

Psychology of Emotion: Theory and Applications
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Lecture 2: Historical Background and Theories

I welcome you all to the second lecture of the course, Psychology of Emotions: Theory and Applications. This is the second lecture of Module 1. Today, we will be discussing the historical background and some basic theories of emotions. We aim to understand the historical context through the concepts of basic theories of emotions. Before we delve into today's lecture, let me provide a brief recap of Lecture 1. In Lecture 1, we attempted to define emotions and observed that emotions have three major components: a physiological component, an experiential aspect, and a behavioral facet.

Then we discussed the differences among the three terms: affect, emotions, and mood, highlighting that affect is the broad umbrella term under which emotions and moods fall. Emotion refers to more specific, context-oriented feelings that arise in response to a person, situation, or object, and is generally a short-term experience. For example, you may become angry when someone insults you, and this feeling may last for a few minutes. Thus, emotion is a context-driven feeling that arises.

Moods, on the other hand, are generally context-free, more general, and represent a more diffuse state that typically lasts for a longer time—possibly for a few hours, during which you may be in a good or bad mood, or even for days. Then we discussed the classification of emotions through some theories of emotions, more specifically, the basic emotional model. This model attempts to classify emotions or identify the fundamental emotions that are universal across cultures and are considered innate, evolutionary, and biologically based. Among these, we discussed Ekman's model, which identifies seven basic emotions. We discussed in detail these emotions: anger, fear, sadness, joy, contempt, disgust, and surprise. Additionally, we reviewed the facial expressions associated with each of these emotions in the last class.

We also discussed Plutchik's Wheel of Emotions, which outlines eight basic emotions and their characteristics, and how these basic emotions can combine to form advanced emotions, and so on. Additionally, we explored Parrot's framework of primary and secondary emotions, which identifies six basic emotions: love, joy, surprise, anger, sadness, and fear. The premise of Parrot's theory is that each basic emotion can lead to other, more complex emotions. Thus, from primary emotions, secondary emotions are derived. Each basic emotion can lead to a secondary emotion, and each secondary emotion can further lead to tertiary emotions.

He elaborates on how one emotion can lead to the derivation of many emotions from a single emotion. Thus, he categorized emotions into primary, secondary, and tertiary emotions, which we covered in the last class. Additionally, we discussed the dimensional model of emotion towards the end due to certain inherent limitations of the basic emotions model. Different theories propose varying numbers of basic emotions, leading to some lack of consensus. Because of these limitations, some theories suggest that instead of identifying basic emotions, emotions should be classified based on dimensions.

One of the models we discussed is the circumplex model, which classifies emotions based on dimensions. One dimension is valence, indicating whether emotions are positive or negative, and the other is arousal, distinguishing between high arousal and low arousal emotions. In this model, we identified four quadrants or categories of emotion based on these dimensions. One quadrant represents positive valence and high arousal, which could include feelings of joy and excitement. Another quadrant includes emotions that are positive but characterized by low arousal.

It could include emotions like calmness and relaxation. There could also be emotions in the quadrant of negative high arousal, such as fear and anger, or emotions that are negative and low arousal, such as boredom. All these topics were discussed in the last class. Today, we will specifically delve into the historical background of how the concept of emotion evolved throughout history and discuss some important figures and theories that emerged over time. In today's lecture, we will specifically discuss Charles Darwin's concept of emotions, William James's theory, the Cannon-Bard theory, the Schachter-Singer theory, and appraisal theories, and conclude with the Zajonc-LeDoux theory.

Let us begin today's lecture. If we start with the historical background of how emotion research emerged, we find that emotion has always been a major theme in the writings of various disciplines, including literature, philosophy, and, of course, psychology. Emotion has been the center of a lot of writings across different disciplines. Theologians have also discussed emotions, primarily referring to them in terms of passions and affections of the soul, which was the definition given at the time.

Now, with the advent of psychology as a separate discipline, psychology also began discussing emotions in its initial days. The initial focus of emotion research was mostly on the nature of consciousness, physiological sensations, and brain functions. These were some of the major areas initially focused on in emotion research, including how emotions were experienced, the physical sensations associated with them, and some physiological aspects of the brain. Modern understanding of emotions owes a lot to earlier researchers, prominent among them being Charles Darwin, whose major ideas we will discuss.

William James, along with Wilhelm Wundt, was one of the initial pioneers in psychology. Sigmund Freud also discussed emotions in his theory of psychoanalysis. We will not be able to cover everyone's ideas, as it would make the lecture very lengthy, but we will discuss some of the major theories and figures in the history of emotion research. Let us focus on Charles Darwin, as we cannot fully understand the evolution of emotion research without acknowledging Darwin's contributions to the theory and understanding of emotions. As we know, Charles Darwin was the father of evolutionary biology and made significant contributions to evolutionary sciences.

However, a less-known aspect of Charles Darwin is his significant contributions to the field of psychology, particularly in the study of emotions. He wrote a very significant book titled "Expression of Emotions in Man and Animals" in 1872, which is one of the most influential works providing initial ideas on emotions. These ideas have been taken up by many modern researchers in emotions and continue to impact contemporary research. In his book, Darwin discusses many significant aspects of emotions. I will talk about some of the important aspects. For example, he proposed that emotional expression evolved either directly from adaptive behavior or through association with adaptive behavior.

Since his perspective was evolutionary, he posited that whatever has evolved, including emotions, should have some adaptive function or has evolved because of association with an adaptive function. For example, many emotions can serve an adaptive function. Let us take the case of anger as an emotion. Throughout evolution, the emotion of anger likely helped animals and humans to survive because becoming angry can scare away predators. Thus, it has an evolutionary function in terms of survival. This is why this emotion has evolved and been passed on from generation to generation.

