

VR & Physiological Response

Task 1: Emotion & Physiology Observation Task

Exploring how emotional states influence physiological arousal using VR and Galvanic Skin Response (GSR)

Purpose of the Task:

Understanding the link between emotional experiences and physiological responses is a fundamental part of emotion research. Early theories such as the James–Lange Theory proposed that emotions arise because we perceive changes in our body. According to this view, we don't tremble because we're afraid, we feel afraid because we notice ourselves trembling. Physiological changes like increased heart rate or sweating are therefore central to the emotional experience.

Later models, such as Schachter and Singer's Two-Factor Theory, argue that emotion is the result of both physiological arousal and cognitive interpretation. For example, an elevated heart rate could mean fear, excitement, or anger, depending on the situation and how we interpret the arousal.

This task relates to research on non-verbal communication of emotion. Studies by Paul Ekman and colleagues demonstrated that emotions are often visible in facial expressions, body posture, and behaviour. Observers can often infer someone's emotional state from these cues, though accuracy varies widely. Together, these theories suggest that emotion is multi-layered, involving the body, mind, and behaviour. This task gives students the chance to watch these processes unfold in real time.

In this activity, you will explore how different emotional states produce changes in physiological arousal using VR and GSR.

Instructions:

1. Work in a group of three. One person will be the participant, the rest will be observers
2. The participant will wear the VR headset.
3. You will experience two VR scenarios designed to evoke contrasting emotions. You need to think about the emotions you want to evoke, and find scenarios to do this.
4. Observers should predict emotional responses, note behavioural cues, and predict the types of changes you would see in the GRS.
5. After each scenario, discuss the changes seen in the observation, and the predictions that you would see in the GSR.

Record Your Observations:

Use the space below to record predictions and results for both scenarios.

Task 2: Emotion Regulation Challenge

Testing whether you can regulate your physiological arousal during emotional VR experiences

Purpose of the Task:

Emotion regulation refers to the processes we use to influence which emotions we experience, how intense they are, and how we express them. One of the most influential frameworks is James Gross's Process Model of Emotion

Regulation, which identifies several regulation strategies, including:

- Reappraisal: Changing how you think about a situation (e.g., seeing a VR height scenario as "just a simulation").
- Suppression: Attempting to hide or inhibit emotional expressions.
- Attentional deployment: Shifting your focus away from the emotional stimulus.
- Response modulation: Using techniques such as deep breathing to calm the body.

Research consistently shows that reappraisal is one of the most effective strategies, reducing both emotional intensity and physiological arousal. Suppression, in contrast, tends to reduce outward expression but often increases physiological strain because the body remains activated.

This task also draws on psychophysiological research showing that emotional arousal can be influenced by both top-down (cognitive) and bottom-up (physiological) processes. For example, slow breathing directly reduces sympathetic activation, helping calm the nervous system.

Using VR enhances emotional engagement, which makes it an ideal tool for studying emotion regulation in a controlled yet immersive environment. Students can see directly how different strategies influence physiological markers like GSR.

This activity helps you understand how emotion regulation strategies influence physiological arousal during VR-based emotional experiences.

Instructions:

1. Take turns being the participant wearing the VR headset and GSR sensors.
2. Note your baseline GSR.
3. Experience an emotion-evoking VR scenario – you must think of the emotion that would have a big impact on your GSR response, and find scenarios to do this.
4. Choose a regulation strategy: breathing, self-talk, reappraisal, or distraction.
5. Try to reduce your GSR within 2 minutes.
6. Swap roles and compare strategies.

Your Results

Record which strategies were used and how effective they were.

Task 3: Mini Experimental Design Task

Design and test a simple emotion–behaviour experiment using VR.

Purpose of the Task

This task explores how emotions are expressed through behaviour and non-verbal cues, a central area of psychological research. Before physiological tools were widely used, psychologists relied on observable behaviour, such as posture, facial expression, movement, and vocal tone, to infer emotional states. This activity builds on key theories of emotion, communication, and experimental design.

Emotion Induction in Research:

Emotion researchers often use controlled methods—such as films, images, memory recall, or virtual reality—to reliably evoke emotional states for comparison. VR is especially valuable because it creates a highly immersive environment that feels realistic while allowing researchers to maintain full experimental control. This makes it ideal for observing naturalistic emotional reactions safely.

