

## REFERENCES:

- Abercrombie, E. D., and DeBoer, P. (1997). Substantia nigra D1 receptors and stimulation of striatal cholinergic interneurons by dopamine: A proposed circuit mechanism. *J. Neurosci.* 17, 8498–8505. doi: 10.1523/jneurosci.17-21-08498.1997.
- Adelson, E. H., and Bergen, J. R. (1985). Spatiotemporal energy models for the perception of motion. *J. Opt. Soc. Am. A* 2, 284. doi: 10.1364/josaa.2.000284.
- Albright, T. D., and Stoner, G. R. (1995). Visual motion perception. *Proc. Natl. Acad. Sci. U. S. A.* 92, 2433–2440. doi: 10.1073/pnas.92.7.2433.
- Algom, D., and Cohen-Raz, L. (1984). Visual velocity input-output functions: The integration of distance and duration onto subjective velocity. *J. Exp. Psychol. Hum. Percept. Perform.* 10, 486–501. doi: 10.1037/0096-1523.10.4.486.
- Alvarez, G. A., and Franconeri, S. L. (2007). How many objects can you track?: Evidence for a resource-limited attentive tracking mechanism. *J. Vis.* 7, 14–14. doi: 10.1167/7.13.14.
- Amemiya, T., Beck, B., Walsh, V., Gomi, H., and Haggard, P. (2017). Visual area V5/hMT+ contributes to perception of tactile motion direction: A TMS study. *Sci. Rep.* 7, 1–7. doi: 10.1038/srep40937.
- Amit, D. J. (1989). “Modeling Brain Function,” in *Modeling Brain Function* (Cambridge University Press), 58–91. doi: 10.1017/cbo9780511623257.
- Anders, M. W. (1980). Metabolism of drugs by the kidney. *Kidney Int.* 18, 636–647. doi: 10.1038/KI.1980.181.

- Andersen, R. A., Essick, G. K., and Siegel, R. M. (1985). Encoding of spatial location by posterior parietal neurons. *Science (80-. )*. 230, 456–458. doi: 10.1126/science.4048942.
- Anderson, S. J., and Holliday, I. E. (1995). Night driving: effects of glare from vehicle headlights on motion perception. *Ophthalmic Physiol. Opt.* 15, 545–551. doi: 10.1016/0275-5408(95)00070-T.
- Ansbacher, H. L. (1944). Distortion in the perception of real movement. *J. Exp. Psychol.* 34, 1–23. doi: 10.1037/h0061686.
- Antal, A., Nitsche, M. A., Kruse, W., Kincses, T. Z., Hoffmann, K. P., and Paulus, W. (2004). Direct Current Stimulation over V5 Enhances Visuomotor Coordination by Improving Motion Perception in Humans. *J. Cogn. Neurosci.* 16, 521–527. doi: 10.1162/089892904323057263.
- Anton, A. H., Sayre, D. F., Pharmacol, J., Da Prada, M., and Pletscher, A. (1970). Visual Experience Modifies Distribution of Horizontally and Vertically Oriented Receptive Fields in Cats. *Science (80-. )*. 168, 869–871. doi: 10.1126/SCIENCE.168.3933.869.
- Anzai, A., Ohzawa, I., and Freeman, R. D. (2001). Joint-encoding of motion and depth by visual cortical neurons: Neural basis of the Pulfrich effect. *Nat. Neurosci.* 4, 513–518. doi: 10.1038/87462.
- Aronov, D., Nevers, R., and Tank, D. W. (2017). Mapping of a non-spatial dimension by the hippocampal–entorhinal circuit. *Nat. 2017 5437647 543*, 719–722. doi: 10.1038/nature21692.
- Askaripoor, T., Motamedzade, M., Golmohammadi, R., Farhadian, M., Babamiri, M., and

- Samavati, M. (2019). Effects of light intervention on alertness and mental performance during the post-lunch dip: A multi-measure study. *Ind. Health* 57, 511–524. doi: 10.2486/indhealth.2018-0030.
- Bao, X., Gjorgieva, E., Shanahan, L. K., Howard, J. D., Kahnt, T., and Gottfried, J. A. (2019). Grid-like Neural Representations Support Olfactory Navigation of a Two-Dimensional Odor Space. *Neuron* 102, 1066-1075.e5. doi: 10.1016/J.NEURON.2019.03.034.
- Basser, P. J., Mattiello, J., and Lebihan, D. (1994). Estimation of the Effective Self-Diffusion Tensor from the NMR Spin Echo. *J. Magn. Reson. Ser. B* 103, 247–254. doi: 10.1006/jmrb.1994.1037.
- Beckers, G., and Zeki, S. (1995). The consequences of inactivating areas V1 and V5 on visual motion perception. *Brain* 118, 49–60. doi: 10.1093/brain/118.1.49.
- Berry, J. W. (1968). Ecology, perceptual development and the Müller-Lyer illusion. *Br. J. Psychol.* 59, 205–210. doi: 10.1111/j.2044-8295.1968.tb01134.x.
- Blasberg, R. G., Fenstermacher, J. D., and Patlak, C. S. (1983). Transport of  $\alpha$ -aminoisobutyric acid across brain capillary and cellular membranes. *J. Cereb. Blood Flow Metab.* 3, 8–32. doi: 10.1038/jcbfm.1983.2.
- Bonneh, Y. S., Cooperman, A., and Sagi, D. (2001). Motion-induced blindness in normal observers. *Nat.* 2001 4116839 411, 798–801. doi: 10.1038/35081073.
- Bonnevie, T., Dunn, B., Fyhn, M., Hafting, T., Derdikman, D., Kubie, J. L., et al. (2013). Grid cells require excitatory drive from the hippocampus. *Nat. Neurosci.* 2013 163 16,

309–317. doi: 10.1038/nn.3311.

Bordier, C., Hupé, J. M., and Dojat, M. (2015). Quantitative evaluation of fMRI retinotopic maps, from V1 to V4, for cognitive experiments. *Front. Hum. Neurosci.* 9, 277. doi: 10.3389/fnhum.2015.00277.

Borruat, F. X., Nater, B., Robyn, L., and Genton, B. (2001). Prolonged visual illusions induced by mefloquine (Lariam®): A case report. *J. Travel Med.* 8, 148–149. doi: 10.2310/7060.2001.24461/2/JTM8-0148.PDF.GIF.

Bouma, H. (1970). Interaction Effects in Parafoveal Letter Recognition. *Nat.* 1970 2265241 226, 177–178. doi: 10.1038/226177a0.

Bourne, J. A., and Rosa, M. G. P. (2006). Hierarchical development of the primate visual cortex, as revealed by neurofilament immunoreactivity: Early maturation of the middle temporal area (MT). *Cereb. Cortex* 16, 405–414. doi: 10.1093/cercor/bhi119.

Brennan, A. A., Bruderer, A. J., Liu-Ambrose, T., Handy, T. C., and Enns, J. T. (2017). Lifespan changes in attention revisited: Everyday visual search. *Can. J. Exp. Psychol.* 71, 160–171. doi: 10.1037/CEP0000130.

brown, S. W. (1995). Time, change, and motion: The effects of stimulus movement on temporal perception. *Percept. Psychophys.* 57, 105–116. doi: 10.3758/BF03211853.

Burak, Y., and Fiete, I. R. (2009a). Accurate path integration in continuous attractor network models of grid cells. *PLoS Comput. Biol.* 5, e1000291. doi: 10.1371/journal.pcbi.1000291.

Burak, Y., and Fiete, I. R. (2009b). Accurate path integration in continuous attractor network

- models of grid cells. *PLoS Comput. Biol.* 5, e1000291. doi: 10.1371/journal.pcbi.1000291.
- Carhart-Harris, R. L., and Nutt, D. J. (2017). Serotonin and brain function: a tale of two receptors. *J. Psychopharmacol.* 31, 1091–1120. doi: 10.1177/0269881117725915.
- Carter, O. L., Pettigrew, J. D., Burr, D. C., Alais, D., Hasler, F., and Vollenweider, F. X. (2004). Psilocybin impairs high-level but not low-level motion perception. *Neuroreport* 15. Available at: [https://journals.lww.com/neuroreport/Fulltext/2004/08260/Psilocybin\\_impairs\\_high\\_level\\_but\\_not\\_low\\_level.23.aspx](https://journals.lww.com/neuroreport/Fulltext/2004/08260/Psilocybin_impairs_high_level_but_not_low_level.23.aspx).
- Ceccarini, J., Liu, H., Van Laere, K., Morris, E. D., and Sander, C. Y. (2020). Methods for Quantifying Neurotransmitter Dynamics in the Living Brain With PET Imaging. *Front. Physiol.* 11, 792. doi: 10.3389/fphys.2020.00792.
- Chen, Y. (2011). Abnormal visual motion processing in schizophrenia: A review of research progress. *Schizophr. Bull.* 37, 709–715. doi: 10.1093/schbul/sbr020.
- Chen, Y., Palafox, G. P., Nakayama, K., Levy, D. L., Matthyse, S., and Holzman, P. S. (1999). Motion Perception in Schizophrenia. *Arch. Gen. Psychiatry* 56, 149–154. doi: 10.1001/ARCHPSYC.56.2.149.
- Chen, Z. S., Zhang, X., Long, X., and Zhang, S. J. (2022). Are Grid-Like Representations a Component of All Perception and Cognition? *Front. Neural Circuits* 16, 64. doi: 10.3389/FNCIR.2022.924016/BIBTEX.
- Chuang, J., Ausloos, E. C., Schwebach, C. A., and Huang, X. (2016). Integration of motion

- energy from overlapping random background noise increases perceived speed of coherently moving stimuli. *J. Neurophysiol.* 116, 2775–2776. doi: 10.1152/JN.01068.2015/ASSET/IMAGES/LARGE/Z9K0121639300012.JPEG.
- Chubb, C., Sperling, G., and Solomon, J. A. (1989). Texture interactions determine perceived contrast. *Proc. Natl. Acad. Sci. U. S. A.* 86, 9631–9635. doi: 10.1073/pnas.86.23.9631.
- Clarke, W. T., Stagg, C. J., and Jbabdi, S. (2021). FSL-MRS: An end-to-end spectroscopy analysis package. *Magn. Reson. Med.* 85, 2950–2964. doi: 10.1002/mrm.28630.
- Constantinescu, A. O., O'Reilly, J. X., and Behrens, T. E. J. (2016). Organizing conceptual knowledge in humans with a gridlike code. *Science (80-. )*. 352, 1464–1468. doi: 10.1126/SCIENCE.AAF0941/SUPPL\_FILE/CONSTANTINESCU.SM.PDF.
- Costa, A. L. L., Silva, R. C., Coelho-Cordeiro, P. H., da Silveira, F. S., Barros, M., Caixeta, F. V., et al. (2021). The Perception of the Müller-Lyer Visual Illusion in Schizophrenics and Non-human Primates: A Translational Approach. *Front. Behav. Neurosci.* 15, 104. doi: 10.3389/FNBEH.2021.641776/XML/NLM.
- Couey, J. J., Witoelar, A., Zhang, S. J., Zheng, K., Ye, J., Dunn, B., et al. (2013). Recurrent inhibitory circuitry as a mechanism for grid formation. *Nat. Neurosci.* 2013 163 16, 318–324. doi: 10.1038/nn.3310.
- Cowey, A., and Rolls, E. T. (1974). Human cortical magnification factor and its relation to visual acuity. *Exp. Brain Res.* 21, 447–454. doi: 10.1007/BF00237163.
- Cserr, H. F., DePasquale, M., Nicholson, C., Patlak, C. S., Pettigrew, K. D., and Rice, M. E. (1991). Extracellular volume decreases while cell volume is maintained by ion uptake in

- rat brain during acute hypernatremia. *J. Physiol.* 442, 277–295. doi: 10.1113/JPHYSIOL.1991.SP018793.
- D’Alfonso, A. A. L., Van Honk, J., Schutter, D. J. L. G., Caffé, A. R., Postma, A., and De Haan, E. H. F. (2013). Spatial and temporal characteristics of visual motion perception involving V5 visual cortex. <http://dx.doi.org/10.1179/016164102101199891> 24, 266–270. doi: 10.1179/016164102101199891.
- Daelli, V., van Rijsbergen, N. J., and Treves, A. (2010). How recent experience affects the perception of ambiguous objects. *Brain Res.* 1322, 81–91. doi: 10.1016/J.BRAINRES.2010.01.060.
- Daneman, R., and Prat, A. (2015). The Blood–Brain Barrier. *Cold Spring Harb. Perspect. Biol.* 7. doi: 10.1101/CSHPERSPECT.A020412.
- Dang, S., Wu, Y., Yan, R., and Tang, H. (2021). Why grid cells function as a metric for space. *Neural Networks* 142, 128–137. doi: 10.1016/J.NEUNET.2021.04.031.
- Derrington, A. M., Allen, H. A., and Delicato, L. S. (2004). Visual mechanisms of motion analysis and motion perception. *Annu. Rev. Psychol.* 55, 181–205. doi: 10.1146/annurev.psych.55.090902.141903.
- Di Cara, B., Panayi, F., Gobert, A., Dekeyne, A., Sicard, D., De Groote, L., et al. (2007). Activation of dopamine D1 receptors enhances cholinergic transmission and social cognition: A parallel dialysis and behavioural study in rats. *Int. J. Neuropsychopharmacol.* 10, 383–399. doi: 10.1017/S1461145706007103.
- Diez-Cirarda, M., Cabrera-Zubizarreta, A., Murueta-Goyena, A., Strafella, A. P., Del Pino,

- R., Acera, M., et al. (2023). Multimodal visual system analysis as a biomarker of visual hallucinations in Parkinson's disease. *J. Neurol.* 270, 519–529. doi: 10.1007/S00415-022-11427-X/METRICS.
- Duncan, R. O., and Boynton, G. M. (2003). Cortical magnification within human primary visual cortex correlates with acuity thresholds. *Neuron* 38, 659–671. doi: 10.1016/S0896-6273(03)00265-4.
- Eagleman, D. M. (2001). Visual illusions and neurobiology. *Nat. Rev. Neurosci.* 2001 212 2, 920–926. doi: 10.1038/35104092.
- Edwards, A. E., and Cohen, S. (1961). Visual illusion, tactile sensibility and reaction time under LSD-25. *Psychopharmacologia* 2, 297–303. doi: 10.1007/BF00404117/METRICS.
- Edwards, M., and Rideaux, R. (2013). How many motion signals can be simultaneously perceived? *Vision Res.* 76, 11–16. doi: 10.1016/j.visres.2012.10.004.
- Elliot, A. J., Maier, M. A., Moller, A. C., Friedman, R., and Meinhardt, J. (2007). Color and psychological functioning: the effect of red on performance attainment. *J. Exp. Psychol. Gen.* 136, 154–168. doi: 10.1037/0096-3445.136.1.154.
- Engel, S., Zhang, X., and Wandell, B. (1997). Colour tuning in human visual cortex measured with functional magnetic resonance imaging. *Nature* 388, 68–71. doi: 10.1038/40398.
- Etienne, A. S., and Jeffery, K. J. (2004). Path integration in mammals. *Hippocampus* 14, 180–192. doi: 10.1002/HIPO.10173.

- Etienne, A. S., Maurer, R., and Séguinot, V. (1996). Path integration in mammals and its interaction with visual landmarks. *J. Exp. Biol.* 199, 201–209. doi: 10.1242/JEB.199.1.201.
- Evans, R., Dal Poggetto, G., Nilsson, M., and Morris, G. A. (2018). Improving the Interpretation of Small Molecule Diffusion Coefficients. *Anal. Chem.* 90, 3987–3994. doi: 10.1021/ACS.ANALCHEM.7B05032/SUPPL\_FILE/AC7B05032\_SI\_001.PDF.
- Evans, R., Deng, Z., Rogerson, A. K., McLachlan, A. S., Richards, J. J., Nilsson, M., et al. (2013). Quantitative Interpretation of Diffusion-Ordered NMR Spectra: Can We Rationalize Small Molecule Diffusion Coefficients? *Angew. Chemie* 125, 3281–3284. doi: 10.1002/ANGE.201207403.
- Fan, L., Li, H., Zhuo, J., Zhang, Y., Wang, J., Chen, L., et al. (2016). The Human Brainnetome Atlas: A New Brain Atlas Based on Connectional Architecture. *Cereb. Cortex* 26, 3508–3526. doi: 10.1093/cercor/bhw157.
- Faubert, J. (2002). Visual perception and aging. *Can. J. Exp. Psychol.* 56, 164–176. doi: 10.1037/H0087394.
- Fenstermacher, J. D., and Davson, H. (1982). Distribution of two model amino acids from cerebrospinal fluid to brain and blood. *Am. J. Physiol. - Ren. Fluid Electrolyte Physiol.* 11. doi: 10.1152/ajprenal.1982.242.2.f171.
- Fernandez, J. M., and Farell, B. (2009). Is perceptual space inherently non-Euclidean? *J. Math. Psychol.* 53, 86–91. doi: 10.1016/J.JMP.2008.12.006.
- Ferrandez, A. M., Hugueville, L., Lehericy, S., Poline, J. B., Marsault, C., and Pouthas, V.

- (2003). Basal ganglia and supplementary motor area subtend duration perception: An fMRI study. *Neuroimage* 19, 1532–1544. doi: 10.1016/S1053-8119(03)00159-9.
- Fischer, R. (1967). THE BIOLOGICAL FABRIC OF TIME. *Ann. N. Y. Acad. Sci.* 138, 440–488. doi: 10.1111/J.1749-6632.1967.TB55004.X.
- Fischer, R. (1971). A cartography of the ecstatic and meditative states. *Science (80-. )*. 174, 897–904. doi: 10.1126/SCIENCE.174.4012.897/ASSET/53984BA0-58FB-4662-BA8F-2A339E96A8A8/ASSETS/SCIENCE.174.4012.897.FP.PNG.
- Fischer, R., Hill, R. M., and Warshay, D. (1969a). Effects of the psychodysleptic drug psilocybin on visual perception. Changes in brightness preference. *Experientia* 25, 166–169. doi: 10.1007/BF01899102/METRICS.
- Fischer, R., Hill, R., Thatcher, K., and Scheib, J. (1970). Psilocybin-induced contraction of nearby visual space. *Agents Actions* 1, 190–197. doi: 10.1007/BF01965761.
- Fischer, R., Kappeler, T., Wisecup, P., and Thatcher, K. (1969b). Measurement of handwriting area to pressure ratios during psilocybin-induced hallucinations. *Agents Actions* 1, 42–52. doi: 10.1007/BF01990020/METRICS.
- Fischer, R., Kappeler, T., Wisecup, P., and Thatcher, K. (1969c). Measurement of handwriting area to pressure ratios during psilocybin-induced hallucinations. *Agents Actions 1969 11* 1, 42–52. doi: 10.1007/BF01990020.
- Fradkin, S. I., and Silverstein, S. M. (2022). Resistance to depth inversion illusions: A biosignature of psychosis with potential utility for monitoring positive symptom emergence and remission in schizophrenia. *Biomarkers in Neuropsychiatry* 6, 100050.

doi: 10.1016/J.BIONPS.2022.100050.

Frank, S. A. (2013). Input-output relations in biological systems: Measurement, information and the Hill equation. *Biol. Direct* 8, 1–25. doi: 10.1186/1745-6150-8-31/FIGURES/10.

Fuhs, M. C., and Touretzky, D. S. (2006). A spin glass model of path integration in rat medial entorhinal cortex. *J. Neurosci.* 26, 4266–4276. doi: 10.1523/JNEUROSCI.4353-05.2006.

Gable, P., and Harmon-Jones, E. (2010). The motivational dimensional model of affect: Implications for breadth of attention, memory, and cognitive categorisation. <https://doi.org/10.1080/02699930903378305> 24, 322–337. doi: 10.1080/02699930903378305.

García-Gutiérrez, M. S., Navarrete, F., Sala, F., Gasparyan, A., Austrich-Olivares, A., and Manzanares, J. (2020). Biomarkers in Psychiatry: Concept, Definition, Types and Relevance to the Clinical Reality. *Front. Psychiatry* 11, 432. doi: 10.3389/FPSYT.2020.00432/BIBTEX.

Gardner, R. J., Hermansen, E., Pachitariu, M., Burak, Y., Baas, N. A., Dunn, B. A., et al. (2022). Toroidal topology of population activity in grid cells. *Nat.* 2022 6027895 602, 123–128. doi: 10.1038/s41586-021-04268-7.

Gelbtuch, M. H., Calvert, J. E., Harris, J. P., and Phillipson, O. T. (1986). Modification of visual orientation illusions by drugs which influence dopamine and GABA neurones: Differential effects on simultaneous and successive illusions. *Psychopharmacology (Berl)*. 90, 379–383. doi: 10.1007/BF00179195/METRICS.

- Giaschi, D., Zwicker, A., Young, S. A., and Bjornson, B. (2007). The role of cortical area V5/MT+ in speed-tuned directional anisotropies in global motion perception. *Vision Res.* 47, 887–898. doi: 10.1016/j.visres.2006.12.017.
- Giese, M. A., and Poggio, T. (2003). Neural mechanisms for the recognition of biological movements. *Nat. Rev. Neurosci.* 2003 43 4, 179–192. doi: 10.1038/nrn1057.
- Gitis, V., and Rothenberg, G. (2020). Handbook Of Porous Materials: Synthesis, Properties, Modeling And Key Applications (In 4 Volumes). *Handb. Porous Mater. Synth. Prop. Model. Key Appl. (In 4 Vol., 1–412.* doi: 10.1142/11909.
- GOLDSTEIN, L. (1978). “QUANTITATIVE ELECTROENCEPHALOGRAPHY OF ‘CLASSICAL’ PSYCHOACTIVE DRUGS,” in *Neuro-Psychopharmacology* (Pergamon), 1165–1171. doi: 10.1016/b978-1-4832-8322-7.50155-2.
- Golomb, J. D., McDavitt, J. R. B., Ruf, B. M., Chen, J. I., Saricicek, A., Maloney, K. H., et al. (2009a). Enhanced visual motion perception in major depressive disorder. *J. Neurosci.* 29, 9072–9077. doi: 10.1523/JNEUROSCI.1003-09.2009.
- Golomb, J. D., McDavitt, J. R. B., Ruf, B. M., Chen, J. I., Saricicek, A., Maloney, K. H., et al. (2009b). Enhanced Visual Motion Perception in Major Depressive Disorder. *J. Neurosci.* 29, 9072–9077. doi: 10.1523/JNEUROSCI.1003-09.2009.
- Gratton, C., Yousef, S., Aarts, E., Wallace, D. L., D’Esposito, M., and Silver, M. A. (2017). Cholinergic, But Not Dopaminergic or Noradrenergic, Enhancement Sharpens Visual Spatial Perception in Humans. *J. Neurosci.* 37, 4405–4415. doi: 10.1523/JNEUROSCI.2405-16.2017.