Many emotions or expressions of emotion have survived, and we still experience them, partly because they evolved directly from adaptive behavior or through association with such behavior. He also stated that emotional expressions are external representations of an internal state. Thus, emotions, which we experience internally, can be stimulated by external stimuli and reflect an internal state. Something happens internally and is expressed through the face and body. These emotions play a very important role in communication because they convey our state of mind. Every emotion communicates something about our desires. If you are angry, it signals something to the other person; if you are happy, it communicates something about what you want or what should be done. Through emotions, we communicate our intentions, actions, and state of mind to others. Thus, it serves a vital role in communication.

Very interestingly, Charles Darwin was one of the first people to talk about basic primary emotions, which we discussed in detail in the first lecture. Many theories about basic emotions refer to Darwin's discussion of basic emotions in his book, which are universally represented in the body and physiology. Many of the modern theories on basic emotions are derived from, influenced by, or can be credited to Charles Darwin's ideas. In his book, Darwin also attempts to address significant questions that continue to guide emotional research. These questions remain relevant because, in any field, research is never complete; there is always more to discover. The field of emotion is also evolving, so many of the earlier questions that Darwin posed are still prevalent and continue to guide research.

One of the questions he addressed is how emotions are expressed in humans and animals, providing a detailed analysis of the expression of emotions, particularly through facial expressions and body postures. This detailed analysis and the methods he used to collect data are all documented in his book. The second question he sought to address concerns the origins of our emotions: where do they come from, and why do they arise? In this context, Darwin suggested that emotional expressions are mostly derived from habits. According to Darwin, these emotions are akin to habits or reflexes.

So, they formed in a particular way. Whenever we expressed an emotion and it served some advantageous purpose in terms of evolution, that emotion became associated with certain situations and turned into a habit. Whenever a similar situation arises, this emotion arises as well. Thus, it became like a reflex mechanism, occurring whether useful or not. Initially, it started with situations where it was useful, and when it became reflex-like, it probably generalized to many other situations. Therefore, they can be reactivated spontaneously in situations similar to those that initiated the original habit. Originally, when a certain situation led to certain emotions.

Therefore, these responses could be generalized to many other situations, and many of these situations can trigger emotions automatically. Whenever we find ourselves in a particular situation, a certain emotion reflexively starts. This automatic response is evident when, for

example, you enter a situation, someone insults you, and anger arises spontaneously. In this case, an insult serves as a stimulus, and reflex-like anger can arise automatically. Consistent with the theory of evolution, Darwin stated that animal emotions are evolutionary antecedents of human emotions. Darwin argued that emotions are not exclusive to human beings; many animals also express various kinds of emotions.

Animal emotions, being antecedents, evolved into the complex emotions experienced by human beings. Darwin discussed three principles of expression in his book. He proposed that many expressions are innate, becoming more biologically and evolutionarily significant. The three principles are the principle of serviceable associated habits, the principle of antithesis, and the principle of direct action of the nervous system. These are the principles he elaborated on. Let us briefly examine what these three principles of emotional expression entail.

The principle of serviceable associated habits suggests that some actions could be useful in particular mental states, leading individuals to continue making the same movement or action out of habit, even when it serves no practical purpose. Essentially, this means that when humans or non-human animals experience an emotion, they act in a once satisfying way. For most emotions experienced, there are also some associated actions. For example, when angry, we might adopt a certain body posture or perform actions such as tightening our fists, which is an action associated with the desire to fight or express anger.

When you tighten your fist, it is an action associated with the emotion of anger. Experiencing an emotion prompts you to act in a certain way that satisfies it. For instance, when you are angry, you might attempt to fight with someone to satisfy that anger. Thus, to serve that emotion, the action and the emotion become connected. Consequently, the tightening of your fist and the emotion of anger become associated with each other.

That is the concept: action and emotion become connected, and the behavior becomes habitual when the emotion is present. Whenever an emotion is present, the behavior habitually and automatically manifests, as it is associated with that emotion. For example, you automatically tighten up and prepare to fight if someone insults you. This reaction occurs because the action and emotion are linked; once such links are formed, they remain established.

Generally, these associations remain strong over time because they are very strongly linked with each other. Emotion drives the activity, even when the associated action is not functional. Now, emotion and associated actions have become so strongly interconnected that these actions can be exhibited by us even when they are not functional. For example, when someone is present and insults occur, adopting a fighting posture makes sense because there is an actual function to taking a posture of the fight—there is someone to fight with. However, this association becomes so strong that even when this posture is no longer useful, you will still display those postures.

For example, let's say you stand in front of a mirror and just imagine that somebody has insulted you. Even though it's purely imaginary, you will see that your body automatically takes a fighting posture, and facial expressions of anger appear, despite the scenario being imaginary. If you strongly imagine a situation where you are fighting, your body will adopt the posture of fight even though it is not functional in this context because there is no one to fight with. This illustrates that even when the associated action is not functional, the emotion can drive those activities. This is because a habitual link is formed between the action and the emotion. Next,

the principle of antithesis essentially states that opposing mental states will result in opposing expressive behaviors.

We exhibit various emotions that are associated with certain mental states. Some emotions can be positive, while others may be negative, leading to opposing emotions. Consequently, the expression of each of these opposing emotions will also be opposite. Thus, if you express one emotion in a certain way, the opposite emotion will be expressed oppositely.

