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Behaviour Modification and Learning through Digital Games

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Talk based on..

- Linehan, C., Kirman, B., Lawson, S. and Chan, G. Practical, Appropriate, Empirically Validated Guidelines for Designing Educational Games. In *Proceedings of CHI 2011* (2011).

structure

- Why use games for behaviour change?
- Integrating behaviour modification & games design – how?
- ABA – appropriate, practical, empirically validated

Why use games for behaviour change?

- Good question!
- Generally
  - motivational qualities,
  - Grabbing attention
  - Maintaining attention over long periods of time
- These predict success

Why use games for behaviour change?

- Games have been used successfully to deliver interventions (Baranowski, 2008)
- Health
  - Diet
  - Diabetes monitoring & control
  - Asthma
  - Exercise
  - Mental health

Why use games for behaviour change?

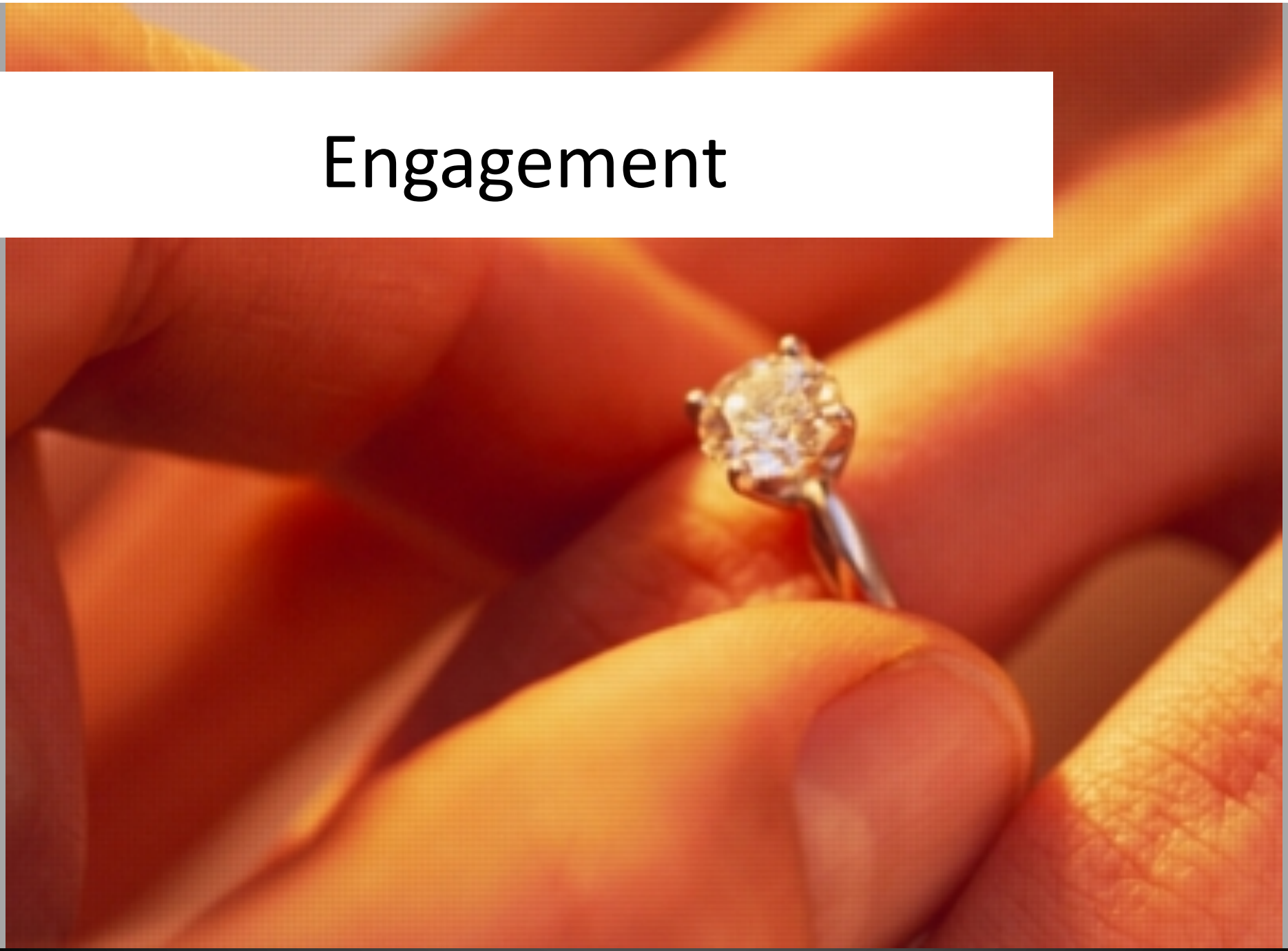
- Platforms such as smart phones & social networking sites make it easy
  - Casual games
  - Quick development
  - Short bursts of play
  - These kinds of games are also hugely popular