- Grill-Spector, K., Kushnir, T., Hendler, T., Edelman, S., Itzhak, Y., and Malach, R. (1998). A sequence of object-processing stages revealed by fMRI in the human occipital lobe. *Hum. Brain Mapp.* 6, 316–328. doi: 10.1002/(SICI)1097-0193(1998)6:4<316::AID-HBM9>3.0.CO;2-6.
- Groothuis, D. R., Warkne, P. C., Molnar, P., Lapin, G. D., and Mikhael, M. A. (1990). Effect of hyperosmotic blood-brain barrier disruption on transcapillary transport in canine brain tumors. *J. Neurosurg.* 72, 441–449. doi: 10.3171/JNS.1990.72.3.0441.
- Guanella, A., Kiper, D., and Verschure, P. (2007a). A model of grid cells based on a twisted torus topology. in *International Journal of Neural Systems* (World Scientific Publishing Company), 231–240. doi: 10.1142/S0129065707001093.
- Guanella, A., Kiper, D., and Verschure, P. (2007b). A model of grid cells based on a twisted torus topology. in *International Journal of Neural Systems* (Int J Neural Syst), 231–240. doi: 10.1142/S0129065707001093.
- Gulban, O. F., Sitek, K. R., Ghosh, S. S., Moerel, M., and Martino, F. De (2019). “Auditory localization with 7T fMRI.” doi: 10.18112/openneuro.ds001942.v1.2.0.
- Hafting, T., Fyhn, M., Molden, S., Moser, M. B., and Moser, E. I. (2005). Microstructure of a spatial map in the entorhinal cortex. *Nat.* 2005 4367052 436, 801–806. doi: 10.1038/nature03721.
- Hagler, D. J., and Sereno, M. I. (2006). Spatial maps in frontal and prefrontal cortex. *Neuroimage* 29, 567–577. doi: 10.1016/j.neuroimage.2005.08.058.
- Harrington, D. L., Haaland, K. Y., and Knight, R. T. (1998). Cortical networks underlying

- mechanisms of time perception. *J. Neurosci.* 18, 1085–1095. doi: 10.1523/jneurosci.18-03-01085.1998.
- Harris, D. (2016). *Human Performance on the Flight Deck*. CRC Press doi: 10.1201/9781315252988.
- Hartig, R., Battal, C., Chávez, G., Vedoveli, A., Steudel, T., Krampe, E., et al. (2017). Topographic mapping of the primate primary interoceptive cortex. *Front. Neurosci.* 11. doi: 10.3389/conf.fnins.2017.94.00005.
- Hasler, F., Grimberg, U., Benz, M. A., Huber, T., and Vollenweider, F. X. (2004). Acute psychological and physiological affects of psilocybin in healthy humans: A double-blind, placebo-controlled dose-effect study. *Psychopharmacology (Berl)*. 172, 145–156. doi: 10.1007/S00213-003-1640-6/METRICS.
- Hawkins, J., Lewis, M., Klukas, M., Purdy, S., and Ahmad, S. (2019). A framework for intelligence and cortical function based on grid cells in the neocortex. *Front. Neural Circuits* 12, 121. doi: 10.3389/fncir.2018.00121.
- Hering, E. (1861). *Beiträge zur Physiologie I. Zur Lehre vom Ortssinne der Netzhaut*. Leipzig.
- Hermansen, E., Klindt, D. A., and Dunn, B. A. (2022). Uncovering 2-D toroidal representations in grid cell ensemble activity during 1-D behavior. *bioRxiv*, 2022.11.25.517966. doi: 10.1101/2022.11.25.517966.
- Herrington, J. D., Baron-Cohen, S., Wheelwright, S. J., Singh, K. D., Bullmore, E. T., Brammer, M., et al. (2007). The role of MT+/V5 during biological motion perception in

- Asperger Syndrome: An fMRI study. *Res. Autism Spectr. Disord.* 1, 14–27. doi: 10.1016/j.rasd.2006.07.002.
- Hill, R. M., and Fischer, R. (1971a). Interpretation of visual space under drug-induced ergotropic and trophotropic arousal. *Agents Actions* 2, 122–130. doi: 10.1007/BF01966750.
- Hill, R. M., and Fischer, R. (1971b). Interpretation of visual space under drug-induced ergotropic and trophotropic arousal. *Agents Actions 1971 23* 2, 122–130. doi: 10.1007/BF01966750.
- Hill, R. M., Fischer, R., and Warshay, D. (1969). Effects of excitatory and tranquilizing drugs on visual perception. spatial distortion thresholds. *Exp.* 1969 252 25, 171–172. doi: 10.1007/BF01899105.
- Hoffman, R. E., Grasemann, U., Gueorguieva, R., Quinlan, D., Lane, D., and Miikkulainen, R. (2011). Using computational patients to evaluate illness mechanisms in schizophrenia. *Biol. Psychiatry* 69, 997–1005. doi: 10.1016/J.BIOPSYCH.2010.12.036/ATTACHMENT/845B2E11-3A9B-4FFD-91C1-08B365E434E5/MMC1.PDF.
- Horner, A. J., Bisby, J. A., Zotow, E., Bush, D., and Burgess, N. (2016). Grid-like Processing of Imagined Navigation. *Curr. Biol.* 26, 842–847. doi: 10.1016/J.CUB.2016.01.042.
- Horton, J. C., and Hoyt, W. F. (1991). The Representation of the Visual Field in Human Striate Cortex: A Revision of the Classic Holmes Map. *Arch. Ophthalmol.* 109, 816–824. doi: 10.1001/archopht.1991.01080060080030.

- Huk, A. C., Ress, D., and Heeger, D. J. (2001). Neuronal basis of the motion aftereffect reconsidered. *Neuron* 32, 161–172. doi: 10.1016/S0896-6273(01)00452-4.
- Hurvich, L. M. (1981). *Color Vision*. 1st ed. Sunderland: Sinauer Associates.
- Huys, Q. J. M., Browning, M., Paulus, M. P., and Frank, M. J. (2021). Advances in the computational understanding of mental illness. *Neuropsychopharmacology* 46, 3–19. doi: 10.1038/s41386-020-0746-4.
- Imperato, A., Obinu, M. C., and Gessa, G. L. (1993). Stimulation of both dopamine D1 and D2 receptors facilitates in vivo acetylcholine release in the hippocampus. *Brain Res.* 618, 341–345. doi: 10.1016/0006-8993(93)91288-4.
- Indow, T. (1979). Alleys in visual space. *J. Math. Psychol.* 19, 221–258. doi: 10.1016/0022-2496(79)90008-7.
- Ivan Yeung, W. T., Lee, T. Y., Del Maestro, R. F., Kozak, R., and Brown, T. (1992). In vivo CT measurement of blood-brain transfer constant of iopamidol in human brain tumors. *J. Neuro-Oncology* 1992 142 14, 177–187. doi: 10.1007/BF00177622.
- Ivry, R. B., and Spencer, R. M. C. (2004). The neural representation of time. *Curr. Opin. Neurobiol.* 14, 225–232. doi: 10.1016/j.conb.2004.03.013.
- Jacobs, J., Weidemann, C. T., Miller, J. F., Solway, A., Burke, J. F., Wei, X. X., et al. (2013). Direct recordings of grid-like neuronal activity in human spatial navigation. *Nat. Neurosci.* 2013 169 16, 1188–1190. doi: 10.1038/nn.3466.
- Jahshan, C., Wynn, J. K., Mathis, K. I., and Green, M. F. (2015). The neurophysiology of biological motion perception in schizophrenia. *Brain Behav.* 5, e00303. doi:

10.1002/BRB3.303.

Janssen, P., and Shadlen, M. N. (2005). A representation of the hazard rate of elapsed time in macaque area LIP. *Nat. Neurosci.* 8, 234–241. doi: 10.1038/nn1386.

Jazayeri, M., and Shadlen, M. N. (2015). A Neural Mechanism for Sensing and Reproducing a Time Interval. *Curr. Biol.* 25, 2599–2609. doi: 10.1016/j.cub.2015.08.038.

Jeffery, K. J., Donnett, J. G., Burgess, N., and O’Keefe, J. M. (1997). Directional control of hippocampal place fields. *Exp. Brain Res.* 117, 131–142. doi: 10.1007/S002210050206/METRICS.

Jun, J. J., Steinmetz, N. A., Siegle, J. H., Denman, D. J., Bauza, M., Barbarits, B., et al. (2017). Fully integrated silicon probes for high-density recording of neural activity. *Nat.* 2017 5517679 551, 232–236. doi: 10.1038/nature24636.

Kaiser, M. D., Hudac, C. M., Shultz, S., Su Mei Lee, Cheung, C., Berkena, A. M., et al. (2010). Neural signatures of autism. *Proc. Natl. Acad. Sci. U. S. A.* 107, 21223–21228. doi: 10.1073/pnas.1010412107.

Kaiser, M. D., and Shiffrar, M. (2009). The visual perception of motion by observers with autism spectrum disorders: A review and synthesis. *Psychon. Bull. Rev.* 2009 165 16, 761–777. doi: 10.3758/PBR.16.5.761.

Kalderon, M. E. (2011). Color Illusion. *Noûs* 45, 751–775. doi: 10.1111/J.1468-0068.2010.00781.X.

Kaneko, S., and Murakami, I. (2009). Perceived duration of visual motion increases with speed. *J. Vis.* 9, 1–12. doi: 10.1167/9.7.14.

- Kantner, L. A., Segall, M. H., Campbell, D. T., and Herskovits, M. J. (1968). The Influence of Culture on Visual Perception. *Stud. Art Educ.* 10, 68. doi: 10.2307/1319670.
- Karşilar, H., Kisa, Y. D., and Balci, F. (2018). Dilation and constriction of subjective time based on observed walking speed. *Front. Psychol.* 9, 2565. doi: 10.3389/fpsyg.2018.02565.
- Kastanakis, M. N., and Voyer, B. G. (2014). The effect of culture on perception and cognition: A conceptual framework. *J. Bus. Res.* 67, 425–433. doi: 10.1016/J.JBUSRES.2013.03.028.
- Kelley, L. A., and Kelley, J. L. (2014). Animal visual illusion and confusion: the importance of a perceptual perspective. *Behav. Ecol.* 25, 450–463. doi: 10.1093/BEHECO/ART118.
- Killian, N. J., Jutras, M. J., and Buffalo, E. A. (2012a). A map of visual space in the primate entorhinal cortex. *Nature* 491, 761–764. doi: 10.1038/nature11587.
- Killian, N. J., Jutras, M. J., and Buffalo, E. A. (2012b). A map of visual space in the primate entorhinal cortex. *Nat.* 2012 4917426 491, 761–764. doi: 10.1038/nature11587.
- Kim, J. (2015). Light Levels and Driver Perception of Speed: A study examining egospeed under simulated day and night lighting conditions in a rural setting. Available at: <https://researchcommons.waikato.ac.nz/handle/10289/9758> [Accessed March 10, 2024].
- Kim, J., Norton, D., McBain, R., Ongur, D., and Chen, Y. (2013a). Deficient biological motion perception in schizophrenia: Results from a motion noise paradigm. *Front. Psychol.* 4, 46070. doi: 10.3389/FPSYG.2013.00391/BIBTEX.
- Kim, J., Norton, D., McBain, R., Ongur, D., and Chen, Y. (2013b). Deficient biological

- motion perception in schizophrenia: Results from a motion noise paradigm. *Front. Psychol.* 4, 391. doi: 10.3389/fpsyg.2013.00391.
- Kim, M., Jeffery, K. J., and Maguire, E. A. (2017). Multivoxel Pattern Analysis Reveals 3D Place Information in the Human Hippocampus. *J. Neurosci.* 37, 4270–4279. doi: 10.1523/JNEUROSCI.2703-16.2017.
- Kim, M., and Maguire, E. A. (2018). Hippocampus, Retrosplenial and Parahippocampal Cortices Encode Multicompartment 3D Space in a Hierarchical Manner. *Cereb. Cortex* 28, 1898–1909. doi: 10.1093/CERCOR/BHY054.
- Koenderink, J. J., Van Doorn, A. J., and Lappin, J. S. (2016). Direct Measurement of the Curvature of Visual Space. <http://dx.doi.org/10.1068/p2921> 29, 69–79. doi: 10.1068/P2921.
- Kojima, T., Matsushima, E., Iwama, H., Ando, H., Moriya, H., Ando, K., et al. (1986). Visual perception process in amphetamine psychosis and schizophrenia. *Psychopharmacol. Bull.* 22, 768–773. Available at: [https://jglobal.jst.go.jp/en/detail?JGLOBAL\\_ID=201102035333266626](https://jglobal.jst.go.jp/en/detail?JGLOBAL_ID=201102035333266626) [Accessed June 27, 2023].
- Konen, C. S., and Kastner, S. (2008). Representation of eye movements and stimulus motion in topographically organized areas of human posterior parietal cortex. *J. Neurosci.* 28, 8361–8375. doi: 10.1523/JNEUROSCI.1930-08.2008.
- Kröger, A., Hof, K., Krick, C., Siniatchkin, M., Jarczok, T., Freitag, C. M., et al. (2014). Visual Processing of Biological Motion in Children and Adolescents with Attention-Deficit/Hyperactivity Disorder: An Event Related Potential-Study. *PLoS One* 9, e88585.

doi: 10.1371/JOURNAL.PONE.0088585.

Krug, K. (2004). A common neuronal code for perceptual processes in visual cortex?

Comparing choice and attentional correlates in V5/MT. *Philos. Trans. R. Soc. B Biol. Sci.* 359, 929–941. doi: 10.1098/rstb.2003.1415.

Kume-Kick, J., Mazel, T., Voříšek, I., Hrabětová, S., Tao, L., and Nicholson, C. (2002).

Independence of extracellular tortuosity and volume fraction during osmotic challenge in rat neocortex. *J. Physiol.* 542, 515–527. doi: 10.1113/JPHYSIOL.2002.017541.

Kunnath, A. J., Gifford, R. H., and Wallace, M. T. (2023). Cholinergic modulation of sensory perception and plasticity. *Neurosci. Biobehav. Rev.* 152, 105323. doi:

10.1016/J.NEUBIOREV.2023.105323.

LaMontagne, P. J., Benzinger, T. L., Morris, J. C., Keefe, S., Hornbeck, R., Xiong, C., et al.

(2019). OASIS-3: Longitudinal Neuroimaging, Clinical, and Cognitive Dataset for Normal Aging and Alzheimer Disease. *medRxiv*, 2019.12.13.19014902. doi: 10.1101/2019.12.13.19014902.

Lange-Malecki, B., Treue, S., Rothenberger, A., and Albrecht, B. (2018). Cognitive control

over visual motion processing – Are children with adhd especially compromised? A pilot study of flanker task event-related potentials. *Front. Hum. Neurosci.* 12, 423563. doi: 10.3389/FNHUM.2018.00491/BIBTEX.

Larsson, J., and Heeger, D. J. (2006). Two retinotopic visual areas in human lateral occipital

cortex. *J. Neurosci.* 26, 13128–13142. doi: 10.1523/JNEUROSCI.1657-06.2006.

Laycock, R., Crewther, D. P., Fitzgerald, P. B., and Crewther, S. G. (2007). Evidence for fast

- signals and later processing in human V1/V2 and V5/MT+: A TMS study of motion perception. *J. Neurophysiol.* 98, 1253–1262. doi: 10.1152/jn.00416.2007.
- Lederman, S. J., and Jones, L. A. (2011). Tactile and Haptic Illusions. *IEEE Trans. Haptics* 4, 273–294. doi: 10.1109/TOH.2011.2.
- Lehmenkühler, A., Syková, E., Svoboda, J., Zilles, K., and Nicholson, C. (1993). Extracellular space parameters in the rat neocortex and subcortical white matter during postnatal development determined by diffusion analysis. *Neuroscience* 55, 339–351. doi: 10.1016/0306-4522(93)90503-8.
- Lehner, F. K. (1979). On the validity of Fick's law for transient diffusion through a porous medium. *Chem. Eng. Sci.* 34, 821–825. doi: 10.1016/0009-2509(79)85137-4.
- Leon, M. I., and Shadlen, M. N. (2003). Representation of Time by Neurons in the Posterior Parietal Cortex of the Macaque tures may also play a role in time perception (Harrington et al As a first step toward elucidating the repre. *Neuron* 38, 317–327.
- Lewis, P. A., and Miall, R. C. (2003). Distinct systems for automatic and cognitively controlled time measurement: Evidence from neuroimaging. *Curr. Opin. Neurobiol.* 13, 250–255. doi: 10.1016/S0959-4388(03)00036-9.
- Lidestam, B., and Thorslund, B. (2019). Visual perception of speed in drivers with ADHD. *Int. J. Sustain. Soc.* 11, 125–137. doi: 10.1504/IJSSOC.2019.103669.
- Lidow, M. S., Goldman-Rakic, P. S., Gallager, D. W., and Rakic, P. (1991). Distribution of dopaminergic receptors in the primate cerebral cortex: Quantitative autoradiographic analysis using [3H]raclopride, [3H]spiperone and [3H]SCH23390. *Neuroscience* 40,

657–671. doi: 10.1016/0306-4522(91)90003-7.

Lindenblatt, H., Krämer, E., Holzmann-Erens, P., Gouzoulis-Mayfrank, E., and Kovar, K. A. (1998). Quantitation of psilocin in human plasma by high-performance liquid chromatography and electrochemical detection: comparison of liquid–liquid extraction with automated on-line solid-phase extraction. *J. Chromatogr. B Biomed. Sci. Appl.* 709, 255–263. doi: 10.1016/S0378-4347(98)00067-X.

Liu, T., Hu, P., Cao, R., Ye, X., Tian, Y., Chen, X., et al. (2017). Dopaminergic Modulation of Biological Motion Perception in patients with Parkinson’s disease. *Sci. Rep.* 7, 1–9. doi: 10.1038/s41598-017-10463-2.

Long, X., Deng, B., Cai, J., Chen, Z. S., and Zhang, S.-J. (2021). A compact spatial map in V2 visual cortex. *bioRxiv*, 2021.02.11.430687. doi: 10.1101/2021.02.11.430687.

Long, X., and Zhang, S. J. (2021). A novel somatosensory spatial navigation system outside the hippocampal formation. *Cell Res.* 31, 649–663. doi: 10.1038/s41422-020-00448-8.

Luneburg, R. K. (1947). *Mathematical analysis of binocular vision*. Princeton, NJ, US: Princeton University Press.

Macdonald, D. D. (1977). “The Mathematics of Diffusion,” in *Transient Techniques in Electrochemistry* (Boston, MA: Springer, Boston, MA), 47–67. doi: 10.1007/978-1-4613-4145-1\_3.

Mamassian, P., and Goutcher, R. (2001). Prior knowledge on the illumination position. *Cognition* 81, B1–B9. doi: 10.1016/S0010-0277(01)00116-0.

Manning, C., Morgan, M. J., Allen, C. T. W., and Pellicano, E. (2017). Susceptibility to

- Ebbinghaus and Müller-Lyer illusions in autistic children: a comparison of three different methods. *Mol. Autism* 8, 16. doi: 10.1186/S13229-017-0127-Y/TABLES/5.
- Martorana, A., Mori, F., Esposito, Z., Kusayanagi, H., Monteleone, F., Codecà, C., et al. (2009). Dopamine modulates cholinergic cortical excitability in Alzheimer's disease patients. *Neuropsychopharmacology* 34, 2323–2328. doi: 10.1038/npp.2009.60.
- Mashour, M. (1981). The information basis in the perception of velocity. *Acta Psychol. (Amst)*. 48, 69–78. doi: 10.1016/0001-6918(81)90049-4.
- Massironi, M., Antonucci, G., Pizzamiglio, L., Vitale, M. V., and Zoccolotti, P. (1988). The Wundt-Jastrow illusion in the study of spatial hemi-inattention. *Neuropsychologia* 26, 161–166. doi: 10.1016/0028-3932(88)90039-5.
- Mate, J., Pires, A. C., Campoy, G., and Estaún, S. (2009). Estimating the duration of visual stimuli in motion environments. *Psicológica* 30, 287–300.
- Matthews, W. J., and Gheorghiu, A. I. (2016). Repetition, expectation, and the perception of time. *Curr. Opin. Behav. Sci.* 8, 110–116. doi: 10.1016/J.COBEHA.2016.02.019.
- McCorry, L. K. (2007). Physiology of the Autonomic Nervous System. *Am. J. Pharm. Educ.* 71. doi: 10.5688/AJ710478.
- McLean, J., and Palmer, L. A. (1989). Contribution of linear spatiotemporal receptive field structure to velocity selectivity of simple cells in area 17 of cat. *Vision Res.* 29, 675–679. doi: 10.1016/0042-6989(89)90029-1.
- McNaughton, B. L., Battaglia, F. P., Jensen, O., Moser, E. I., and Moser, M. B. (2006). Path integration and the neural basis of the “cognitive map.” *Nat. Rev. Neurosci.* 2006 78 7,

663–678. doi: 10.1038/nrn1932.

Meng, Q., Wang, B., Cui, D., Liu, N., Huang, Y., Chen, L., et al. (2019). Age-related changes in local and global visual perception. *J. Vis.* 19, 10–10. doi: 10.1167/19.1.10.

Mikhael, J. G., and Gershman, S. J. (2019). Adapting the flow of time with dopamine. *J. Neurophysiol.* 121, 1748–1760. doi: 10.1152/jn.00817.2018.

Moser, E. I., Kropff, E., and Moser, M. B. (2008). Place Cells, Grid Cells, and the Brain's Spatial Representation System.

<http://dx.doi.org/10.1146/annurev.neuro.31.061307.090723> 31, 69–89. doi:

10.1146/ANNUREV.NEURO.31.061307.090723.

Moser, E. I., Roudi, Y., Witter, M. P., Kentros, C., Bonhoeffer, T., and Moser, M. B. (2014).

Grid cells and cortical representation. *Nat. Rev. Neurosci.* 2014 157 15, 466–481. doi:

10.1038/nrn3766.

Muckli, L., Kohler, A., Kriegeskorte, N., and Singer, W. (2005). Primary Visual Cortex

Activity along the Apparent-Motion Trace Reflects Illusory Perception. *PLOS Biol.* 3,

e265. doi: 10.1371/JOURNAL.PBIO.0030265.

Mueller, A., Krock, R. M., Shepard, S., and Moore, T. (2020). Dopamine Receptor

Expression among Local and Visual Cortex-Projecting Frontal Eye Field Neurons.

*Cereb. Cortex* 30, 148–164. doi: 10.1093/cercor/bhz078.

Mulas, V., Troffa, R., and Caddeo, P. (2012). Differences between experts and non-experts in photographic perception and assessment. *Cogn. Process.* 13 Suppl 1. doi:

10.1007/S10339-012-0456-X.

- Nau, M., Navarro Schröder, T., Bellmund, J. L. S., and Doeller, C. F. (2018). Hexadirectional coding of visual space in human entorhinal cortex. *Nat. Neurosci.* 2017 21, 188–190. doi: 10.1038/s41593-017-0050-8.
- Nicholson, C., and Phillips, J. M. (1981). Ion diffusion modified by tortuosity and volume fraction in the extracellular microenvironment of the rat cerebellum. *J. Physiol.* 321, 225–257. doi: 10.1113/jphysiol.1981.sp013981.
- Nicholson, C., Phillips, J. M., and Gardner-Medwin, A. R. (1979). Diffusion from an iontophoretic point source in the brain: role of tortuosity and volume fraction. *Brain Res.* 169, 580–584. doi: 10.1016/0006-8993(79)90408-6.
- Niedenthal, P. M., and Wood, A. (2019). Does emotion influence visual perception? Depends on how you look at it. <https://doi.org/10.1080/02699931.2018.1561424> 33, 77–84. doi: 10.1080/02699931.2018.1561424.
- Nijhawan, R. (1994). Motion extrapolation in catching. *Nat.* 1994 3706487 370, 256–257. doi: 10.1038/370256b0.
- Nisbett, R. E., and Masuda, T. (2003). Culture and point of view. *Proc. Natl. Acad. Sci. U. S. A.* 100, 11163–11170. doi: 10.1073/PNAS.1934527100/ASSET/26DCB7F9-805D-42ED-B578-5D059492269C/ASSETS/GRAPHIC/PQ1934527017.JPEG.
- Nishida, S., Kawabe, T., Sawayama, M., and Fukiage, T. (2018). Motion perception: From detection to interpretation. *Annu. Rev. Vis. Sci.* 4, 501–523. doi: 10.1146/annurev-vision-091517-034328.
- Nolen, W. A., van Meekeren, E., Voskuil, P., and van Tilburg, W. (2020). New vision on the

- mental problems of Vincent van Gogh; results from a bottom-up approach using (semi-)structured diagnostic interviews. *Int. J. Bipolar Disord.* 8, 1–9. doi: 10.1186/S40345-020-00196-Z/FIGURES/4.
- Norton, D. J., McBain, R. K., Pizzagalli, D. A., Cronin-Golomb, A., and Chen, Y. (2016). Dysregulation of visual motion inhibition in major depression. *Psychiatry Res.* 240, 214–221. doi: 10.1016/J.PSYCHRES.2016.04.028.
- Novotny, E. J., Fulbright, R. K., Pearl, P. L., Gibson, K. M., and Rothman, D. L. (2003). Magnetic resonance spectroscopy of neurotransmitters in human brain. *Ann. Neurol.* 54, S25–S31. doi: 10.1002/ana.10697.
- Oeijord, N. K. (2005). *The very basics of tensors*. iUniverse.
- Ohata, K., and Marmarou, A. (1992). Clearance of brain edema and macromolecules through the cortical extracellular space. *J. Neurosurg.* 77, 387–396. doi: 10.3171/JNS.1992.77.3.0387.
- Okruszek, Ł., and Pilecka, I. (2017). Biological motion processing in schizophrenia – Systematic review and meta-analysis. *Schizophr. Res.* 190, 3–10. doi: 10.1016/J.SCHRES.2017.03.013.
- Olbrich, S., Preller, K. H., and Vollenweider, F. X. (2021). LSD and ketanserin and their impact on the human autonomic nervous system. *Psychophysiology* 58, e13822. doi: 10.1111/PSYP.13822.
- Olman, C. A., Van de Moortele, P. F., Schumacher, J. F., Guy, J. R., Uğurbil, K., and Yacoub, E. (2010). Retinotopic mapping with spin echo BOLD at 7T. *Magn. Reson.*

*Imaging* 28, 1258–1269. doi: 10.1016/j.mri.2010.06.001.

