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GCL'14 Course: Advanced Media and Game Studies

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Introduction of "Gamification as Behavioral Psychology"

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Topics

- Gamification

- Review of Behavioral Psychology
  - Historical View of Behaviorism and its Philosophy
  - Radical Behaviorism

- Applied Behavior Analysis (ABA) / Behavior Modification

Structure

- **Introduction**
  - Gamification as “The use of game design elements in non-game contexts” (Deterding et al. 2011).
  - Little is known of gamification from psychological, social or design perspective.
  - Behavioral psychology is a proven, valid, useful and interesting lens through we can investigate gamification.

- **A Gameful Life**
  - Jesse Schell (2010) and Jane McGonigal (2011) emphasized the importance of gamification for the future and it’s daily use.
  - Through deeper understanding of games, play and behavior of players, it is possible to motivate those players to behave in a certain way.
  - The core idea is that through modifying the environment and giving suitably motivating rewards, the behavior of players can be changed for their own benefit (or of their corporate masters)

- **The History and Philosophy of Behavioral Science**
  - Behaviorism tries to understand the interaction of an organism with it's environment (Hayes 1993)
  - Behavioral psychologist tries to investigate and replicate the behaviors of an organism and control them through control of the environment (Catania 1998)
  - Focus on the behavior of a person, rather than presumed inner state or intentions or some other common-sense-influenced model of behavior will lead to better results.

- **B. F. Skinner and Radical Behaviorism**
  - Burrhus Frederic Skinner build up the foundation of behavior analysis. He studied the behavior of animals among others with the Skinner Box.
  - Studies lead to definition of operant conditioning, where "consequences of behavior may 'feed back' into the organism and may change the probability that the behavior will occur again (Skinner 1953, 59)

- Skinner specified the operant behavioral unit as a three-term contingency consisting of an antecedent, a response and a consequence.
  - Positive reinforcement: Stimulus makes that behavior more likely to occur in that context in the future.
  - Negative reinforcement: Removing a stimulus makes that behavior more likely to occur in that context in the future.
  - Negative punishment: Removal of a stimulus makes that behavior less likely to occur.
  - Positive punishment: Addition of stimulus makes behavior less likely to occur again.
  - Reward is any stimulus that it will increase the likelihood of the behavior being repeated in the future.
  - Reinforcer is any stimulus that has been observed to increase the likelihood of the rewarded behavior being repeated in the future.

- **Scheduling Feedback**
  - The science part of behavior analysis lies in the scheduling of consequences.
  - The intensity of any stimulus as a reward or punishment changes over time through experience.
  - Term “schedule of reinforcement” describes important aspects that define the organism’s experience of reinforcements.
    - Interval of time that has passed since the last reinforcement
    - Ratio of work that it takes to earn a reinforcer
      - Fixed interval (FI): First response after an amount of time has elapsed is rewarded. Most behavior occurs minutes before the reinforcement.
      - Variable interval (VI): Similar as FI. Results in a steady but low rate of response.
      - Fixed ratio (FR): Reinforcement after every nth response. Produces a high, steady rate of responding with a pause after delivery of the reinforcer.
      - Variable ratio (VR): Similar to FR. Results in a high and steady rate of responding and is typically the most economical.

- **Evaluating the Effectiveness of Feedback**
  - Simple providing rewards is of little value unless there is a check to see if the behavior has changed as a consequence.
  - Analysing is necessary as there are very few stimuli that function as a reinforcer or punisher for all people at all times.
  - Herrnstein's matching law (Herrnstein 1961) is a mathematical way of determining which contingencies an organism finds most rewarding when multiple options are available. He found that the amount of time and work that was devoted was consistent with the rate at which that work was rewarded.
  - Through continually monitoring a player's behavior, a system can automatically calculate which rewards are eliciting the most work from that person.

- **Beyond the Skinner Box**
  - The behavioral processes measured through the Skinner Box can also be used for more complex behavior.
  - Bogost (2011): "Game mechanics are the operational parts of games that produce an experience of interest, enlightenment, terror, fascination, hope or any number of other sensations. Points and levels and the like are mere gestures that provide structure and measure progress within such a system.