For example, disobedience is expressed through expansive gestures and a forward attitude. When you are disobedient to someone, you might assert, "I will not do it," accompanied by expansive gestures—though there may be exceptions—and adopt a forward stance, essentially saying, "No, I will not do it." Thus, a forward and expansive posture is adopted. The opposite of disobedience is submission. When in a state of submission, individuals generally become more contracted, bowing down with a bowed head, and so on. Therefore, while one expression is expansive, the other is more contractive.

Opposing emotions will have opposing expressions; that is the idea. The third principle is the direct action of the nervous system. Essentially, this takes note of the role of the nervous system in the expression of emotions. It posits that certain actions, which we recognize as expressive of specific states, will be associated with actions that are the direct result of the constitution of the nervous system.

Those expressions will also be contributed by the basic constitution of the nervous system. For example, direct actions of the nervous system include trembling, which can be brought on by cold, fear, excitement, or muscle exhaustion, and sweating in response to fear and pain. Whenever we experience certain emotions, the nervous system will also play a role, resulting in bodily symptoms like trembling and sweating, which are direct actions of the nervous system. That is the idea behind the contribution of the nervous system to the expression of emotions. When researching basic universal emotions in the 1960s, as we discussed in the first lecture, a lot of research was dedicated to the basic emotional models, with efforts to identify basic emotions.

It was all primarily influenced by, derived from, or significantly credited to Charles Darwin. People even utilized Charles Darwin's method of analyzing facial expressions, where, mostly at that time, Darwin was using photographs of different facial expressions. He would show these to people, asking observers to identify which emotion was expressed in each photograph. This method was also used in the 1960s and is still considered one of the methods today. Thus, you can see how significant his contribution was, not only to theories but also to methodology. The two leading theorists who have studied facial expressions of emotions and who were highly influenced by Charles Darwin are Carroll Izard and Paul Ekman.

Paul Ekman, whom we have already discussed in detail in the first lecture, developed his theories. Carroll Izard also developed his theory, and both had many commonalities with Charles Darwin's ideas. Here, we will talk a bit about Carroll Izard's theory. Izard identified ten fundamental emotions: fear, anger, surprise, joy, disgust, contempt, shame, sadness, interest, and guilt. These emotions collectively make up a unique subsystem of the personality. According to Izard, these basic emotions are innate, generally developing in the first two years of life, and are identifiable by distinct expressions. This is similar to what we have seen in Ekman's theory in the last class, where each emotion is associated with distinct facial

expressions. According to Izard, individual emotions interact with one another, meaning that these fundamental emotions can combine to form other emotions. Furthermore, he stated that these emotions can interact with other personality subsystems like drives, the motor perceptual system, and the cognitive system to create a variety of complex emotions.

For example, he suggests that the emotion of romantic love could be formed by the association of the drive system, primarily the sexual aspect, with the emotional subsystems of joy and interest. These can combine to form the experience of romantic love and so on. Thus, complex combinations of different systems can combine to form complex emotions. Paul Ekman's theory, as we have already discussed in the first class, also plays a significant role in understanding emotions. This was a brief overview of Charles Darwin's contributions. Obviously, his contributions are extensive, and there is much more to discuss, but these are some of the major aspects he contributed to.

Now, let's look at William James. William James is a celebrated personality who contributed significantly in the early days of the development of the discipline of psychology, impacting almost every aspect of psychological research. He also discussed emotion and proposed a particular theory, which we will explore. What was William James's theory of emotion? James claimed that physiological changes precede emotional experiences. He posited that physiological changes occurring in the body precede emotional experiences. According to him, emotional experiences occur later, with physiological changes happening first, including changes in heart rate, breathing, and so on.

Physiological arousal and changes happen first, and then emotional experiences occur. This was a somewhat counterintuitive idea because we generally experience or tend to think that it violates the common-sense belief that physiological changes are a consequence of emotion. We experience an emotion, and this emotion changes the physiological aspect of it. William James argued that it is, in fact, the other way around.

This was his idea. We generally think, "I am afraid; therefore, I am trembling." James would say, "You are trembling; therefore, you are afraid." Thus, physiological changes happen first, and then the emotional experience follows. Here, the physiological reaction happens first, and then, based on the physiological response, we label an emotion accordingly.

That is the essence of James's theory of emotion. According to this theory, emotions are the labels we give to the way our body reacts to certain situations. When a situation occurs in your life, your body reacts in a certain way, which involves physiological changes and arousal, and then you label it according to the situation with a certain emotion. First come the physiological changes, then the emotional experience. A similar idea was proposed at the same time by a Danish psychologist named Lange. He also proposed a similar idea; therefore, this theory is collectively known as the James-Lange theory.

Essentially, both presented a similar idea, which is why they are combined into one. Interestingly, many theories were initially proposed by two people, most of whom were conducting independent research yet arrived at similar ideas. Thus, the contributions of these two individuals were merged to form a single theory.

We will see later, as well, that similarly, two people came together to propose one theory, which was a trend at that time. This is known as the James-Lange theory. So, what happens in the

James-Lange theory? It challenges the common-sense view, which generally suggests that an event happens, leading to certain feelings.

Those feelings then lead to physiological changes and behavior. The James-Lange theory says an event happens, which leads to physiological changes first. Then, at the end, we experience the feeling part of it. This is one way it differs from the common-sense view. The James-Lange theory proposes that the entire experience of emotion requires sensation from the muscles and internal organs. Thus, his whole idea of emotion is essentially derived from physiological arousal.

