
1.) What is the intended clinical/real-world application of the research demonstration described? Who might benefit?

2.) The brain-machine interface (BMI) takes input from (a.) and outputs signals that (b.).

3.) What parts of the brain interact to control plan and generate motor behavior?

4.) What insight did these researchers have that Georgopoulos missed about the nature of the underlying neural code for movement.

5.) Describe what the researchers found out about the relationship between robot arm accuracy and the number of neurons they sampled.

6.) What does the answer to 5 tell you about the nature of the neural code for movement.

7.) What happens to the accuracy of the robotic movements with “motor learning”?

8.) How do the researchers cope with the consequences of motor learning on their predictions?

9.) What technique do the researchers plan to use to see if it is possible to “meld the robotic arm” into the neural representation of the animal’s own body?
1.)___________-receptors translate the main attributes of tactile stimuli into a language that the brain can understand; electricity.

2.) Describe briefly the main proposal of the labeled-line model of sensory communication.

3.) What technique did Woolsey and Van der Loos use in the 1970’s to reveal the barrel fields in the primary somatosensory cortex (SI) of the mouse brain? (2 sentences max).

4.) In the context of barrel fields, sensory neurophysiologists use the term receptive field to refer to the....

5.) What is the main prediction of the labeled line theory for the activation of a single neuron in a trigeminal barrel field?

6.) What neuroscience technique did Armstrong-James use to find results that counter the main prediction of the labeled line theory?

7.) The results of Armstrong-James indicated (large/small) receptive fields for the VPM neurons in the thalamus. From this finding, the researchers argue in favor of a ____________ representation of the whiskers.

8.) Of particular interest is the dynamic _______________ aspect of the neural responses, which allows the cells to quickly reorganize their reactions immediately after any change in the flow of tactile information from the periphery.
9.) In the 1990’s, Ghazanfer used Artificial Neural Networks (ANNs) to predict the location of a whisker using ________________ as input.

10.) In a series of follow-up studies the authors and their colleagues found that sensory neurons are able to encode much more about the tactile stimulation when a rat ..... 

11.) How have the evolving methods of listening to neurons enriched our understanding of how the brain works?

1.) Delgado was first interested in the use of brain stimulation as a way to avoid doing what kind of psychosurgery?

2.) The first implants of electrodes into humans was done with patients suffering from what two types of brain disorders?

3.) Delgado found that in some patients, stimulation of the _______ induced euphoria strong enough to counteract depression and physical pain.

4.) Delgado limited his research with humans after realizing that the therapeutic benefits of brain stimulation were _________

5.) Implanted brain stimulators have had some real success in treating some conditions. By far the most successful neural prosthesis is a ________________, with some 70K people having been equipped with these devices to treat hearing impairments.

6.) Name two additional disorders that are being treated by implanted brain stimulators in some cases.
1.) What is white matter in the brain?

2.) _______________ is a fatty substance that coats axons.

3.) Nodes of Ranvier are _________ that occur about every millimeter in the material that coats axons (answer to 2).

4.) _______________ is a protein that helps Schwann cells to determine how thickly wrapped individual axons should be.

5.) The wrapping of axons is complete at birth (T/F).

6.) Which lobe of the brain is the last to have its axons wrapped in myelin?

7.) What new type of imaging technology has been helpful in “seeing” the density of white matter in the brain?

8.) What effect does learning a complex skill like playing piano have on white matter density in the relevant brain areas?

9.) In what sense do these authors argue that faster conduction of a neural impulse is not always better?

10.) Name 3 reasons that white matter anomalies have been implicated in schizophrenia.

11.) How is myelination related to the concept of a critical period for learning?
1.) Since the 1970’s, the primary function of the cerebellum has been thought to be:

2.) The surface area of the cerebellum is (larger/smaller) than the cerebral cortex.

3.) The cerebellum contains (more/less) neurons than the cerebral cortex.

4.) The pattern of wiring of the neurons in the cerebellum is (similar to/different from) the pattern of wiring in lesser-evolved animals.

