



nature of OpenGL, while PsychoPy has an automated luminance calibration utility and interfaces more easily with certain types of hardware. Furthermore, the primary development platform of the Vision Egg is GNU/Linux, while it appears to be Windows for PsychoPy.

Another interesting issue discussed shortly in Straw's paper is the feasibility of setting up a stimulus library in form of a database that could be downloaded and used with different presentation environments. As everyone who has developed databases knows, there is more involved in such a project than just storing bitmaps (or sequences thereof) of a standard number of pixels. For example, the issues of frame rate,

display luminance and position calibration, and synchronization with data acquisition and other hardware would all need to be addressed. Even further, the creation of a universal language for specifying sensory stimuli would be of great interest.

Altogether this paper by Straw on the Vision Egg gives a fairly technical account of many relevant hardware and software considerations, but is nevertheless a well readable primer of considerations when deciding on what visual stimulus software to choose or extend.

ACKNOWLEDGMENTS

This work was supported by the Initiative and Networking Fund of the Helmholtz

Association within the Helmholtz Alliance on Systems Biology.

REFERENCES

- Peirce, J. W. (2007). PsychoPy – psychophysics software in python. *J. Neurosci. Methods* 162, 8–13.
- Straw, A. D. (2008). Vision Egg: an open-source library for realtime visual stimulus generation. *Front. Neuroinform.* doi: 10.3389/neuro.11.004.2008.

Received: 10 May 2009; published: 15 September 2009.

Citation: *Front. Neurosci.* (2009) 3, 2: 163–164. doi: 10.3389/neuro.01.021.2009

Copyright © 2009 Kötter. This is an open-access publication subject to an exclusive license agreement between the authors and the Frontiers Research Foundation, which permits unrestricted use, distribution, and reproduction in any medium, provided the original authors and source are credited.

Another angle on rat somatosensory thalamic barreloids

Kathleen S. Rockland*

Laboratory of Cortical Organization and Systematics, RIKEN Brain Science Institute, Wako-Shi, Saitama, Japan

*Correspondence: rockland@brain.riken.go.jp

A commentary on

Lemniscal and extralemniscal compartments in the VPM of the rat

by Sebastian Haidarliu, Chunxiu Yu, Naama Rubin and Ehud Ahissar

The rodent barrel cortex is one of the premier model systems for investigating sensory organization and cortical micro-circuitry. In no small degree, this is because the cortical barrels, thalamic barreloids, and brainstem barrelettes can be easily visualized and referenced both to each other and to the peripheral whisker field.

The report by Haidarliu et al. (2008) concerns a relatively simple, reproducible method for visualizing two thalamic subdivisions and the border between them. The subdivisions in question are the ventrolateral (vl) and dorsomedial (dm) subdivisions of the rat ventral posteromedial (VPM) thalamic nucleus. These are two specialized vibrissa-representing compartments with distinct ascending inputs, associated with extralemniscal (VPMvl) or

lemniscal (VPMdm) afferent pathways. The compartments have different output targets, and distinct response properties, related to whisker contact signals (VPMvl) and complex whisking-touch signals (VPMdm). On this basis, they have been supposed to work as parallel thalamic pathways for whisking and touch (Yu et al., 2006). A third distinguishable pathway has been reported through the dorsal part of the barreloids (Urbain and Deschenes, 2007).

In this and previous work, the authors have developed an unconventional, tilted oblique plane of section, where the shape of the two subdivisions and the border between them, although otherwise indistinct, become obvious. In this report in particular, the authors modify their original method (Yu et al., 2006) in order to allow translation of coordinates from the oblique to the coronal planes. This is a relatively simple step, at least in retrospect. As with the barrel system as a whole, however, the ability to clearly and reproducibly visualize these structures has significant practical implications. Clearly, definite identification of structure is a necessary condition for

interpreting physiological recordings in the thalamus (e.g., Yu et al., 2006). These data in turn are basic to determining whether the subdivisions are primarily specialized for submodality segregation (Alloway, 2008) or for some other processing strategies; for example, the special requirements arising from the operation of a mobile sensory organ and the processing of vibrissal information during active whisking (Ahissar, 2008; Urbain and Deschenes, 2007).

The methodology for transforming coordinates and the standardization of nuclear boundaries also augments brain atlases. Atlases are now part of the modern toolkit, with the potential for enabling developmental and comparative research, including at the molecular level; but this requires the highest level of precise details and interdisciplinary transpositions.

I would like to interpose two general comments inspired by this article. First, it is remarkable that basic neural structures are still being discovered at the macroscopic level. This stands as a salutary lesson about how much, even at a basic level, remains unknown. Second, although I have empha-

sized the importance of visualization, it is worth remembering that images can be deceptive: experimenter reading-in happens, often inadvertently. Almost all images carry interpretation, and the interpretation can err. Of many examples that “looks alone are deceptive,” Rokni et al. (2008) present evidence that cerebellar parallel fibers, a preeminently beamlike structure, actually activate Purkinje cells in a patchlike fashion.

It remains for further investigations in the barrel system to establish whether these distinct thalamic compartments are functionally distinct or interactive. This should be significantly expedited by the current generation of experiments in alert animals, which can more directly address questions of active sensory perception and the interactions of motor-control and sensation

(Ahissar, 2008; Brecht, 2007; Petersen, 2007). Over the longer term, one can realistically hope for a rigorous and enlightening comparison of processing mechanisms in the rodent barrel system with that of other specialized systems, such as the primate visual (Nassi and Callaway, 2009).

REFERENCES

- Ahissar, E. (2008). And motion changes it all. *Nat. Neurosci.* 11, 1369–1370.
- Alloway, K. D. (2008). Information processing streams in rodent barrel cortex: the different functions of barrel and septal circuits. *Cereb. Cortex* 18, 979–989.
- Brecht, M. (2007). Barrel cortex and whisker-mediated behaviors. *Curr. Opin. Neurobiol.* 17, 1–9.
- Haidarliu, S., Yu, C., Rubin, N., and Ahissar, E. (2008). Lemniscal and extralemniscal compartments in the VPM of the rat. *Front. Neuroanat.* 2, 1–10.
- Nassi, J. J., and Callaway, E. M. (2009). Parallel processing strategies of the primate visual system. *Nat. Rev. Neurosci.* 10, 360–372.
- Petersen, C. C. H. (2007). The functional organization of the barrel cortex. *Neuron* 56, 339–355.
- Rokni, D., Llinas, R., and Yarom, Y. (2008). The morpho/functional discrepancy in the cerebellar cortex: looks alone are deceptive. *Front. Neurosci.* 2, 192–198.
- Urbain, N., and Deschenes, M. (2007). A new thalamic pathway of vibrissal information modulated by the motor cortex. *J. Neurosci.* 27, 12407–12412.
- Yu, C., Derdikman, D., Haidarliu, S., and Ahissar, E. (2006). Parallel thalamic pathways for whisking and touch signals in the rat. *PLoS Biol.* 4, 819–825.

Received: 22 April 2009; published: 15 September 2009.

Citation: *Front. Neurosci.* (2009) 3, 2: 164–165. doi: 10.3389/neuro.01.022.2009

Copyright © 2009 Rockland. This is an open-access publication subject to an exclusive license agreement between the authors and the Frontiers Research Foundation, which permits unrestricted use, distribution, and reproduction in any medium, provided the original authors and source are credited.