

DO NOT OPEN THIS EXAM UNTIL INSTRUCTED TO BEGIN

Name	Signature
ID	

- Step 1: Verify that your name and student number are correct on the label. Sign your name above. Have your photo ID ready.
- Step 2: Without opening the exam, looking only at the bottom left corners of the pages, verify that your exam has 10 pages.
- Step 3: You may not use notes, memory aids, calculators, cell phones, your Aunt Martha or a smoke break or any other assistance. If suddenly feel the need to visit the washroom raise your hand and wait for an escort. Be sure to wash your hands.
- Step 4: This exam consists of multiple choice, true/false, and short answer questions and may be too long to complete in the time allotted. Numbers in brackets indicate approximate point values of each question. Scores on this exam will be adjusted based on individual and overall class performance. Emphasis has been placed on synthesis and application of the material covered through February 14, 2002. Make all answers on these pages. You may use the blank back of the pages to report you answers or for scratch. Be sure to write down only one answer for each question – contradictory answers will receive zero points. Be concrete and brief in your answers, as longer answers tend to lead to bullshit and vagueness. Be complete in your answers as we cannot read your mind.
- Step 5: While waiting for signal to begin, enjoy this comic.

SHERMAN'S LAGOON

by Jim Toomey



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Mike Kayira

- 1.1 [1] The Behaviourist attitude to perception was that:
- a perceptual abilities were innate, and so could never change
 - b mental “atoms” were conceptual, but not perceptual
 - c perception had to be discussed only in terms of measurement**
 - d conscious perception occurred only in “higher” animals
- 1.2 [1] What was the main problem with ecological optics?
- a it always assumed that consciousness was inaccessible
 - b it never specified what information was used for a perceptual process
 - c it never specified what computation was used for a perceptual process**
 - d it always assumed that a perceptual hypothesis was possible
- 1.3 [5] Early psychologists could not explain visual illusions. In contrast, cognitive psychologists can explain visual illusions.
- A. Which assumptions about perception and cognition did the early psychologists have that kept them from explaining visual illusions? Be specific.

2pts: Bottom-up processing transformed sensations from perceptual atoms to percepts.

Experience and top-down processing could not alter perceptual atoms [no top-down processing]

- B. In contrast to early psychologists, what are the assumptions that cognitive psychologists make that allow them to explain visual illusions?

2pts: Top-down knowledge and bottom-up information are combined to test hypotheses

which could explain sensations, [experience/knowledge/higher order processing]

- C. Name a visual illusion and briefly describe the cognitive psychologist explanation for the illusion.

0.5pt: name actual illusion or type: distortion, ambiguity, paradox, hallucination

0.5 pt: explanation. [must be static visual illusion]

Ben Fox

- 2.1 [1] Light passes through the following structures on its way to sensation in human eyes
- a lens, aqueous humor, optic nerve, photoreceptors
 - b aqueous humor, lens, vitreous humor, photoreceptors**
 - c cornea, vitreous humor, iris, lens, photoreceptors
 - d cornea, lens, iris, ganglion nerves, photoreceptors
- 2.2 [2] What types of eyes could exist if light did not refract?
- 1. **Pinhole (or cup eyes)**
 - 2. **Compound (0.5 pt for ommatidium)**
- 2.3 [2] Define light:
Portion of the electromagnetic spectrum that is visible to the human eye.
(or electromagnetic radiation that can be treated optically)
-
-
-
- 2.4 [4] Briefly describe the four classes of illusions
[1 point each]
- Distortion: misperception of size, length, straightness**
-
- Ambiguity: two or more possible interpretations (switched between)**
-
- Paradox: impossible 3D structure depicted in 2D (Escher)**
-
- Hallucination: not really there (triangle, fruit man)**
-
-

Siobhan McCormick

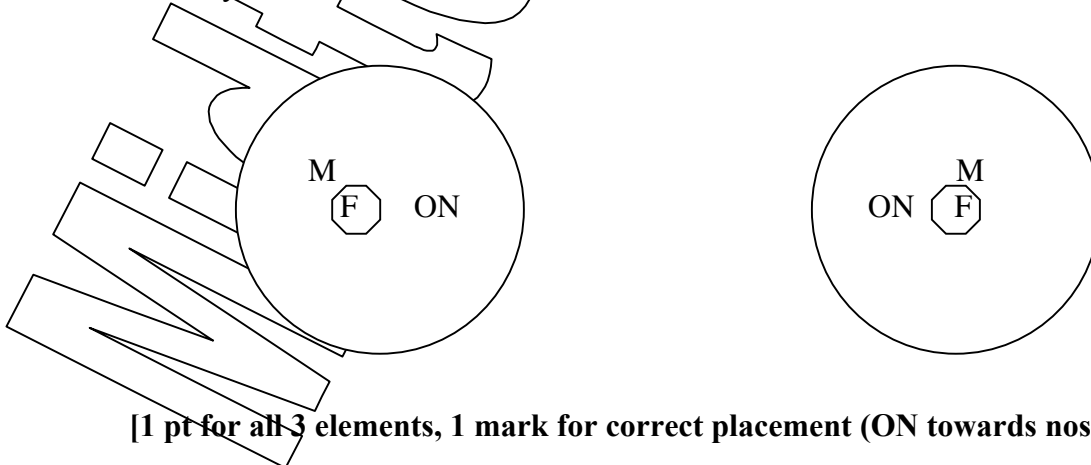
3.1 Circle *True* or *False* for each of these statements regarding cones and rods:
Do not guess: 1/2 point for a right answer, -1 point for a wrong answer

