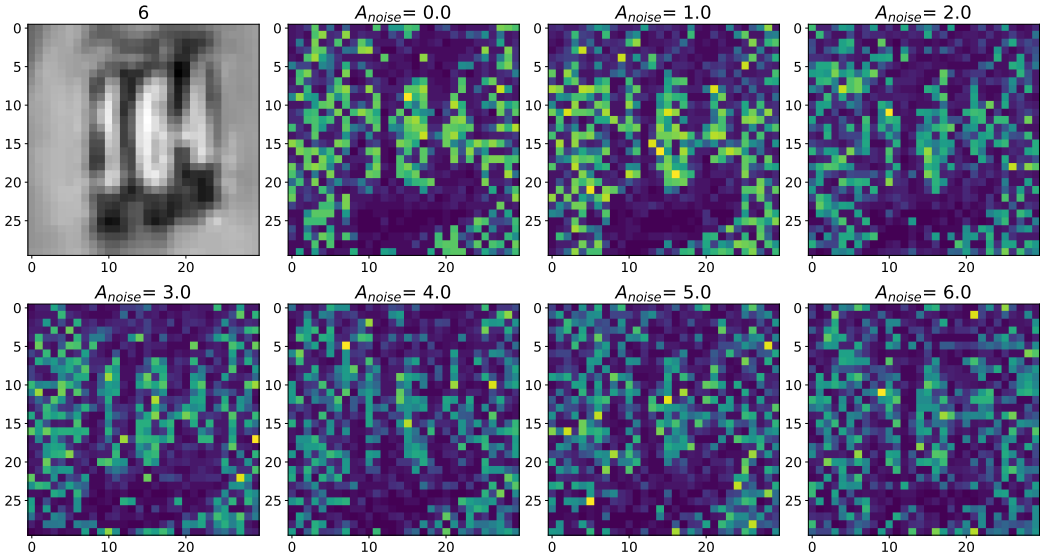

Figure S74. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 6 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

