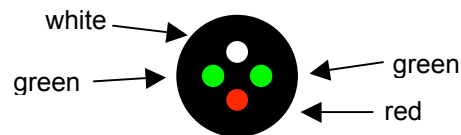


## Vision Science III Binocular Vision Module

**Exam 2**

Friday, May 7, 2004 (maximum points: 45)

- Which of the following would most likely lead to binocular rivalry?
  - Image of a house on the OD fovea and trees on the OS fovea.
  - High-quality, correlated images on the OD and OS retinas
  - Alternating exotropia
  - Fixation by OD and suppression of OS.
- Which of the following best describes diplopia (not confusion)?
  - One image formed on the OD fovea and a different image on the OS fovea.
  - An image formed on the OD fovea and the same image on the OS fovea.
  - An image formed on the OD fovea and the same image on the OS peripheral retina.
  - Two different images formed on corresponding points on the two retinas.
- Which of the following does NOT correctly describe a basic principle of binocular rivalry?
  - Contours tend to dominate homogenous fields.
  - An image with high spatial frequencies tends to dominate an image that's missing them.
  - A high contrast image tends to dominate a low contrast image.
  - A stationary image tends to dominate a moving image.
- When doing a Worth-4-dot test (see figure), with the red lens over OD and green lens over OS, the patient sees only three green dots. What is the diagnosis?



- Suppression OD
  - Suppression OS
  - Diplopia
  - Binocular fusion
- According to the lecture notes, which of the following prismatic corrections would most likely make a patient feel that he is taller than normal?
    - Base up over one eye and base down over the other
    - Base-in prism OU
    - Base-out prism OU
    - Horizontal yoked prism
  - Stereocampimetry is a technique used to measure
    - stereoacuity threshold.
    - the suppression field in one eye.
    - the empirical horopter.
    - the Hering-Hillebrand deviation.
  - Which of the following is correct?
    - Amblyopes can never see the Pulfrich Effect.
    - Some amblyopes who cannot fuse can see the Pulfrich Effect with an ND filter.
    - Some amblyopes who cannot fuse can see the Pulfrich Effect without an ND filter.
    - Some amblyopes who can fuse can see the Pulfrich Effect without an ND filter.
  - Name four factors other than a difference in the powers for the OD and OS spectacle lenses that can contribute to the perceived aniseikonia. (4)

optics of the eyes, distribution of local signs on the retinas, neural processing, adaptation

9. How will a wall in front of a patient appear if he has aniseikonia caused by the following spectacle Rx?

OD            -1.00 -2.00 x 180  
OS            -3.00 sphere

- a. Trapezoid base left and the right side will appear farther away
- b. Trapezoid base right and the right side will appear farther away
- c. Trapezoid base right and the left side will appear farther away
- d. Trapezoid base left and the left side will appear farther away

10. How will a wall in front of a patient appear if he has aniseikonia caused by the following spectacle Rx?

OD            -2.00 sphere  
OS            plano -2.00 x 090

- a. Trapezoid base left and the right side will appear farther away
- b. Trapezoid base right and the right side will appear farther away
- c. Trapezoid base right and the left side will appear farther away
- d. Trapezoid base left and the left side will appear farther away

11. How will a wall in front of a patient appear if he has aniseikonia due to the following spectacle Rx?

OD            -2.00 -3.00 x 045  
OS            -2.00 -3.00 x 135

- a. Trapezoid base up, top side closer
- b. Trapezoid base up, bottom side closer
- c. Trapezoid base down, top side closer
- d. Trapezoid base down, bottom side closer

12. When testing a patient with an eikonometer, the vertical lines appear parallel to the fronto-parallel plane, and the cross appears tilted farther away on the left side. The person has greater

- a. horizontal mag OD (axis 090).
- b. horizontal mag OS (axis 090).
- c. vertical mag OD (axis 180).
- d. vertical mag OS (axis 180).
- e. overall mag OD.
- f. overall mag OS.

13. When testing a patient with an eikonometer, the vertical lines and the cross appear tilted away from OD. The person has greater

- a. horizontal mag OD (axis 090).
- b. horizontal mag OS (axis 090).
- c. vertical mag OD (axis 180).
- d. vertical mag OS (axis 180).
- e. overall mag OD.
- f. overall mag OS.