So, this was his idea. Thus, we generally think that I am afraid; therefore, I am trembling. James will say, "You are trembling; therefore, you are afraid." Thus, physiological changes happen first, and then emotional experiences occur. Therefore, here, the physiological reaction happens first, and then, based on the physiological level, an emotion develops.

So, that is the idea of James's theory of emotion. According to this theory, emotions are the levels we assign to the way the body reacts to certain situations. When certain situations occur in your life, your body reacts in a certain way, which involves physiological changes and arousal, and then you label it according to the situation, assigning a certain emotion. Thus, first, physiological changes occur, then emotional experiences. A similar idea was also proposed at the same time by a Danish psychologist called Lange. He also proposed a similar idea; therefore, this theory is collectively referred to as the James-Lange theory.

So, you know, both gave a similar idea. Thus, they are combined into one. Interestingly, most of the theories are proposed by two people initially. Most of them conduct independent research, and their ideas are similar. Consequently, two people combine their ideas to form a single theory. We will see later that similarly, two people came together to propose one theory. This was a kind of trend at that time. This is known as the James-Lange theory. So, what happens in the James-Lange theory? It states that the common-sense view generally suggests that when an event occurs, it leads to certain feelings. These feelings then lead to physiological changes and behavior. However, the James-Lange theory proposes that when an event occurs, it leads to physiological changes first. Then, at the end, we experience the feeling part of it. This is one way it differs from the common-sense view. The James-Lange theory proposes that the entire experience of emotion requires sensations from the muscles and intervals. Thus, his whole idea of emotion is derived from physiological arousal.

So, there has to be a sensation in the body, and then there is a labeling of emotions. It all depends on the physiological sensations in the body. That is why the first physiological changes are given importance, and then emotional labeling happens. According to this theory, emotion fades once sensation decreases; just as the sensation decreases in the body, emotion will also fade accordingly.

So, that was the main idea of this theory. One of the supports for this theory was provided by people who, you know, generally experience that when they drink wine, it reduces anxiety for a lot of them. The argument given according to this theory is that when people drink wine, their body's physiological arousal decreases. Thus, with the decrease of sensation, the corresponding emotion also decreases. They kind of use this instance as support for their theory. Now, this theory has a lot of limitations because many people criticize it based on various ideas.

So, let us see some of the criticisms of this theory. This theory was criticized on many grounds; some of the criticisms are, first, there was not much empirical support for this theory; there was no proper research-oriented support for this theory; it was mostly based on introspection. Because William James, one of the methods he used, was introspection. So, many of these ideas came from introspection rather than proper experimental research. This was one of the criticisms. Furthermore, researchers found that in people with muscle paralysis, in many cases where the muscle was completely paralyzed, and with the paralysis, obviously, sensation also gets lost; when there is paralysis, we do not get any sensation from that part of the body. And even after muscle paralysis, people could experience a lot of emotions like joy, fear, and anger. So, if this theory is correct, then they should not experience any emotion because there is no sensation from the physiological body. But despite paralysis, people experience a lot of emotions.

So, it kind of evaluates a lot of the ideas of these theories. Another American physiologist, Walter Cannon, pointed out many specific limitations, and he developed another theory that we will discuss later. He pointed out that individuals have a poor ability to perceive many subtle physiological changes induced by the sympathetic nervous system. One thing is that people have a very poor perceptual ability to detect all the physiological changes that are happening in the body. So, how can the perception of physiological changes be the basis of emotional experience when we are not able to perceive all the physiological changes in the body in the first place? This is one of the criticisms. Second, different emotions are associated with the same pattern of physiological arousal. How could different emotions, he said, be associated with mostly the same kind of physiological changes?

Similarly, heart rate increases, especially during intense emotions, and breathing becomes faster. So, similar kinds of physiological changes happen, and similar sensations occur. So, how could all the different emotions be experienced based on the same kind of physiological arousal? That is another criticism. The third argument or criticism given by Walter Cannon is that physiological changes depend on the secretion of hormones by the adrenal glands of the body. Whenever physiological changes happen, they are generally caused by changes in the hormones in the body.

So, adrenal glands or many other glands secrete hormones into the blood, and these hormones create all the changes in the body, including changes in heartbeat breathing patterns, and so on. He said these changes in hormones are very slow to be the basis of all emotions because we experience a lot of very instantaneous emotions. We experience emotions immediately. Now, he said these physiological changes may happen very slowly in many cases. How can all emotions, particularly the instantaneous ones, be based on physiological changes that are not instantaneous? They happen very slowly, or at least it takes some time.

But we experience emotions instantaneously. So, how can that be the basis? So, that was one criticism. All these limitations were raised or given in response to the James-Lange theory. Despite all these limitations, James-Lange's theory is one of the first theories that at least instigated interest and prompted modern research into the physiological reaction associated with different emotions. At least the physiological aspects of emotions received a lot of attention from this theory, even though there are many limitations to it. Next comes the Cannon-Bard theory. Walter Cannon, as we said, made a lot of criticisms of the James-Lange theory and provided an alternative theory after making all these criticisms.

So, Walter Cannon is also known for discovering the fight-or-flight response. The fight-or-flight response is basically whenever there is an emergency or a threat in the environment, it is a physiological way the body reacts to danger or threat. So, the body will either, you know, the whole physiological system will either try to fight with it or run away from it just to protect itself. That is called the fight-or-flight response of the body. So, Walter Cannon first discovered and talked about this particular syndrome, and another physiologist at that time, Philip Bard, also had a similar idea. So, it became the Cannon-Bard theory, just like the James-Lange theory, it became a two-person theory, the Cannon-Bard theory.