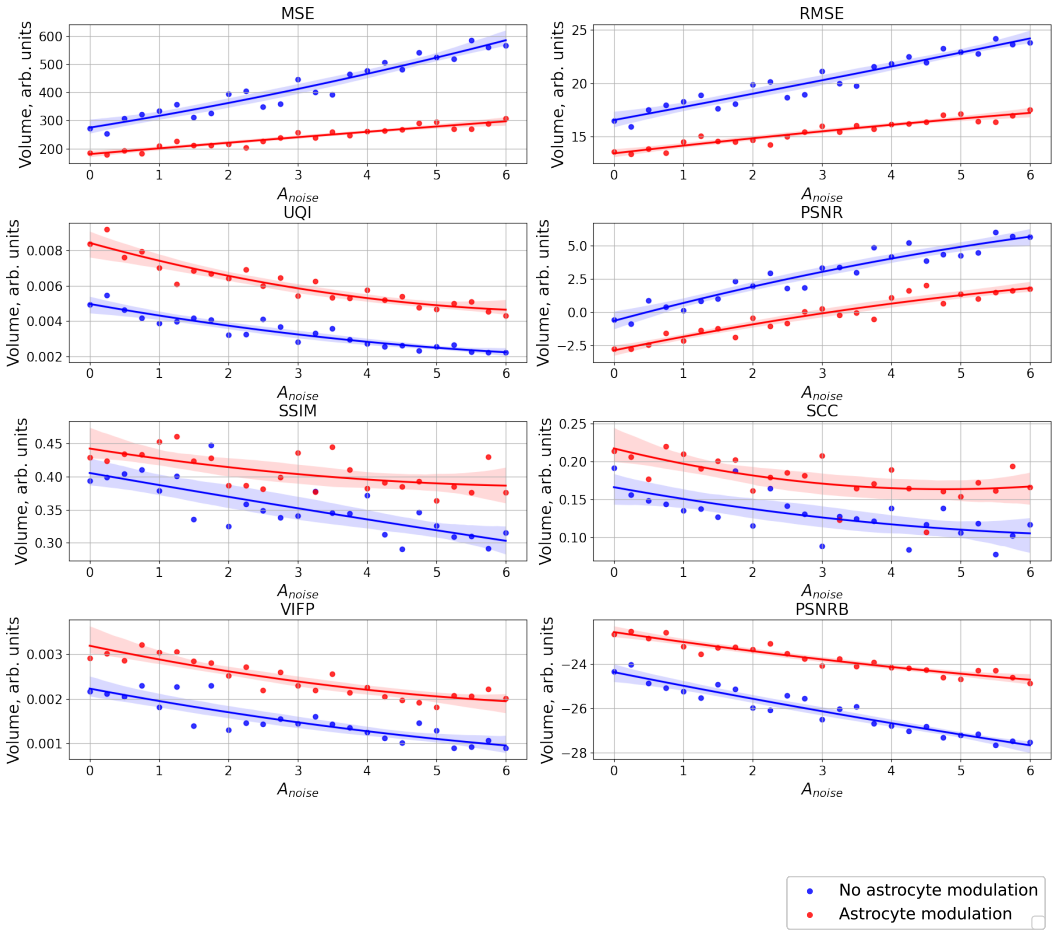

Figure S75. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S73 and Figure S74 with an image 6 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.8. Number 7 from database SVHN

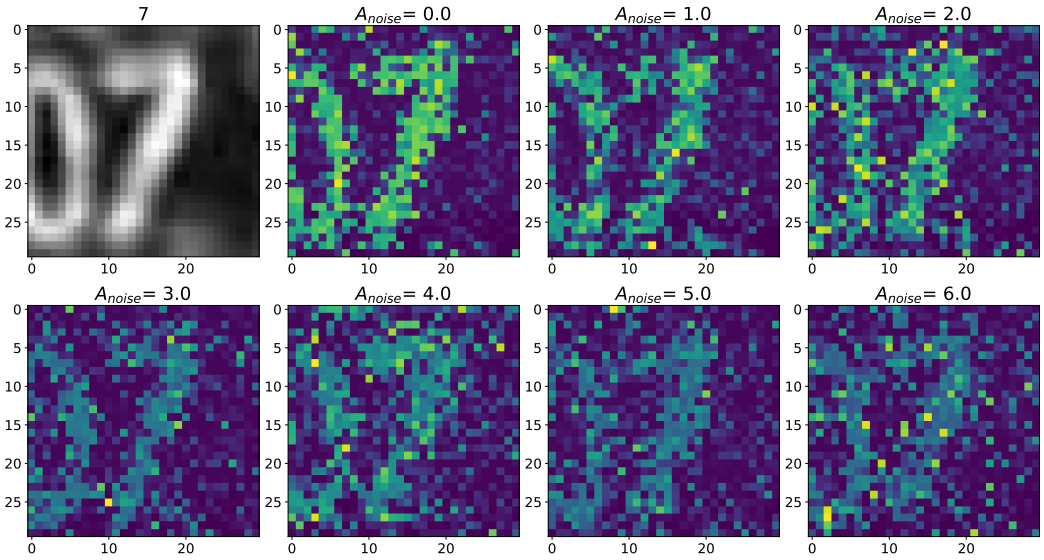

Figure S76. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 7 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