Onoe, H., Komori, M., Onoe, K., Takechi, H., Tsukada, H., and Watanabe, Y. (2001).

Cortical networks recruited for time perception: A monkey positron emission tomography (PET) study. *Neuroimage* 13, 37–45. doi: 10.1006/nimg.2000.0670.

Ortiz-Peregrina, S., Ortiz, C., Casares-López, M., Jiménez, J. R., and Anera, R. G. (2021).

Effects of cannabis on visual function and self-perceived visual quality. *Sci. Reports* 2021 111 11, 1–11. doi: 10.1038/s41598-021-81070-5.

Palmer, C. J., Paton, B., Hohwy, J., and Enticott, P. G. (2013). Movement under uncertainty:

The effects of the rubber-hand illusion vary along the nonclinical autism spectrum.

*Neuropsychologia* 51, 1942–1951. doi:

10.1016/J.NEUROPSYCHOLOGIA.2013.06.020.

Pardridge, W. M. (2012). Drug transport across the blood-brain barrier. *J. Cereb. Blood Flow*

*Metab.* 32, 1959–1972. doi: 10.1038/jcbfm.2012.126.

Park, G., and Thayer, J. F. (2014). From the heart to the mind: Cardiac vagal tone modulates

top-down and bottom-up visual perception and attention to emotional stimuli. *Front.*

*Psychol.* 5, 77423. doi: 10.3389/FPSYG.2014.00278/BIBTEX.

Patlak, C. S., and Fenstermacher, J. D. (1975). Measurements of dog blood-brain transfer

constants by ventriculocisternal perfusion. *Am. J. Physiol.* 229, 877–884. doi:

10.1152/AJPLEGACY.1975.229.4.877.

Paulk, A. C., Kfir, Y., Khanna, A. R., Mustroph, M. L., Trautmann, E. M., Soper, D. J., et al.

(2022). Large-scale neural recordings with single neuron resolution using Neuropixels

- probes in human cortex. *Nat. Neurosci.* 2022 252 25, 252–263. doi: 10.1038/s41593-021-00997-0.
- Pawar, A. S., Gepshtein, S., Savel'ev, S., and Albright, T. D. (2019). Mechanisms of Spatiotemporal Selectivity in Cortical Area MT. *Neuron* 101, 514-527.e2. doi: 10.1016/j.neuron.2018.12.002.
- Peirce, J. W. (2007). PsychoPy—Psychophysics software in Python. *J. Neurosci. Methods* 162, 8–13. doi: 10.1016/J.JNEUMETH.2006.11.017.
- Pelli, D. G., Palomares, M., and Majaj, N. J. (2004). Crowding is unlike ordinary masking: Distinguishing feature integration from detection. *J. Vis.* 4, 12–12. doi: 10.1167/4.12.12.
- Penn, D. C., Holyoak, K. J., and Povinelli, D. J. (2008). Darwin's mistake: Explaining the discontinuity between human and nonhuman minds. *Behav. Brain Sci.* 31, 109–178. doi: 10.1017/S0140525X08003543.
- Perez-Pinzon, M. A., Tao, L., and Nicholson, C. (1995). Extracellular potassium, volume fraction, and tortuosity in rat hippocampal CA1, CA3, and cortical slices during ischemia. <https://doi.org/10.1152/jn.1995.74.2.565> 74, 565–573. doi: 10.1152/JN.1995.74.2.565.
- Perrone, J. A., and Thiele, A. (2001). Speed skills: measuring the visual speed analyzing properties of primate MT neurons. *Nat. Neurosci.* 2001 45 4, 526–532. doi: 10.1038/87480.
- Perrone, J. A., and Thiele, A. (2002). A model of speed tuning in MT neurons. *Vision Res.* 42, 1035–1051. doi: 10.1016/S0042-6989(02)00029-9.

- Petzold, A., and Pitz, E. (2009). The historical origin of the pulfrich effect: A serendipitous astronomic observation at the border of the Milky Way. *Neuro-Ophthalmology* 33, 39–46. doi: 10.1080/01658100802590829.
- Poirier, C., Collignon, O., DeVolder, A. G., Renier, L., Vanlierde, A., Tranduy, D., et al. (2005). Specific activation of the V5 brain area by auditory motion processing: An fMRI study. *Cogn. Brain Res.* 25, 650–658. doi: 10.1016/j.cogbrainres.2005.08.015.
- Ponzo, M. (1911). Intorno ad alcune illusioni nel campo delle sensazioni tattili sull'illusione di Aristotele e fenomeni analoghi. *Arch. Ital. Biol.*
- Posner, M. I., Snyder, C. R., and Davidson, B. J. (1980). Attention and the detection of signals. *J. Exp. Psychol. Gen.* 109, 160–174. doi: 10.1037/0096-3445.109.2.160.
- Priebe, N. J., Cassanello, C. R., and Lisberger, S. G. (2003). The neural representation of speed in macaque area MT/V5. *J. Neurosci.* 23, 5650–5661. doi: 10.1523/jneurosci.23-13-05650.2003.
- Protopapa, F., Hayashi, M. J., Kulashekhar, S., Van Der Zwaag, W., Battistella, G., Murray, M. M., et al. (2019). *Research article chronotopic maps in human supplementary motor area.* doi: 10.1371/journal.pbio.3000026.
- Puri, A. M., and Wojciulik, E. (2008). Expectation both helps and hinders object perception. *Vision Res.* 48, 589–597. doi: 10.1016/J.VISRES.2007.11.017.
- Purves, D., Augustine, G. J., Fitzpatrick, D., Katz, L. C., LaMantia, A.-S., McNamara, J. O., et al. (2001). *The Audible Spectrum.*
- Qian, N., and Andersen, R. A. (1997). A physiological model for motion-stereo integration

- and a unified explanation of Pulfrich-like phenomena. *Vision Res.* 37, 1683–1698. doi: 10.1016/S0042-6989(96)00164-2.
- Rajsic, J., Wilson, D. E., and Pratt, J. (2015). Confirmation bias in visual search. *J. Exp. Psychol. Hum. Percept. Perform.* 41, 1353–1364. doi: 10.1037/XHP0000090.
- Rensink, R. A., and Cavanagh, P. (2004). The Influence of Cast Shadows on Visual Search. <http://dx.doi.org/10.1068/p5322> 33, 1339–1358. doi: 10.1068/P5322.
- Reuter-Lorenz, P. A., Drain, M., and Hardy-Morais, C. (1996). Object-Centered Attentional Biases in the Intact Brain. *J. Cogn. Neurosci.* 8, 540–550. doi: 10.1162/JOCN.1996.8.6.540.
- Reynaud, A., and Hess, R. F. (2017). Interocular contrast difference drives illusory 3D percept. *Sci. Reports* 2017 71 7, 1–6. doi: 10.1038/s41598-017-06151-w.
- Ricard, A. S., Desbarats, P., Laurentjoye, M., Montaudon, M., Caix, P., Dousset, V., et al. (2010). On two equations about brain volume, cranial capacity and age. *Surg. Radiol. Anat.* 32, 989–995. doi: 10.1007/S00276-010-0650-4/TABLES/4.
- Richard, L., and Charbonneau, D. (2009). An introduction to E-Prime. *Tutor. Quant. Methods Psychol.* 5, 68–76. doi: 10.20982/tqmp.05.2.p068.
- Riddoch, G. (1917). Dissociation of visual perceptions due to occipital injuries, with especial reference to appreciation of movement. *Brain* 40, 15–57. doi: 10.1093/brain/40.1.15.
- Rosa, M. G. P. (2002). Visual maps in the adult primate cerebral cortex: Some implications for brain development and evolution. *Brazilian J. Med. Biol. Res.* 35, 1485–1498. doi: 10.1590/S0100-879X2002001200008.

- Routier, A., Burgos, N., Díaz, M., Bacci, M., Bottani, S., El-Rifai, O., et al. (2021). Clinica: An Open-Source Software Platform for Reproducible Clinical Neuroscience Studies. *Front. Neuroinform.* 15, 39. doi: 10.3389/fninf.2021.689675.
- Rovamo, J., and Virsu, V. (1979). An estimation and application of the human cortical magnification factor. *Exp. Brain Res.* 37, 495–510. doi: 10.1007/BF00236819.
- Sakata, H., and Kusunoki, M. (1992). Organization of space perception: neural representation of three-dimensional space in the posterior parietal cortex. *Curr. Opin. Neurobiol.* 2, 170–174. doi: 10.1016/0959-4388(92)90007-8.
- Saleem, A. B., Diamanti, E. M., Fournier, J., Harris, K. D., and Carandini, M. (2018). Coherent encoding of subjective spatial position in visual cortex and hippocampus. *Nat.* 2018 5627725 562, 124–127. doi: 10.1038/s41586-018-0516-1.
- Samsonovich, A., and McNaughton, B. L. (1997). Path Integration and Cognitive Mapping in a Continuous Attractor Neural Network Model. *J. Neurosci.* 17, 5900–5920. doi: 10.1523/JNEUROSCI.17-15-05900.1997.
- Schira, M. M., Wade, A. R., and Tyler, C. W. (2007). Two-Dimensional Mapping of the Central and Parafoveal Visual Field to Human Visual Cortex. *J. Neurophysiol.* 97, 4284–4295. doi: 10.1152/jn.00972.2006.
- Schöning, C. (2008). “Driver Ants (Dorylus subgenus Anomma) (Hymenoptera: Formicidae),” in *Encyclopedia of Entomology*, ed. J. L. Capinera (Dordrecht: Springer Netherlands), 1246–1251. doi: 10.1007/978-1-4020-6359-6\_991.
- Schwartz, E. L. (1980). Computational anatomy and functional architecture of striate cortex:

- A spatial mapping approach to perceptual coding. *Vision Res.* 20, 645–669. doi: 10.1016/0042-6989(80)90090-5.
- Sepulveda, J. A., Wood, J. M., Anderson, A. J., and McKendrick, A. M. (2022). The Effects of Glare on the Perception of Visual Motion as a Function of Age. *Transl. Vis. Sci. Technol.* 11, 11–11. doi: 10.1167/TVST.11.9.11.
- Shipston-Sharman, O., Solanka, L., and Nolan, M. F. (2016). Continuous attractor network models of grid cell firing based on excitatory–inhibitory interactions. *J. Physiol.* 594, 6547–6557. doi: 10.1113/JP270630.
- Sitek, K. R., Gulban, O. F., Calabrese, E., Johnson, G. A., Lage-Castellanos, A., Moerel, M., et al. (2019). Mapping the human subcortical auditory system using histology, postmortem MRI and in vivo MRI at 7T. *Elife* 8, 1–36. doi: 10.7554/eLife.48932.
- Sliney, D. H. (2016). What is light? The visible spectrum and beyond. *Eye* 2016 302 30, 222–229. doi: 10.1038/eye.2015.252.
- Slotnick, S. D., Klein, S. A., Carney, T., and Sutter, E. E. (2001). Electrophysiological estimate of human cortical magnification. *Clin. Neurophysiol.* 112, 1349–1356. doi: 10.1016/S1388-2457(01)00561-2.
- Snowden, R. J., and Hammett, S. T. (1998). The effects of surround contrast on contrast thresholds, perceived contrast and contrast discrimination. *Vision Res.* 38, 1935–1945. doi: 10.1016/S0042-6989(97)00379-9.
- Soma, S., Suematsu, N., and Shimegi, S. (2013). Cholinesterase inhibitor, donepezil, improves visual contrast detectability in freely behaving rats. *Behav. Brain Res.* 256,

362–367. doi: 10.1016/J.BBR.2013.08.022.

Spang, K., and Morgan, M. (2008). Cortical correlates of stereoscopic depth produced by temporal delay. *J. Vis.* 8, 10–10. doi: 10.1167/8.9.10.

Stensola, H., Stensola, T., Solstad, T., FrØland, K., Moser, M. B., and Moser, E. I. (2012). The entorhinal grid map is discretized. *Nat.* 2012 4927427 492, 72–78. doi: 10.1038/nature11649.

Stevenson, R. J. (2011). Olfactory illusions: Where are they? *Conscious. Cogn.* 20, 1887–1898. doi: 10.1016/J.CONCOG.2011.05.011.

Strasburger, H. (2022). On the cortical mapping function – Visual space, cortical space, and crowding. *Vision Res.* 194, 107972. doi: 10.1016/j.visres.2021.107972.

Stuart-Fox, M. (2015). The origins of causal cognition in early hominins. *Biol. Philos.* 30, 247–266. doi: 10.1007/s10539-014-9462-y.

Stubbert, E., Tullo, D., Faubert, J., Bertone, A., and Burack, J. A. (2023). Biological motion and multiple object tracking performance develop similarly from childhood through early adolescence. *Cogn. Dev.* 67, 101360. doi: 10.1016/J.COGDEV.2023.101360.

Sullivan, E. V., Rosenbloom, M. J., Deshmukh, A., Desmond, J. E., and Pfefferbaum, A. (1995). Alcohol and the Cerebellum: Effects on Balance, Motor Coordination, and Cognition. *Alcohol Health Res. World* 19, 138. Available at: [/pmc/articles/PMC6875723/](https://pubmed.ncbi.nlm.nih.gov/6875723/) [Accessed June 27, 2023].

Summerfield, C., and Egnér, T. (2009). Expectation (and attention) in visual cognition. *Trends Cogn. Sci.* 13, 403–409. doi: 10.1016/j.tics.2009.06.003.

- Summerfield, J. J., Rao, A., Garside, N., and Nobre, A. C. (2011). Biasing Perception by Spatial Long-Term Memory. *J. Neurosci.* 31, 14952–14960. doi: 10.1523/JNEUROSCI.5541-10.2011.
- Sun, Y., and Sun, X. (2021). Exploring the interstitial system in the brain: The last mile of drug delivery. *Rev. Neurosci.* 32, 363–377. doi: 10.1515/REVNEURO-2020-0057/ASSET/GRAPHIC/J\_REVNEURO-2020-0057\_FIG\_009.JPG.
- Swearer, J. (2011). Visual Angle. *Encycl. Clin. Neuropsychol.*, 2626–2627. doi: 10.1007/978-0-387-79948-3\_1411.
- Tadin, D., Silvanto, J., Pascual-Leone, A., and Battelli, L. (2011). Improved motion perception and impaired spatial suppression following disruption of cortical area MT/V5. *J. Neurosci.* 31, 1279–1283. doi: 10.1523/JNEUROSCI.4121-10.2011.
- Thompson, P. (1982). Perceived rate of movement depends on contrast. *Vision Res.* 22, 377–380. doi: 10.1016/0042-6989(82)90153-5.
- Threlfell, S., Clements, M. A., Khodai, T., Pienaar, I. S., Exley, R., Wess, J., et al. (2010). Striatal muscarinic receptors promote activity dependence of dopamine transmission via distinct receptor subtypes on cholinergic interneurons in ventral versus dorsal striatum. *J. Neurosci.* 30, 3398–3408. doi: 10.1523/JNEUROSCI.5620-09.2010.
- Threlfell, S., Lalic, T., Platt, N. J., Jennings, K. A., Deisseroth, K., and Cragg, S. J. (2012). Striatal dopamine release is triggered by synchronized activity in cholinergic interneurons. *Neuron* 75, 58–64. doi: 10.1016/j.neuron.2012.04.038.
- Tian, J., Yang, F., Wang, Y., Wang, L., Wang, N., Jiang, Y., et al. (2024). Atypical

Biological Motion Perception in Children with Attention Deficit Hyperactivity Disorder: Dissociating the Roles of Local Motion and Global Configuration Processing. *bioRxiv*, 2023.07.25.550597. doi: 10.1101/2023.07.25.550597.

Tolhurst, D. J., and Ling, L. (1988). Magnification factors and the organization of the human striate cortex. *Hum. Neurobiol.* 6, 247–254.

Tolman, E. C. (1948). Cognitive maps in rats and men. *Psychol. Rev.* 55, 189–208. doi: 10.1037/H0061626.

Tse, P. U., and Hsieh, P. J. (2006). The infinite regress illusion reveals faulty integration of local and global motion signals. *Vision Res.* 46, 3881–3885. doi: 10.1016/J.VISRES.2006.06.010.

van Daal, R. J. J., Aydin, Ç., Michon, F., Aarts, A. A. A., Kraft, M., Kloosterman, F., et al. (2021). Implantation of Neuropixels probes for chronic recording of neuronal activity in freely behaving mice and rats. *Nat. Protoc.* 2021 167 16, 3322–3347. doi: 10.1038/s41596-021-00539-9.

van der Hoort, B., and Ehrsson, H. H. (2014). Body ownership affects visual perception of object size by rescaling the visual representation of external space. *Attention, Perception, Psychophys.* 76, 1414–1428. doi: 10.3758/S13414-014-0664-9/TABLES/2.

van der Hoort, B., Guterstam, A., and Ehrsson, H. H. (2011). Being Barbie: The Size of One's Own Body Determines the Perceived Size of the World. *PLoS One* 6, e20195. doi: 10.1371/JOURNAL.PONE.0020195.

van Es, D. M., van der Zwaag, W., and Knapen, T. (2019). Topographic Maps of Visual

- Space in the Human Cerebellum. *Curr. Biol.* 29, 1689-1694.e3. doi: 10.1016/j.cub.2019.04.012.
- Van Hedger, K., Keedy, S. K., Schertz, K. E., Berman, M. G., and de Wit, H. (2019). Effects of methamphetamine on neural responses to visual stimuli. *Psychopharmacology (Berl)*. 236, 1741–1748. doi: 10.1007/S00213-018-5156-5/METRICS.
- Van Loon, A. M., Knapen, T., Scholte, H. S., St. John-Saaltink, E., Donner, T. H., and Lamme, V. A. F. (2013). GABA Shapes the Dynamics of Bistable Perception. *Curr. Biol.* 23, 823–827. doi: 10.1016/J.CUB.2013.03.067.
- van Rossum, J. M. (2011). The Relation Between Chemical Structure and Biological Activity. *J. Pharm. Pharmacol.* 15, 285–316. doi: 10.1111/J.2042-7158.1963.TB12787.X.
- van Santen, J. P. H., and Sperling, G. (1985). Elaborated Reichardt detectors. *J. Opt. Soc. Am. A* 2, 300. doi: 10.1364/josaa.2.000300.
- Vollenweider, F. X., and Kometer, M. (2010). The neurobiology of psychedelic drugs: implications for the treatment of mood disorders. *Nat. Rev. Neurosci.* 11, 642–651. doi: 10.1038/NRN2884.
- Vuilleumier, P. (2005). How brains beware: Neural mechanisms of emotional attention. *Trends Cogn. Sci.* 9, 585–594. doi: 10.1016/j.tics.2005.10.011.
- Wadlinger, H. A., and Isaacowitz, D. M. (2006). Positive mood broadens visual attention to positive stimuli. *Motiv. Emot.* 30, 87–99. doi: 10.1007/S11031-006-9021-1/METRICS.
- Walenchok, S. C., Goldinger, S. D., and Hout, M. C. (2020). The confirmation and

- prevalence biases in visual search reflect separate underlying processes. *J. Exp. Psychol. Hum. Percept. Perform.* 46, 274. doi: 10.1037/XHP0000714.
- Wandell, B. A., and Winawer, J. (2011). Imaging retinotopic maps in the human brain. *Vision Res.* 51, 718–737. doi: 10.1016/j.visres.2010.08.004.
- Wang, H., Wang, Z., Zhou, Y., and Tzvetanov, T. (2021). Moderate Alcohol Intake Changes Visual Perception by Enhancing V1 Inhibitory Surround Interactions. *Front. Neurosci.* 15, 682229. doi: 10.3389/FNINS.2021.682229/BIBTEX.
- Watanabe, K., and Shimojo, S. (1998). Attentional Modulation in Perception of Visual Motion Events. <http://dx.doi.org/10.1068/p271041> 27, 1041–1054. doi: 10.1068/P271041.
- Wegner, A. J., and Fahle, M. (1999). Alcohol and visual performance. *Prog. Neuro-Psychopharmacology Biol. Psychiatry* 23, 465–482. doi: 10.1016/S0278-5846(99)00009-3.
- White, C., Brown, J., and Edwards, M. (2013a). Altered visual perception in long-term ecstasy (MDMA) users. *Psychopharmacology (Berl)*. 229, 155–165. doi: 10.1007/S00213-013-3094-9.
- White, C., Brown, J., and Edwards, M. (2013b). Altered visual perception in long-term ecstasy (MDMA) users. *Psychopharmacology (Berl)*. 229, 155–165. doi: 10.1007/S00213-013-3094-9/METRICS.
- Wiegmann, D., Faaborg, T., Boquet, A., Detwiler, C., Holcomb, K., and Shappell, S. (2005). *Human Error and General Aviation Accidents: A Comprehensive, Fine-Grained*

Analysis Using HFACS.

Wilson, J. A., and Anstis, S. M. (1969). Visual delay as a function of luminance. *Am. J. Psychol.* 82, 350–358. doi: 10.2307/1420750.

Winton-Brown, T. T., Allen, P., Bhattacharrya, S., Borgwardt, S. J., Fusar-Poli, P., Crippa, J. A., et al. (2011). Modulation of auditory and visual processing by delta-9-tetrahydrocannabinol and cannabidiol: an fMRI study. *Neuropsychopharmacology* 36, 1340–1348. doi: 10.1038/NPP.2011.17.

Wittmann, M., Carter, O., Hasler, F., Cahn, B. R., Grimberg, U., Spring, P., et al. (2007). Effects of psilocybin on time perception and temporal control of behaviour in humans. *J. Psychopharmacol.* 21, 50–64. doi: 10.1177/0269881106065859.

Wolfe, J. M. (1994). Guided Search 2.0 A revised model of visual search. *Psychon. Bull. Rev.* 1, 202–238. doi: 10.3758/BF03200774/METRICS.

Wolfe, J. M., Horowitz, T. S., and Kenner, N. M. (2005). Cognitive psychology: rare items often missed in visual searches. *Nature* 435, 439–440. doi: 10.1038/435439A.

Wurtz, R. H. (2008). Neuronal mechanisms of visual stability. *Vision Res.* 48, 2070–2089. doi: 10.1016/J.VISRES.2008.03.021.

Wyczesany, M., Ligeza, T. S., Tymorek, A., and Adameczyk, A. (2018). The influence of mood on visual perception of neutral material. *Acta Neurobiol. Exp. (Wars)*. 78, 163–172. doi: 10.21307/ANE-2018-015.

Xing, J., and Heeger, D. J. (2000). Center-surround interactions in foveal and peripheral vision. *Vision Res.* 40, 3065–3072. doi: 10.1016/S0042-6989(00)00152-8.

- Yartsev, M. M., and Ulanovsky, N. (2013). Representation of three-dimensional space in the hippocampus of flying bats. *Science (80-. )*. 340, 367–372. doi: 10.1126/SCIENCE.1235338/SUPPL\_FILE/YARTSEV.SM.PDF.
- Yartsev, M. M., Witter, M. P., and Ulanovsky, N. (2011). Grid cells without theta oscillations in the entorhinal cortex of bats. *Nat. 2011 4797371* 479, 103–107. doi: 10.1038/nature10583.
- Yeh, F. C., Panesar, S., Fernandes, D., Meola, A., Yoshino, M., Fernandez-Miranda, J. C., et al. (2018). Population-averaged atlas of the macroscale human structural connectome and its network topology. *Neuroimage* 178, 57–68. doi: 10.1016/J.NEUROIMAGE.2018.05.027.
- Yeh, F. C., Verstynen, T. D., Wang, Y., Fernández-Miranda, J. C., and Tseng, W. Y. I. (2013). Deterministic Diffusion Fiber Tracking Improved by Quantitative Anisotropy. *PLoS One* 8, e80713. doi: 10.1371/JOURNAL.PONE.0080713.
- Yeung, P. K. F., Hubbard, J. W., Korchinski, E. D., and Midha, K. K. (1993). Pharmacokinetics of chlorpromazine and key metabolites. *Eur. J. Clin. Pharmacol. 1993 456 45*, 563–569. doi: 10.1007/BF00315316.
- Zanker, J. M., and Braddick, O. J. (1999). How does noise influence the estimation of speed? *Vision Res.* 39, 2411–2420. doi: 10.1016/S0042-6989(99)00036-X.
- Zeki, S. (2015). Area V5—a microcosm of the visual brain. *Front. Integr. Neurosci.* 9, 1–18. doi: 10.3389/fnint.2015.00021.
- Zeki, S., and Ffytche, D. H. (1998). The Riddoch syndrome: Insights into the neurobiology

of conscious vision. *Brain* 121, 25–45. doi: 10.1093/brain/121.1.25.