So, this theory claims that emotion is produced when an event or an object is perceived by the thalamus. The thalamus is a very small organ in the center of the brain. According to this theory, this organ first perceives an event in the environment and then converts this information to whatever perception you perceive as a danger or something like that. It simultaneously sends this information to the cerebral cortex, skeletal muscles, and sympathetic nervous system. So, the thalamus, a small organ in the center of the brain, perceives an event and then sends signals to three parts: the cortex of the brain (the outer layer), skeletal muscles, and the sympathetic nervous system.

According to this theory, if you just look at it, let's say I am just drawing a rough diagram—I am not very good at drawing—so, let's say this is the human brain, the outer layer is called the cortex. Somewhere here is the thalamus, a small organ in the center of the brain. So, this is the cortex, and somewhere here is the thalamus. This brain and it goes somewhere, you know, the spinal cord goes through, then it touches the lower part of the body. So, we will have, then, this will be associated with our skeletal muscles, legs, and body like this.

Many nerves will also be associated with our vital organs like the heart, lungs, kidneys, and so on. There will be a connection from the spinal cord to the brain, the connection will go to various vital organs of the body. Many nerves will also be connected to the skeletal muscles. According to this theory, the thalamus in the brain first perceives an event in the environment, and then it sends signals simultaneously. It sends it to the cortex. The information will go to the cortex, then it will go to the sympathetic nervous system, some of the nervous systems that connect and send signals from the brain, and spinal cord to the vital organs of the body like the heart, lungs, and so on.

And also, it will connect, sending information to the skeletal muscles like the hand, leg, and other muscle switchers, you know, part of that. So, just to give you an idea of some of the aspects of the nervous system, the human nervous system is categorized into different parts. So, the nervous system broadly has different categories: one is the central nervous system, and another is called the peripheral nervous system.

Peripheral and central. So, the central nervous system includes the brain and spinal cord. So, these are the central parts, the brain and spinal cord. This brain and spinal cord constitute the central nervous system; all the other nerves in the body are called the peripheral nervous system. Now, this peripheral nervous system also has two parts: one is called the somatic nervous system, and one is called the autonomic nervous system. So, the somatic nervous system is those nerves that send signals to the skeletal muscles that we can control, for example, I am moving my hand. So, it is under the somatic nervous system. The autonomic nervous system is connected with all the vital organs of the body like the heart, and you know, breathing, and all these aspects where we do not have much control; this happens automatically.

So, the autonomic nervous system again has two parts: one is called sympathetic and another is called parasympathetic. So, if you see this diagram. So, it talks broadly about, you know. So, the autonomic nervous system has sympathetic and parasympathetic nervous systems. The sympathetic nervous system is the part of the autonomic nervous system that activates the body; all the physiological arousal is done by the sympathetic nervous system.

So, whenever you feel like, you know, your heartbeat is increasing, you're sweating, or your breathing is becoming faster, it is done by the sympathetic nervous system. The parasympathetic nervous system does the opposite. So, it tries to cool down the body; otherwise, you know, without the parasympathetic nervous system, your body will not be able to calm down. So, generally, whenever we get activated, our body becomes activated, and then our body also gets relaxed after some time.

So, this relaxation is done by the parasympathetic part of the nervous system. So, this sympathetic nervous system, all the physiological arousal, is done by this sympathetic part of the autonomic nervous system. So, according to this theory, the thalamus perceives an event and sends a signal to the three parts simultaneously: one is the cortex where all the higher thinking processes are done by the outer part of the brain. Another signal goes to the sympathetic nervous system which activates the body like heartbeat increases and so on. And another information goes to the skeletal muscles where the body moves as the hand moves and legs move and so on all the voluntary functions happen. So, the cerebral cortex then uses memories of the parts of the cerebral cortex for thinking higher thinking part.

So, human beings have this cerebral cortex which helps human beings to think, you know, in detail. So, it uses memories, past experiences, everything; it can do all the processing of information, and it determines the nature of the perceived event, what kind of event is this, you know, providing the subjective one; this cortex gives you the feeling part or subjective experience of an emotion. Muscles and the sympathetic nervous system provide physiological arousal that prepares the individual to take action and adjust to the situation. The Cannon-Bard theory assumes that different emotions can be experienced with the same physiological arousal. He said for every emotion there is no different physiological arousal; the same physiological arousal can lead to different emotions based on how you perceive an event. So, according to this theory, emotional cognition, means how you think and perceive an event.

So, emotional cognitions and feelings are causally independent of physiological arousal. So, it is not saying the physiological arousal happens and then you interpret that physiological. So, all these are independently happening according to this theory. So, even though all these aspects occur at the same time, more specifically cognitive appraisal, feeling, and physiological aspects of emotion arise independently. So, simultaneously, these all happen; for example, seeing a snake may instigate feelings of fear and physiological reactions such as rapid heartbeat.

So, if fear is experienced, the heartbeat will be fast. It's not like one after the other. So, simultaneously, it is happening. According to this theory, both feelings and physiological reactions occur simultaneously and independently. You know, it is not one causing the other; both are happening at the same time. This is how it is different from the James-Lange theory. So, this theory is also known as the thalamic theory because the focus is given on the thalamus, the organ of the brain.

It states that the thalamus in the lower part of the brain controls emotional experience. However, the cortex in the higher part of the brain controls emotional expression. So, experience is controlled by the thalamus, and the cortex controls the expression. This feeling and physical reaction occur simultaneously. However, the research did not find any support for the thalamus playing an important role in emotion. So, later research could not find the role of the thalamus as envisioned by the Cannon-Bard theory.