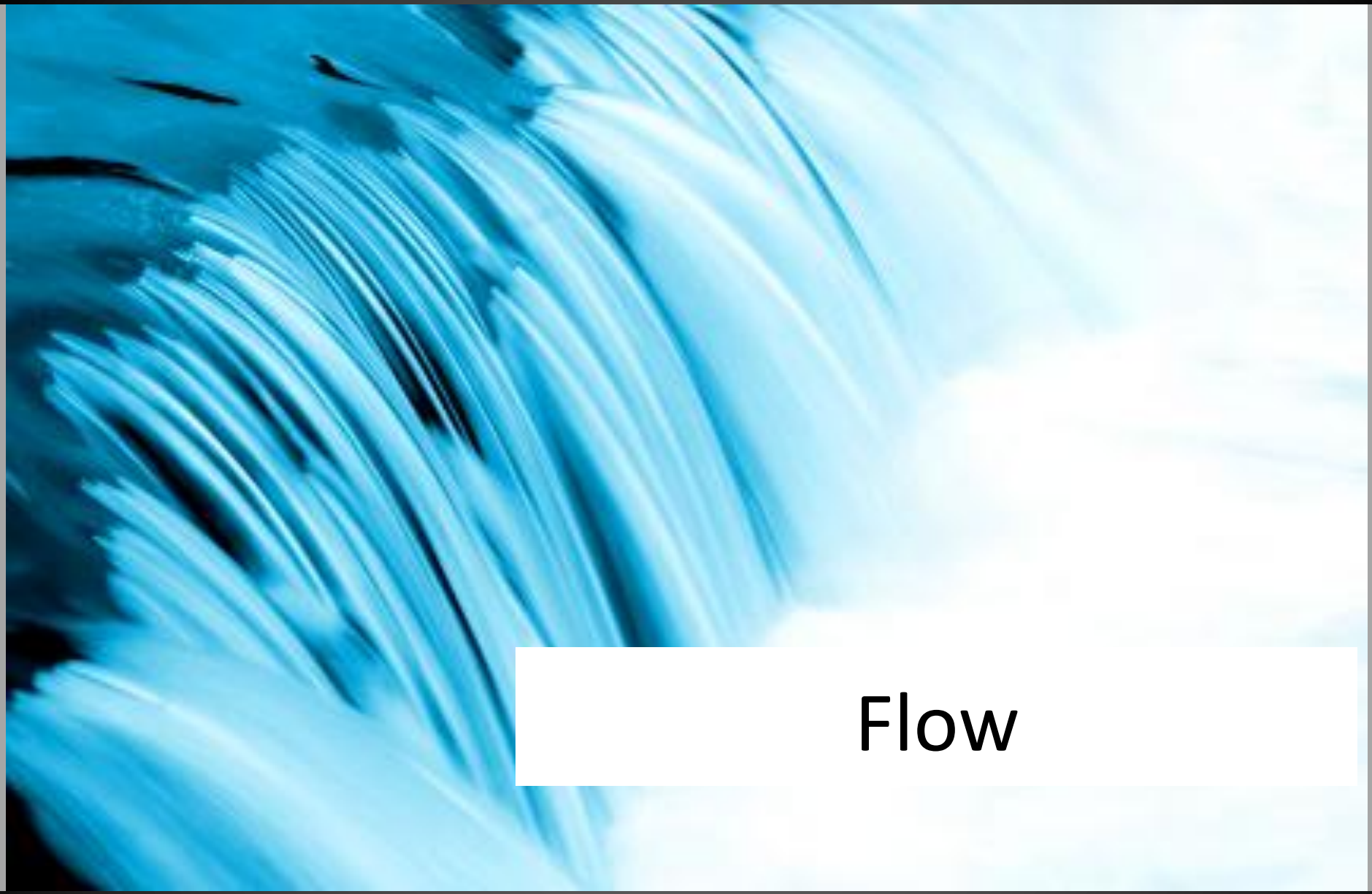
ANGRY BIRDS

Fantasy narrative

Fun

Engagement





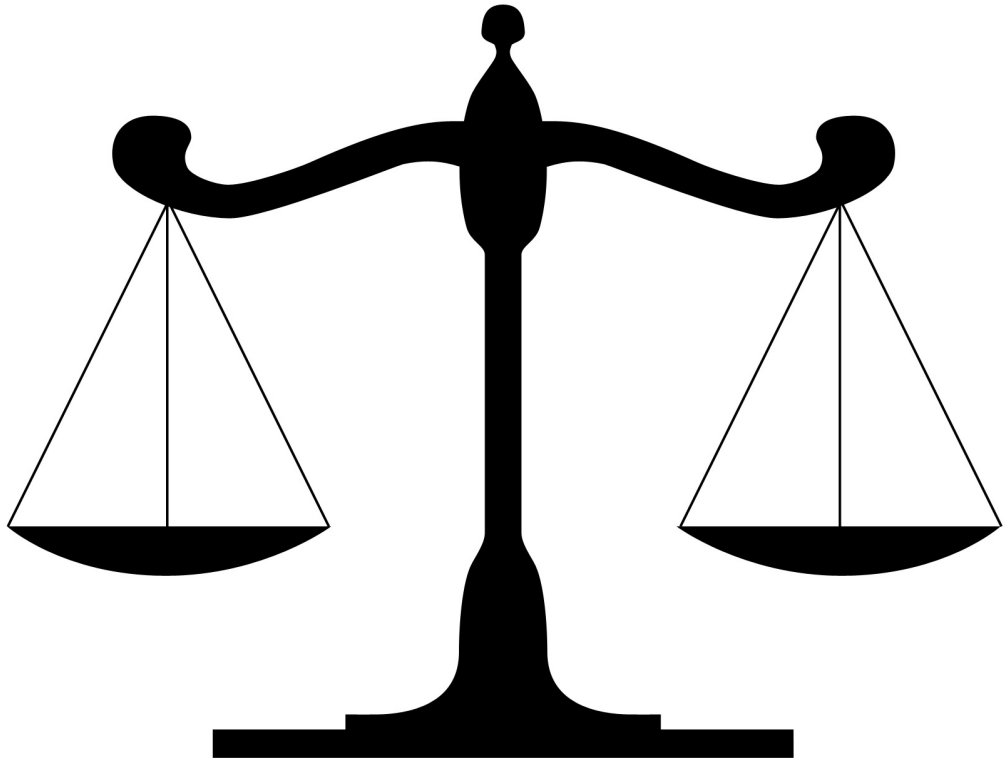
Flow

Feedback

Goals

Problem solving

Game Balance



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Interesting choices

Achievement

Practice

Discovery

vity

Experience

Meta-learning

Why use games for behaviour change?

- When games are designed to educate, to train, or to modify the behaviour of players….
- They should work
- We should should be able to make a case in advance that **they will work**.
- We need a process! We need to know HOW they work

structure

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Integrating games design and behaviour modification

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- Games are fun
- Behaviour change is difficult
- Combining the two should make behaviour change fun!

- OR…….

Integrating games design and behaviour modification

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- More likely……
- …make really difficult games.
- If it's not fun or interesting, there's no point in making it a game.

- Can we reconcile this problem?

Integrating games design and behaviour modification

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- Can it be done?
- It has already been done! By Entertainment Games Designers!
- But games only teach how to jump over chasms, hack zombies, murder prostitutes, rescue princesses etc.
- We must understand the **structure** of games & use this in teaching

How do games motivate?