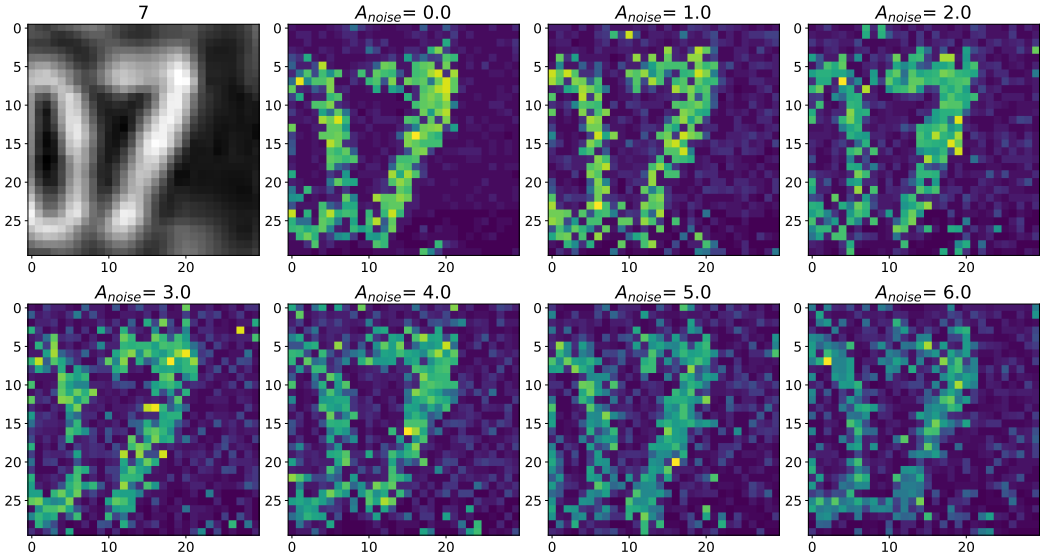

Figure S77. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 7 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

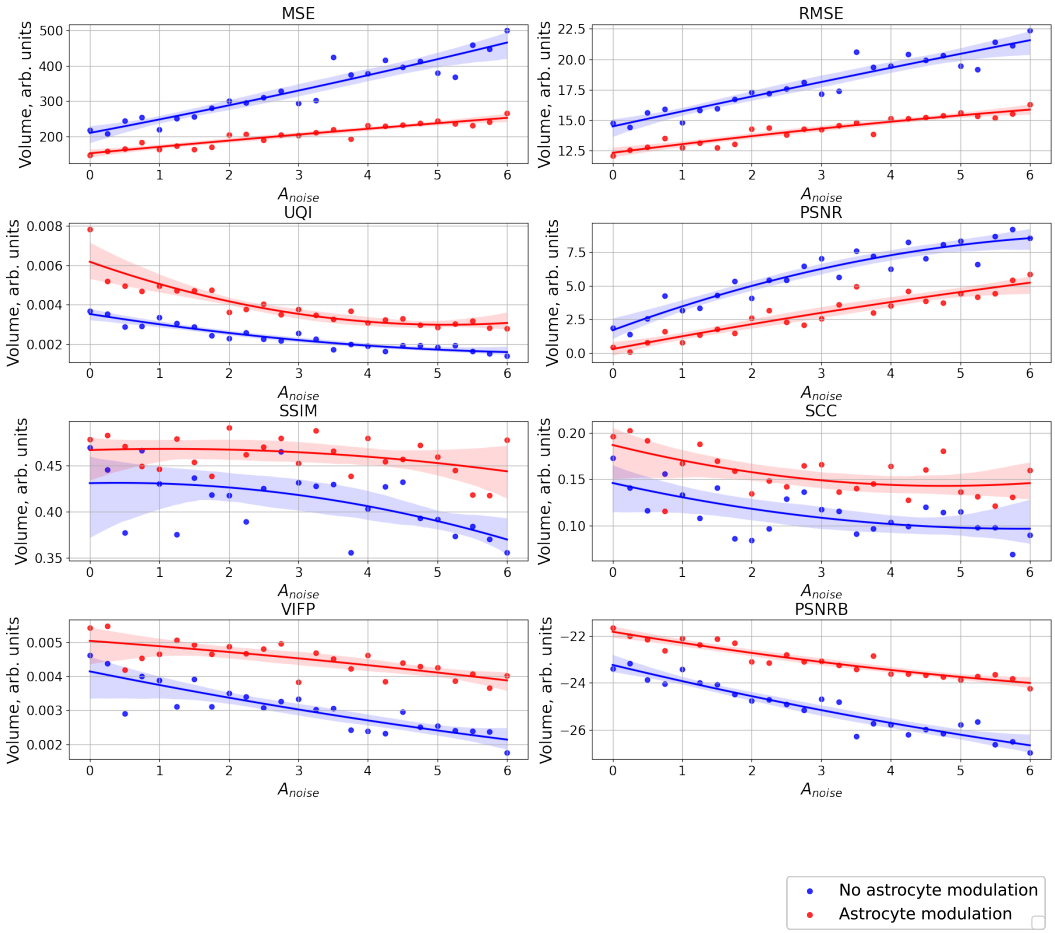

Figure S78. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S76 and Figure **??** with an image 7 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.9. Number 8 from database SVHN

