UC San Diego

Lecture 6.2 Surprise: Contrastive Valence

MUS 20 Exploring the Musical Mind

Summer Session II 2025

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The ITPRA Theory of Expectation: Purposes

Sweet Anticipation: Music and the Psychology of Expectation by David Huron

- *Imaginative response*: motivate an organism to behave in ways that increase the likelihood of future beneficial outcomes.
- *Tension response*: prepare an organism for an impending event by tailoring arousal and attention to match the level of uncertainty and importance of an impending outcome.
- *Prediction response*: provide positive and negative inducements that encourage the formation of accurate expectations.
- *Reaction response*: address a possible worst-case situation by generating an immediate protective response.
- *Appraisal response*: provide positive and negative reinforcements related to the biological value of different final states.

The ITPRA Theory of Expectation: Feelings

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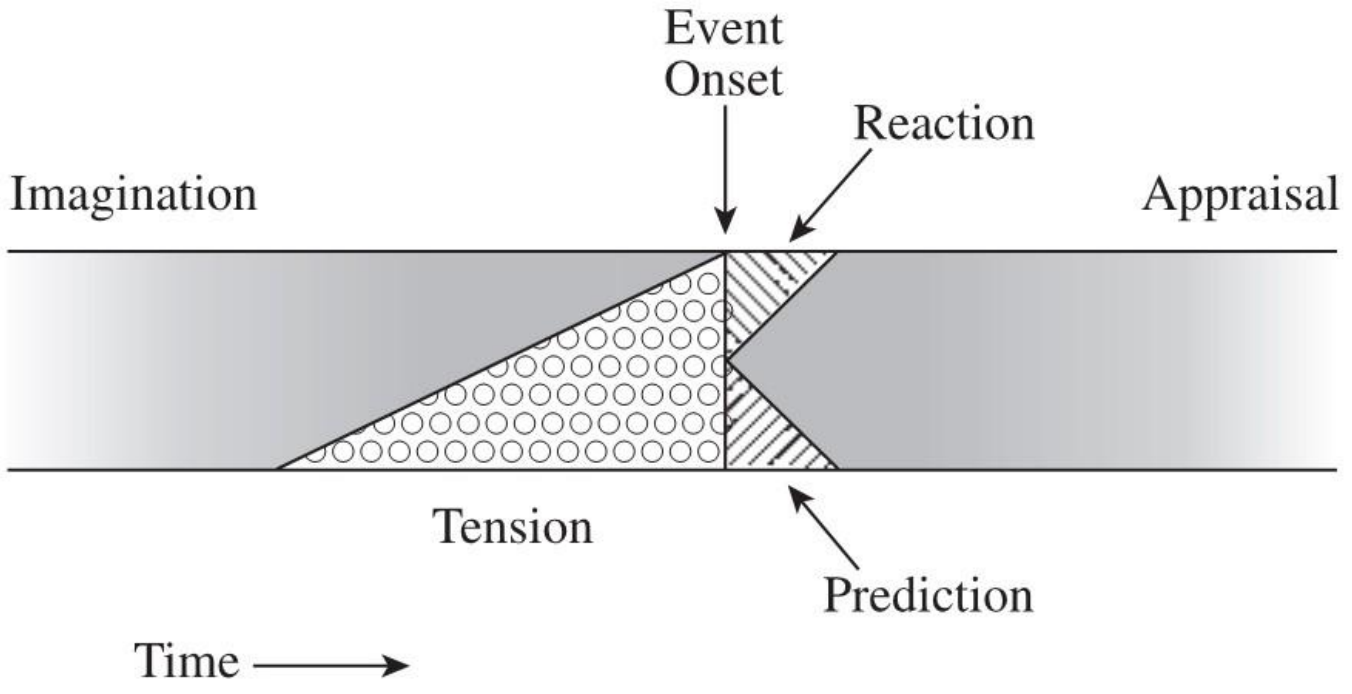
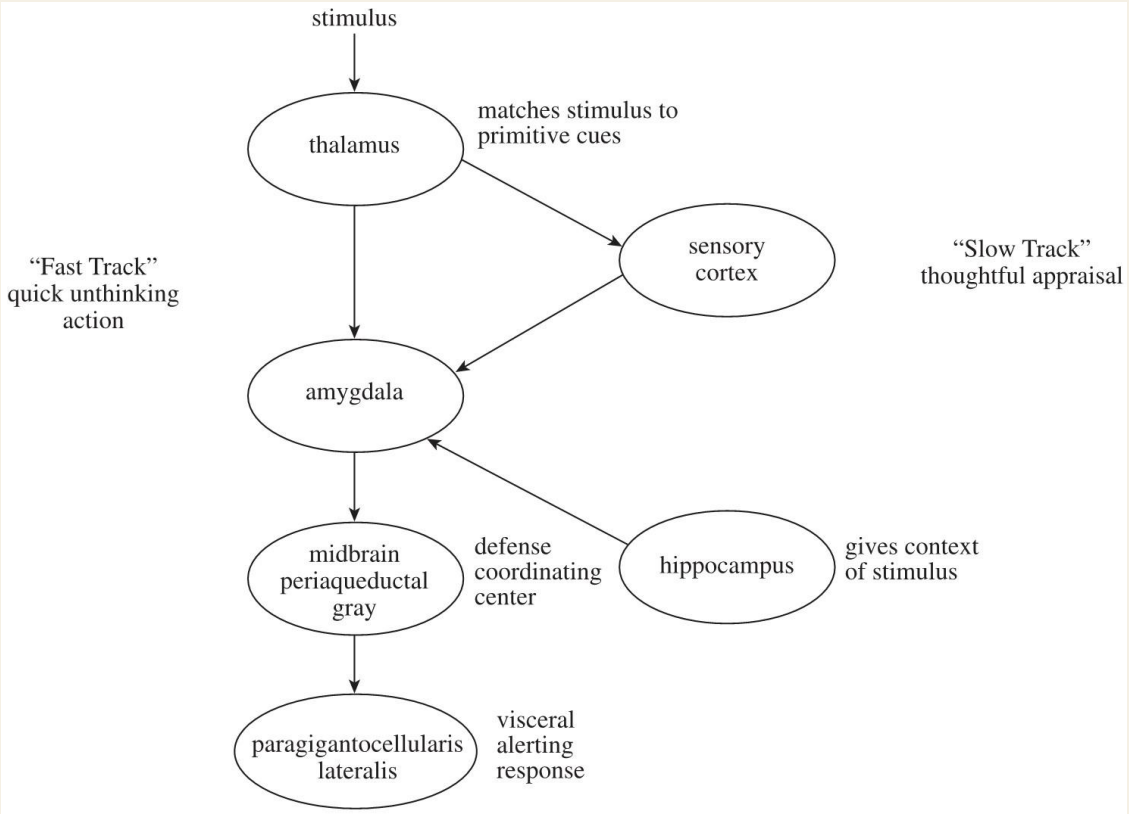
- *Imaginative response*: What do you think might happen, and how do you feel about that prospect?
- *Tension response*: Are you ready for what's about to happen? How do the preparations make you feel?
- *Prediction response*: Did you "place a good bet"—did you predict the outcome accurately? Are you pleased or disappointed by the accuracy of your wager?
- *Reaction response*: Assuming the worst, how have you reacted? How does this reaction make you feel?
- *Appraisal response*: Upon reflection, how do you feel about how things have turned out?