- Short, medium and long-term goals
- Players must act to reach those goals
- Immediate, specific feedback
- Complex system of rewards
- Long complex tasks broken into short, simple tasks
- These are trained individually then chained together
- Mastery criteria

Integrating games design and behaviour modification

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- Intrinsic learning (Habgood, 2007)
- The game goals and the intervention goals are the same thing.
- Your success in the game should be dependent on the behaviour you are modifying.
- For example, Nike Plus games

structure

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ABA

- ABA teaching
  - Typically one-to-one
  - Teacher as coach
  - High performance targets
  - Repetition
  - Quantitative
  - Specific timely feedback
  - ~90% passing criterion
- Sound familiar? It's very appropriate

The methods through which games designers motivate & engage players are very similar to the methods through which ABA teaches / coaches / modifies behaviour.

ABA

- **Also have:**
  - Short, medium and long-term goals
  - Must act to reach those goals
  - Immediate, specific feedback
  - Complex system of rewards
  - Long complex tasks broken into short, simple tasks
  - These are trained individually then chained together
  - Mastery criteria

ABA

- **Empirically validated:**
- Successful wherever used
  - University, secondary, primary, driver training, special populations.
  - Early intervention for children with autistic spectrum disorders.
- Practical:
  - ideal for machine implementation
  - Quantitative; algorithmic

Structure

- Why use games for behaviour change?
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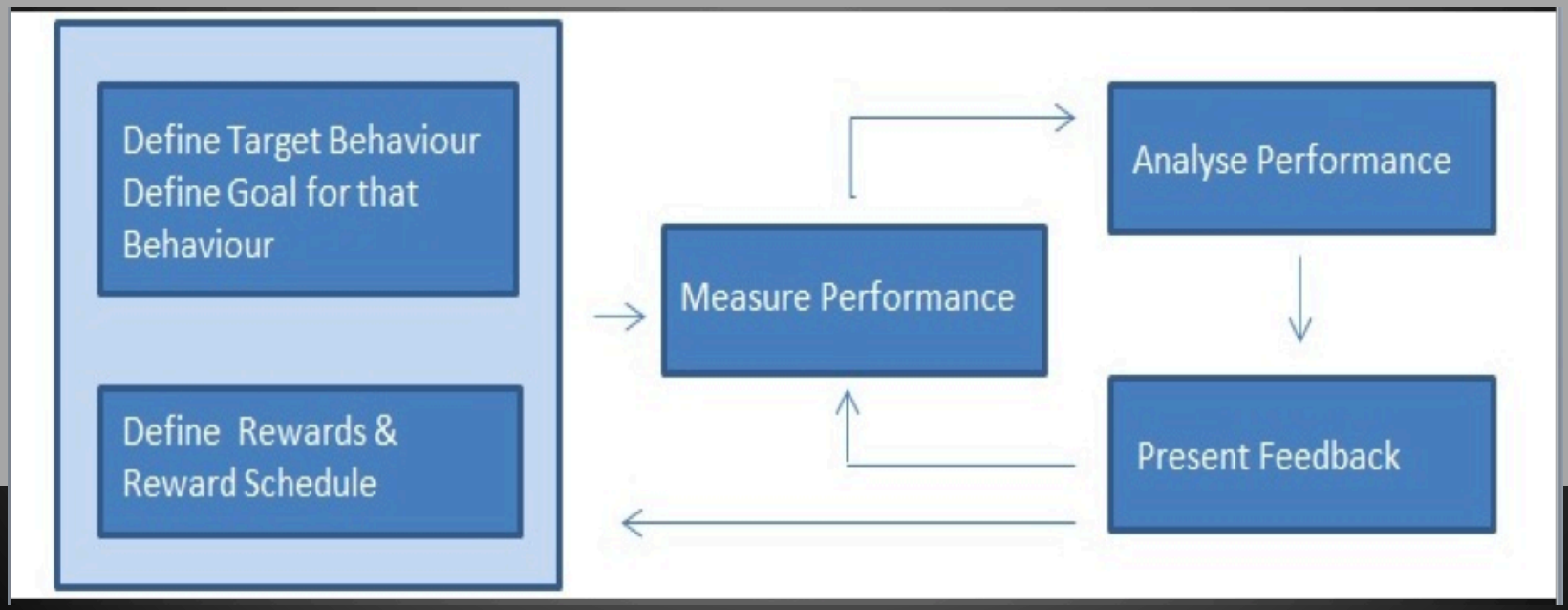
ABA

1. Defining and measuring behaviour
2. Recording and analysing behaviour change
3. Presenting corrective feedback
4. Dynamically adapting to student performance



1. Defining & Measuring

- **Define:**
  - The target behaviour must be clear, *observable,* quantitative
  - Intrinsic learning
  - Break it into simplest components
  - Hierarchy of goals

- **Measuring**:
  - Measurement is an ongoing process in ABA
  - Synchronous or asynchronous gameplay?
  - Self-report or objective?