Arousal and Valence:

Many models describe emotions using two key dimensions:

- Arousal: high (e.g., fear, excitement) to low (e.g., calm, boredom)
- Valence: positive (pleasant) to negative (unpleasant)

This framework helps researchers predict how people might respond in different VR scenarios. For example, high arousal negative emotions (fear, anxiety) typically produce more noticeable behavioural reactions than low arousal states like relaxation.

Non-verbal Emotional Expression:

Much of what we communicate emotionally happens through body language, facial expressions, posture, vocal tone, and movement. Paul Ekman's research on universal facial expressions argued that certain emotional displays (like fear, anger, or joy) are biologically based and recognisable across cultures. Later work emphasised that emotional expression also varies with context, personality, and social learning.

In VR, emotional displays often become more pronounced because the user feels immersed, meaning that behavioural responses can closely mimic real-world reactions. In immersive VR, these emotional behaviours often become more pronounced, closely mirroring real world responses.

Independent and Dependent Variables:

In this task, you will act as researchers by designing a simple behavioural experiment.

- Independent Variable: the factor you manipulate (e.g., type of VR scenario)
- Dependent Variable: the outcome you measure (e.g., observed behaviours such as hesitation, approach, tension, vocal reactions)

Your Task

1. Create a research question. Think of a question you want to find out, and design a study to answer this question.
2. Form a hypothesis. Think about what you expect your results to be.
3. Select two VR conditions and think about the behavioural observation you expect to see
4. Run the experiment and record the behaviours
5. Summarise findings.

Your Experimental Plan

Use the space below to note your plan and results.

VR Behavioural Observation Checklist

Use this checklist to record visible emotional and behavioural responses during the VR scenario.

Group members:

Participant:

Observers:

VR Scenario:

Date/Time:

General Behavioural Indicators

Tick and/or describe any behaviours you observe.

Body Movement:

- ☐ Steps backward / avoidance
- ☐ Steps forward / approach
- ☐ Freezing / reduced movement
- ☐ Sudden movements (jerk, flinch, startle)
- ☐ Leaning forward
- ☐ Leaning back
- ☐ Turning body away from stimulus
- ☐ Fidgeting (hands/feet shifting)

Posture:

- ☐ Tense shoulders
- ☐ Relaxed posture
- ☐ Defensive posture (hunched, arms close to body)
- ☐ Open/expansive posture
- ☐ Stiff or rigid stance

Hand and Arm Behaviour:

- ☐ Hands raised defensively
- ☐ Reaching out
- ☐ Gripping controller tightly
- ☐ Relaxed hands
- ☐ Trembling / shaky hands

Vocal and Verbal Responses:

- ☐ Audible gasps
- ☐ Laughter
- ☐ Silence / holding breath
- ☐ Vocal hesitation (“uh...”, “wait...”)
- ☐ Nervous talking
- ☐ Calm talking
- ☐ Emotional outbursts (surprised shout, nervous giggle)

Head and Eye Behaviour:

(Eye direction may be inferred from head movements)

- ☐ Looking directly at key stimulus
- ☐ Avoiding looking at stimulus
- ☐ Rapid head turning
- ☐ Slow, cautious scanning
- ☐ Head lowered
- ☐ Head raised or stretched forward

Facial Expression Indicators:

(Observers record what they can see beneath the headset)

- ☐ Mouth tension
- ☐ Jaw drop (surprise)
- ☐ Smiling
- ☐ Frowning
- ☐ Tight lips
- ☐ Rapid breathing visible

Emotion-Linked Behavioural Cues

Tick and/or describe any behaviours you observe.

Indicators of Anxiety or Fear:

- ☐ Avoidance movements
- ☐ Freezing
- ☐ Hesitation
- ☐ Defensive posture
- ☐ Heightened startle response
- ☐ Vocal tension

Indicators of Excitement or Engagement:

- ☐ Leaning forward
- ☐ Quick, energetic movements
- ☐ Reaching out toward objects
- ☐ Laughter or enthusiastic speech

Indicators of Comfort / Calm:

- ☐ Slow movements
- ☐ Relaxed posture
- ☐ Steady breathing
- ☐ Open body language

Appraisal Indicators:

(These behaviours may suggest how the participant is interpreting the situation).

- ☐ “This feels real” behaviour (hesitation, caution)
- ☐ “This is safe” behaviour (exploration, playfulness)
- ☐ Task focus (checking environment carefully)
- ☐ Confusion / uncertainty
- ☐ Confidence / mastery of scene