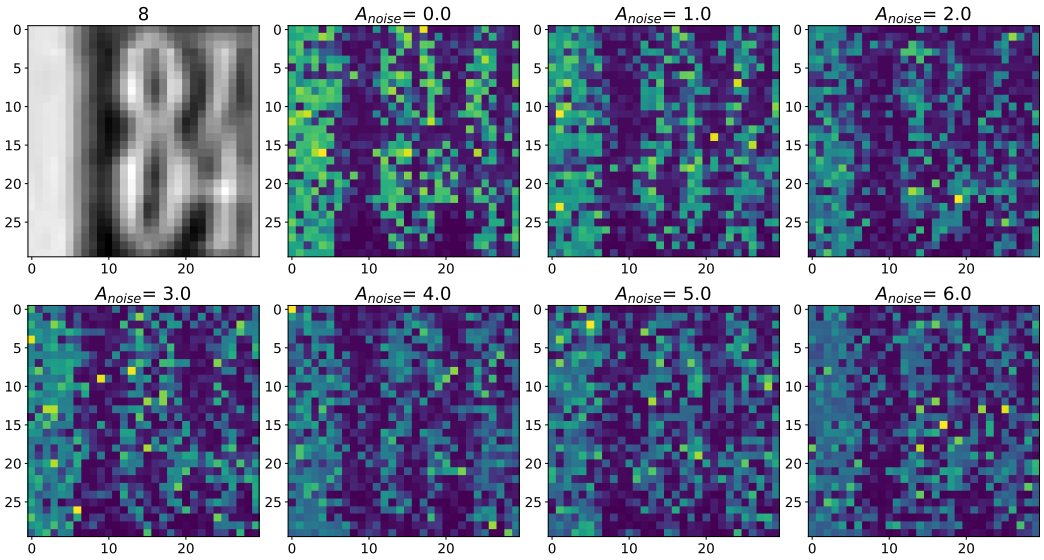

Figure S79. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 8 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

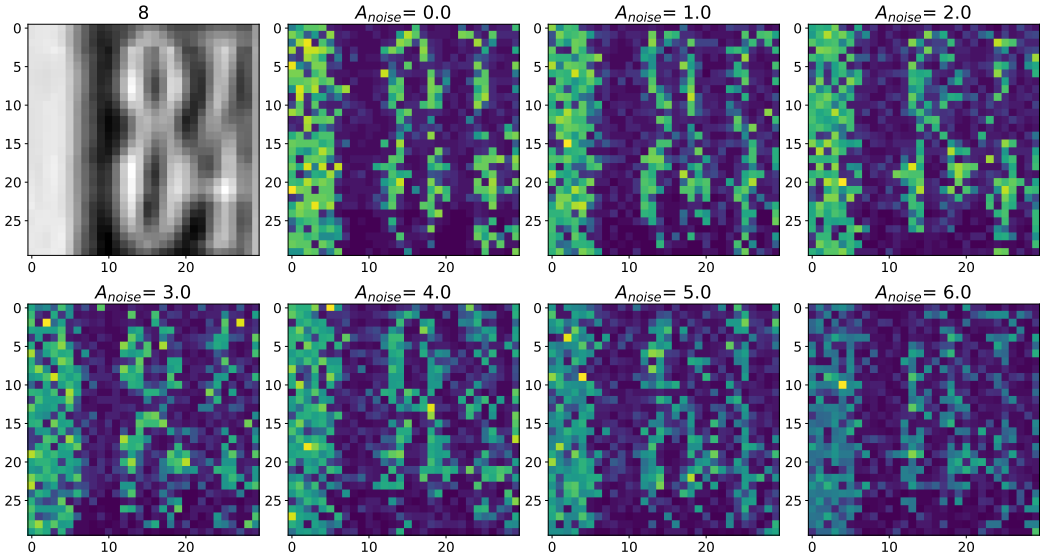

Figure S80. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 8 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