So, this theory says an event happens, and three things may happen simultaneously: one is cognition or how you think and perceive that event, and then there are feelings happening. So, you see a snake and you perceive a snake in terms of cognition, then you feel afraid (feeling part), and then physiological changes, let's say your heartbeat increases, all happen simultaneously and independently. This is what happens according to this theory. So, this is in contrast to the James-Lange theory because this is an alternative theory given based on the criticism of that theory. So, the ideas are very different whereas the James-Lange theory states that emotion arises by leveling the physiological reactions in the body. So, physiological emotions depend on that, not independent. This theory says these are all independently happening.

Research on victims of spinal cord injury has provided some support to this Cannon-Bard theory. Studies have found that people with spinal cord injuries prevent them from perceiving their bodily arousal. So, certain spinal cord injuries may lead to a state where, you know, a person is not able to feel anything, feel the bodily or physiological arousal; that feeling is disconnected. You know, the people with spinal cord injuries that prevented them from perceiving the body experiences, they also experience emotions. So, physiological arousal, you know, as envisioned in the James-Lange theory, you know, is not directly necessary for, you know, in terms of emotional experiences to happen. So, this example where now a spinal cord injury patient experiences emotion violates the Lange theory but supports Cannon-Bard's theory's assumption that emotional experiences depend on the brain's perception of an ongoing event.

So, how the brain perceives an event is more important in terms of the experience of the emotion. So, in this example, the Cannon-Bard theory holds, and the James-Lange theory is violated here. Again, Cannon-Bard theory also, for example, the role of the thalamus, has not been supported in the research, and not every aspect of this theory was supported; both have been influenced, they both have their limitations, both have influenced modern research, and emotional processes of the brain, particularly the physiological study in the part of the brain's role in emotion; they stimulated a lot of future research. Both theories have limitations and criticism for their over-generalization of emotion and the contradiction between theory and evidence. So, a lot of evidence is not in support of this; some evidence is there, but some evidence contradicts it.

So, all these things were there, and they kind of over-generalized their theories' findings. So, Cannon-Bard's theory more specifically stimulated interest in the cognitive aspect because it says the perception of the event by the brain is very important. So, it stimulated research into the cognitive theories of emotion, and how mental processes or thought processes play an important role in emotion. So, it stimulated a lot of interest in that. So, the next theory is cognitive theory; we will see what it talks about.

So, the next theory is called the Schachter-Singer theory. So, all these theories we are discussing are just to get an idea of how the various conceptualizations of emotion have evolved. So, this theory is a reflection of, how the conceptualization has changed and evolved. The Schachter-Singer theory, also called the two-factor theory, is one of the first cognitive theories of emotion which was put forth in the 1960s by Stanley Schachter and Jerome Singer. It is one of the earliest cognitive theories of emotion. According to this theory, there are two key components of emotion. Every emotion has two main components according to this theory: one is physiological arousal and the other is cognitive labeling, how the mind levels it.

So, physiological arousal includes, as we have seen, activation of the sympathetic nervous system which arouses the body, like increasing heartbeat, making your breathing faster, and so on, sweating, and so on. Cognitive processing or labeling includes interpreting the physiological arousal by looking at the surroundings. So, physiological arousal will be there and cognitive processing will level that physiological arousal and interpret it, mostly based on looking at the surroundings and leveling, what kind of emotion one is experiencing. So, emotions are not derived from physiological arousal as such, but physiological arousal will trigger, and a person will level that arousal as a particular emotion based on evidence from the environment.

That is the main idea of this theory. For example, if your heart is beating faster, let us say you are physiologically aroused in a situation. Now, depending on the situation, that faster heartbeat can be leveled as different emotions. So, you may level different emotions based on the environment in which you are placed. You may interpret a rising heart as happiness if you are in a party situation. The same heartbeat can be called anger if you are in a situation where you are insulted. So, the physiological symptom is the same, but you may level it depending on the situation as anger or happiness, depending on the situation.

That is the central idea of this theory. Another physiological arousal that often accompanies emotion determines the intensity. So, according to this theory, physiological arousal is not causing a particular emotion, X, Y, Z emotion, but if the physiological arousal is very intense, it will add to the intensity of that emotion, but it is not creating an X, Y, Z emotion. It is just influencing the intensity of the emotion but does not identify the emotion. This theory assumes all emotions evoke similar physiological responses, according to this theory. The Cannon-Bard theory also talks about the same thing, that all emotions evoke physiologically similar responses in the body, but one cannot recognize which emotion one is feeling just by observing the body's reaction or physiological arousal.

Instead, we identify an emotion as X, Y, or Z, or it is anger or it is fear, or whatever it is, based on the situation or the environment. So, how and how do you interpret that situation? Therefore, the difference between the two emotions lies in the cognitive appraisal aspect. So, why an emotion is anger and why an emotion is fear, all depends on the situational surroundings. So, physiological aspects only add to the intensity of it.

It cannot give rise to a particular emotion, you know, all emotions, you know, create almost similar physiological responses. So, there is an interaction between physiological aspects and the kind of labeling of cognitive labeling that creates an emotion. So, they did a very famous experiment, these two persons, Schachter and Singer, and that led to this. They tried to test this hypothesis, you know, that, you know, their research problem was like with the same type of physics. So, that is one of the propositions of that theory, that the same type of physiological

arousal is associated with all emotions, and it is the cognitive labeling depending on the situation that you say an emotion is fear or an emotion is anger or whatever it is.