14. When testing a patient with an eikonometer, the cross appears parallel to the fronto-parallel plane, and the vertical lines appear tilted farther away on the left side. The person has greater

- a. horizontal mag OD (axis 090)
- b. horizontal mag OS (axis 090)
- c. vertical mag OD (axis 180)
- d. vertical mag OS (axis 180)

[continues on the next page]

- e. overall mag OD
- f. overall mag OS

15. If a patient with aniseikonia has the refraction and keratometer data shown below, assuming Knapp's Law applies, you should

Refraction: OD -7.25 sph                      Keratometer: OD 46.25@180/ 46.75  
 OS -2.00 sph                                      OS 42.00@180/ 42.75

- a. assume he has an axial anisometropia and correct him with contact lenses.
- b. assume he has an axial anisometropia and correct him with spectacles.
- c. assume he has a refractive anisometropia and correct him with contact lenses.
- d. assume he has a refractive anisometropia and correct him with spectacles.

16. The first truly binocular neurons in the mature human visual system are found in the

- a. optic chiasm.
- b. LGN.
- c. Layers IVC  $\alpha$  and  $\beta$  in the primary visual cortex.
- d. Layer II, III and IVB of the primary visual cortex.

17. Neurons from LGN layers 3-6 synapse in which layer of the primary visual cortex?

- a. IVA
- b. IVB
- c. IVC $\alpha$
- d. IVC $\beta$

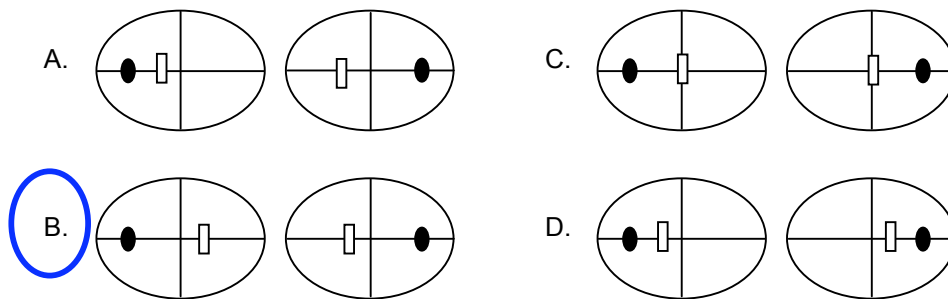
18. Which of the following is NOT a function associated with the parvocellular system?

- a. course-motion stereopsis
- b. crossed and uncrossed disparity
- c. color perception
- d. sensitivity to high spatial frequencies

19. Magnocellular neurons synapse in which of the following tissues?

- a. Layers V and VI of the primary visual cortex.
- b. The thick dark stripes of area V2.
- c. The thin striped region of area V2.
- d. Area V4

20. Which of the following receptive fields most likely corresponds with a binocular neuron tuned for crossed disparity? In each, the black oval represents the blind spot and the white rectangles represent the location of the receptive field in each eye's monocular visual field.



21. LGN neuron receptive fields are circular and show spatial antagonism. Scientists hypothesize that LGN neurons with adjacent receptive fields arranged in a straight line probably synapse with a simple cell

in the primary visual cortex whose receptive field closely matches the sum of the LGN fields. This is an example of

- a. bottom-down processing.
- b. parallel processing.
- c. correlative dominance.
- d. hierarchal processing.

22. Which of the following is NOT a specific characteristic required of a light to optimally stimulate a simple cell? The stimulus must have the proper

- a. shape – elongated like a bar or edge.
- b. orientation.
- c. position.
- d. direction of movement

23. Which of the following is common among many normal newborn infants?

- a. Unstable fixation with intermittent exotropia
- b. Visual acuity of about 6 cycles per degree
- c. Stereoacuity threshold of about 300 arc seconds
- d. Worth grade 3 fusion

24. During which time interval does the sense of stereopsis development most rapidly?

- a. From birth to about 2 months of age
- b. From about 3 to 5 months of age
- c. From about 6 months to 1 year
- d. From age 3-6 years

25. For humans, the sensitive or critical period

- a. begins at birth.
- b. begins a couple of months after birth.
- c. is the same for contrast sensitivity, visual acuity and stereopsis.
- d. ends before most children develop accurate ocular alignment.

26. Many first-order neurons in the primary visual cortex are

- a. monocular at birth, but become binocular within the first few months.
- b. monocular from birth and throughout the sensitive period.
- c. binocular at birth, but become monocular within the first few months.
- d. binocular from birth and throughout the sensitive period.

27. Monocular deprivation is most damaging to the development of visual acuity if it occurs

- a. prior to the sensitive period.
- b. within the first six months of the sensitive period.
- c. within the last six months of the sensitive period.
- d. immediately after the completion of the sensitive period.