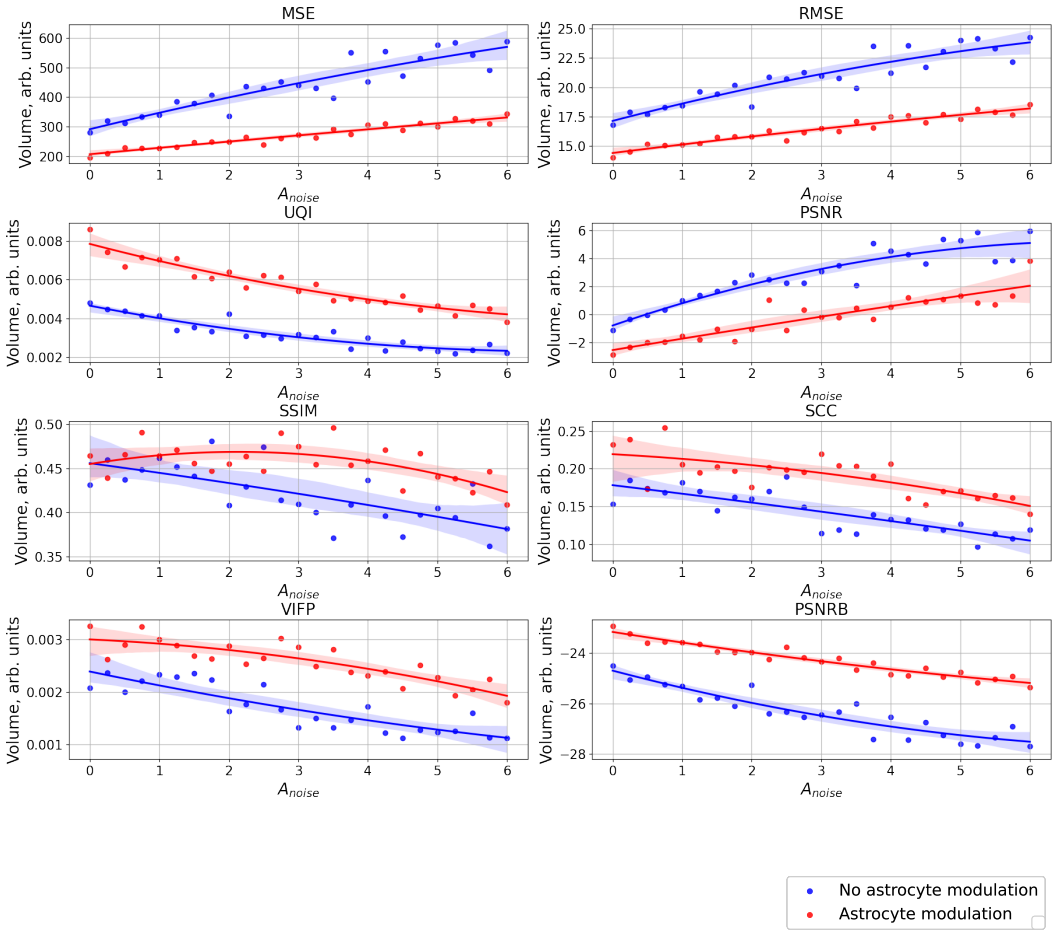

Figure S81. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S79 and Figure S80 with an image 8 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

