# UNIT 5: PHYSIOLOGY

***QUESTION #5.1: What does the structure of the brain have to do with marketing?***

*SHORT ANSWER: the human brain is the organ by which the consumer will perceive a product and decide to purchase it*

Different parts of the brain control different functions. The inner most parts of the brain (the **limbic system**) includes the thalamus, hypothalamus, and amygdala, and process emotion. The cerebellum is concerned with balance and coordinating movement. The cerebrum is the proportionately largest part of the human brain and is divided into four lobes. The **frontal** lobe processes and controls emotion; the temporal lobe involves hearing; the occipital lobe involves vision, and the rest of the senses are handled in the parietal lobe. The outermost layer, the cerebral cortex, processes new information.

Until recently, it was impossible to literally get inside of a customer's head and observe how he or she was thinking about a product. Now, with the development of sophisticated brain scanning techniques (e.g., **MRI**) it is possible to see which centers of the brain are activated. Marketing researchers can present different advertisements (the independent variable) and then record the changes on the MRI (the dependent variable).

***QUESTION #5.2: How does sensation take place?***

*SHORT ANSWER: the sense organs (e.g., eye, ear, nose, tongue, skin) transform physical energy into neural impulses and send them to the brain, where they are interpreted.*

Each physical sense is a transducer capable of transforming one form of physical energy into a neural impulse. If a particular sense is important in the advertisement, or the customer's satisfaction with a given product or service, then those who are going to develop that product, service, or advertisement must carefully study the dimensions of that sense.

Proprioceptive senses deal with motion detection. Kinesthetic senses are located in the muscles and limbs and tell us the load on a muscle or position of a limb. Vestibular senses tell help us maintain our balance while walking or detect acceleration or deceleration. While some consumers (e.g., adolescents on a roller coaster) might want great proprioceptive stimulation, most passengers in a car or on a cruise ship do not.

Many senses are cutaneous (located on the skin). These include pain, pressure (touch), hot, and cold. The number of sensors (and therefore the sensitivity) differs greatly by location on the skin. The fingertips are more sensitive than the heels. What is most easily detected is not the current level of sensation, but a large and rapid change.

The chemoceptive senses are **gustation** (taste) and **olfaction** (smell). The tongue only has specific sensors for sweet, salty, sour, bitter, and fat. However, the flavor experience is also

influenced by the smell of the food and the fact that the tongue is covered in skin, and therefore reports cutaneous senses such as texture, temperature and even pain. Chefs and food servers must understand the relative importance of each of these in the dining experience. Chile, for example, adds to the perception of food, not by its interaction with the tongue's heat receptors, but with its pain receptors. To say that a chile is "hot" is only a metaphor.

**Audition** (hearing) is the sense that processes sound waves. Audition has three dimensions: pitch, volume and timbre. The pitch is the tone, determined by cycles per second. The human range of hearing is up to about twenty thousand cycles per second (much lower than that of a cat, dog or bat). This range varies person to person, generally decreasing with age. One convenience store in the U.K. found that it could easily decrease the amount of time that adolescent shoppers were spending inside by having uncomfortable high pitched sounds which the adolescents would hear, but older shoppers (who spent more) would not hear.

**Vision** (sight) is the sense that processes light waves. Vision has three dimensions: brightness, hue (colors), and saturation. People from different cultures might prefer different color schemes. People in different physical environments might find different levels of brightness preferable.

***QUESTION #5.3: What is perception?***

*SHORT ANSWER: perception is how the brain assembles and interprets the sensory inputs to form recognizable figures*

The scientific study of sensation is known as **psychophysics**, and it is one of the oldest branches of scientific psychology. Once the sensory inputs travel down the neurons from a sense organ to the specific lobe of the brain processing that is dedicated to that sense, the brain begins the process of recognizing a familiar or important pattern. The capacity of the brain to process all these stimuli is limited. This is especially true of **clutter**: the excessive amount of advertising to which all of us are exposed on a daily basis.

The brain ignores certain stimuli, allowing them to comprise a background, and focuses on what fits the pattern, a figure. Various cues help the brain in figure/ground perception. Advertisers must be aware of these cues to help focus attention on their message and stand out from the clutter. When the consumer ignores an advertisement, that is a **zap**.