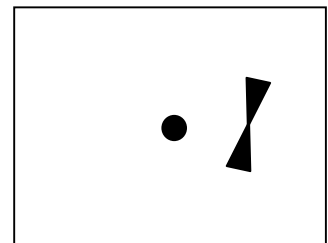
28. To receive the maximum benefit from reverse occlusion for amblyopia, it should be started

- a. and completed prior to the onset of the sensitive period.
- b. early in the sensitive period.
- c. near the end of the sensitive period.
- d. at any time, as long as it is done full time.

29. In Hubel and Wiesel's research with kittens, which of the following resulted the most normal-looking ocular dominance histogram?

- a. Constant monocular deprivation during the sensitive period
- b. Alternating monocular deprivation during the sensitive period
- c. Binocular occlusion during the critical period
- d. Induced strabismus during the critical period

30. The most common kind of strabismus between about 6 months and 1 year of age is  
 a. infantile esotropia.  
 b. refractive esotropia.  
 c. intermittent exotropia.  
 d. constant infantile exotropia
31. Which of the following is the most important initial treatment for refractive esotropia?  
 a. Strabismus surgery  
 b. Cycloplegia  
 c. Patching the dominant eye  
 d. Spectacle prescription
32. Which of the following is NOT associated with refractive amblyopia?  
 a. Abnormal sense of visual direction  
 b. Abnormal space perception  
 c. Reduced vernier acuity  
 d. Poor contrast sensitivity for low spatial frequencies
33. Some people have an unusual condition in which they can see scenes normally, but they are unable to recognize or perceive certain objects contained within the scene. This is called  
 a. an agnosia.  
 b. blind sight.  
 c. metamorphopsia.  
 d. anisophoria.
34. If a baby is born with a dense congenital congenital cataract, at what age should you refer the child for cataract surgery?  
 a. Within one month after birth  
 b. At about 3 months of age  
 c. Between 6 months and 1 year of age  
 d. At about 3 years of age
35. 3-D movies create a compelling illusion of three-dimensional depth using red/green glasses to make the right and left eyes see slightly disparate images. If the movie shows natural scenery with depth, what will happen if the person accidentally wears his glasses with the red and green filters over the wrong eyes?  
 a. All depth cues will be reversed since the disparities will be reversed.  
 b. The scene will appear flat since all depth perception will be lost.  
 c. The sense of stereoscopic depth will be increased due to hyperstereopsis.  
 d. There will probably be little change in perceived depth since the monocular depth cues remain.
36. Which of the following best describes microstrabismus, also known as monofixation syndrome?  
 a. It must usually be corrected surgically.  
 b. It is a common cause of eyestrain and headaches.  
 c. It is a small residual deviation following strabismus surgery.  
 d. These patients are incapable of central or peripheral binocular fusion.
37. If a patient (viewing with OD; OS occluded) attempts to fixate the center dot, but sees Haidinger's Brushes to the right, as shown in the figure, what condition do he have?  
 a. Nasal eccentric fixation in OD  
 b. Temporal eccentric fixation in OD  
 c. Normal fixation in OD  
 d. Anomalous correspondence



38. By prism neutralization and the cover test, you determine that a patient has 10 prism diopters of esotropia OS. He is able to fuse, and subjectively shows 2 prism diopters of eso deviation by the von Graefe test. Which of the following conditions does he have?

- a. Eccentric fixation
- b. Harmonious anomalous correspondence
- c. Unharmonious anomalous correspondence
- d. Past pointing

39. Which of the following best summarizes top-down processing of visual information according to the Gestalt theory?

- a. The brain interprets and organizes incoming visual data to best-fit preconceived images.
- b. High and low spatial frequency components are processed in parallel up to the extrastriate level.
- c. The visual system analyzes image components and reassembles them in the brain before the image is perceived.
- d. Active processing of visual information does not begin until the primary visual cortex.

40. While stopped in traffic, you suddenly sense that your car is moving due to the movement of cars in the next lane, even though you are not actually moving. This is an example of

- a. biological motion.
- b. the induced effect.
- c. autokinesis.
- d. self motion.

41. In figure-ground processing

- a. the visual system tends to focus attention on one object and relegate everything else to the background.
- b. the visual system rapidly shifts attention between the foreground and background.
- c. the visual system efficiently minimizes background neural noise, thereby improving the signal-to-noise ratio.
- d. the magnocellular system compensates for deficiencies in the parvocellular system.

42. Based on Teller's rule of thumb, what visual acuity should you expect for a 6-month old baby?

- a. 20/20
- b. 20/60
- c. 20/100
- d. 20/600