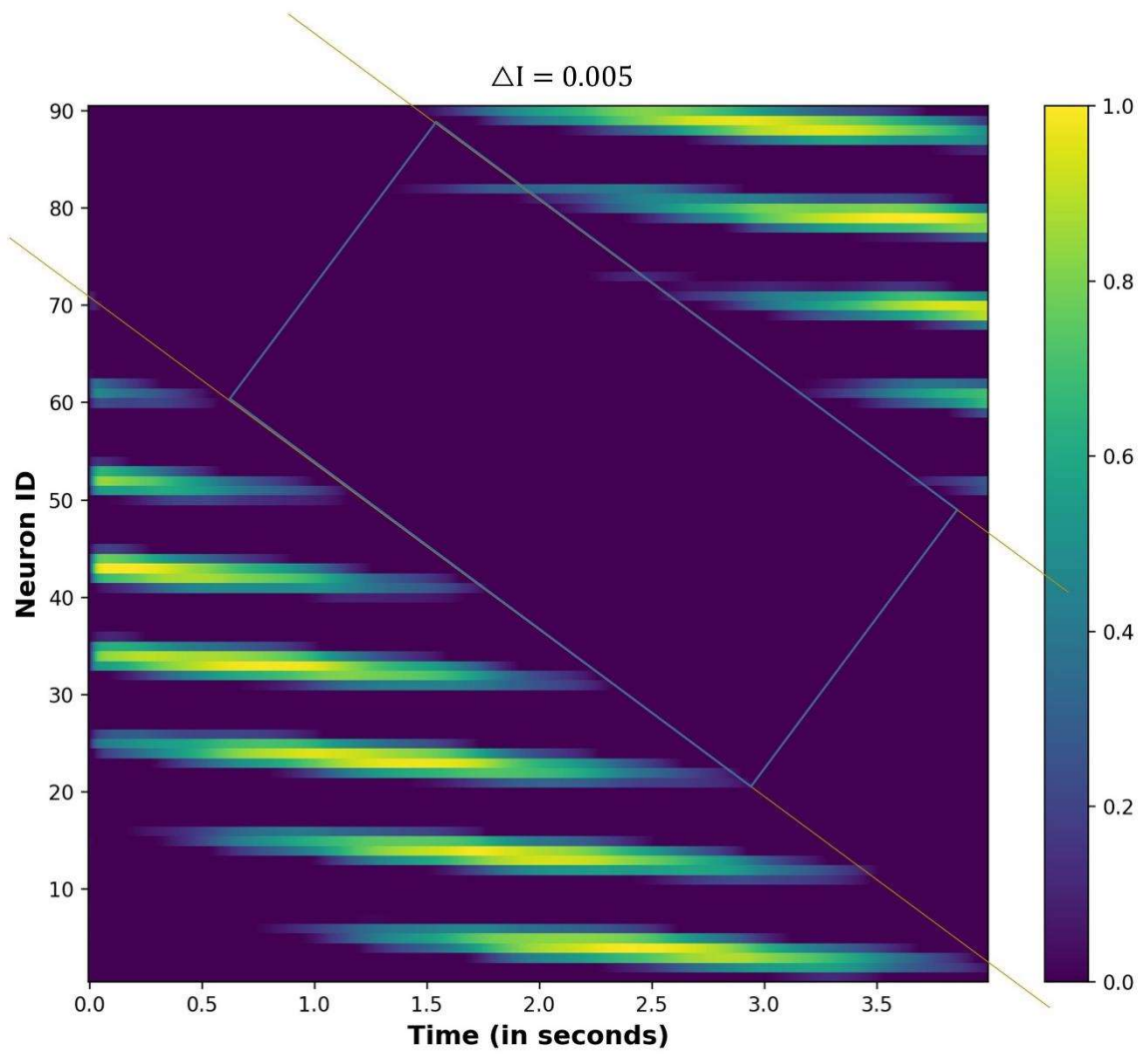
Zhu, J., Li, J., Han, Y., and Liu, W. (2020). Relationship between symptom dimensions and white matter alterations in untreated patients with obsessive-compulsive disorder: A diffusion tensor imaging study. *Neuroreport* 31, 891–896. doi: 10.1097/WNR.0000000000001460.

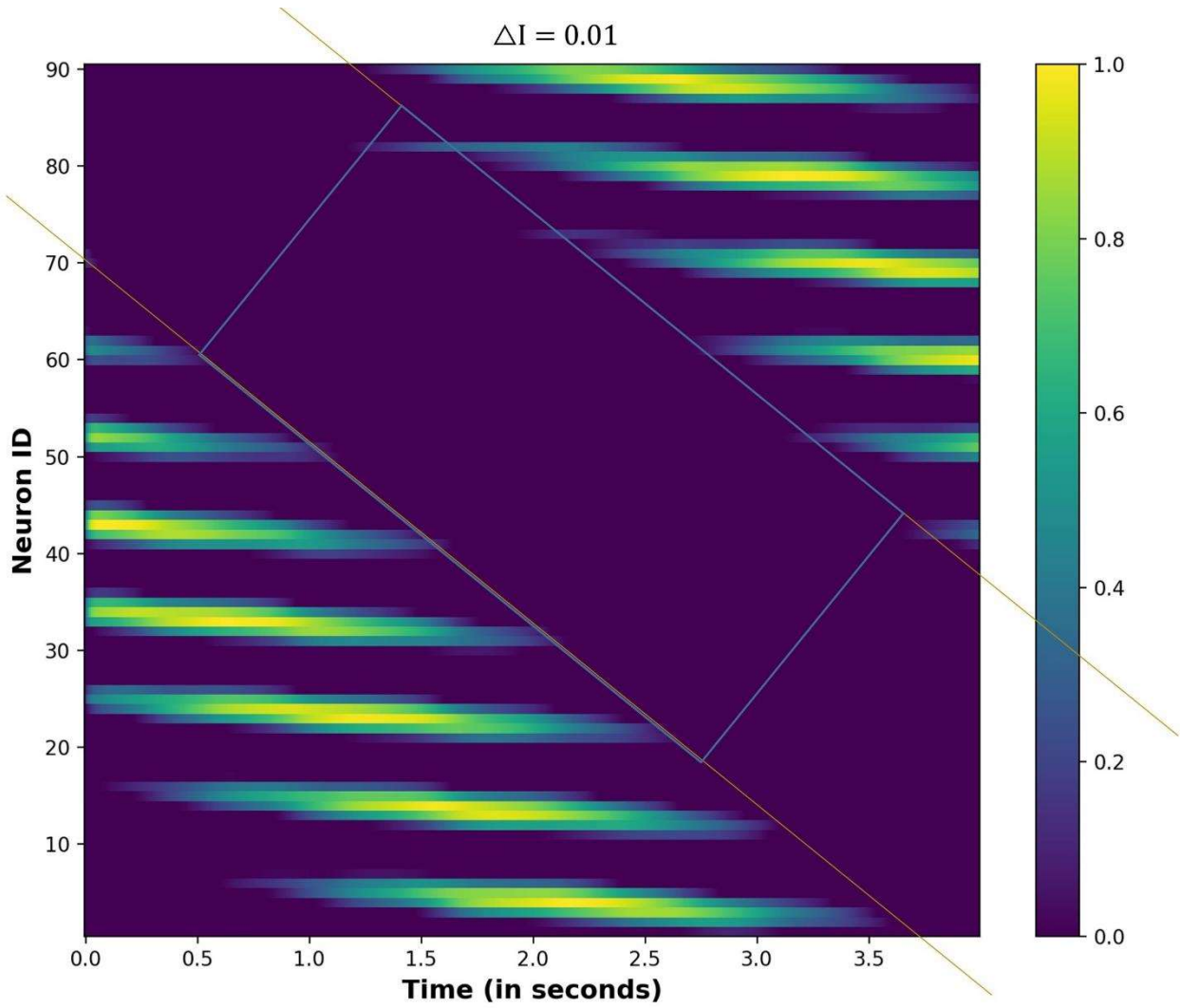
Zilles, K., and Palomero-Gallagher, N. (2017). Multiple transmitter receptors in regions and layers of the human cerebral cortex. *Front. Neuroanat.* 11, 1–26. doi: 10.3389/fnana.2017.00078.

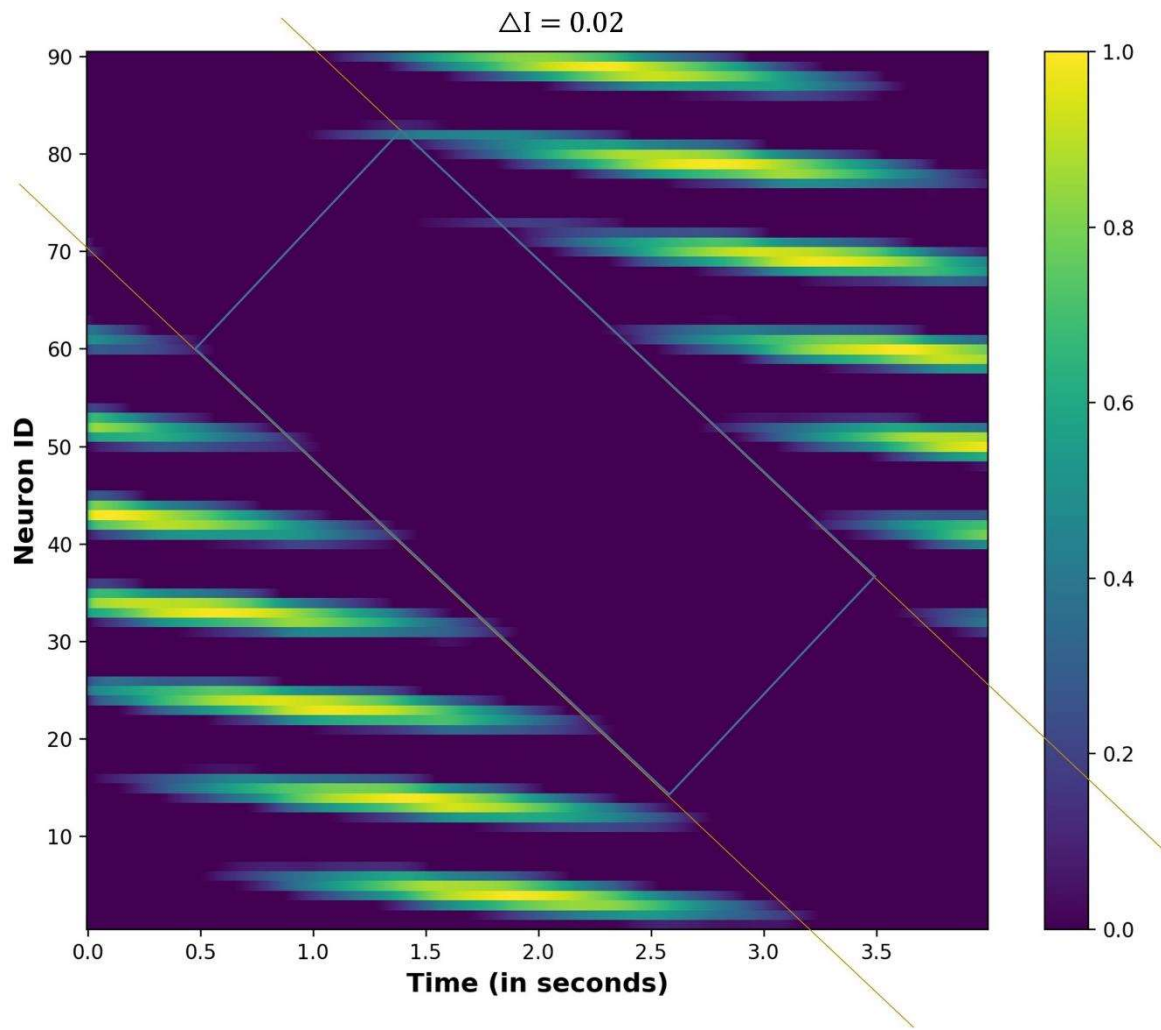
## **APPENDIX-A**

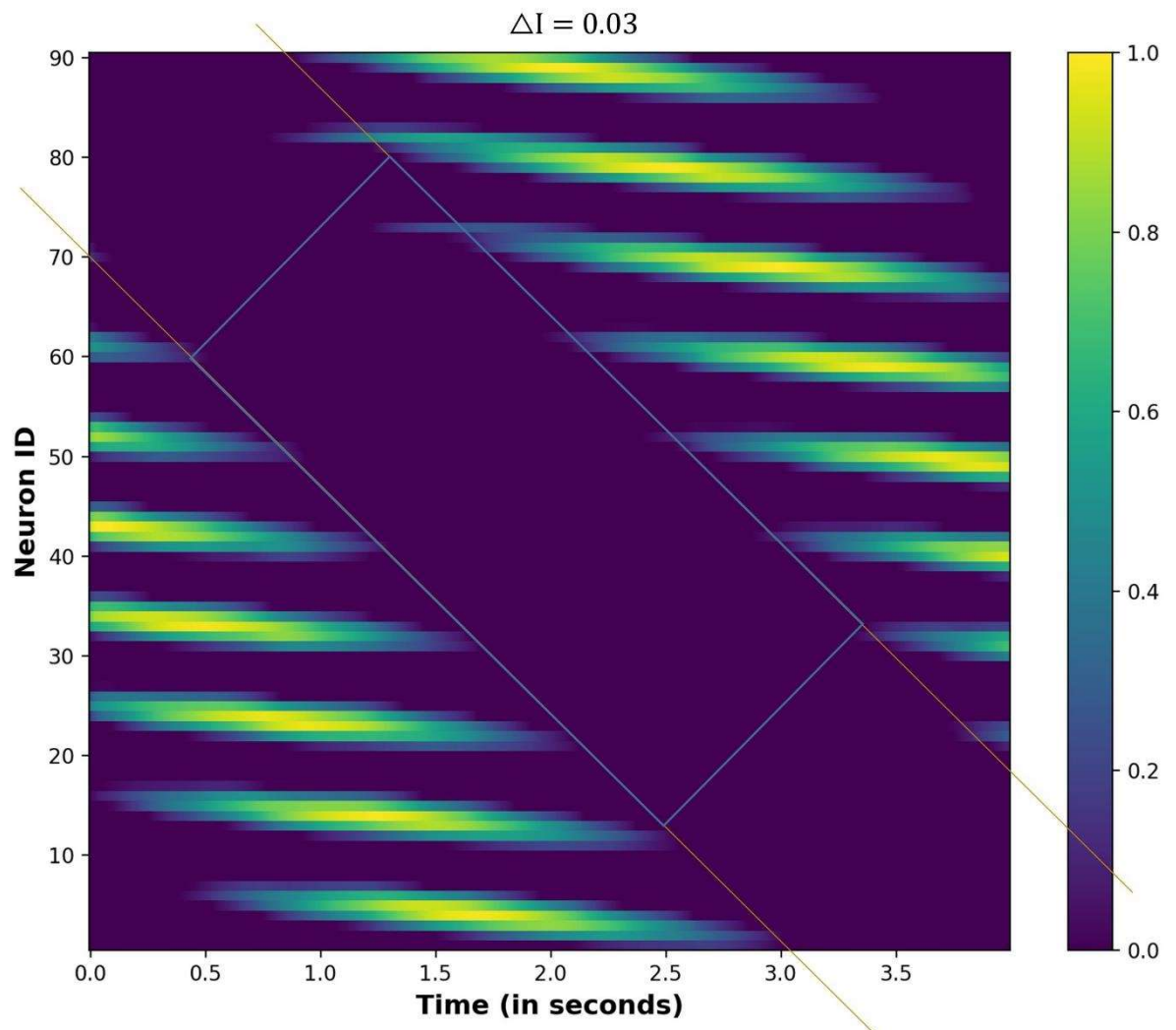
**Measurement of the Activity Index (AI) at different values of the change in Interaction parameter (I)**

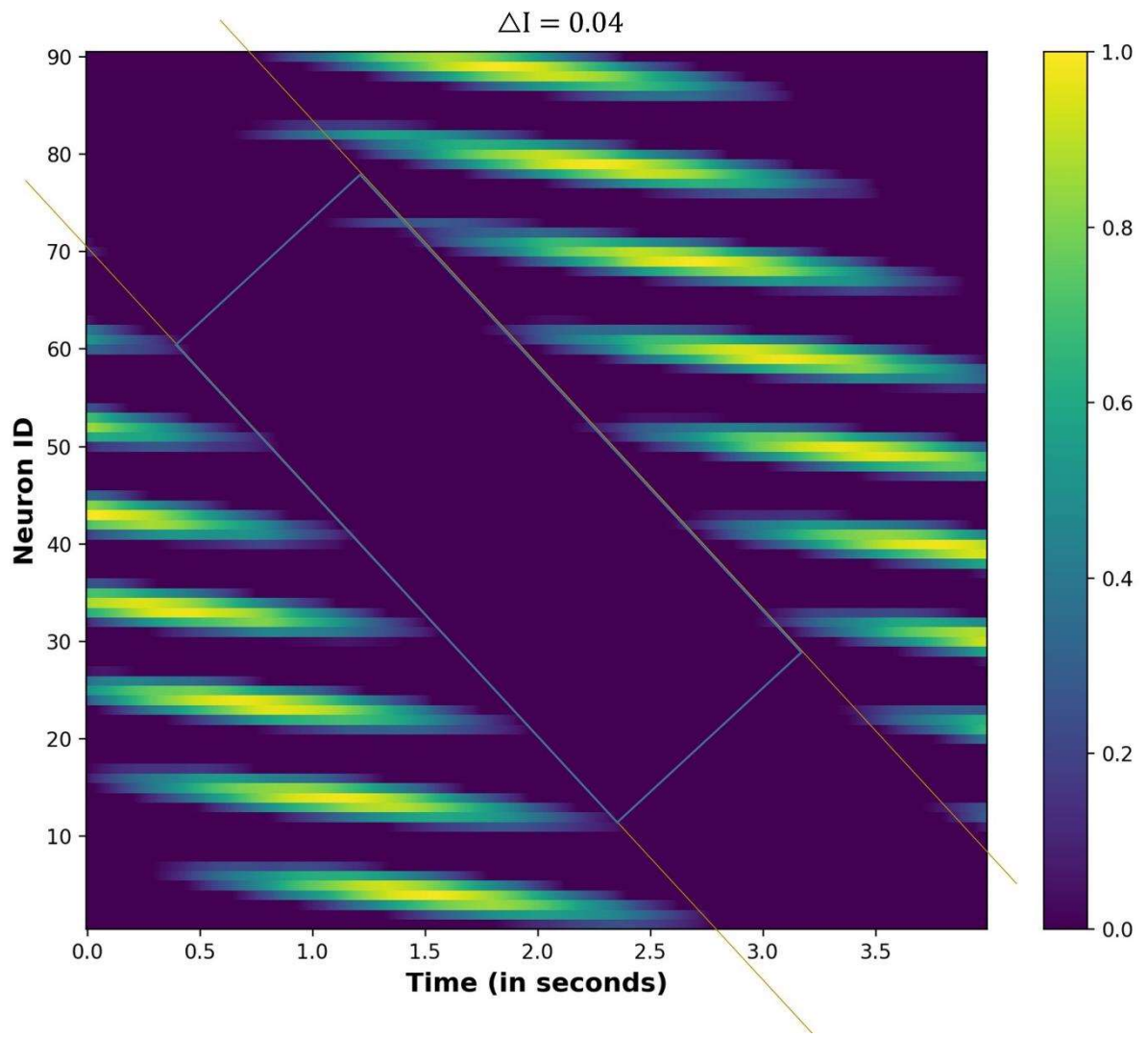
**Each of the subsequent figures show alteration of activity index as the  $\Delta I$  varies. The value of  $\Delta I$  is mentioned on the top of each figure.**