2. Recording & Analysing

- **Recording:**
  - Everything is recorded!
  - big benefit of games to ABA

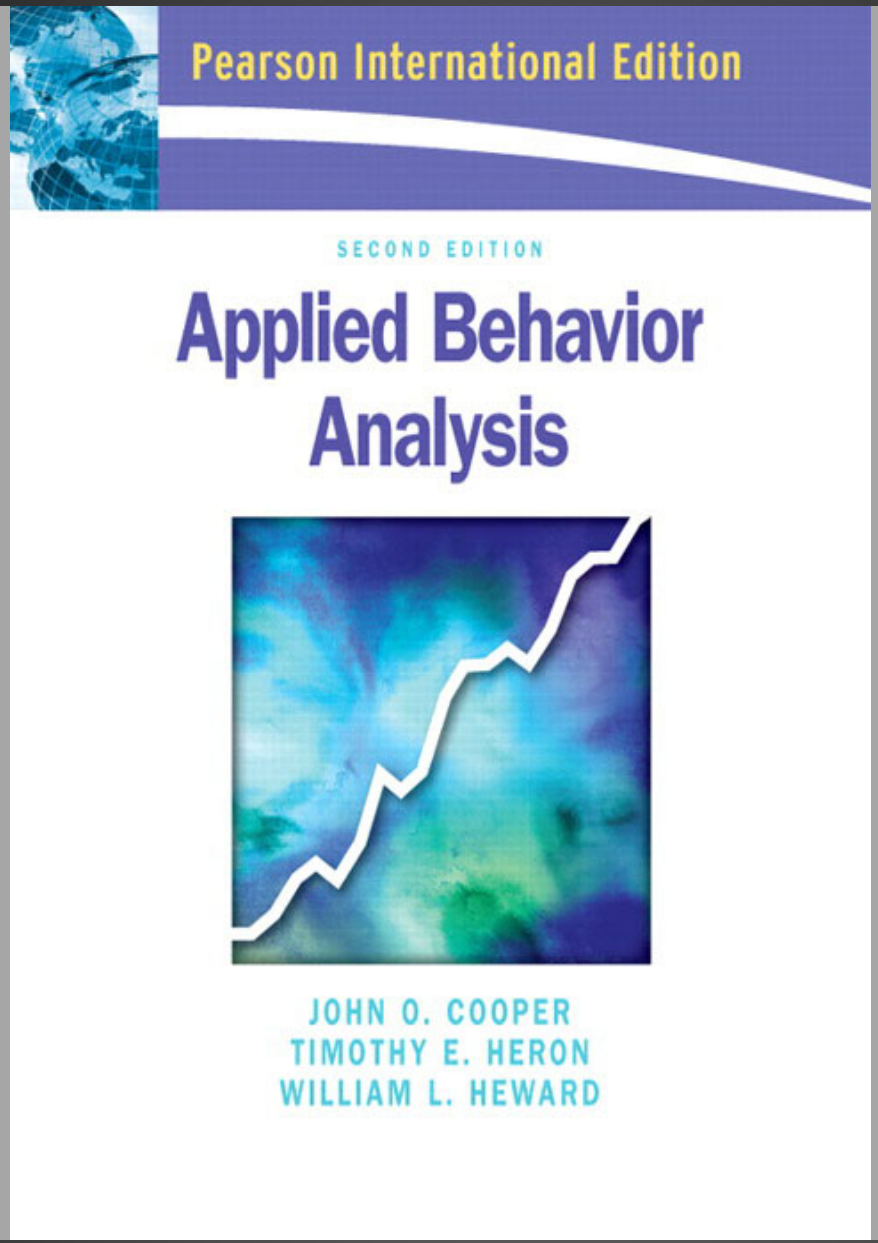
- **Analyse:**
  - *change* in behaviour
  - Accuracy is dependent on how well behaviour has been defined, measured and recorded

