ALION
SCIENCE AND TECHNOLOGY

What Can Game Designers Learn from Serious Games?

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SIEGE Game Conference, Atlanta 2011

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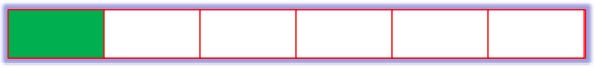
PART 1

Introduction

"Greatness and nearsightedness are incompatible." – Pink *(6)*



My Goal

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- Convince you:
  - That game designers can learn a lot from serious games
  - That there is a science to making good games
  - Game design and the science of learning are closer than we think
- But first…
  - What is a serious game?

Goal of Serious Games

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Learning Theory

Game Design

Awesome!

The Risk

6

- 'Academizing' the fun *(18)*
  - "It is possible to design a game that is the WORST of both worlds – a boring game that makes use of ineffective teaching methods." - Clint Bowers *(25)*
- The Solution
  - Understand both
    - Game design
    - The science of learning
- The Example...

Damage Control Trainer

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- Customer
  - US Navy, Recruit Training Command
  - 40,000 Navy recruits/year
- Goal
  - Improve performance
    - Communication
    - Navigation
    - Basic damage control

Project Team

8

- Raytheon-BBN – prime
- Alion – game & engine development
- IDSI – instructional design
- I.D.E.A.S – story and audio
- UCF – studies and cut scenes
- Sponsored by
  - Office of Naval Research

Street Cred

9

- Results
  - 50-80% improvement in performance
    - 1 hour playtime
- Awards
  - Best In Business, I/ITSEC 2009
    - Serious Games Challenge
  - Outstanding Training Initiatives
    - Training Magazine, 2010
  - Outstanding Achievement in Modeling and Simulation
    - National Training and Simulation Association (NTSA) 2010

Demo Time!

10

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PART 2

Game Design

“Being a professional is doing
what you love to do,
on the days you don’t feel like doing it.”
– ‘Dr’ Julius Irving

Game Techniques (30)

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1. Flow
2. Feedback
3. Simplicity
4. Choice
5. Immersion & Engagement
6. Practice
7. Fun

1 – Flow #1

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- The optimal human experience
- Complete focus – zen like
- Time becomes distorted
- The ‘state in which people are so involved in an activity that nothing else seems to matter’ *(8)*
  - Mihaly Csikszentmihalyi

- *(Refs: 5, 6, 7, 8, 9, 11, 15, 19, 20, 23, 26)*

Flow Matters!

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- It is:
  - The essence of games!
    - It is why we play
  - Intrinsically **motivating**
  - A “magnet for learning” *(9)*
  - **Pleasurable**

How to Create Flow?

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- There are four conditions for Flow:

Clear Task	• Understand what must be done
Feedback	• How we perceive progress • What succeeds/fails • Usually immediate
Attainable, Balanced Goal	• Goal is challenging • But within abilities • And not overly long
Concentration / Focus	• Lack of distractions • Can fully attend to task

The Flow Channel

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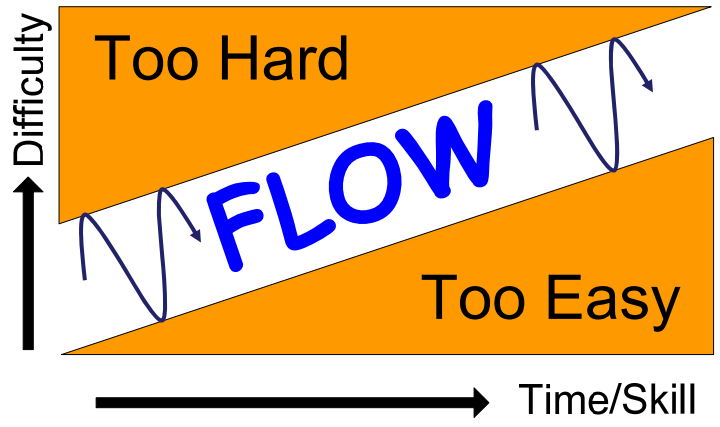


Flow creates a cycle of increasing learning

2 - **Feedback**

- Two Types *(30)*
- Type One - short term
  - Task completion
  - Progress
  - Immediate