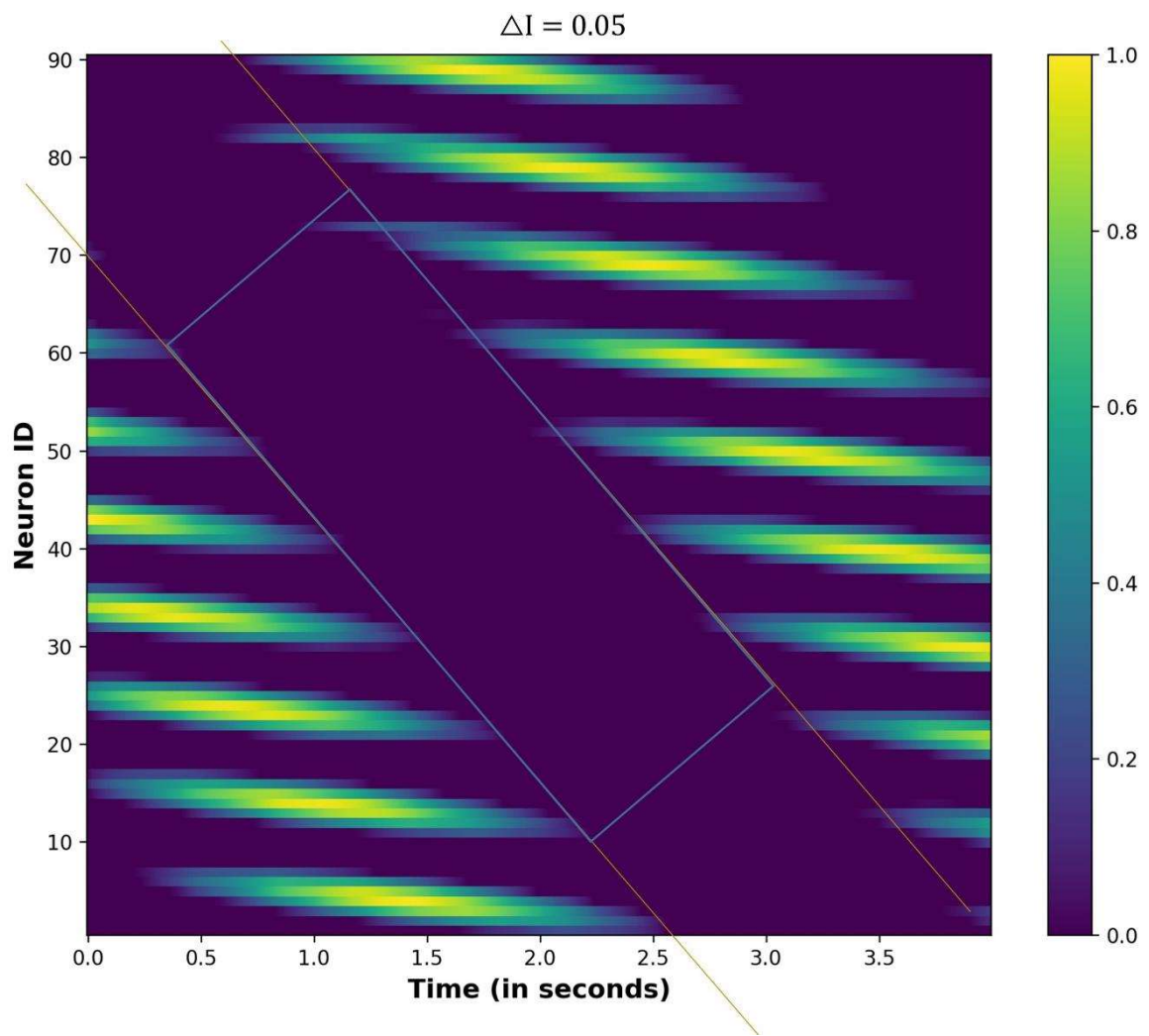


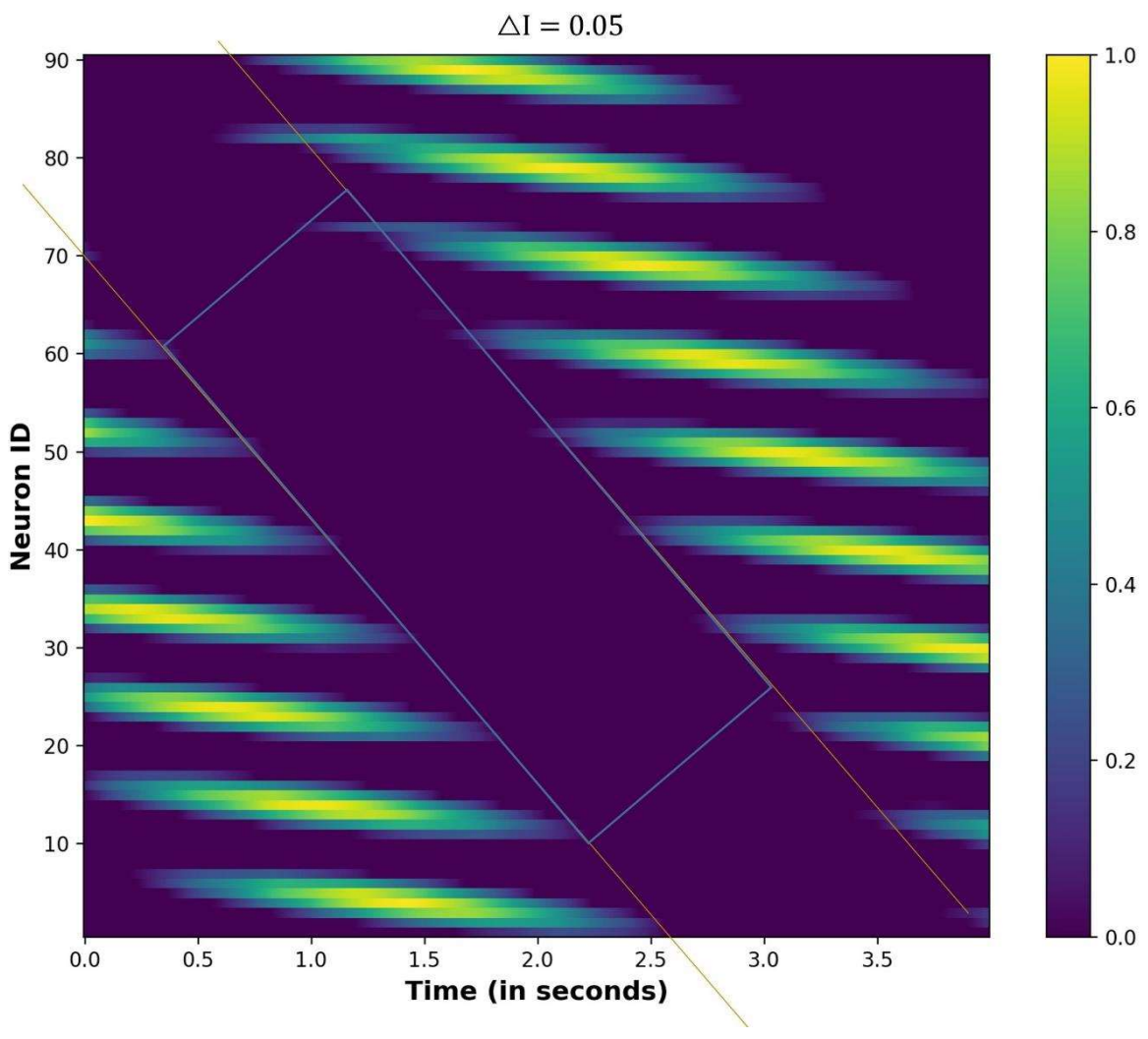


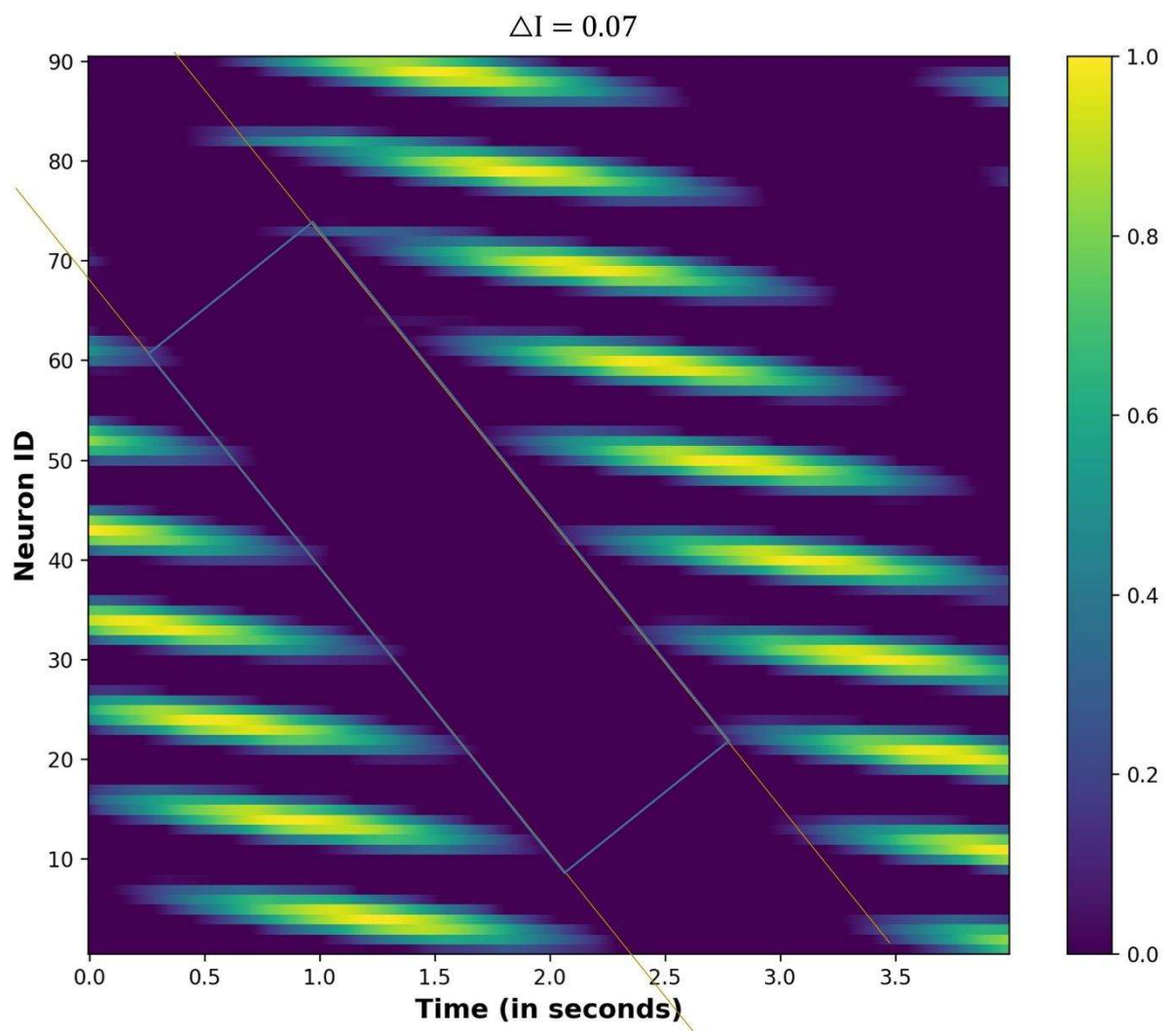


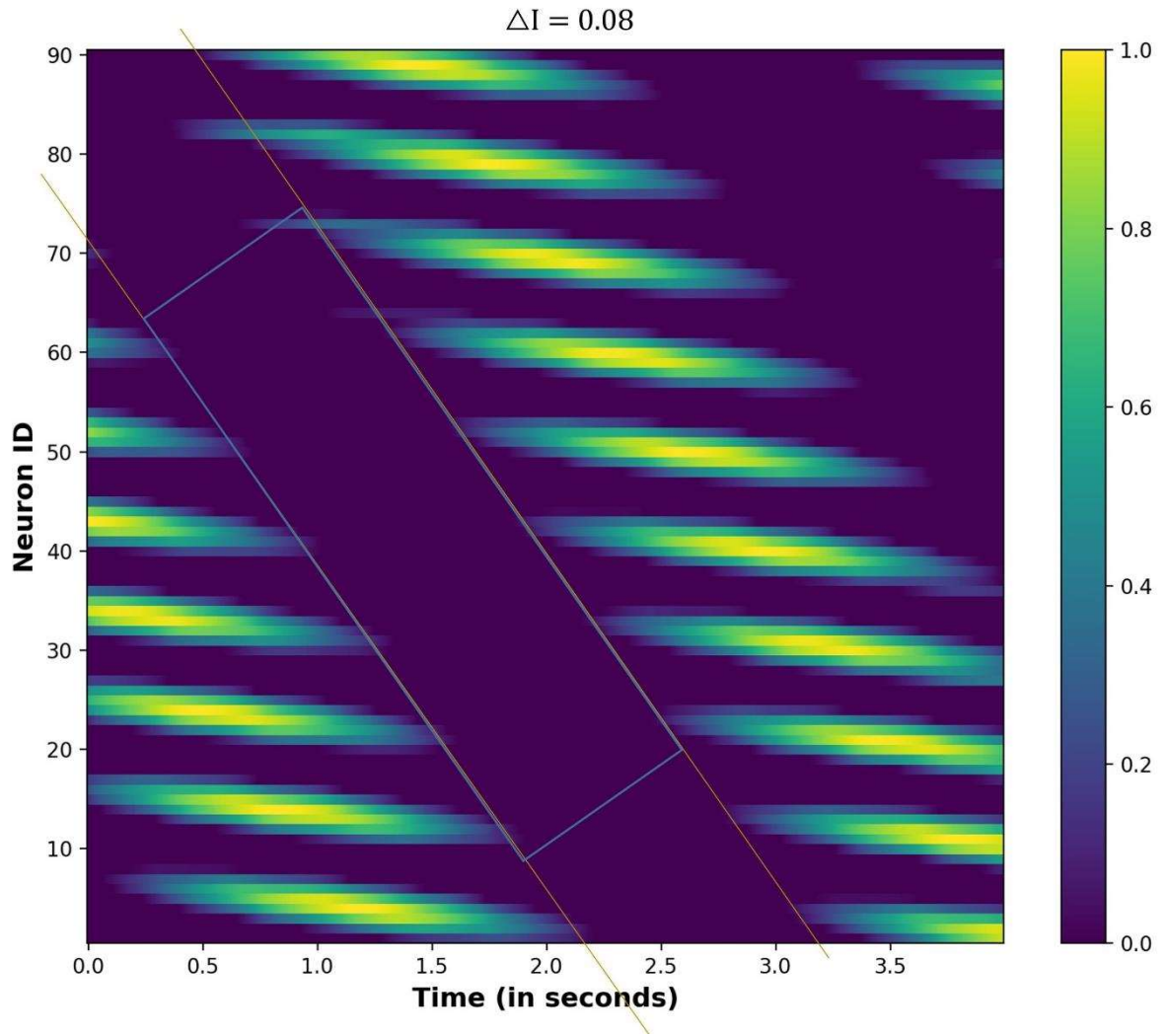


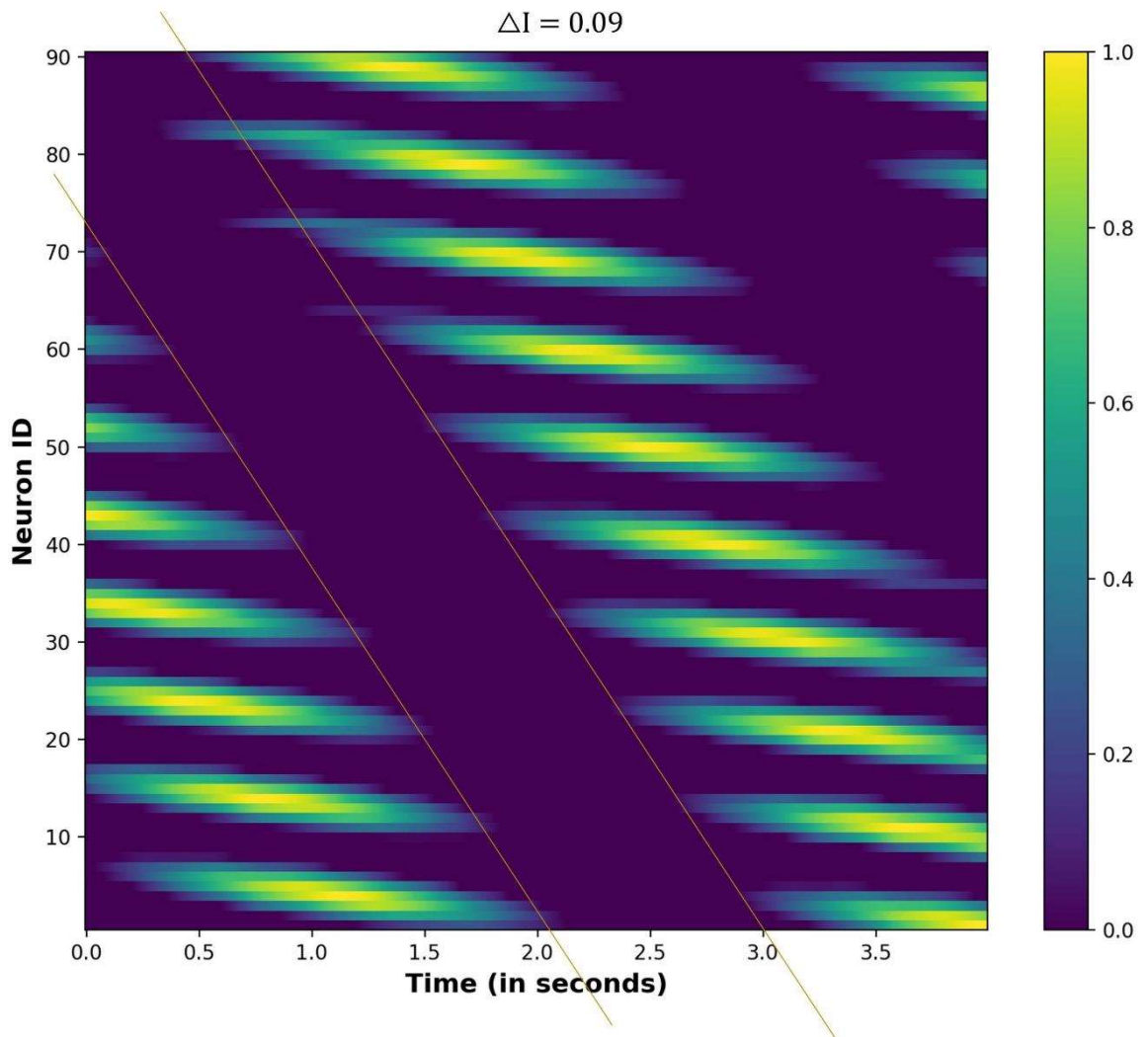


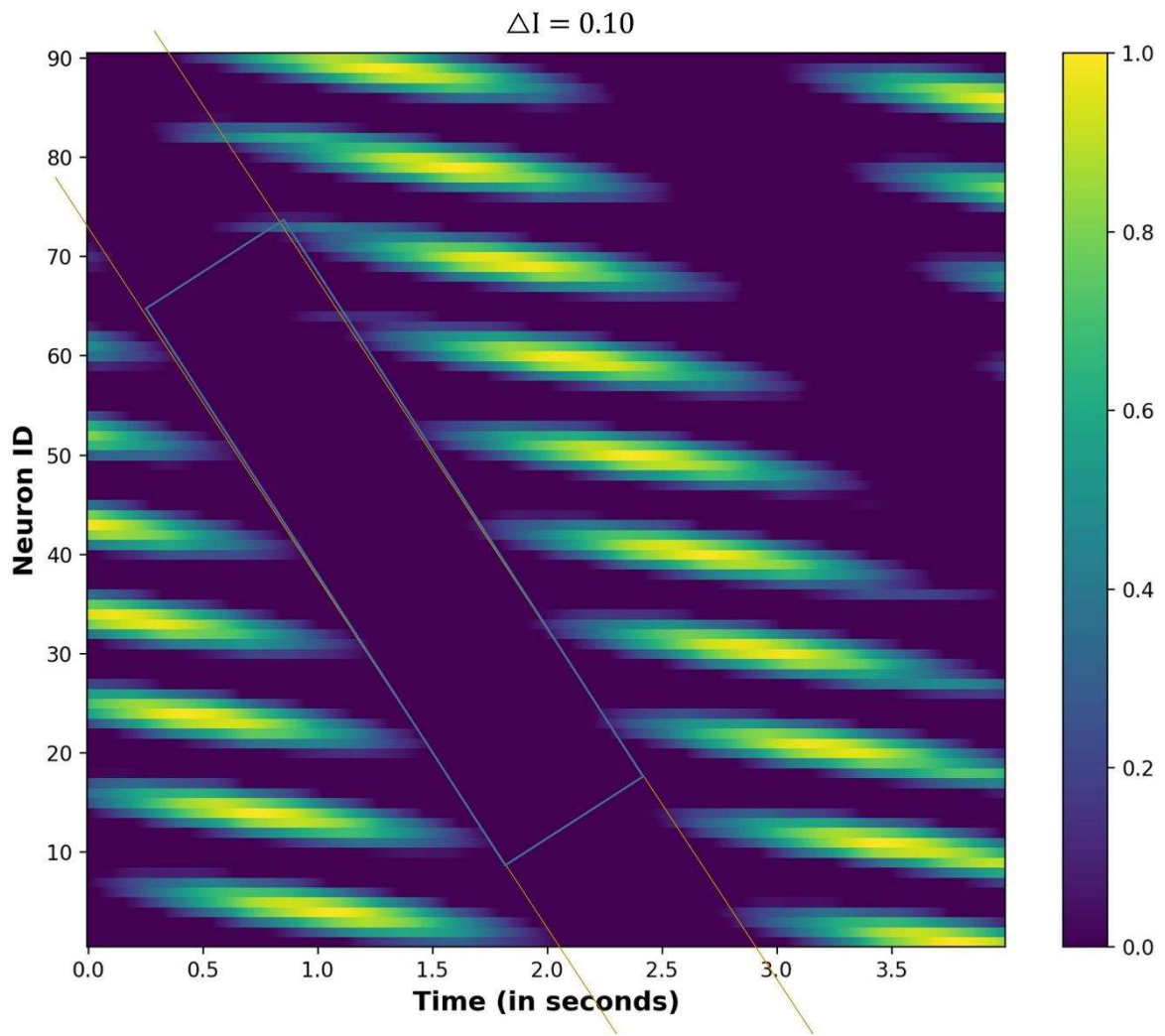


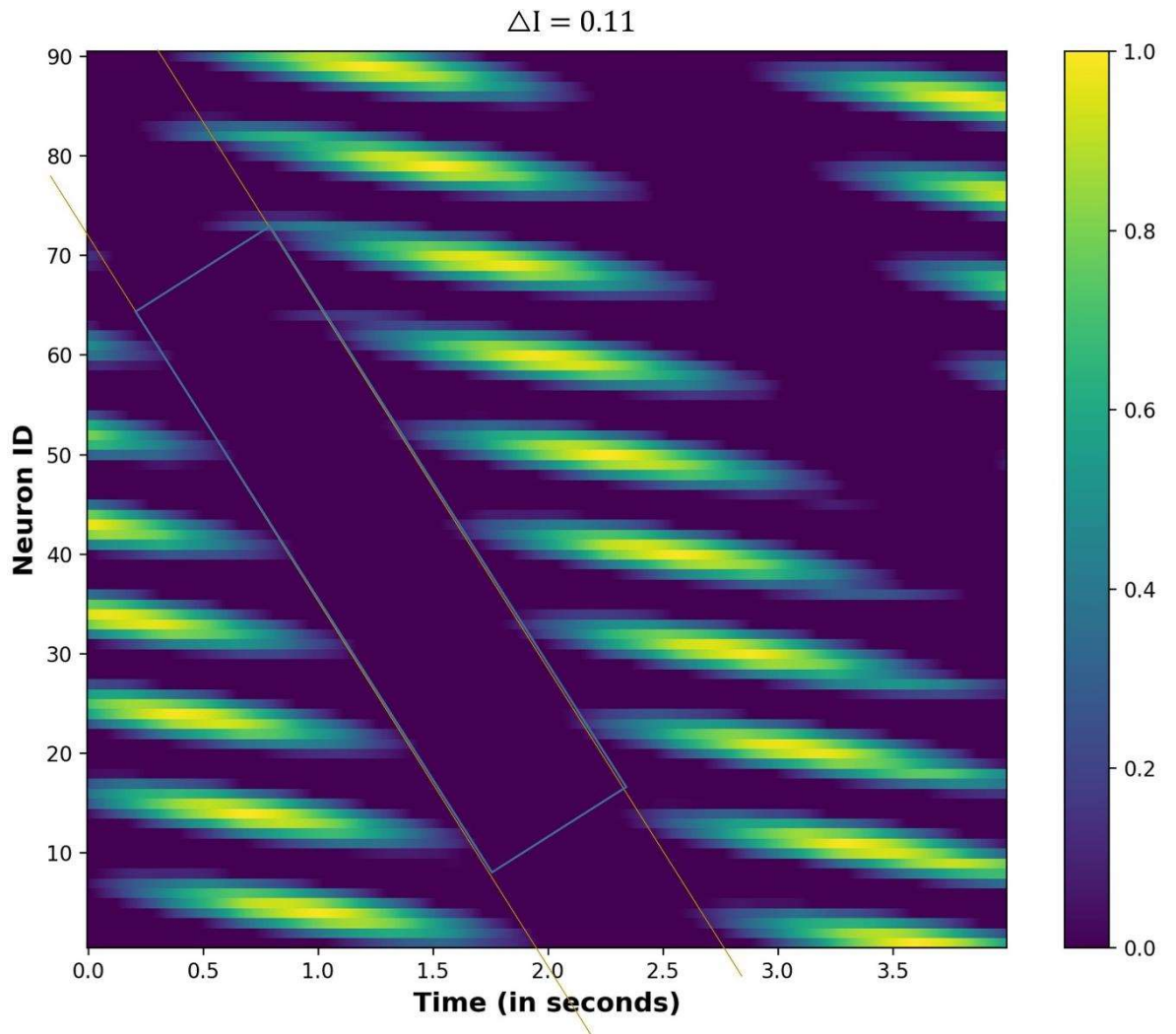


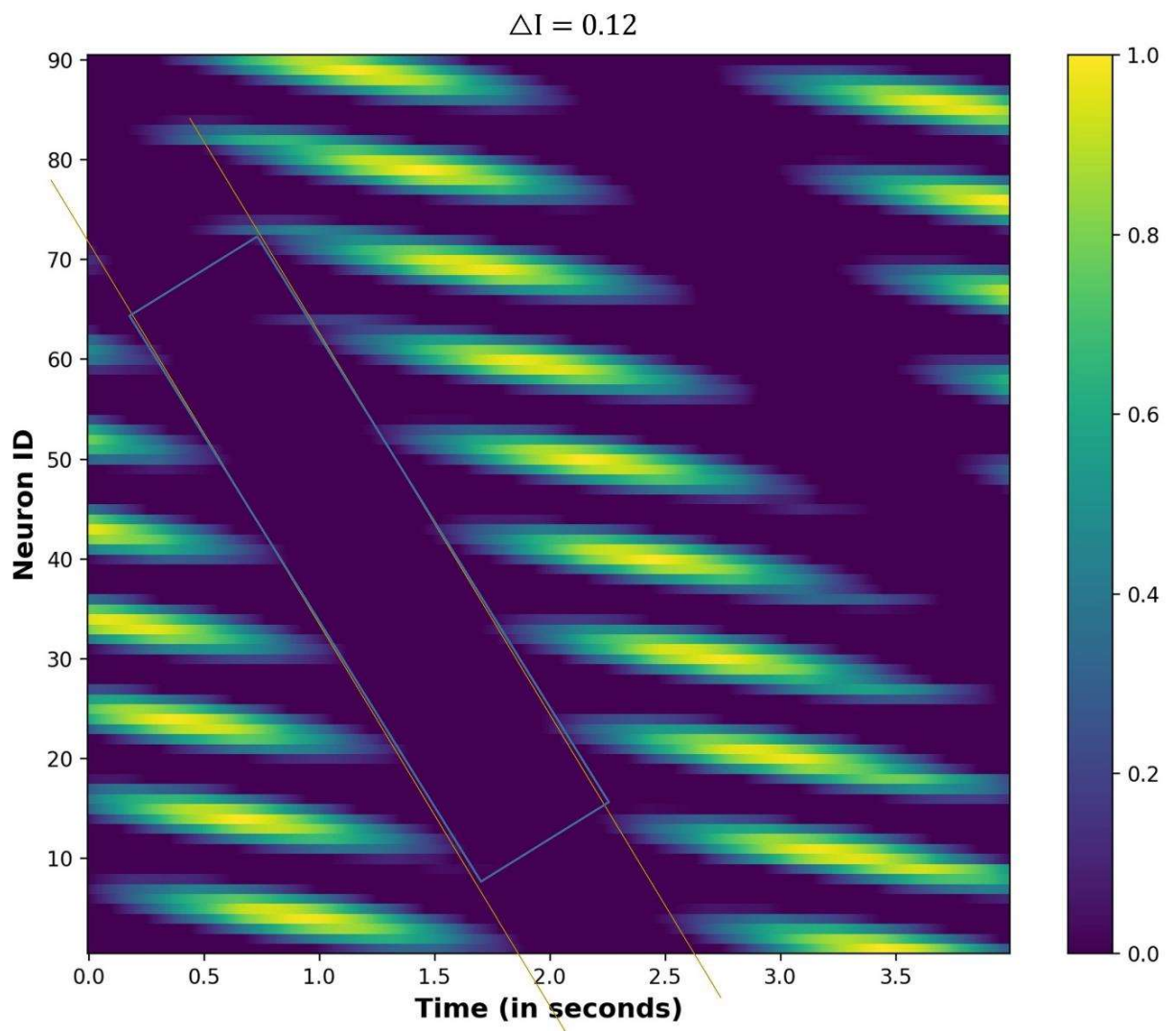


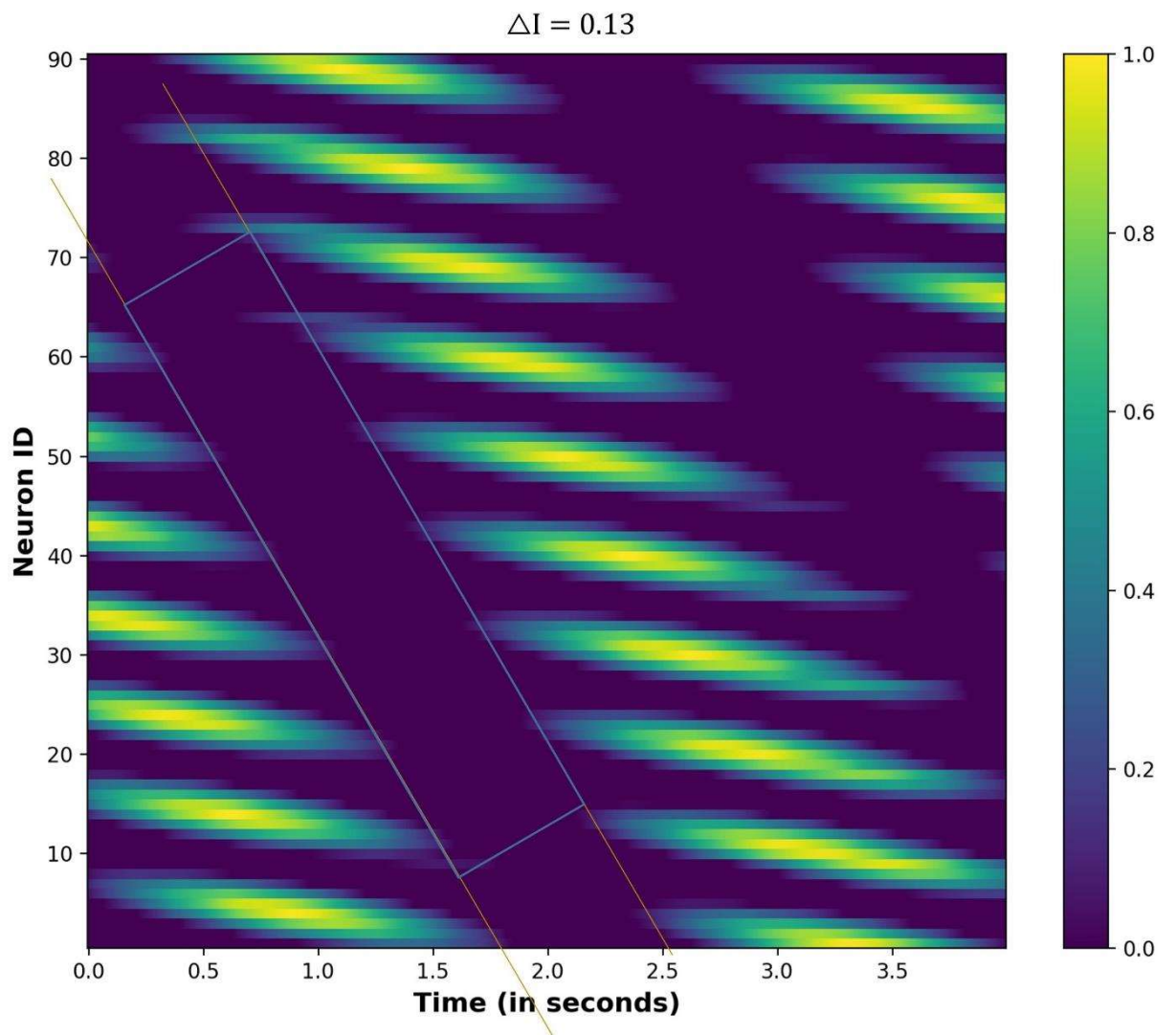


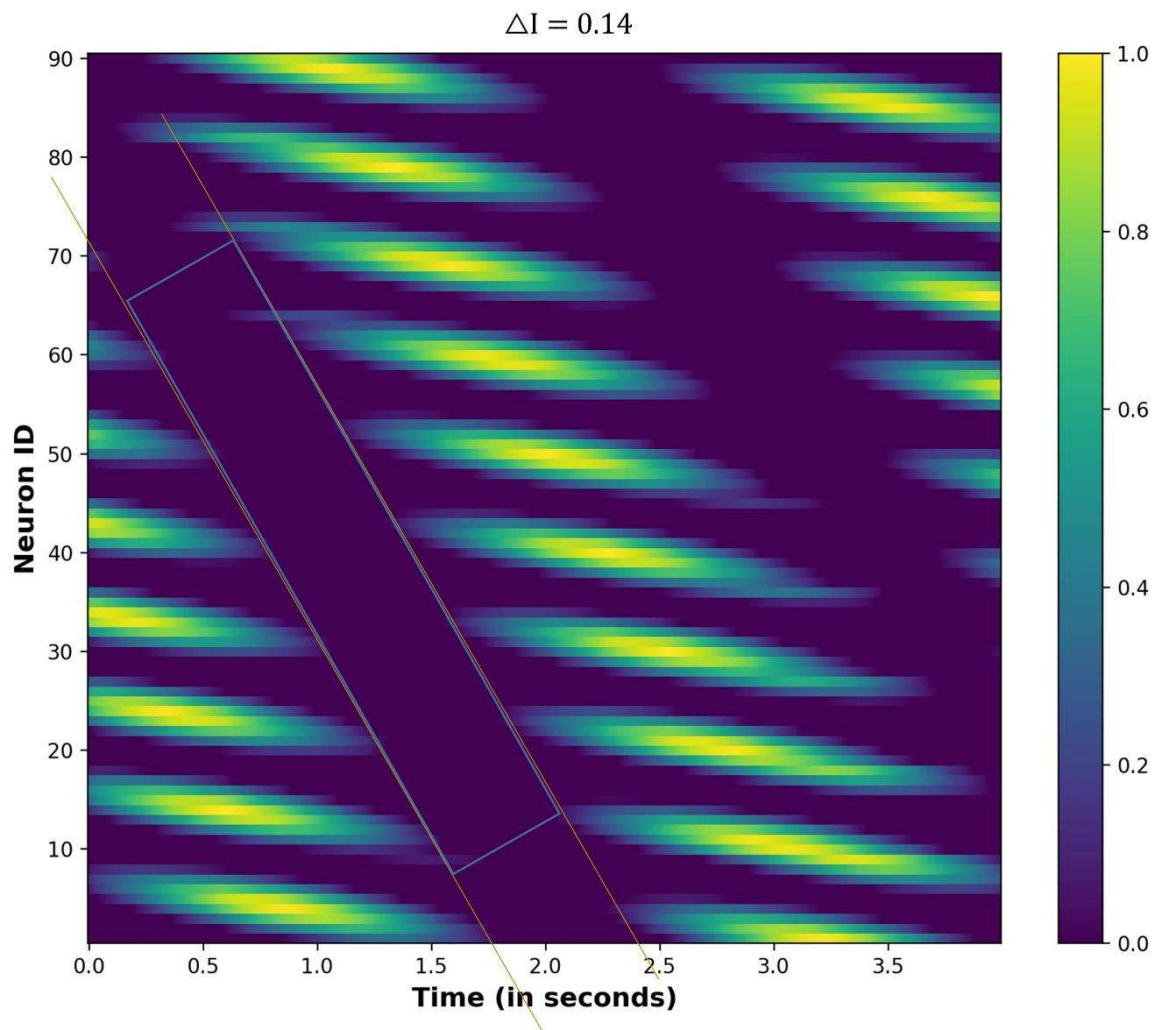


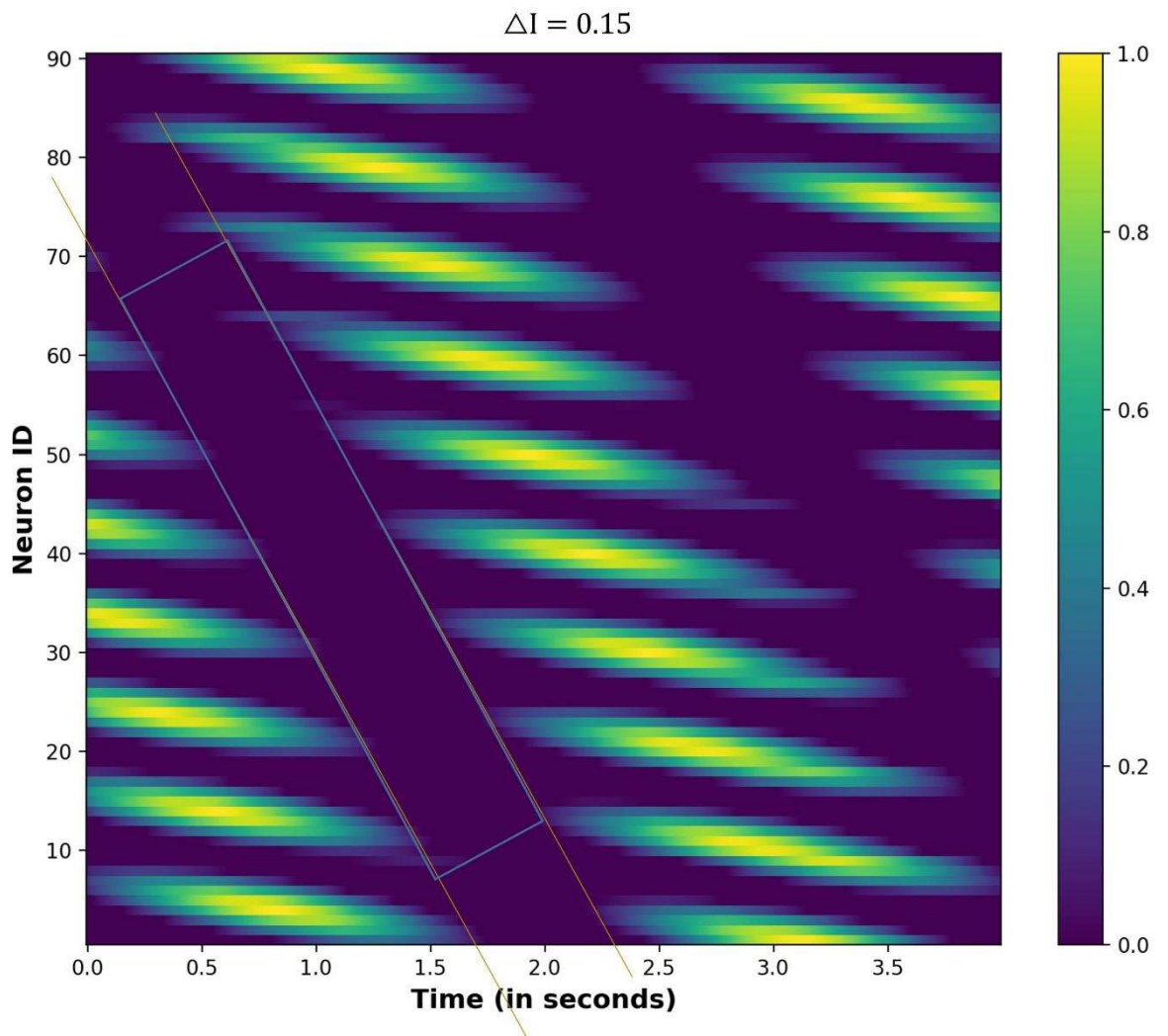


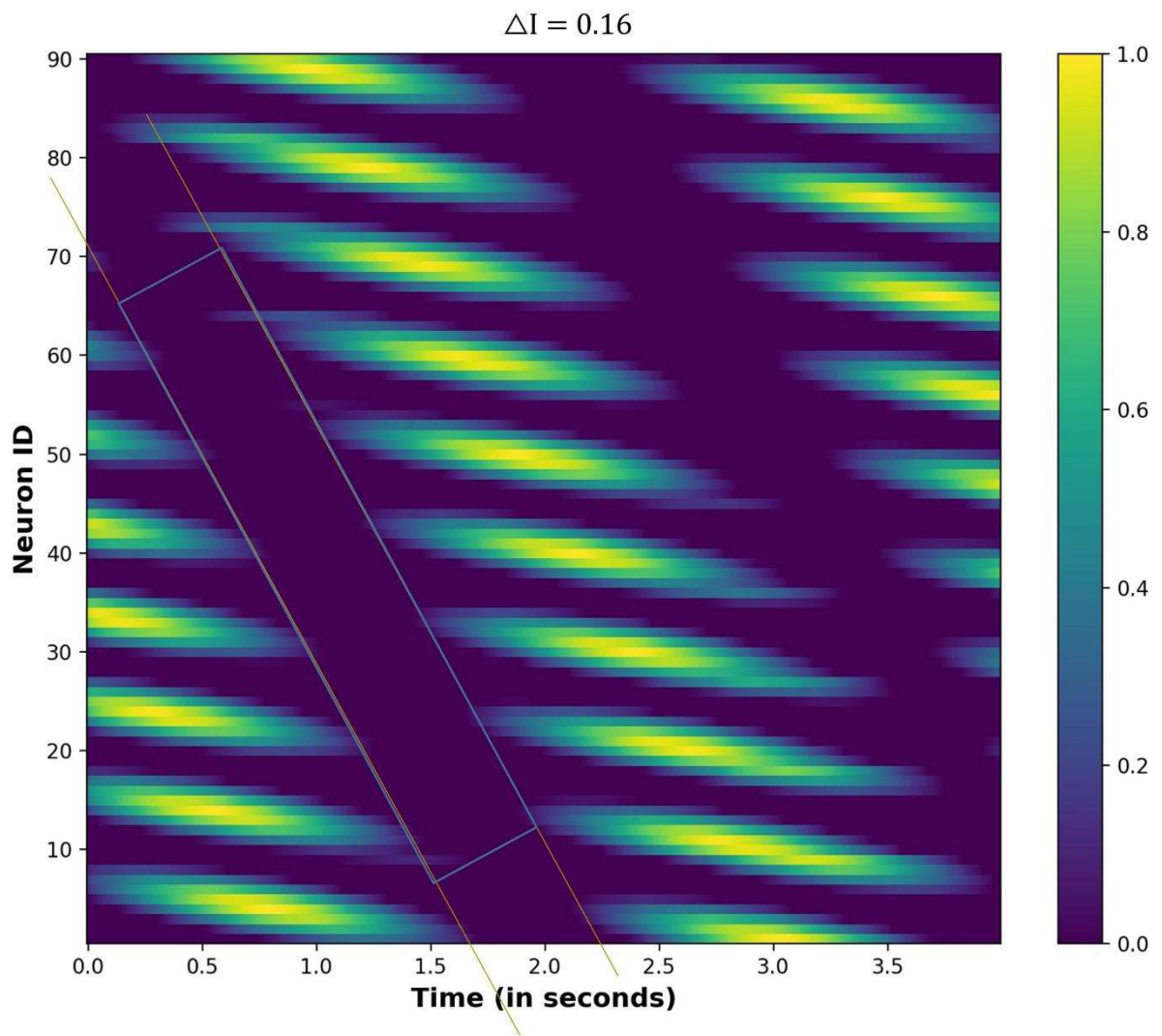


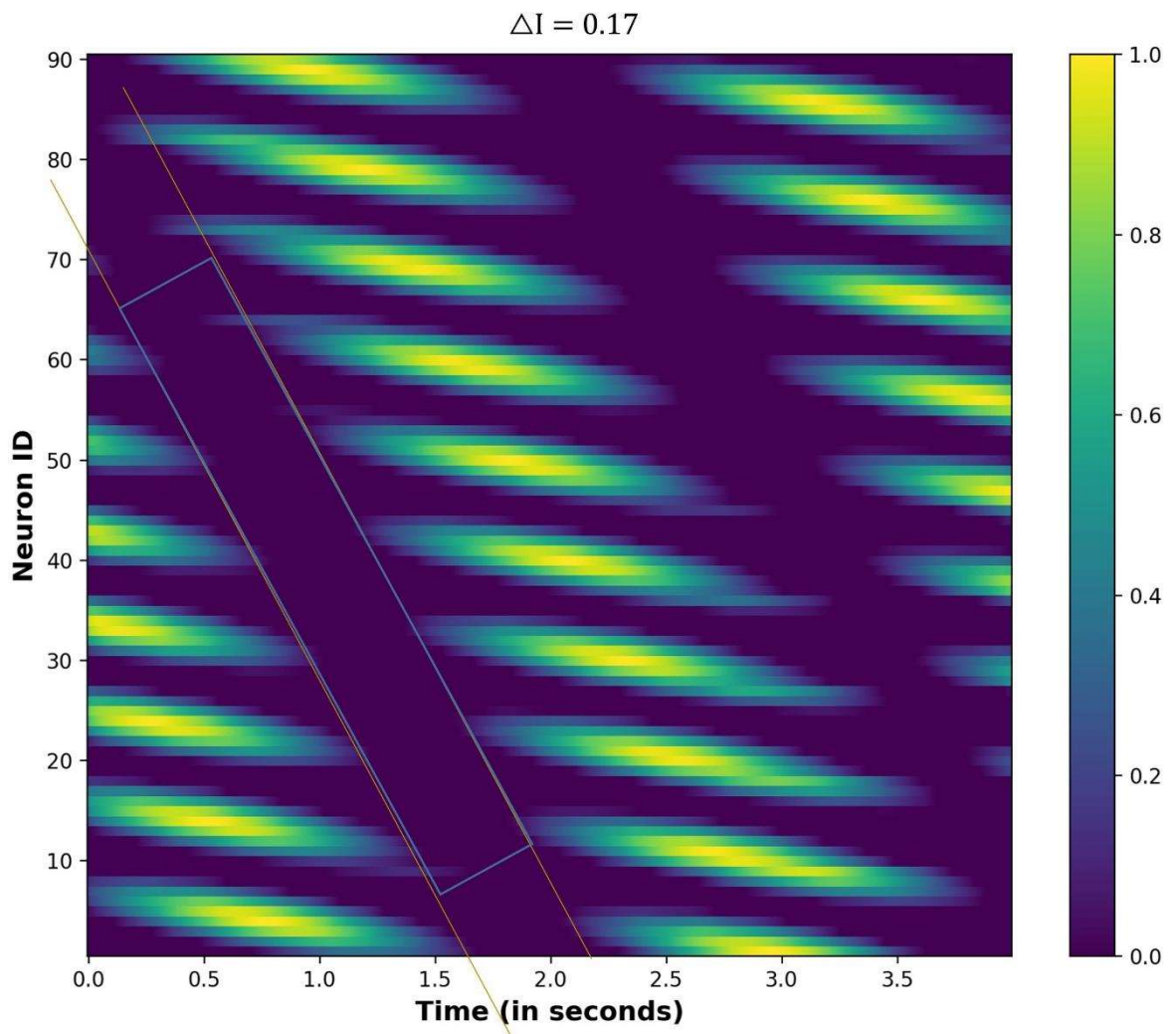


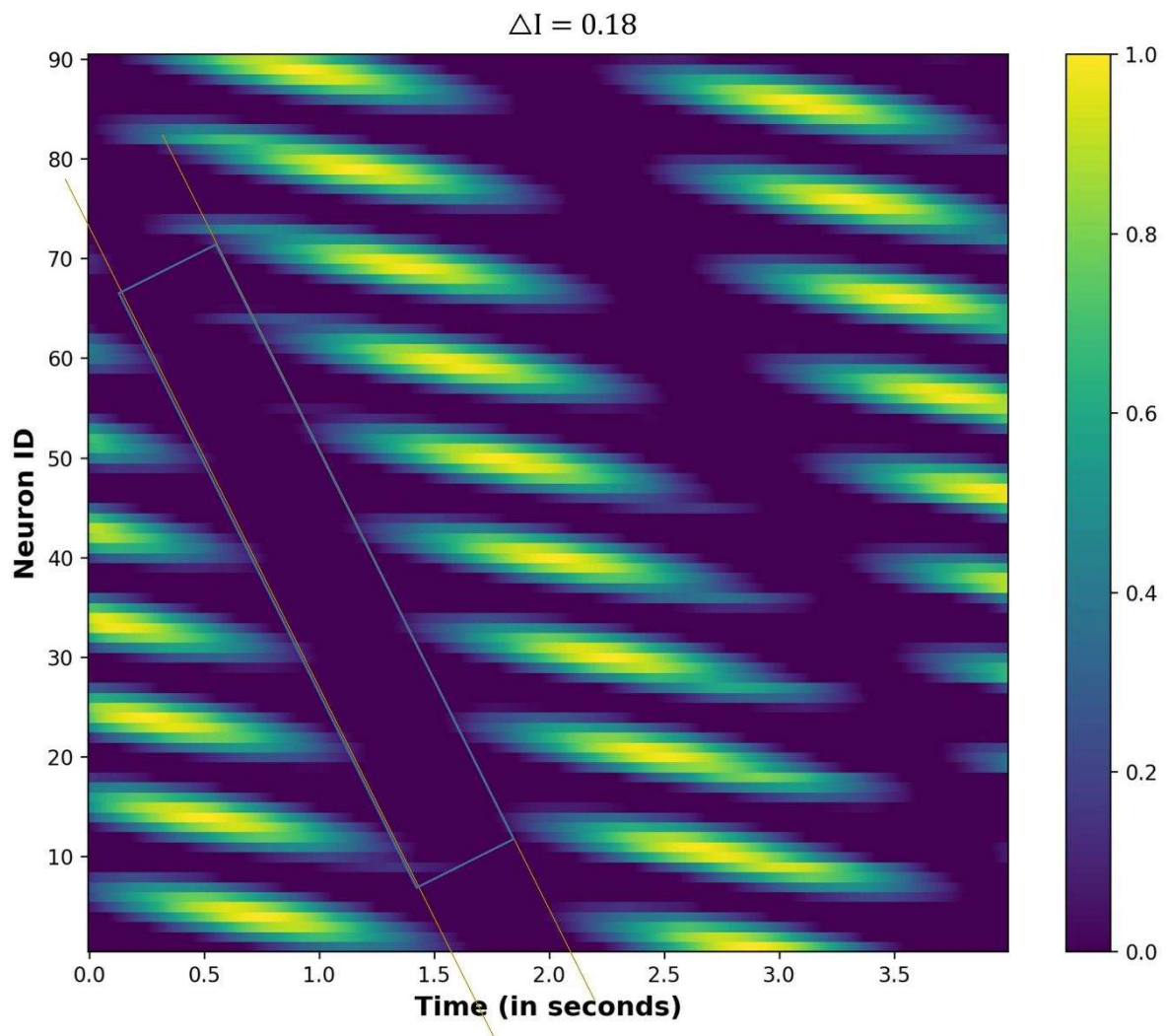


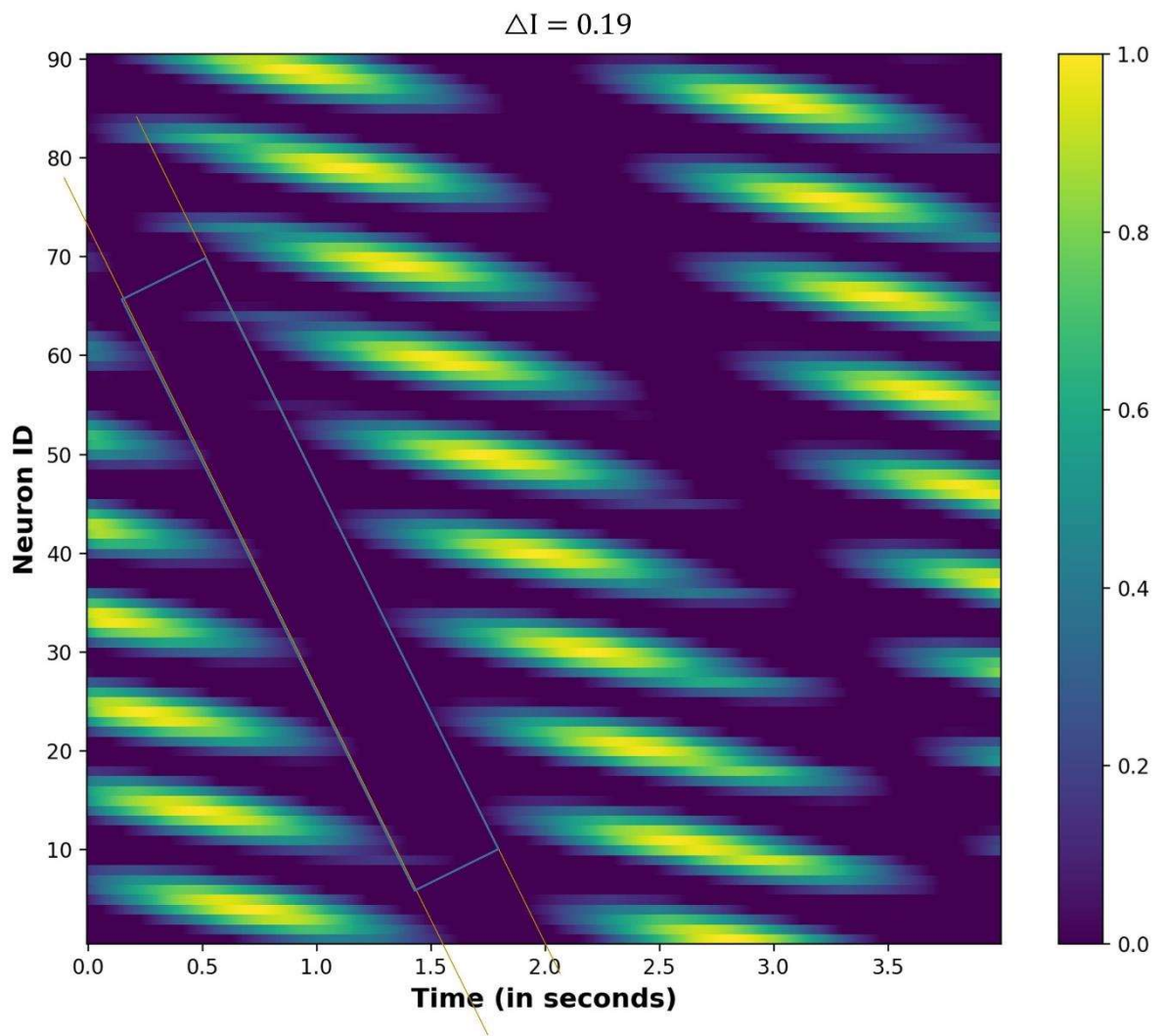


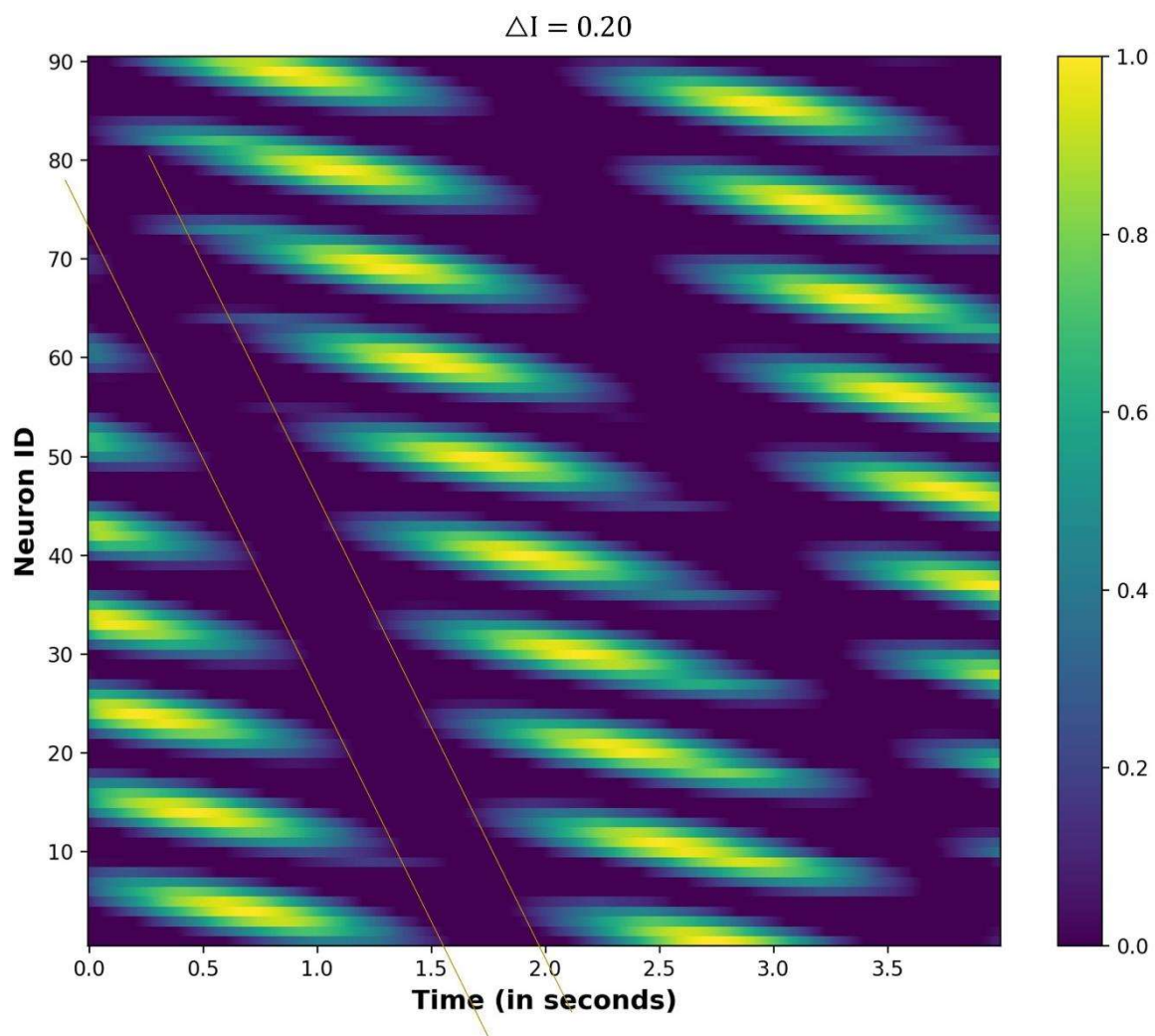


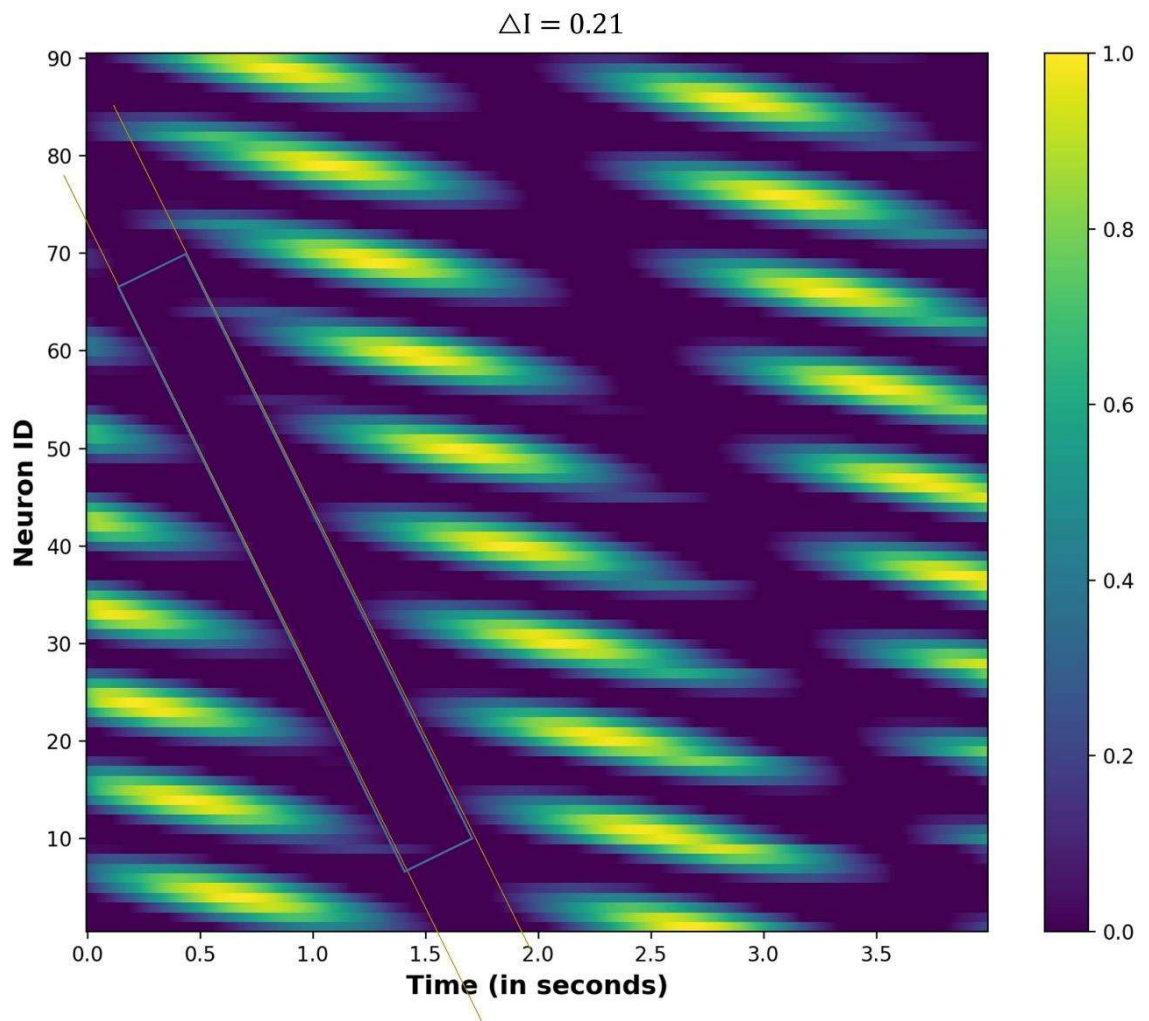


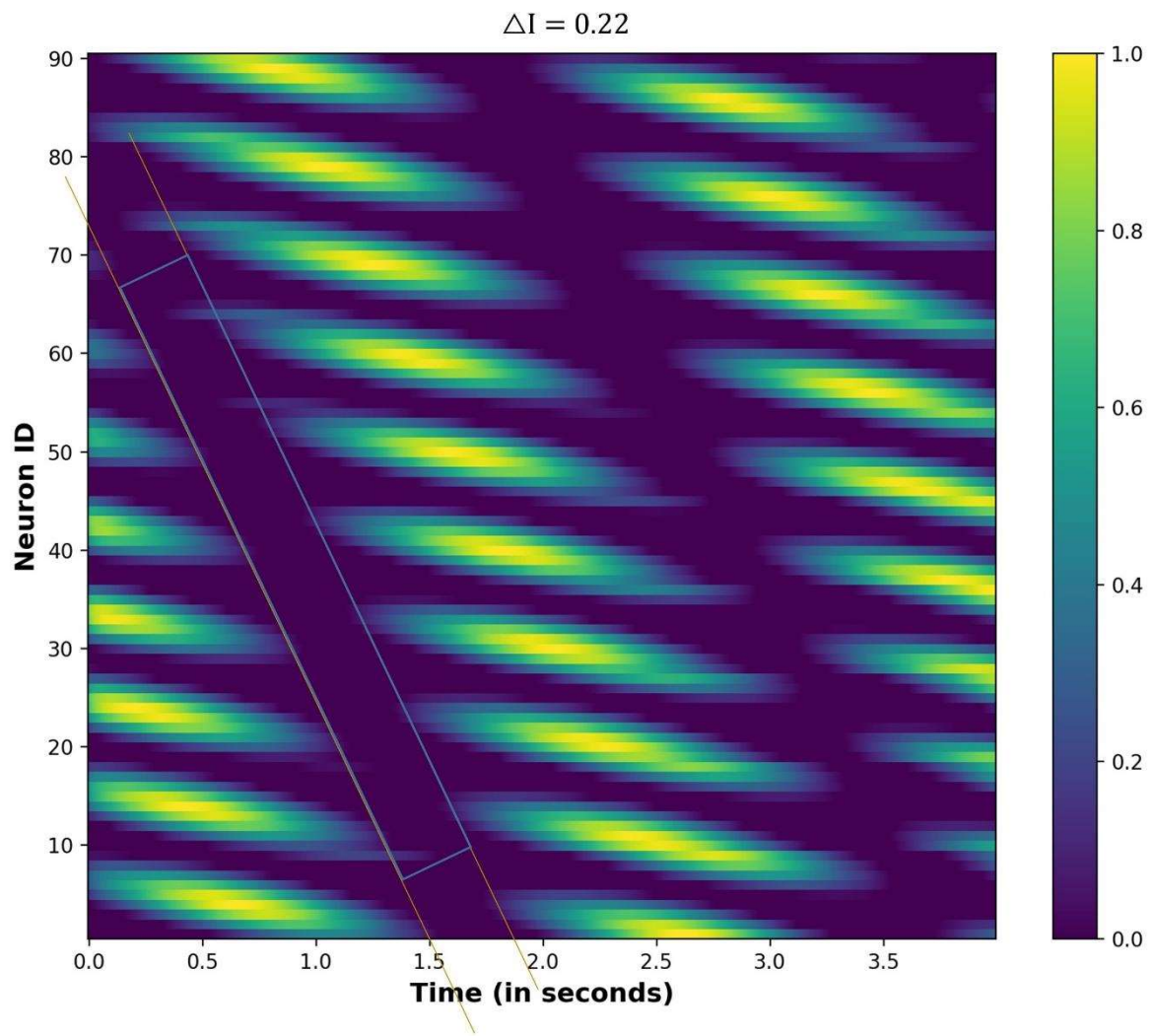


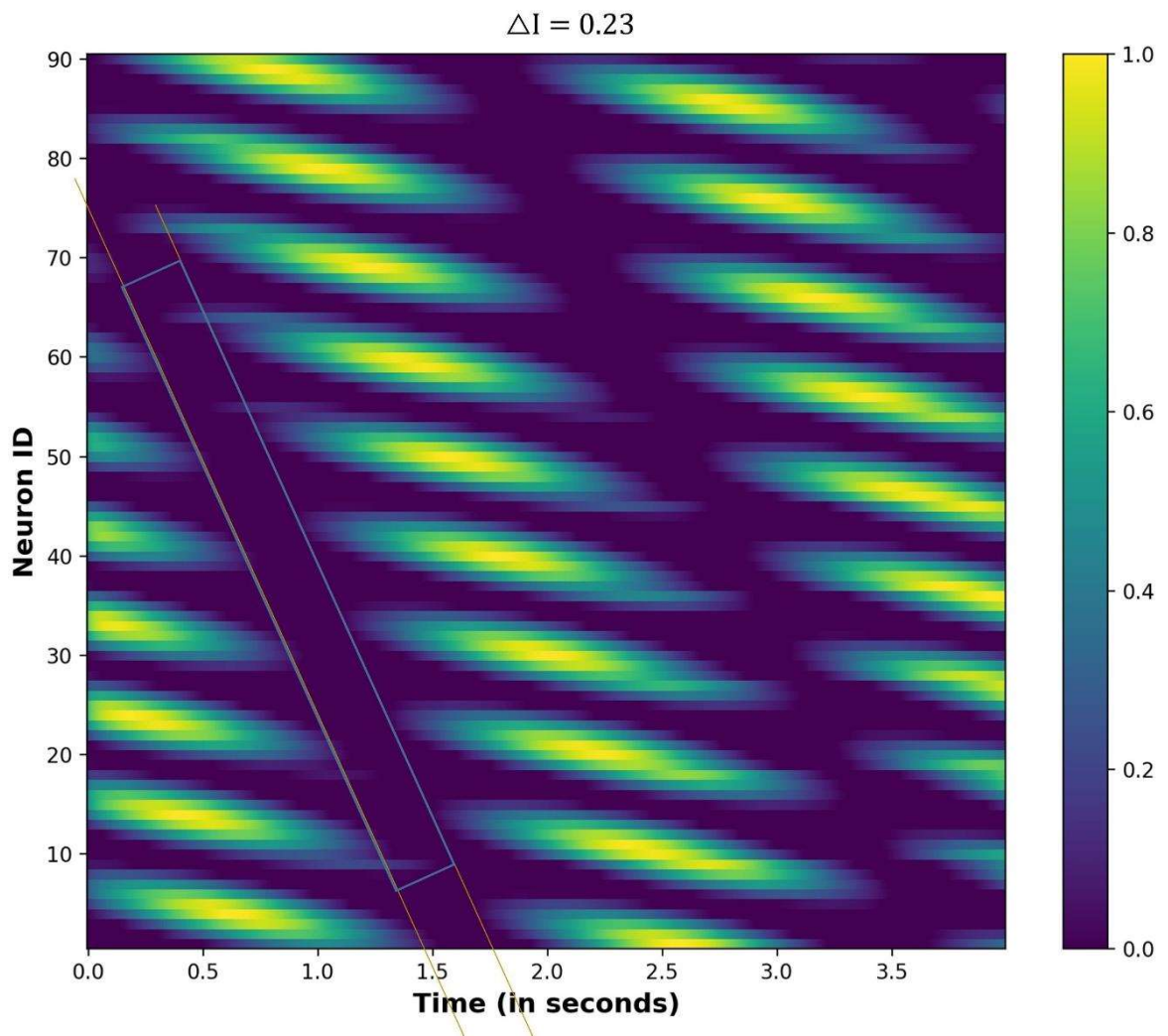


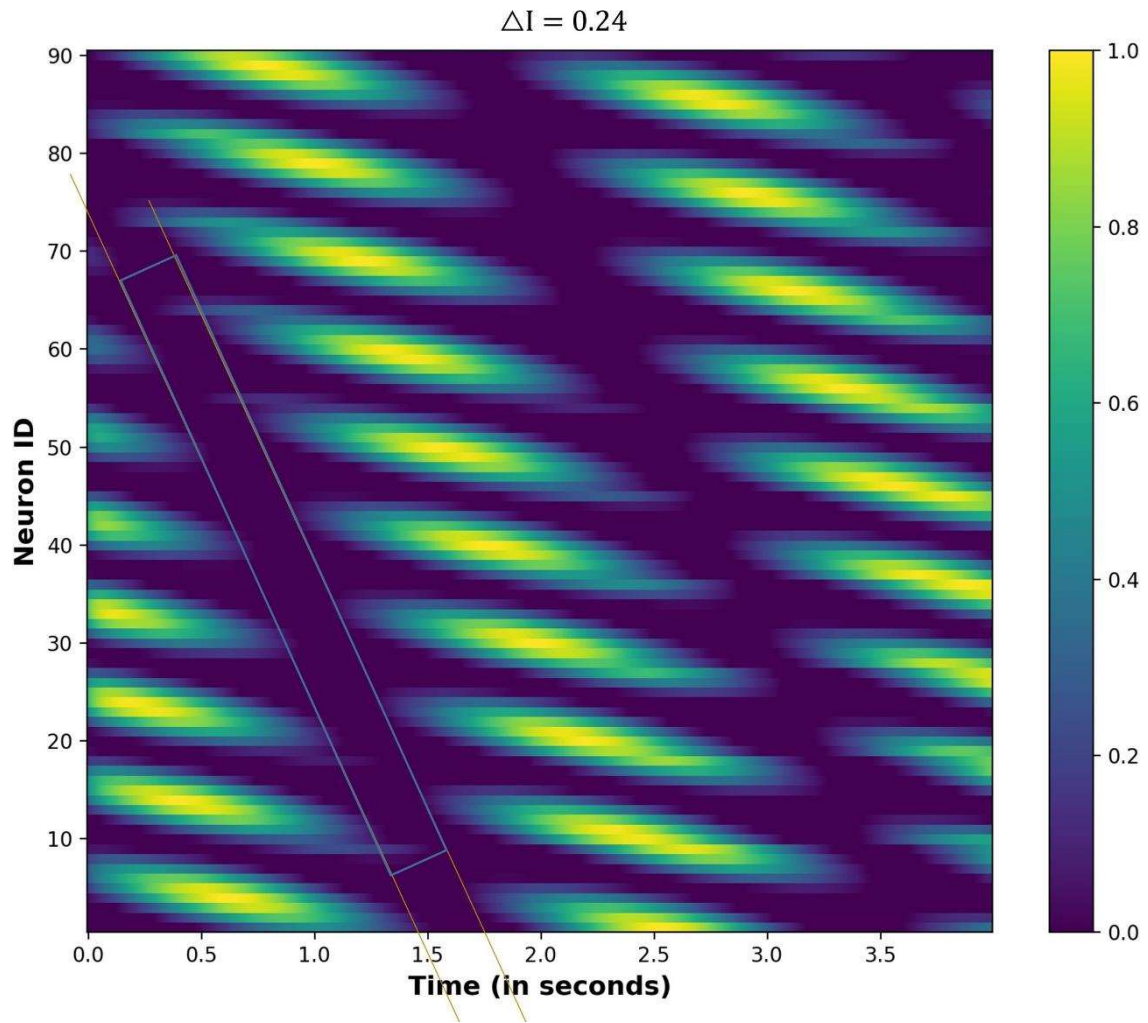


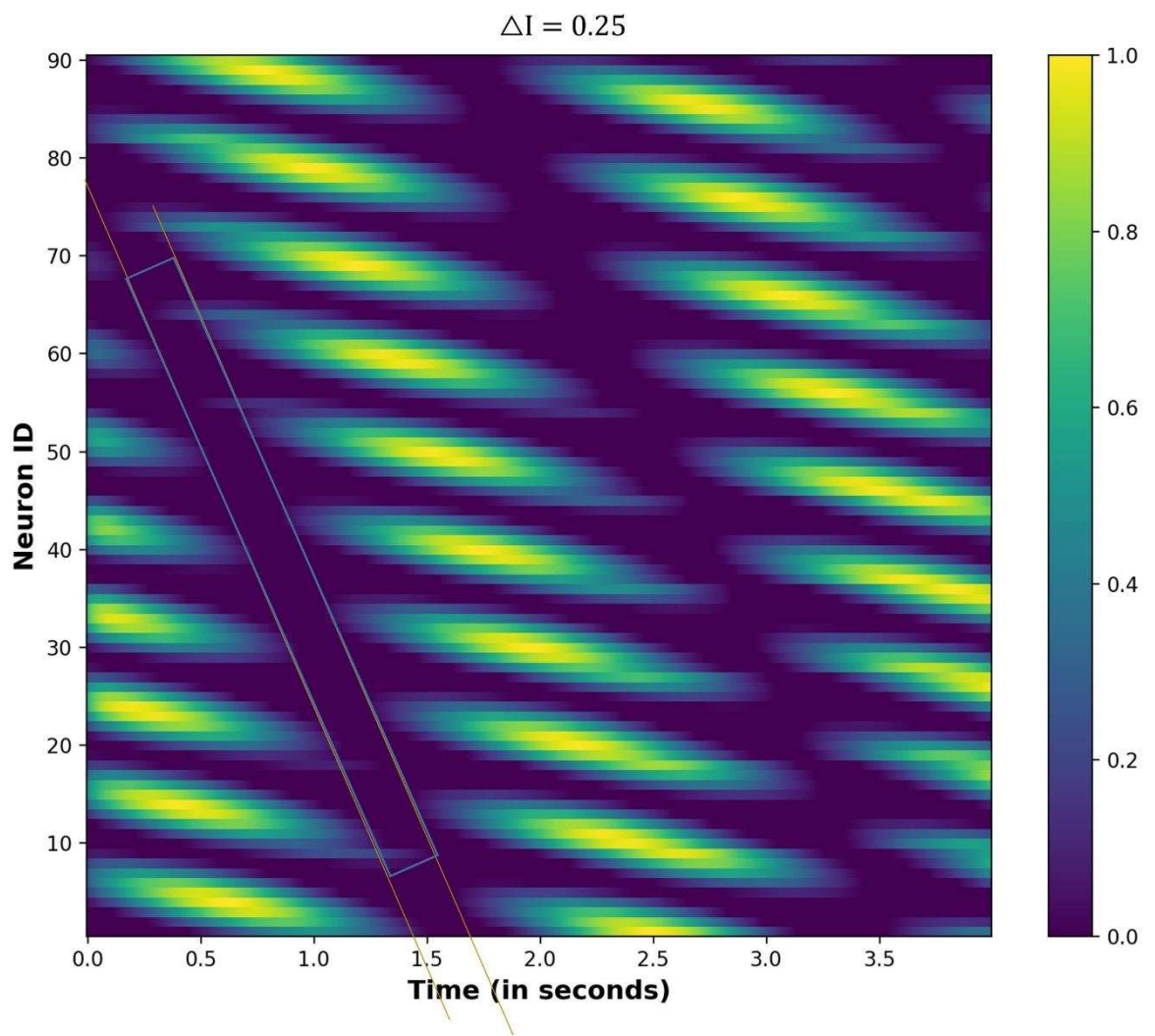


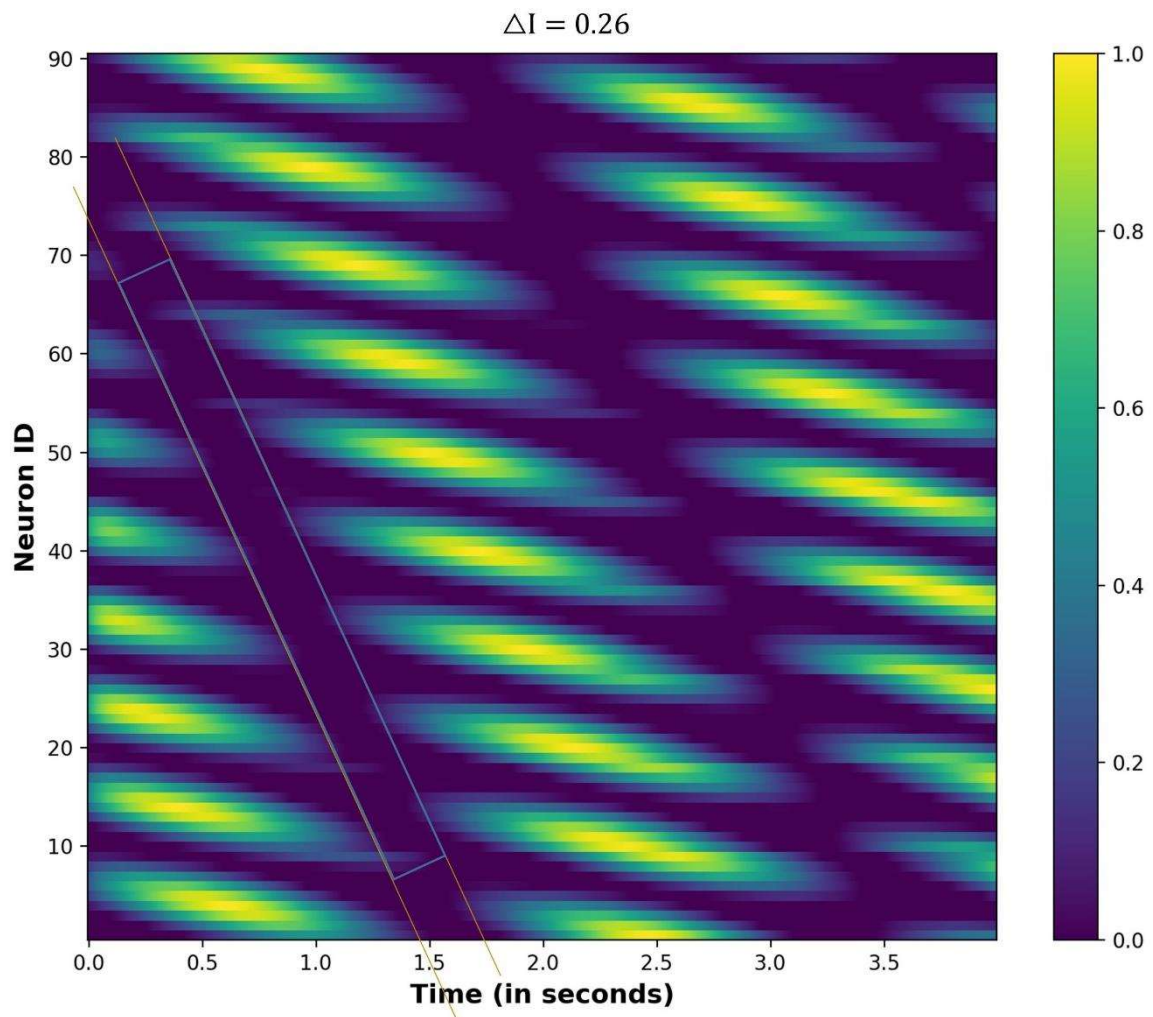


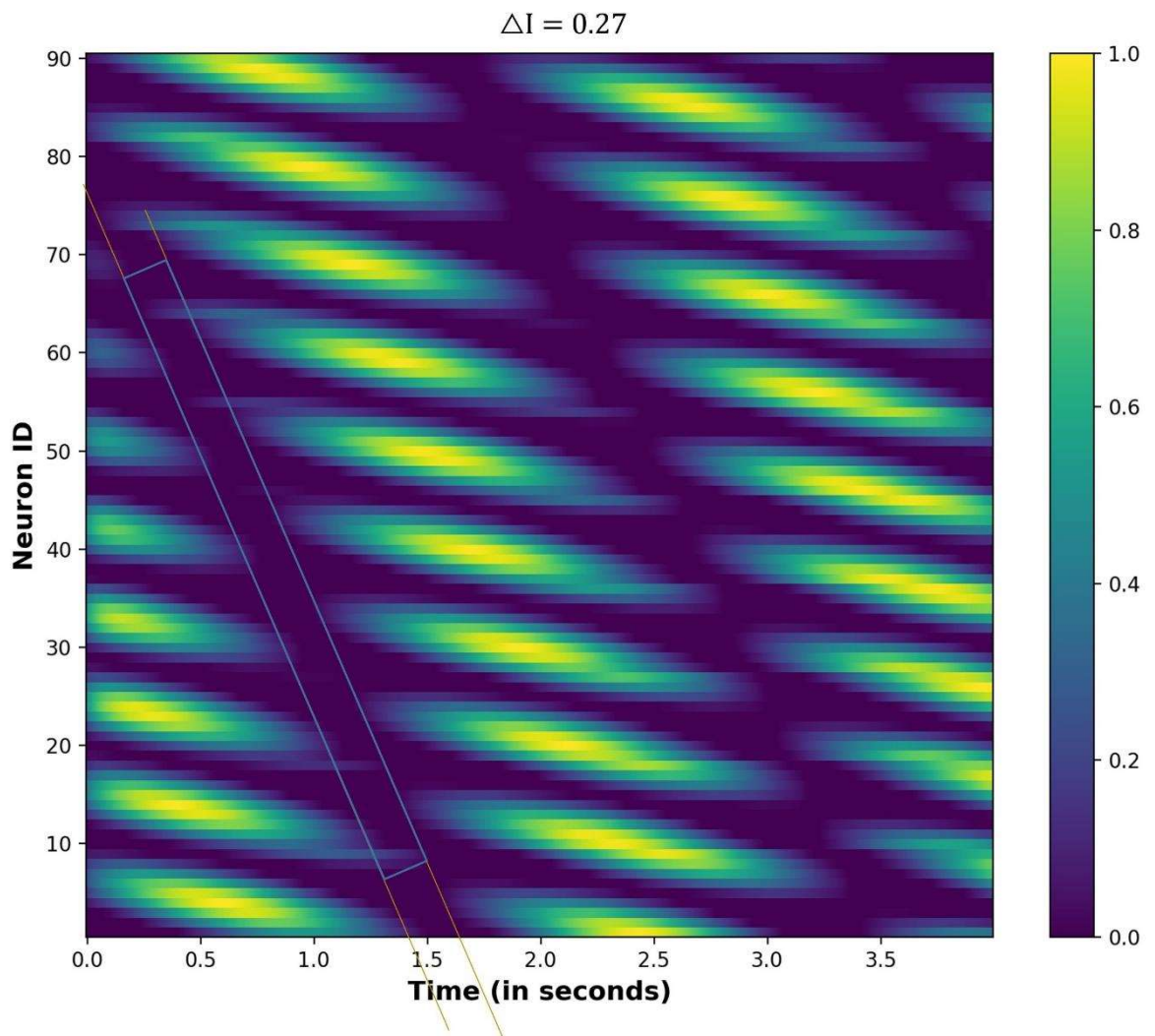


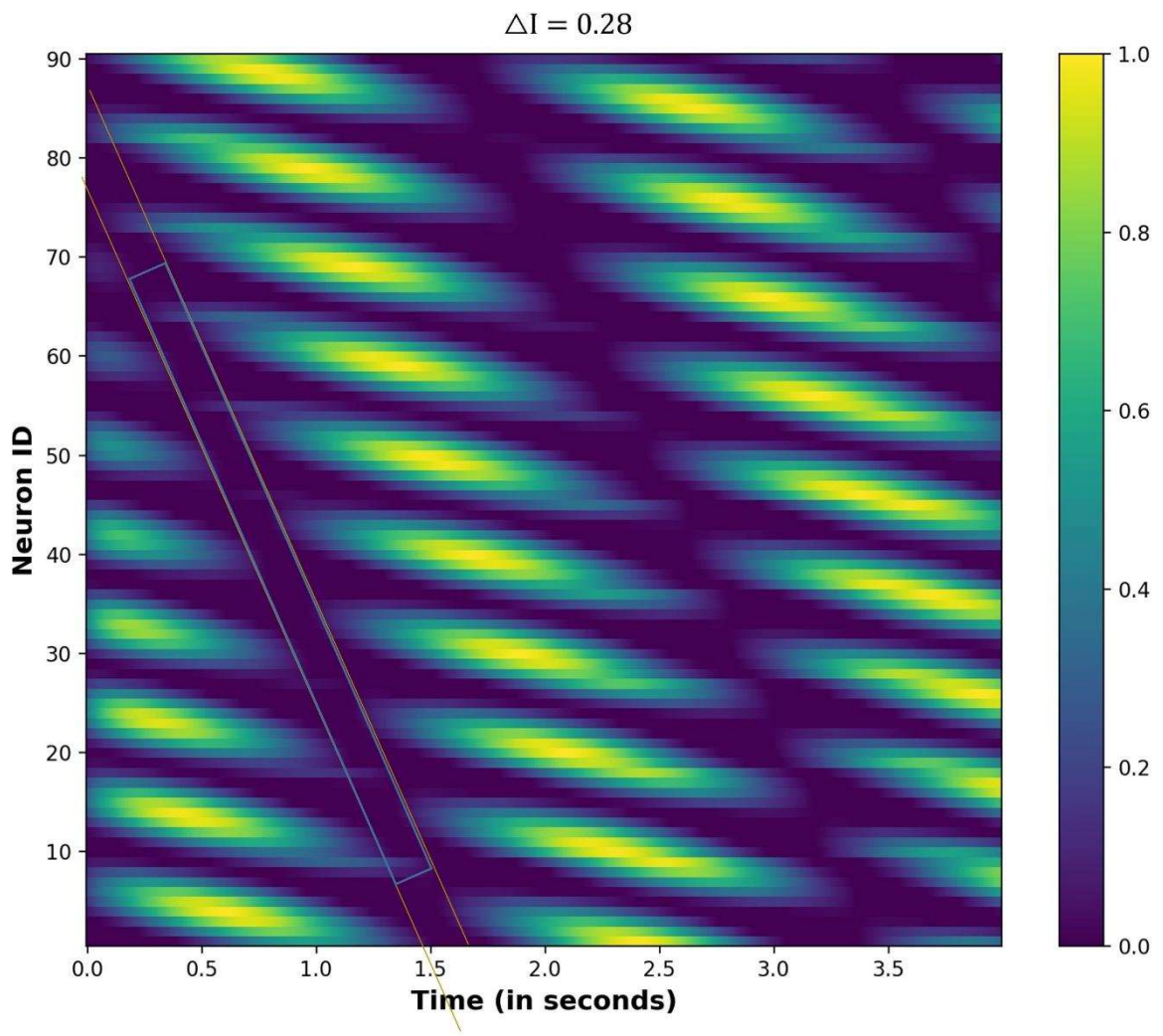


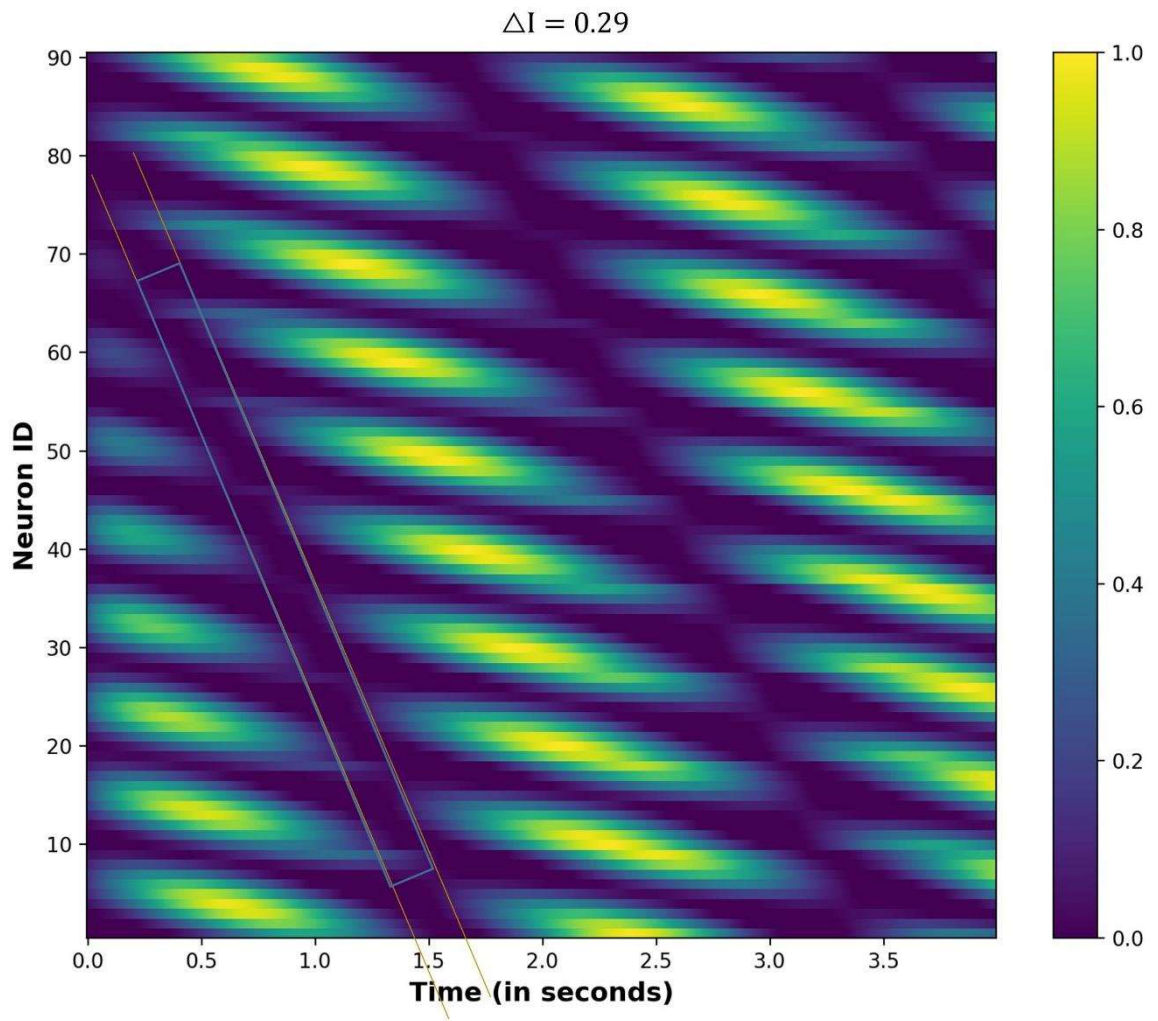














## List of Publications during Ph.D. Program

### Journals

- **Purohit P** and Roy PK. Interaction between spatial perception and temporal perception enables preservation of cause-effect relationship: Visual psychophysics and neuronal dynamics. *Mathematical Biosciences and Engineering*, 2023, 20(5): 9101-9134. doi: 10.3934/mbe.2023400
- **Purohit, P**, Dutta, P., & Roy, P. K. Empirically Validated Theoretical Analysis of Visual-Spatial Perception under change of Nervous System Arousal. *Frontiers in Computational Neuroscience*, 2023, 17. doi: 10.3389/fncom.2023.1136985