5.) One of the first suggestions about the function of the cerebellum in humans came during the early 20th century. What was the nature of the evidence?

6.) The authors use the tactile senses to investigate the role of the cerebellum in detail. They find a topographic map of tactile stimulation in the cerebellum (T/F).

7.) According to these authors, what do the forepaws of a cat, the mouth of a rat and the fingers of a monkey have in common?

8.) So, the organization of the cerebellum’s representation of the body is by its ________________.

9.) Ultimately, one hypothesis that these authors espouse is that an important function of the cerebellum is to coordinate the _________ of sensory information.

10.) What is the generalized “timing hypothesis” of cerebellum function?

11.) Why is it difficult to answer the following question, “How important is the cerebellum?”

1.) Turing’s B-unorganized machine consists of two things:

2.) Connection modifiers can be in two modes:

3.) Every neuron in the network executes this logical operation:

4.) Give the output of the logical operation filled in for 3.) for the following inputs:

   1 1 -> 0
   0 1 -> 1
   1 0 -> 1
   0 0 -> 1

5.) Why did Turing choose this logical operation?

6.) Turing’s machine employs _____ of connections in training

   a.) destruction
   b.) creation
   c.) alteration of strength
   d.) specify a combination of the above: _______

7.) Give 1 examples of a task that has been called “uncomputable”

8.) Turing proposed the O-Machine to compute ________

9.) Turing and Church’s claims for the universal Turing machine have been commonly misstated. State them correctly.
1.) According to this author, what was the most exciting feature of the Netflix competition to recommend movies? What does this tell you about the biggest challenge to machine learning approaches that learn by “experience”? 

2.) Finding attributes that are good predictors of behavior is the goal of the training phase. What is somewhat odd or disturbing about the attributes?

3.) What is reinforcement learning? Give an example of its use.

4.) What is non-supervised learning? Give an example of its use.

5.) What is over-fitting and how do researchers guard against it?
1.) The (right/left) hemisphere of the brain is typically dominant for visual-motor tasks.

2.) The (right/left) hemisphere searches more intelligently.

3.) What structure in the brain allows monkeys to transit visual information across the hemispheres but does not function similarly in humans?

4.) LeDoux and Gazzaniga showed that a split brain could respond to visual information presented to the right hemisphere by asking the subject to respond by ...... (a word or two will suffice)

5.) ________________ is a general term for the several “bridges of neurons that connect the hemispheres” (i.e. the corpus colossum is an example of this term).

6.) The (left/right) hemisphere is more likely to be involved in false memory.

7.) The creative, narrative talent of the above hemisphere (# 6), which tends to put facts and experiences into a schemata or into the larger context has been referred to as the:

8.) Holtzman (1982) discovered that when one half of a split brain worked harder on a task, it (affected/did not affect) the ability of the other-half of the brain to perform a task simultaneously.

9.) Gazzaniga suggests that lateralization of brain functions occurred because one of the two hemispheres added on new abilities (true/false).

10.) (Humans/Rats) learn to maximize the odds of being correct when faced with the task of predicting an event that is actually generated randomly.
1.) What anecdotal comment does the author make about the subtle “symptoms” or characteristics of people without a corpus collosum?

2.) When examining MRIs from University of San Francisco Hospital, at what rate, did Sherr find people without a corpus collosum?

3.) What compensatory neural change is suggested in people born without a corpus collosum? (presumably to facilitate communication between the left and right halves of the brain).
1.) Describe TN’s visual abilities and disabilities?

2.) According to this article, damage to which brain region is responsible for the impairment of conscious vision?

3.) Research in which De Gelder and colleagues tested GY, who had lost primary visual cortex in the left hemisphere, revealed what surprising ability with faces?

4.) When faces were presented GYs left primary visual cortex, what was he unable to perceive?

5.) Define emotional contagion and the procedure used to test it.

6.) What is transcranial magnetic stimulation? What does it accomplish?

7.) Brain regions in the (subcortex/cortex) are implicated in emotional blindsight.