S3.10. Number 9 from database SVHN

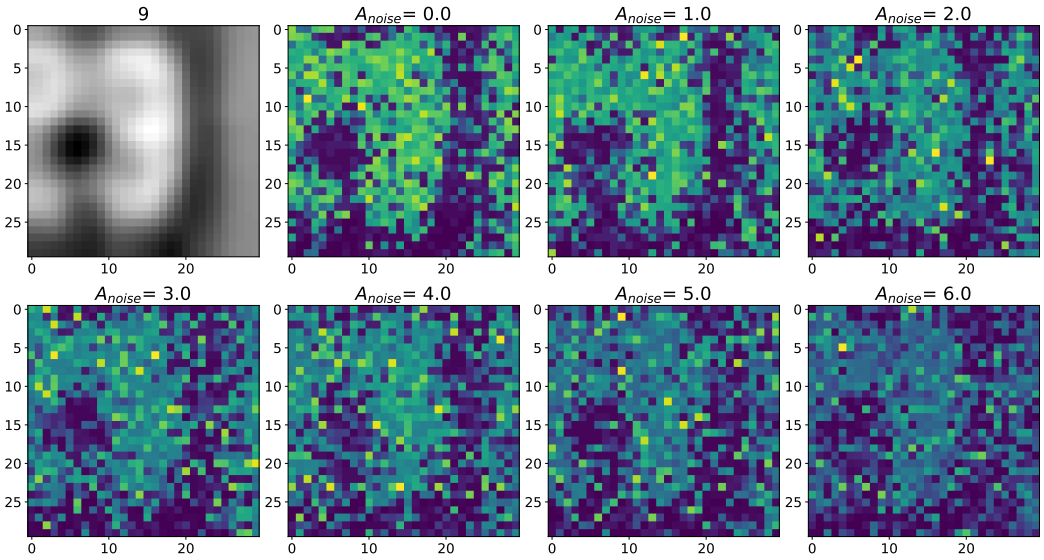

Figure S82. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 9 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 without modulation of neuronal activity by astrocytes.

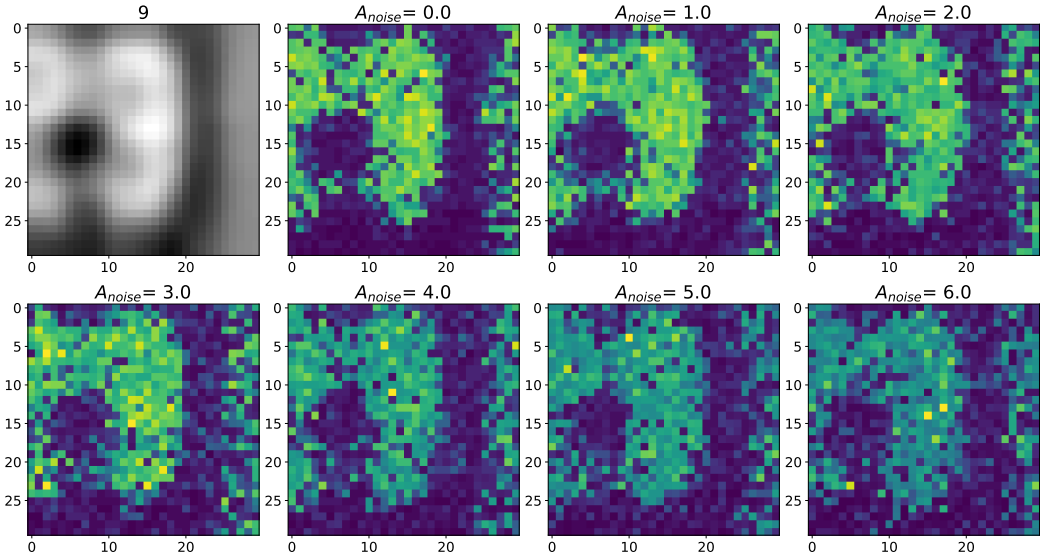

Figure S83. Changes in the spatial sweep of the spike neural network during the representation of the supplied image 9 from database SVHN [3] when the amplitude, A_{noise}, of the noise current, I_{noise}, changes from 0 to 6 with modulation of neuronal activity by astrocytes.