- Ruttala R, **Purohit P**, Bhattacharjee A, Kumari B, Roy PK. MRI-DTI Imaging Reveals Specific Neuro-degeneration Signature in Precuneus Node of Awareness Processing in Brain under Alzheimer's Disease. *Journal of Advanced Applied Scientific Research*. 4(4), 102–111. <https://doi.org/10.46947/joaasr442022460>
- Bhattacharjee A, **Purohit P** and Roy PK. Neuroprotective Drug Discovery From Phytochemicals and Metabolites for CNS Viral Infection: A Systems Biology Approach With Clinical and Imaging Validation. *Frontiers in Neurosci*. 16:917867. doi: 10.3389/fnins.2022.917867
- Kumari B, Sakode C, Lakshminarayanan R, **Purohit P**, Bhattacharjee A, Roy PK. Systems Biology Analysis of Permanent Spontaneous Cancer Remission Phenomenon Genomic Basis, Bioinformatics Networks and Candidate Therapeutic Biomolecules. 3 *Biotech* 13, 113 (2023). doi:10.1007/s13205-023-03515-0
- Bhattacharjee A, **Purohit P** and Roy PK. Hepatic Hypocholic Factor in Alzheimer's Disease Neuroimaging and Biochemical Validation. *Brain Connectivity*, 2023. (Under Review)

- **Purohit P**, Pareek V and Roy PK. Gender-based Inversion of Grey Matter effect on White Matter at Mid-age in Human Subjects. *Journal of Neuroimaging*. 2023 (Under Communication)
- **Purohit P** and Roy PK. Quantitative Framework of Ageing-induced Myelin Optimization in Human Brain. *Neuroscience Research*. 2023 (Under Communication)

### Conferences:

- **Purohit P**, Pareek V, Roy PK. Optimization of Myelination at Mid-Age: Interaction Analysis between Grey Matter and White Matter compartments. *FENS Forum 2022*, Paris, France. July 2022: 4353.
- **Purohit P**, Roy PK. Quantitative Framework of Ageing-induced Myelin Optimization in Human Brain: Experimental Validation using Histology and MRI-relaxometry analysis. *An International Conference in the Celebration of World Health Day on Innovations in Modern / Traditional Health Sciences and Medical Technology*, Institute of Medical Sciences, BHU, Varanasi, 7th – 8th April 2022.