8.) In people who are cortically blind, what brain region is thought to underlie the subconscious perception of visual stimuli?

9.) This brain region acts as an interface between ________________ and ________________.

10.) What does this article tell us about the nature of cortical and subcortical processes in general? Can dissociations of this sort help us to understand how we normally see the world?

1.) The major characteristic of mirror neurons is that they discharge both when a monkey performs an action and when the monkey.....

2.) Because these neurons are found in important areas of the brain including pre-motor cortex and parietal cortex, the authors could not adopt one common strategy for establishing the function of the neurons. What strategy was this?

3.) Instead, they approached the problem in a series of two experiments that were aimed at determining if mirror neurons would respond based on __________ alone.

4.) To determine if something like mirror neurons might exist in the human brain, the researchers turned to techniques that allowed them to observe neuronal activity in the human brain, including EEGs and __________. One region of the human brain that responded in their experiments was the __________________, which is known to respond to moving body parts.

5.) Which brain structure was active in observers when they saw someone experience disgust as a result of inhaling a foul odor? Were the emotional responses in the observer and the participant similar?

6.) Briefly describe the “pain context” experiment done by Singer and colleagues at the University of London. What was the conclusion?

7.) Which area of the brain became active as the participant observed and imitated the expert guitarist?
1.) What are the chief diagnostic signs of autism?

2.) Name one of the less well-known symptoms of autism.

3.) Anatomists have shown characteristic anomalies in the ____________, a brain structure.

4.) What major deficit is posited as the basis of autism in the “theory of other minds” account of the disorder?

5.) A more concrete embodiment of the theory of other minds is that autism is characterized by a breakdown of the ____________ system.

6.) To test this, Ramachandran made use of the well-established finding that _____ waves in EEG are blocked when a person makes a voluntary motor muscle movement.

7.) State the primary finding for autistic children when the children produced a voluntary muscle movement and when they observed another person performing the voluntary muscle movement.

8.) According to Ramachandran, autistics often have difficulty grasping ____________ such as the kiki/bouba demonstration.

9.) Non-autistic people with damage to the ____________, a brain region at the cross-roads of hearing, vision, and touch centers, have difficulty grasping the kiki/bouba test.

10.) Name one technique Ramachandran suggests might provide helpful therapy for autistics.
1. Where is Broca’s area located? According to these authors, why is that a sensible place for it?

2. Where is Wernicke’s area located? According to these authors, why is that a sensible place for it?

3. Why, do these authors hypothesize that sign language might be lateralized in the right hemisphere.

4. Do deaf signers with brain damage show dissociable deficits of language production (like Broca’s aphasia) and language understanding (like Wernicke’s aphasia)? (Yes/No)

5. Damage to the (right/left) hemisphere in signers underlies most acquired impairments in sign language use.

6. What aspect of language is most sharply restricted to the left hemisphere?

7. An alternative way of looking at language lateralization in deaf and hearing people is that language at the “local” level (word deciphering, etc.) is lateralized to the (left/right) whereas the more global aspects of putting together discourse is lateralized the (left/right).

8. What do these authors conclude about the relationship between the sign language abilities of life-long signers and their non-linguistic spatial skills?
1.) People use more words to describe false memories over true memories (T/F)

2.) Memories are more easily modified soon after they are experienced (T/F)

3.) Subjects asked to imagine an event or episode that did not occur are more likely to form a false memory of the event. This phenomenon is referred to as ____________________.

4.) The above phenomenon may be caused by ____________________, which occurs when the source of a memory and its contents are confused.

5.) The reason adults cannot remember episodes from the first year of their life is that the ____________, a part of the brain involved in memory is not sufficiently mature.

6.) Creation of false memories occurs most easily when these 3 external factors are present (3 pts)
   a.)
   b.)
   c.)
1.) Perhaps the most intriguing brain anomaly suffered by Kim, the savant described in the article, is that he was born without a ____________, a brain structure which neurologists joke has only two main functions, propagating seizures and holding the brain together.

2.) Kim’s brain also shows anomalies in the (right/left) hemisphere.