The same type of physiological arousal could have different effects on emotion depending on the situation. So, if the situation changes and physiological arousal is the same, can people experience different emotions with the same physiological arousal? If that is proven, then the theory is proved. So, to prove that they conducted an experiment where around 184 male participants were injected with epinephrine. Epinephrine is a hormone that has certain effects. The adrenal gland also secretes epinephrine naturally in the body when we are highly physiologically aroused. So, epinephrine is one of the hormones that increase heartbeat and rapid breathing, among other effects. If this hormone is injected into the body, it will artificially induce those physiological symptoms.

So, all these participants were injected with epinephrine. I do not know how feasible it would be in today's scenario because there may be ethical issues, but it was done in the 1960s, and probably at that time it was possible. This injection was administered to all the participants, and they were told it was a new drug to test their eyesight. They were not informed about the actual purpose of the injection. They were just told that it was a new drug being tested for something related to eyesight. The information about the injection was manipulated in two ways. In one group of participants, they were informed about the possible side effects of the injection, such as increased heartbeat and rapid breathing. In another group, this information was not provided; they were just told it was a drug being tested for eyesight, and nothing else was informed to them. This is how the information was manipulated in the two groups of participants.

Then, all these participants were placed in a room where there was another person who was not a participant but a helper in the experiment. Another person was there in that room just to manipulate the situation, and the participants were placed in that room. In that experiment, the environment was manipulated. In one case, a happy environment was created, and in another case, an angry environment was created. These environments were artificially created just to test their hypothesis. In the case of the happy environment, the participant interacted with the person in the room, who was the helper of the experimenter. The helper behaved in a very happy and joyful manner and started playing, dancing, and engaging in various activities to create a happy environment. In another case, the participants were put in a room where anger was manipulated. Similarly, another person was there in that room who became very angry because a task was given to all the participants, including filling out a questionnaire with many personal questions. This person became very angry, shouting, tearing up the questionnaires, and displaying anger to create an angry environment in that room.

The hypothesis was that participants would feel happier in the first case and angrier in the second case if they did not know the effect of the drug. In group 2, they did not know the effect of the drug, that there would be an increase in heartbeat physiological arousal or rapid breathing; they did not know anything about it. The drug was administered to everyone, and the symptoms were expected in everybody.

One group only knew that it was because of the drug, while the other group did not know; they could not explain why their heart rate was increasing because they were not aware. Group 2 was also not aware of why they were feeling their heart rate increase, but it was actually because of the drug. When group 1 knew because they were told about it. So, the hypothesis was that

participants would feel happier or angrier depending on Case 1 and Case 2 if they did not know the effects of the drug. So, group 2 did not know that heart rate was increasing because of the drug.

So, they tried to explain why they were feeling physiologically aroused and they tried to explain it using the environment. So, according to the environment, they would label their emotions. If they saw happiness around the environment, they would say their heart rate was increasing, so they must be feeling happy. In the case of anger, they would say they were angry because they did not know why their heart rate was increasing, but it was caused by the drug only, and group 1 knew because it was the drug.

So, they would be influenced less because they knew this; they did not have to explain it based on the situation. That was the hypothesis, and the results came according to the hypothesis. So, group 2 participants had no explanation for that physiological arousal because they did not know that it was caused by the drug. So, they tried to find the reason for that in the environment. So, they tried to cognitively label that they were feeling happy in Case 1 or they were feeling angry in Case 2. This is how they tried to prove their concept or the theoretical propositions.

Not much research later found a lot of evidence. Evidence was mixed; some found some did not find but shows this theory contributed in terms of the role of cognition interpretation in emotions. So, this theory has been influential, and inspired much research in the field of emotion, particularly in the cognitive theories of emotion. If you see, if you compare these three theories, you know because we have talked about a lot of ideas in these theories. So, let us just summarize so that we can clearly distinguish the basic ideas of each of these theories.

In James Lange's theory, physiological arousal and behavior determine emotions. So, according to James Lange's theory, an event happens and then physiological arousal happens, and this physiological arousal determines emotion. So, physiological arousal happens first, and then emotion happens later; first physiological arousal, then emotions. Cannon Bard's theory says physiological arousal behavior and emotions are independent. He said you perceive an event then three physiological arousal happens, emotion happens simultaneously.

Not in the case of James Lange's theory, first physiological arousal, then emotion. In this theory, physiological arousal and emotion happen simultaneously and independently; one is not causing the other. Schachter-Singer's theory says physiological changes determine only the strength or intensity of the emotion. All emotions cause similar physiological arousal; there is no specific physiological arousal associated with a specific emotion. Only the intensity of the physiological arousal causes the intensity of the emotion, but appraisal or the cognitive interpretation of the event determines the specific emotion and behavior.

Whether you experience happiness or anger depends on how you interpret or find interpretation in the situation. Physiological arousal does not cause anger or emotion. It is if the physiological arousal is very intense, the emotion will only be intense, whatever that emotion is. These are the basic differences between these three theories. Now, appraisal theories of emotion came as a set of theories that primarily talk about the primary role of cognitions or thought processes in emotions. So, some theories came along those lines also which were a little bit of modification of Singer and Schachter's theories, but mostly they focused on the role of interpretation.

These appraisal theories, where appraisal means how you interpret a situation or explanation of situations, are significant. They propose that emotions are derived from appraisal— that all

emotions arise based on our interpretation of an event. Many great theorists in these lines of research, like eminent researchers McDonald and Richard Lazarus, have contributed to these theories.