An **illusion** is where there is a misperception of a stimulus. It might be as simple as misjudging the size or location of an object, or completely misidentifying a sound. Some illusions are due to a physical alteration of a stimulus (e.g., heat bends light waves producing a desert mirage) but most illusions are due to old perceptual habits.

A controversial topic within perception is to the extent that it may be taking place below the level of conscious awareness. So-called **subliminal** perception assumes that weak or vague stimuli are processed and (perhaps unconsciously) prime the subject to be more receptive to future messages or actions. Many urban legends exist about the power of subliminal perception, but there is not much in the way of hard evidence about practical applications for advertising.

***QUESTION #5.4: What is learning?***

*SHORT ANSWER: learning is the ability to modify behavior because of interactions with the environment*

Much of the behavior of lower animal species is governed by **instinct**. This refers to a specific behavior that is complex, rigidly patterned, species-wide and unlearned. Instincts are pre-programmed in the genetics of that species. A good example of an instinct would be nest building behavior in swallows. Most psychologists doubt that humans have very many instincts, since most human behavior flexible, rather than rigidly patterned, and variable according to the individual, rather than species wide, few complex human behaviors meet all the criteria of being an instinct. Certainly, humans do have inherited reflexes (e.g., knee jerk, sneezing) but these rigidly patterned behaviors lack the complexity of a true instinct.

So, we should be cautious using the term "instinct" to describe any human behavior. Since instincts are *behaviors*, we should definitely not call intuitions and emotions instincts.

The large cerebral cortex possessed by humans means that they have a great capacity for learning. The simplest form of learning is **classical** conditioning. This associative learning takes place when a neutral stimulus is paired with another stimulus capable of eliciting a specific response. Over a hundred years ago, the Russian physiologist **Pavlov** demonstrated that a dog could be conditioned to salivate at the sound of a bell. Pavlov would ring the bell, food would be presented to the dog, and the dog salivated. After awhile, the dog salivated as soon as the bell rang, even before the food arrived. The bell itself was now a conditioned stimulus, capable of eliciting the response of salivation.

Another of the pioneers in classical conditioning, John **Watson**, ended up as vice president of the J. Walter Thompson advertising agency, where he applied classical conditioning to advertising. An advertisement would associate the image of his products (the neutral stimulus) with attractive spokespersons (stimuli which elicited the attention of consumers) so that conditioning took place, and then the very sight of the product would elicit such attention.

http://www.youtube.com/watch?v=Autbf9zLCg8

Another approach to conditioning was developed by B.F. **Skinner** who discovered that organisms (whether they be rats, pigeons, or humans) tend to repeat behaviors for which they are positively reinforced. Products and services that provide immediate reinforcement can have an addictive quality. Skinner even showed that the reinforcement did not even have to be provided consistently, or even in a predictable pattern, it just had to be immediate and powerful.

http://www.youtube.com/watch?v=rcmgCglsaZ4

Of course, human and animal behavior can also be altered by punishment, which can suppress behaviors (but does not always weaken the underlying habit). What is more relevant to

marketing is the opposite of punishment: negative reinforcement. While punishment is the provision of an aversive stimulus (something the organism does not want to happen) **negative reinforcement** is its removal.

http://www.youtube.com/watch?v=q3_Nk09mNCE

This is the principal marketing strategy of many problems. The consumer is reminded about a problem (whether it be the pain of a headache, the embarrassment of bad breath, or the financial loss of termites) and then the product is presented as a solution that removes the problem. That is the essence of negative reinforcement.

Another kind of learning prevalent in humans is observational, also known as modeling or vicarious learning. Here the subject observes another person demonstrating a behavior. This modeling can be a very powerful stimulus if the subject respects the person (and wishes to emulate) and/or if the subject observes the other person being reinforced (positively or negatively). This is why so many advertisements use attractive or well known actors or spokespersons. Their role is not just to get the subject's attention (and bring about learning via classical conditioning) but also to serve as models for using the product.

Humans are also capable of purely **cognitive** (conceptual) learning. The human capacity for reasoning can be shown a problem and how a particular solution might work. If the subject can be convinced that the product being advertised is a reasonable solution, that might be sufficiently convincing. The cognitive component of advertising would work best with consumers in the form of organizations (e.g., businesses purchasing a new computer network) or adults dealing with complicated problems. However, most advertisements do not rely solely upon cognitive appeals.