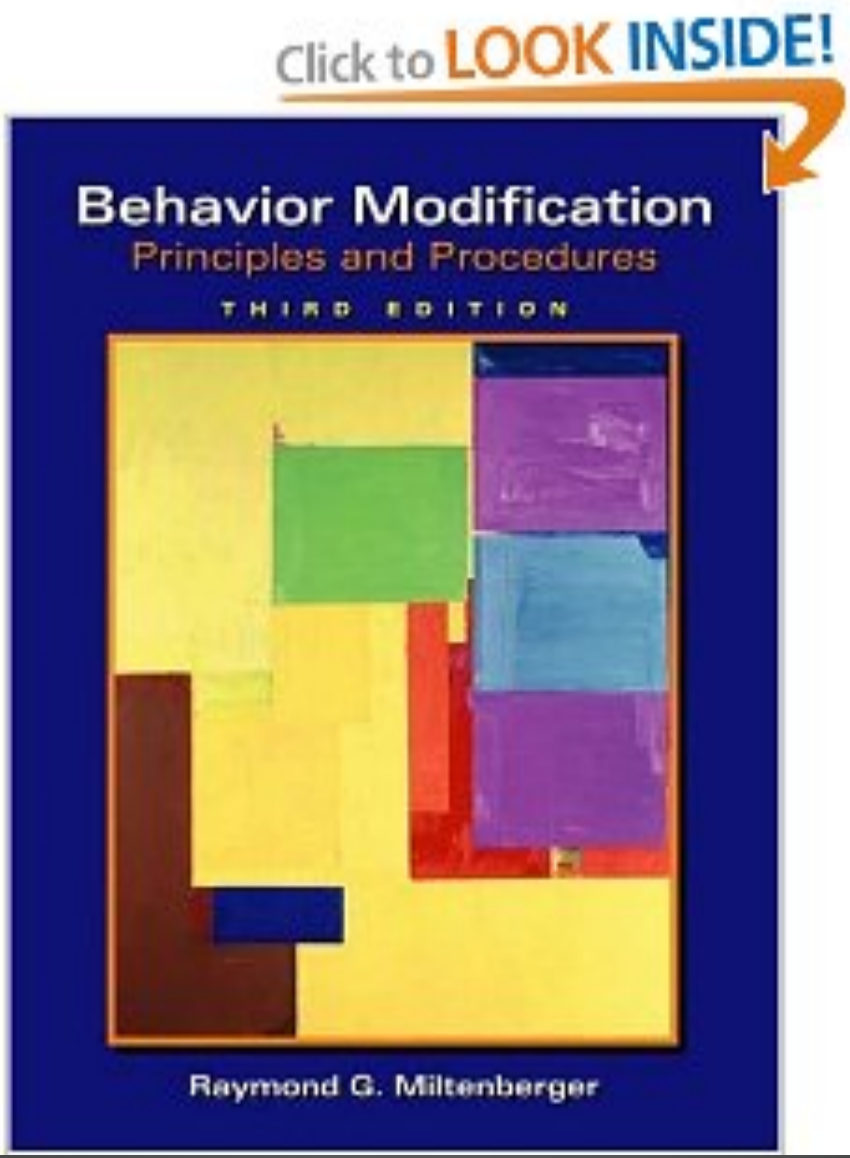
3. Corrective feedback

- **Operant Conditioning**
  - Importance of consequences
  - Reinforcement and punishment as appropriate
  - *Scheduling* rewards and punishment
  - Huge amount of evidence on how this should be done

4. Dynamically adapting

- **Challenges should be appropriate to the learner / player**
  - Balance / pacing
  - ABA has developed algorithms that deal with this
- **Evaluating effectiveness of feedback**
  - All ‘rewards’ are not reinforcing
  - There are mathematical ways of evaluating the effect that rewards are having on player behaviour


Pearson International Edition
SECOND EDITION
Applied Behavior Analysis
JOHN O. COOPER
TIMOTHY E. HERON
WILLIAM L. HEWARD


Click to LOOK INSIDE!
Behavior Modification
Principles and Procedures
THIRD EDITION
Raymond G. Miltenberger

summary

- Games appear promising for behaviour change – if we understand how games motivate & find appropriate ways to integrate
- The way games teach is very very similar to the way ABA teaches – i.e. appropriate
- ABA has tonnes of freely available research on how to put successful programmes together
- Let's use that to make games!

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