3.) ____________ is a term that refers to a savant’s ability to memorize large quantities of text without understanding.
1.) Why do cognitive scientists choose the domain of chess to study expertise?

2.) A main thesis of the argument made by the Ross is that experts have:
   a. stronger powers or analysis
   b. a better store of structured knowledge
   c. both a and b

3.) Grand masters (do/do not) do better than other in general tests of memory.

4.) The fact that it is possible to distract experts while they play chess is evidence that __________ cannot completely explain their impressive performance at chess.

5.) Brain imaging studies show that expert players show greater activation of ____________ memory than novices.

6.) There is general agreement that __________ is needed for prodigies to build the expert knowledge structures needed for mastery of their domains.
The article is organized around 6 basic tendencies of human behavior that come into play in generating a positive response to a request. Fill in the appropriate tendency in the first eight questions.

1.) Asking for something really big or burdensome first, and then asking for something smaller, after the person declines, generally proves more successful for eliciting compliance. This is the principle of:

2.) Tupperware’s use of home parties to sell Tupperware is an example of:

3.) Informing people high school students about the high rates of suicide is a misapplication of the principle of:

4.) Showing potential donors a list of neighbors who have contributed previously to a charity is an example of:

5.) Using the actor Robert Young, who played a much respected doctor on a long-running TV series, to promote the health benefits of decaffeinated coffee is an example of:

6.) Limited time only offers are an example of:

7.) The sending out of personalized address labels with a request for a donation is an example of:

8.) Rephrasing “Please call if you change your plans” to “Will you please call if you change your plans” is an example of:

9.) According to the author, the best way to protect yourself from being manipulated by these techniques is to ....

10.) Cultural differences played a role in a recent study of Citibank employees in the US, Germany, China, and Spain. Match the tendencies that dominated when granting a request to the nationalities (liking-friendship/reciprocity/authority/consistency).
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1.) Describe the Prisoner’s Dilemma. (Draw the chart if it is easier).

2.) Which is the rational choice for an individual, to defect or to cooperate?

3.) Which is the best “group choice”?

4.) Describe what happened in the computer simulation of larger populations of defectors and cooperators?

5.) What are the five mechanisms for the evolution of cooperation? Give a one or two word description of each
   a. –
   b. –
   c. –
   d. –
   e. –

6.) The authors argue that __________ strongly fuels the power of indirect reciprocity and thus is part of why humans are the most cooperative species.

1.) In Freud’s view, mental illness results when _________fails.

2.) Cognitive neuroscientists delineate different memory systems that process _________ and _________ memories as stand-ins for the Freudian terms conscious and unconscious processes.

3.) LeDoux’s found a pathway connecting perceptual information with primitive brain structures important for generating fear responses. This pathway bypasses the _________, which generates conscious memories.

4.) The above path may explain:

5.) According to this author, what is the cause of infantile amnesia.

6.) According to this author, why does infantile amnesia not mean that early experiences do not affect us in ways that fundamentally shape our future personality and mental health.

7.) What mechanism from studies of split brain patients, does Solms consider as an explanation for the “repression”/rationalization offered by anosognosic patients in response to the consequences of their unacknowledged impairments?

8.) Damage to the frontal limbic regions of the brain causes confabulations. It follows that frontal limbic regions may be involved in what cognitive function?

9.) What four “drive systems” have neuroscientists proposed based on lesion studies, the effects of drugs and artificial stimulation of the brain?

10.) The relationship between neurochemistry and the “reward” system has been demonstrated most convincingly in studying:
1.) Describe the Turing test. What was it developed to assess?

2.) Koch and Tononi would like to be able to assess if a brain-injured person, a mouse or a simulacrum can experience ______________.

3.) What are the two axioms of the integrated information theory the authors propose?

4.) How do the authors define a system’s capacity for integrated information (i.e., consciousness)?

5.) According to these authors, what is the practical test of consciousness?

6.) In the end, the authors seem to suggest that conscious machines are possible? How do they envisage these machines? Do you agree?