- **Purohit P**, Gandhi T. Multimodal Neurocognitive Assistive Device for Dyslexic Children. *Proceedings of Annual Conference: Translational Neuroscience for Mental Health, Indian Academy of Neuroscience*, 2018: 229
- Bhattacharjee B, **Purohit P**, Roy PK. A Systems Biology Methodology to Drug Discovery for Neurotropic Virus Infection with Clinical Corroboration. *FENS Forum 2022*, Paris, France. July 2022: 6447.
- Baghel B, Bhattacharjee A, Kumari B, **Purohit P**, Roy PK. High Resilience of Cerebellum Across the Life-Span: Imaging Genomics Leads for identifying and validating Neuroprotective Drug Discovery. *FENS Forum 2022*, Paris, France. July 2022: 6402.

- Baghel B, Ruttala R, **Purohit P**, Roy PK. Neuroprotective Cerebellum Compensates Neurodegenerative Cerebrum in Alzheimer's Disease: Cognitive Reserve of Cerebellum Harnessed during Dementia. 62<sup>nd</sup> Annual Conference of National Academy of Medical Sciences, India, 11-13 Nov 2022.
- Ruttala R, **Purohit P**, Bhattacharjee A, Kumari B, Roy PK. MRI-DTI Imaging Reveals Specific Neurodegeneration Signature in Brain's Self-awareness Node (Precuneus) under Alzheimer's Disease. *An International Conference in the Celebration of World Health Day on Innovations in Modern / Traditional Health Sciences and Medical Technology*, Institute of Medical Sciences, BHU, Varanasi, 7th – 8th April 2022.
- Ruttala R, **Purohit P**, Bhattacharjee A, Kumari B, Roy PK. Cerebral Dynamics in the Precuneus Region of Human Brain under Neurodegeneration, *Students' Research Convention'22*, Indian Institute of Technology Kanpur, 4th – 6th March 2022. (First Prize)