- True** False Rods and cones do not dark adapt in the same way
- True **False** The fovea has no S-cones and this is why it has high acuity
- True **False** Humans are most sensitive to the detection of motion on their central visual field
- True **False** Rods aren't useful for seeing edges because they cannot distinguish colour
- True **False** The Pulfrich effect occurs because rods are slower than cones
- True **False** Activities involving judgments of movement and distance should not be played at dusk (or under low lighting) because of the Purkinje shift

3.2 [4] Write in the word or phrase to best complete the following statements

- a The basic building block of the brain is the neuron
- b The firing rate of a neuron indicates the degree to which it has been stimulated
- c/d Neural signals travel along thick nerve fibers faster than along thin nerve fibers. This difference is due to myelin.

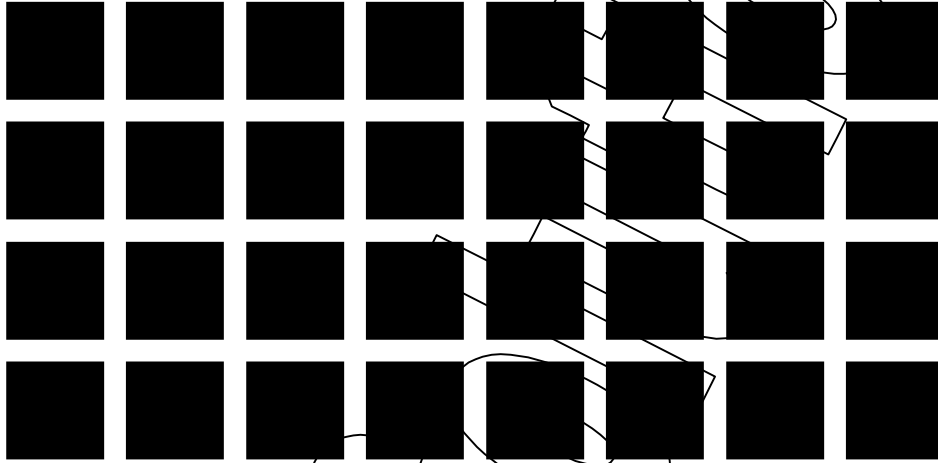
3.3 [2] Indicate in the circles below the position of the fovea, macula, and optic nerve of the two eyes.



[1 pt for all 3 elements, 1 mark for correct placement (ON towards nose)]

David Eichhorn

- 4.1 [4] Examine this grid of white lines formed by the black squares. When you are not looking directly at an intersection it seems to be filled with a grey circle or blob, but when you look directly at an intersection it is pure white.



Explain why these grey blobs appear at the intersections:

[2 pt] lateral inhibition decreases output of ganglion cell – intersections have more “bright area” than “dark areas” (this is why blobs don’t appear along sides of squares.

Why do they appear only at the intersections you are not directly looking at?

[2pt] receptive fields are smaller near fovea and thus suppression (due to lateral inhibition) is uniform.

At intersections away from fovea, larger receptive fields report “edges”

- 4.2 [1] A specialized “arithmetic circuit” _____ exist in the brain, because _____.

- a **does: there is evidence from stroke patients**
- b doesn't: there is no way a visual map would be needed
- c does: each mental ability necessarily has a separate circuit
- d doesn't: neurons can't represent abstract concepts

Alicia Spidel

- 5.1 [4] Define each of these ways of making a spot of light appear to move. Give an example of each. Your example could include the materials or situation required.

autokinetic effect

Dim light in a dark room appears to move due to eye muscle twitching and expectation by the brain that eyes are still.

apparent motion

Quickly changing pair of images (or lights) appears as a single item that is moving spatially.

induced motion

Large framing or background object moves, brain assumes that smaller spot of light moved instead.

waterfall effect

Spot of light on constantly moving background appears to move in opposite direction.

Spot of light on constantly moving background provides fixation, when background suddenly stops moving, background appears to move in opposite direction

- 5.2 [3] Describe the difference between motion parallax and kinetic depth.

Motion parallax is determining depth due to movement of the observer

Kinetic depth is determining shape of an object due to movement/rotation of the object.

Which is the basis for determining depth from binocular stereopsis?

Motion parallax

Jason Harrison

6.1 [10] The following set of sentences incorrectly describe human colour vision.

- a Human colour vision allows us to perceive the different wavelengths of light reflected from objects in our world.
- b Each colour that we perceive corresponds to a spectral hue.
- c Psychologically, human colour perception can be described by three dimensions: wavelength, amplitude, and intensity.
- d The three colour cones in the eye transmit their perceptions along the red, green and blue colour channels of the optic nerve.
- e The colour of an object is determined by the strongest wavelength it absorbs.