***QUESTION #5.5: What is memory?***

*SHORT ANSWER: Memory is the retention of previous perception and learning*

Human memory is not like a steel trap, but more like a leaky bucket or net. There are many reasons why things are not remembered, such as inattention to the stimulus when it is presented or distraction caused by other stimuli. The consolidation of sensations into long term memory requires several phases of processing and requires the part of the brain known as the **hippocampus**.

Memory aids are known as **mnemonics**. Advertisers have found that visual cues (e.g., brand logos) are known as **eidetic** images and these are very helpful for visual memory, as are jingles for auditory memory.

Some things are forgotten because they never get **encoded** into long term memory. Other things make it into long term memory, but suffer from a **retrieval failure** (such as the "tip of the tongue" phenomena).

When advertisements are presented sequentially, some of them are more likely to be remembered. The first advertisement in the series has an advantage known as **primacy** and the last has an advantage known as **recency.** However, the ones in the middle are most likely to be forgotten.

Another difficulty with memory is **prospective** forgetting. This is where I forget that I am supposed to do something. This affects marketing because many times a consumer is impressed by an advertisement, decides to purchase the product, but forgets to write it on the grocery list.

## UNIT 5: PHYSIOLOGY

*Flash cards & matching game*

http://www.quia.com/jg/2533153.html

*Jumbled words*

http://www.quia.com/jg/2533153.html

*Millionaire game*

http://www.quia.com/rr/944799.html

*Summary Paragraph*

http://www.quia.com/cz/467595.html

### UNIT 5 TERMS: physiology, learning & memory

**AUDITION**: the sense of hearing

**BEHAVIORISM**: Watson/Skinner position: the environment (e.g., conditioning) determines most behavior

**CLASSICAL CONDITIONING**: uses paired stimuli with a passive organism; developed by Watson and Pavlov

**CLUTTER**: excessive exposure to many advertisements so that each individual advertisement has less likelihood of getting the consumer's attention

**COGNITION, COGNITIVE**: refers to thinking, beliefs, problem solving, concept formation

**CONDITIONED STIMULUS**: in classical conditioning, a formerly neutral stimulus that now elicits the response

**CONES**: eyes' daytime color receptors

**C.S.:** conditioned stimulus; in classical conditioning, a formerly neutral stimulus which now elicits the response

**DECIBELS**: a measure of sound loudness; prolonged exposure to above 90 db can lead to hearing loss

**DECLARATIVE MEMORY**: memory that is semantic (about facts and concepts) or episodic (about events)

**DEPTH CUES**: linear perspective, shading, stereoscopic vision, relative size, height on horizon

**EIDETIC IMAGE**: visual memory cue

**ELICIT**: to bring forth; a stimulus elicits a response from a passive organism

**EMIT**: to let out, to respond; an active organism emits a response

**ENCODING**: transferring memory from the earliest stages to long term

**EPISODIC**: memory for specific events, such as "flashbulb" memories

**EXPOSURE:** one presentation of a specific advertisement; effective advertisements usually require multiple exposures due to clutter and insufficient attention

**FIGURE GROUND CUES**: cues such as similarity, contrast and nearness that allow us to focus on one part of the perceptual field and push the rest to an irrelevant background

**FRONTAL LOBE:** the part of the cerebrum that processes emotions

**GENERALIZATION**: when a similar stimulus elicits a similar response

**GUSTATION**: sense of taste

**HALLUCINATION**: perceiving non-existent things; seeing/hearing something not there; hallucinations are found in dreams and mental disorders such as delirium and schizophrenia

**HIPPOCAMPUS**: part of brain that processes short term memory into long term

**HUE**: the perception of color; determined by the wavelength of light waves; perceived by the cones in the retina

**ILLUSION**: a misidentification or mismeasurement of a physical stimulus; a misleading perception

**INSTINCT**: complex, rigidly-patterned, inherited behaviors (e.g., nest building in birds)

**INSTRUMENTAL**: operant conditioning, uses reinforcement

**LEARNING**: a change in behavior due to interaction with the environment

**LIMBIC SYSTEM**: a part of the brain governing involuntary muscles, drives, emotions

**LONG TERM MEMORY**: the last, and semi-permanent stage of memory

**LOUDNESS**: dimension of hearing determined by amplitude of sound wave, measured in decibels

**MAGNETIC RESONANCE IMAGING**: MRI, a technique for studying the activity of the brain, capable of indicating when the subject is paying attention and whether the emotions triggered are favorable or not