- **Understanding Game Playing**
  - There are many ways of defining and analyzing game playing in terms of physiology, social behavior, immersion and other methologies.
  - Skinner suggests that, contrary to appearances, the behavior that solves a novel problem is not a brand new behavior or insight, but is simply a novel arrangement of already established behaviors (Skinner 1974)
  - Gingold (2005) proposes that the process of gradually learning simple behaviors and combining these as the game progresses explains the appeal of the game (Wario Ware, Nintendo, 2003)

- **Complexity and Challenge in Games**
  - However, there is no technical definition of game complexity in literature.
  - In recent paper, a behavioral definition of complexity was offered in terms of a concept called “derived rational responding” (Linehan, Roche and Stewart 2010, Linehan 2008)
  - One example of derived rational responding is a psychological phenomenon “stimulus equivalence” (Sidman 1971). A>B, B>C, A><C
  - Humans can derive novel stimulus relations between various indirectly related objects or occurences in the environment and this phenomenon cannot be accounted for in terms of mere response chaining. (Dymond & Roche, 2013)

- **Applied Behavior Analysis (old "Behavior Modification")**

    - The processes (measurement of behavior, analysis and feedback) are also the fundamental basis applied behavior analysis (Cooper et al. 2006)

    - Applied behavior analysis (ABA) is a general term for a range of behavioral methologies (interventions) that build upon the principles discovered by experimental behavioral psychology.

    - ABA programs are designed on the assumption that learning is maximized when high-performance targets are set and teaching is focused on the individual.

- **ABA Processes as Game Design Elements**
  - **Selecting and Defining Target Behaviors**
    - The behavioral goal of the participants must be judged by the observation of the behavior.
    - The designer must clearly define not only the ultimate goal of the program but also the series of steps that learners must reach.

  - **Measuring Behavior**
    - ABA programs typically measure not only accuracy (whether a target has been met or not) but also temporal aspects of performance (how long it took). This is called fluency measures, which is a more accurate method for juding the efficiency of behavior than simle measures of accuracy

  - **Recording Data**
    - Line charts are used to record and represent data. These celeration charts are designed to represent accelerating and decelerating frequencies of target behaviors.

- **Analyzing Behavior Change**
  - The key metric used by behavior analysts in monitoring success of learners is the change in their behavior over time.

- **Presenting Feedback**
  - A: Offering a variety of rewards for appropriate performance
  - B: Offering persistent negative consequences for poor performance, which the player will work to avoid
  - C: Directly presenting aversive consequences when the user does something that the service provider does not want him or her to do.

- **Criticisims of Behavioral Psychology**

  - **Complex Language and Cognition**
    - Humans were more complex than animals.
    - Animals and humans sometimes behave differently under schedules of reinforcement and the reason had to do with the ability to follow verbal rules (O'Hora and Barnes-Holmes 2001)
    - Only humans appear to be able to derive relations between stimuli (Hayes et al. 2001)

  - **Intrinsic Motivation**
    - Intrinsiv motivations are not observable, their explanation would seem to lie outside the explanatory power of behavior analysis.
    - Coherence and sense-making serve as continually available reinforcers for further responding (Hayes et al. 2001). Humans appear to be highly motivated to achieve coherance and make sense in every context.

  - **Questions of Values and Control**
    - Behavioral psychology often provokes unease due to its pragmatic focus on understanding and controlling behavior.

- **Conclusion**
  - Gamification, the process of using game design elements in non-game contexts, has rapidely emerged as tool in the development of online service and applications.
  - Entrepreneurs and businesses use it as a way of increasing engagement with product..
  - Specifically all games and all gamified products and services follow strict patterns of highly structured behavior management, feedback loops and reward mechanisms in order to effect changes in player behavior.
  - The key components of successful ABA programs in terms of game design including the key processes of defining target behaviors, measuring and recording behavioral data, analyzing behavior change and presenting appropriate personalized feedback.
  - With tools of ABA, designers have the ability to create measurably better-gamified experiences for benefit of their players.

Main Points:

- With tools of ABA, designers have the ability to create measurably better-gamified experiences for benefit of their players.

- Through modifiying the environment and giving suitably motivating rewards, the behavior of players can be changed for their own benefit (or that of their corporate masters)

- Real science of behavior analysis lies in the scheduling of the behavior consequences (FI, VI, FR, VR)

- Skinner suggests that, contrary to appearances, the behavior that solves a novel problem is not a brand new behavior or insight, but is simply a novel arrangement of already established behaviors

- Behavioral definition of complexity concept “derived rational responding”

- ABA programs are designed on the assumption that learning is maximized when high-performance targets are set and teaching is focused on the individual.

Results:

- Gamification, the process of using game design elements in non-game contexts has rapidely emerged as a tool in the development of online services and applications.

- Specifically all games and all gamified products and services follow strict patterns of highly structured behavior management, feedback loops and reward mechanisms in order to effect changes in player behavior.

- Discussion of key components of successful ABA programs in terms of game design including the key processes of defining target behaviors, measuring and recording behavioral data, analyzing behavior change and presenting appropriate personalized feedback.

- With tools of ABA, designers have the ability to create measurably better-gamified experiences for benefit of their players.

Relevance:

- Psychology should get a higher significance when a game designer decides to gamify his product.

- Gamification should be seen as a platform of learning and not as a tool to maximize profit.

- Through ABA game designers can create better products for the player that will get higher quality experiences through playing.