Write corrected versions of the sentences:

a:

Human colour vision allows use to perceive the combinations of wavelengths

(we do not the individual wavelengths of the combinations)

b

Each colour that we perceive is either a spectral hue or a combination of spectral

hues. (Purple and brown are not spectral hues)

c

...three dimensions: hue, value, (lightness, brightness, intensity), and saturation.

d

...along the red-green, blue-yellow, and achromatic (black-white, lightness)

opponent channels.

e

...is determined by the combination of wavelengths it reflects (absorbs).

Sam Richer

- 7.1 [1] Someone who is a dichromat cannot distinguish between some different
a **hues when luminance has been equated**
b luminance values when hues have been equated
c levels of saturation in the same hue
d objects, if they are too similar in hue but are different in luminance
- 7.2 [1] A brain lesion can cause color blindness without any effect on the operation of the cones or primary visual cortex. This means that human color vision
a can be accomplished without extra-striate cortical processing
b **requires extra-striate cortical processing**
c depends critically on the cones
d is different from form and motion perception

- 7.3 [4] Define sensation and perception

Sensation is the transduction of physical energy/interactions into nerve impulses. Perception is the formation of percepts/hypotheses from sensations and top-down knowledge.

- 7.4 [1] The idea that perceived reality is a “construction of the brain” implies
a that no two people ever perceive the same reality
b **that objective reality can never be experienced directly**
c that perception is always false
d that perceptions and hallucinations cannot be distinguished

- 7.5 [2] Which of these depth cues used in painting is the strongest depth cue? Why? occlusion/interposition, shading, shadows, perspective, texture gradient, height in plane, aerial perspective, familiar size. (don't forget to tell us why)

Occlusion: the other cues cannot interfere with occlusion – objects that occlude are in front of objects that they occlude.

Christine Tipper

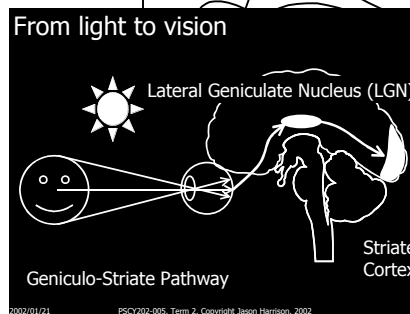
8.1 [1] The human brain contains many maps of the visual field. Which principle is followed in the maps representing form (shape) and color?

- a **the more important a function, the more neurons are devoted to it**
- b each portion of the visual field is represented equally among the neurons
- c more neurons are devoted to peripheral vision than central vision
- d form is a speciality of central vision, color is a speciality of peripheral vision

8.2 [3] Imagine that you look straight up at the center of the blackboard in front of you, and just off to the *left* of where you are looking, a *red* light is flashing. Describe in detail the pathway that neural signals about this light take, from the retina to primary visual cortex. (Space has been left below for a diagram if you wish to draw one)

Retina [photoreceptors, rods/cones] to optic chiasm [along optic nerve] to

LGN (right side of brain) to primary visual cortex [striate cortex, V1]



8.3 [3] Bob the hiker was happily hiking along the Baden-Powell trail. Suddenly he became aware of something moving at his feet. With a swift motion he stabbed at it with his hiking pole. As it slithered away he recognized it as a poisonous snake!

Describe the order of activation of the visual pathways activated in Bob's brain.

Tecto-fugal/old/Superior colliculus/watch-out/etc

How/where pathway/parietal lobe

What pathway/object recognition/temporal lobe

Jodi Pawluski

- 9.1 [1] A fake smile looks different from a real smile because
- a **the smiling motor neurons have been activated by different centers in each case**
 - b the fake smile doesn't have real meaning
 - c the fake smile is generated by the basal ganglia
 - d the real smile is intended to look different by the wearer

- 9.2 [5] Define and give an example of conceptual [modal] completion and perceptual [blindspot] completion

[2] Conceptual: conceptual (not visual) filling-in of object behind occluder

e.g.: rabbit behind fence

[2] Perceptual: pattern filling in where no rod/cones exist (or after injury)

e.g.: blind spot filling in, texture fill in, chopping off head.

Charles Bonnet syndrome is an example of which type of completion? Why?

[1] Conceptual completion – you actually need knowledge of the objects

to fill them in. (e.g., monkeys, shoes, cartoon characters, cows)

- 9.3 [2] Charlie the whiz-bang computer graphics programmer suggests visualizing MRI data using spectral hues such that MRI values are displayed using the following mapping:

MRI value	70	60	50	40	30	20	10
Spectral Hue	Red	Orange	Yellow	Green	Blue	Indigo	Violet

To avoid distortions of the data due to psychophysics, what additional information needs to be specified?

Isoluminant hues need to be used

Linear value range needs to reflect hue discrimination (Gregory fig 7.4)

Blues are bad for detail

- 9.4 [1] Extra credit question: Which floor is Dr Harrison's *Psychology* office on?
- first second **third** fourth