- Baghel B, Ruttala R, **Purohit P**, Bhattacharjee A, Kumari B, Roy PK. Resistance of Cerebellar Brain to Ageing Decline: Physiological Homeostasis Stability as Therapeutic Approach to Neurodegenerative Disease. *Students' Research Convention'22*, Indian Institute of Technology Kanpur, 4th – 6th March 2022. (Third Prize)
- Chowdhury S, **Purohit P**<sup>#</sup>, Bhattacharjee A, Kumari B, Roy PK. Novel Drug Discovery for Acute Encephalitis using A.I.-based machine-reading and knowledge-mapping of Medical Literature Text: Validation by Animal Experiments and Human Clinical Trials. *61<sup>st</sup> Annual Conference of National Academy of Medical Sciences*, India, 26-28 Nov 2021. [ Best Poster Award ] <sup>#</sup>Presenting Author
- Baghel B, Kumari B, Bhattacharjee A, **Purohit P**, Roy PK. Long-term Structural Stability observed in Cerebellum during Ageing: Radiological Genomics identifies Neuroprotective Drugs with Clinical Validation. *61<sup>st</sup> Annual Conference of National Academy of Medical Sciences*, India, 26-28 Nov 2021.

- Roy PK, Pareek V, **Purohit P**. Exploring the 3-D Cartesian Geometry of Human Brain using MRI signatures of Migrating Cancer Cells and Neural Sheathing. *National Conference on AI & Perception Engineering*, Central Electronics Engineering Research Institute, Ministry of Science and technology, Govt. of India, July 2020.

### **Book chapter:**

- **Purohit P**, Roy PK. Multimodal Noninvasive Imaging Strategies for Clinically Monitoring Degenerative Disorders of the Brain. In: Mazumder, N., Gangadharan, G., Kistenev, Y.V. (eds) *Advances in Brain Imaging Techniques*. Springer, Singapore, 2022. [https://doi.org/10.1007/978-981-19-1352-5\\_1](https://doi.org/10.1007/978-981-19-1352-5_1)