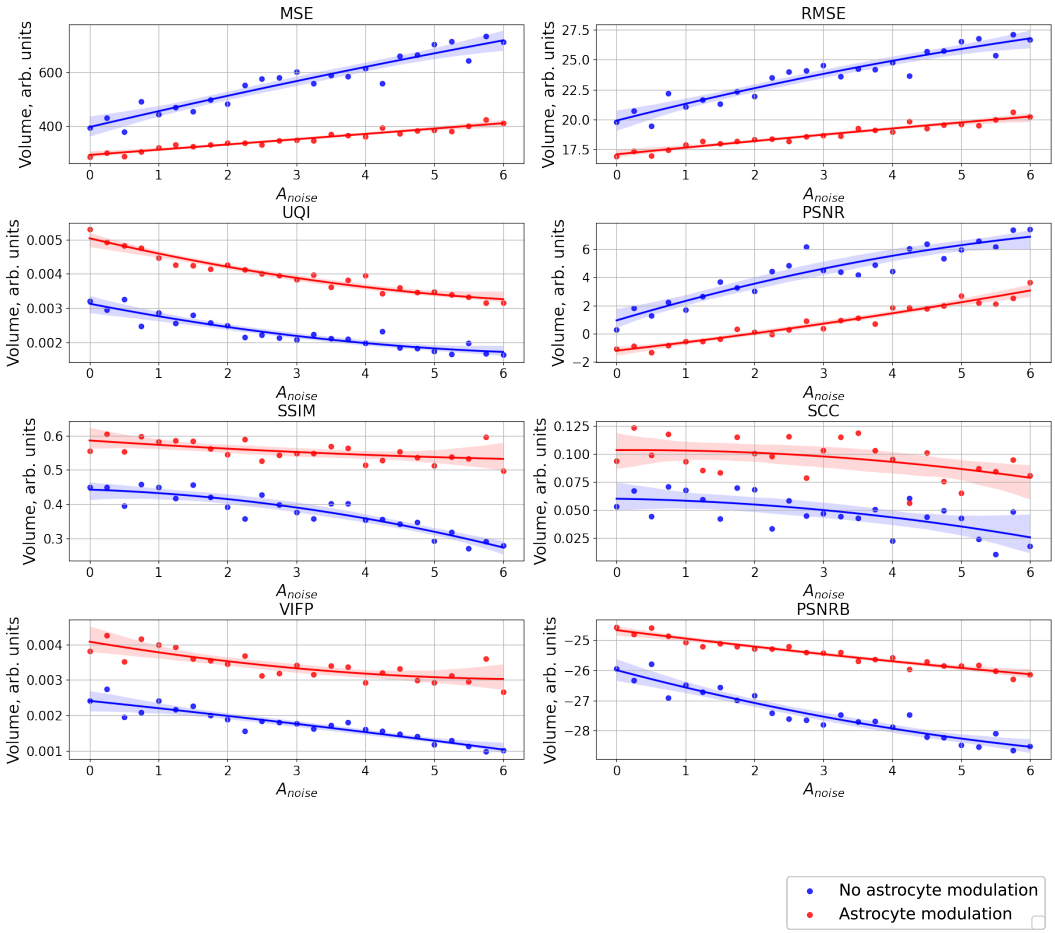

Figure S84. The case of using a quality metrices (MSE, RMSE, UQI, PSNR, SSIM, SCC, VIFP, PSNRB) for comparing raster diagrams of neural activity from Figure S82 and Figure S83 with an image 9 from database SVHN [3] fed to a spike neural network with an increase in the amplitude, A_{noise}, of the noise signal from 0 to 6 supplied to the neurons of the neural network without astrocytic modulation (blue dots and curve) and with astrocytic modulation (red dots and curve).

References

1. LeCun, Y.; Cortes, C.; Burges, C. MNIST Handwritten Digit Database. 2010. Available online: http://yann.lecun.com/exdb/mnist (accessed on 1 November 2022).
2. Xiao, H.; Rasul, K.; Vollgraf, R. Fashion-mnist: a novel image dataset for benchmarking machine learning algorithms. *arXiv* **2017**, arXiv:1708.07747.
3. Yang, R.; Deng, Y.; Zhu, A.; Tong, X.; Chen, Z. Few Shot Learning Based on the Street View House Numbers (SVHN) Dataset. In *International Conference on Edge Computing and IoT*; Springer: Cham, Switzerland, 2021; pp. 86–102.