The main question is, why do different people see and react emotionally differently in identical situations? For example, if you put three people in one emotional situation, they may react very differently. For one person, it could be a terrifying experience full of fear and anxiety; for another, it will be neutral; and for another, it will be full of joy and excitement. The same situation results in three different emotional reactions. Why do these differences occur? They say these differences happen because of the interpretation of the event, and how individuals perceive and interpret that event. Here, the role of cognition comes into play.

The term "appraisal" was coined by the American psychologist McDonald to describe the cognitive processes that precede the arousal of emotion. In 1960, she created a cognitive theory that stated that appraising the situation is the first stage of every emotional experience. First, cognitive interpretation happens, and then other things follow. Arnold claims that initial appraisal triggers both physiological arousal and emotional experiences, but cognitive interpretation happens first; physiological arousal follows later. She recognizes physiological changes as crucial to the process but not as the cause of emotional reactions. Arnold's work was slightly modified and adopted by Richard Lazarus.

Lazarus developed the cognitive mediational theory, which claimed that the appraisal of stimuli determines emotions. It's a similar idea, but he elaborated a bit more. He said instantaneous, frequent appraisals can happen very unconsciously, which may not consciously determine emotions. Whenever you see a snake, you may not consciously think; automatically, very automatically, your appraisal happens, and you sense danger, which can create emotional reactions. Lazarus maintains that appraisal comes before cognitive labeling. Certain interpretations happen, generating physiological arousal and emotional experiences. Schechter-Singer's theory says there is an interaction between physiological arousal and cognition, but in this case, appraisal happens first, and then other things follow. So, some little changes here and there, but the focus is more on cognition.

According to Lazarus, the cognitive activity involved in interpreting emotional context can be conscious or unconscious, and it may or may not take the shape of conceptual processing. He emphasized that cognitive processes govern the quality and intensity of emotions by mediating the link between the person and the environment. Mostly, Lazarus talked about this in the context of stress and coping. How do you experience stress, and how do you cope with the situation? In that context, he said primarily two types of appraisal interpretations happen in the context of stress and coping. One is called primary appraisal, where you identify or level a situation, giving importance to the situation or interpreting the situation in terms of its meaningfulness or importance.

So, when you see an event, you first judge its importance. This may happen automatically; let us say, you know. So, a primary appraisal assesses the situation's importance. That is the primary appraisal. Secondary appraisal analyses your ability to cope with the situation. Will you be able to handle the situation because it is in the context of stress? If you think you have the necessary skills and abilities to deal with a situation, you will not experience much stress because you have the ability. But if you think you will not be able to handle a situation, stress will increase significantly. That is called secondary appraisal. For example, let us say you are

preparing for an interview or an examination. Now, a primary appraisal will judge the importance. If this interview is very important for you, for your job, and other things, the primary appraisal will assess the importance. So, if you find out that this is very important for you, then it will impact you. In secondary appraisal, you will see, "Do I have the ability to handle the situation? Do I have the necessary knowledge and skills to face the interview?" If you think you have enough skills and abilities, then the stress will be much less while facing the interview. But if you think you have not read much and do not have the necessary knowledge and skills, the stress may be much higher. This is how this interpretation may lead to differential outcomes in terms of stress and coping with a situation.

Now, lastly, we will talk about Zajonc-LeDoux theory of emotion. This is a kind of theory that gives a very interesting perspective to many of these ideas. According to Zajonc, some emotions can manifest independently before cognitive interpretation. He said not all emotions necessarily require cognitive interpretation as cognitive theories say; some emotions can happen without cognition. For example, suppose a loud sound suddenly happens unexpectedly; we all experience fear suddenly. But there is no cognition; you do not think before it happens. So, in such cases, cognition is not required; thinking or interpretation is not required. Additionally, sometimes we instantaneously like or dislike somebody based on gut feelings; you do not think much; there is no thinking involved, just a gut feeling. In those cases, also, there is no interpretation involved in it.

So, LeDoux also thinks that some emotions can be understood without cognitive processing, like specifically those emotions that require survival, like fear. According to LeDoux, there are two distinct ways to experience emotion, and this is called the dual pathway: one is called the low road pathway and one is called the high road pathway. In the low road pathways, there is no thinking involved, like in cases of instantaneous reaction. In the case of high road pathways, you think, and then emotion is experienced, where thinking is also involved. According to the writings of Zajonc and Docks, we agree that our mental and emotional responses do not necessarily follow a set pattern. So, in certain cases, some emotional cognition may be involved; in some cases, it may not be involved. So, it depends on the situation; fear, for example, may not require a lot of cognitive intervention in situations where fear is aroused because of survivalist attitudes to danger. Fear mostly occurs when danger happens.

So, in those cases, mostly emotional or cognitive aspects are minimal or not involved at all. In the case of other emotions, such as love, where complex thinking may be involved, cognitive rationalization is involved. This is the idea of this theory. We have seen many of these theories and ideas. So, what is the conclusion? Theories, all these theories, show certain truths, and certain facts about emotions; they contribute to our understanding of emotions. But we know every aspect of human life is so complex that one theory cannot explain everything.

So, all these theories are partially explaining different aspects of emotions, and no theory is perfect; no one theory can explain everything. That is why the limitation of one theory leads to the formulation of another theory, which talks about some other aspects. Every theory has its limitations, and no theory is perfect. So, all these understandings of all these theories help us gain a lot of insights about emotions. In certain contexts, some theories may be more valid; in other contexts, some other theories may be valid, but no theory is perfectly able to explain everything. This happens with most psychological theories because human life is very

complex; one theory cannot simply take account of every aspect of it. So, that is the message from all these theories. With this, I will stop here. Thank you.