The ITPRA Theory of Expectation: Biological Function

Response system	Epoch	Biological function
(I) *imagination response*	pre-outcome	future-oriented behavioral motivation; enables deferred gratification
(T) *tension response*	pre-outcome	optimum arousal and attention in preparation for anticipated events
(P) *prediction response*	post-outcome	negative/positive reinforcement to encourage the formation of accurate expectations
(R) *reaction response*	post-outcome	neurologically fast responses that assume a worst-case assessment of the outcome
(A) *appraisal response*	post-outcome	neurologically complex assessment of the final outcome that results in negative/positive reinforcements

The ITPRA Theory of Expectation: Time Course





Surprise

Chapter 2 Surprise

When a surprising event occurs, two brain processes are initiated:

- A rapid reaction response
- A slower appraisal response

Contrastive Valence

Sweet Anticipation: Chapter 2 Surprise by David Huron

- Surprising people for fun appears to be a cross-cultural universal.
- It is not simply the case that surprises are fun for those doing the surprising. In some circumstances (such as Ms. Bradley's surprise party) surprises can also be fun for the person being surprised.
- The observation that at least some surprises can be pleasurable raises a biological puzzle.
- The purpose of expectation is to enhance readiness. The phenomenon of "surprise" represents a failure of expectation.
- From a biological perspective, surprise is always a bad thing. Even when the surprising outcome turns out to be good, failing to anticipate the outcome means that the brain has failed to provide useful information about possible futures.

Contrastive Valence

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- If surprise is biologically bad, how is it possible for some surprises to activate the physiological machinery for pleasure? How can people possibly enjoy being surprised?
- The magnitude of the emotional response is amplified when there is a large contrast between *predicted and actual outcome*. In general, unexpected fortune or misfortune causes the biggest emotional responses. That is, low expectation amplifies the emotional response to the outcome.
- When we are surprised, a limbic contrast will sometimes arise between the reaction response and the ensuing appraisal response. The fast biological response to surprise is perpetually negative. But the slower appraisal response might be neutral or even positive.

Musical Surprise

Sweet Anticipation: Chapter 2 Surprise by David Huron

- A lengthy dissonant passage is likely to lead listeners to expect further dissonant sonorities. If the music shifts toward a more consonant texture, then the resulting contrast will tend to evoke a pleasing effect that can be greater than experiencing only the consonant passage.
- Whether or not a sound is regarded as inherently pleasant or unpleasant, if it is unexpected, it is capable of evoking a negatively valenced prediction response—which may contrast with an ensuing neutral appraisal.

Contrastive Valence

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- An apparent problem for the contrastive valence theory is accounting for why an unexpected good outcome would be experienced as more positively valenced than an expected good outcome.
- In the case of an expected good outcome, a person should feel good about the outcome and should also feel good about the predictive accuracy. In the case of an unexpected good outcome, a person should feel good about the outcome but also feel bad about the poor predictive accuracy.
- Why then does an unexpected good outcome sometimes evoke a more positive emotion than an expected good outcome?

Contrastive Valence

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- It is possible that the contrast between the positive appraisal and negative reaction is the more powerful effect.
- But if so, it would be maladaptive to consistently experience a positive emotion whenever one's predictions prove wrong.
- Perhaps the only important lessons for an organism to learn occur when a wrong prediction accompanies a negative appraisal of the outcome?

Contrastive Valence: Physiological Perspective

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- When we experience stress, it is typically accompanied by the release of endogenous opiates such as endorphins. These natural opiates produce an analgesic effect that reduces the experience of pain.
- The body appears to release opiates whenever we experience a negatively valenced emotion such as pain or fear.
- Suppose that a wild bear appeared and injured you. Immediately, analgesic opiates are released by the body to counteract the pain and allow you to continue to function. Now, suppose that it turned out that you weren't actually injured, but the opiates were released anyway. The net result is simply the opiate release—and the ensuing pleasant feelings.
- The physiological origin of contrastive valence might follow a path akin to this sequence of events.

Contrastive Valence: Other Arguments

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- The aesthetic experience of the “sublime” depends on an initial sensation of fear that is ultimately appraised as inconsequential. – *Essay on Human Understanding* by *John Locke.*
- Throughout history, sages have recognized that pleasure is enhanced by contrast: *happiness is not so much a state of being as it is a state of becoming*.
- Hunger is the best spice. – *Spartans*