**MEMORY**: the amount of previously learned material that is retained

**MNEMONICS**: techniques for improving memory (e.g., overlearning, sleep, images, concepts)

**MODELING**: learning by observation and imitation of another subject

**MRI**: Magnetic Resonance Imaging, a technique for studying the activity of the brain, capable of indicating when the subject is paying attention and whether the emotions triggered are favorable or not

**NEGATIVE REINFORCEMENT**: reinforcement by removing an aversive stimulus; the opposite of punishment

**NON-REINFORCEMENT**: not giving further reinforcement; serves to extinguish operant conditioning

**OLFACTION**: sense of smell

**OPERANT CONDITIONING**: instrumental; uses reinforcement to get an active organism to emit a response (developed by Skinner)

**PAVLOV**: conditioned dogs (organisms) to salivate to a bell (conditioned stimulus) by pairing it with food (unconditioned stimulus); major pioneer in Classical Conditioning

**PERCEPTION**: interpreting information from the senses, forming a mental picture of the environment

**PITCH**: one of the dimensions of hearing, the tone of a sound; determined by frequency of the sound wave

**POSITIVE REINFORCEMENT**: reinforcement that rewards; used in operant conditioning to make the response more likely

**PRIMACY**: when it comes to remembering things in a series, primacy is the advantage enjoyed by that which comes first (and has no proactive interference)

**PRIMARY MOTIVES**: physiological motives such as hunger, thirst, oxygen, sleep, temperature, elimination

**PROSPECTIVE MEMORY**: remembering our intention to do something in the future

**PSYCHOPHYSICS**: the scientific study of sensation and perception; the oldest branch of experimental psychology (e.g., Weber, Fechner)

**PUNISHMENT**: providing an aversive stimulus; can suppress a habit, but does not extinguish it

**RECALL**: test of retention (memory) that uses no cues; generally gets low scores

**RECENCY**: when it comes to remembering things in a series, this is the advantage enjoyed by the item coming last (and having no retroactive interference)

**RECOGNITION**: test of retention (memory) that presents the original stimulus for subject to identify; high scores

**REFLEX**: a complete stimulus-response relationship; reflexes may be inherited or learned (through conditioning)

**REINFORCEMENT**: in operant conditioning, a stimulus provided to the organism after a response; a reinforced response is more likely to be repeated

**RETENTION**: the amount remembered

**RETRIEVAL FAILURE**: inability to access a stored memory

**RETROACTIVE INTERFERENCE**: when it comes to remembering things in a series, retroactive interference is where more recently learned material crowds out previously learned material

**RODS**: eyes' night brightness receptors

**ROTE**: an inefficient technique of memorization via mere repetition without understanding

**SKINNER**: behaviorist; developed operant conditioning; worked mostly with rats, pigeons; argued for environmental determinism

**SUBLIMINAL**: when a stimulus is weak, or lacking in attention, but it nevertheless has a priming effect on the subject; research on subliminal perception is inconclusive

**THRESHOLD**: the minimum stimulus that can be perceived

**TIMBRE**: the dimension of hearing produced by a combination of different sound waves

**TONE**: one of the dimensions of hearing, the pitch of a sound; determined by frequency of the sound wave

**U.C.S.:** unconditioned stimulus; in classical conditioning, the stimulus which naturally elicits the response

**UNCONDITIONED STIMULUS**: in classical conditioning, the stimulus which naturally elicits the response

**VICARIOUS LEARNING**: modeling, when one person learns by observing the actions and reinforcements of another person

**WATSON**: behaviorist, developed classical conditioning; criticized introspection as unscientific

**WEBER'S LAW**: two perceived stimuli must differ by a certain proportion to be perceived as different

**WHITE NOISE**: sounds blended from many different pitches (e.g., a waterfall)

**ZAP**: the tendency of consumers to ignore advertisements, especially when consumers encounter clutter or do not perceive a need to maintain attention