  - Natural consequences

Sims 3

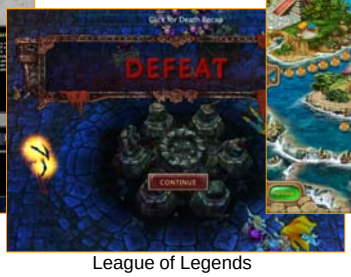
Damage Control Trainer

Feedback in Games

- Type two – holistic
  - Repetition - play again
  - Player development
  - Narrative progression
  - 'Meta' growth

Everquest 2

Damage Control Trainer



League of Legends

Royal Envoy

3 - Simplicity

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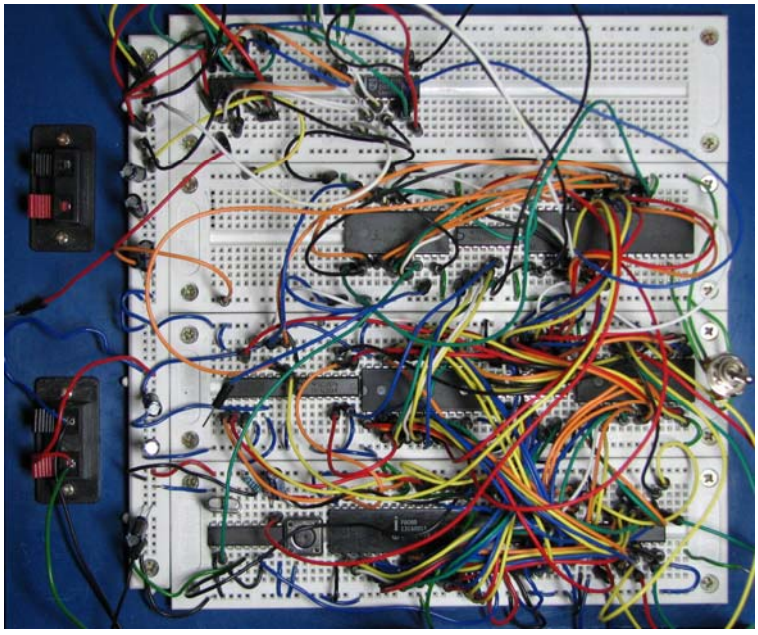

Simplicity

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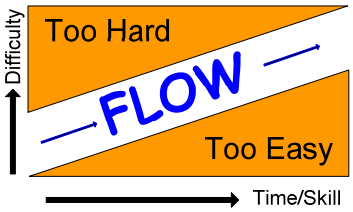
- Games simplify the world to
  - "goals and rules for action" – Csikszentmihalyi *(8)*
- Games offer 'transcendence':
  - "the player is more powerful in the game world than they are in the real world." – Schell *(11)*
- Game design wisdom:
  - 'Your garden is not complete until there's nothing else you can remove.' –
    - Will Wright *(26)*

Simplicity *(26,30)*

- Good Interfaces are Simple
  - Highlight goals
  - Provide clear feedback
  - Seem 'invisible'

Tiny Wings

- Promote Flow
  - Avoid cognitive overload
  - Balance difficulty
  - Don't distract



4 - Choice *(26,30)*

- **Choice**
  - Game play IS choice
  - Games are 'a series of interesting and meaningful choices' – Sid Meier
- But wait! Not so fast!
  - There are some big 'Buts!'

Paradox of Choice

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- Barry Schwartz *(7)*
  - Some choice is good
    - But too much choice is bad!

  - "As the number of choices grows … we become overloaded. At this point, choice … debilitates." *(7)*

Paradox of Choice *(26,30)*

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- Three problems:
  1) Increases difficulty (A LOT)
     - Option paralysis
     - Postpone decisions
     - Increases cognitive load
  2) Leads to 'worse' decisions (less accurate)
     - People are not good at comparing
     - We simplify the criteria → random
     - Hard to correlate feedback
  3) Adds regret & sense of 'loss'

More Choice

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- The Result?
  - Breaks flow
    - Too Hard.
    - Feedback loop gets confused.
    - Distracts us
  - Decreases **motivation** to play!
- Design Guidelines
  - Less > More -- Limit # of options
  - Spread decisions out over time
  - Simplicity!!

Cost of Choices

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- Opportunity Cost (Buchanan) *(10)*
  - Cost includes
    - The value of the option
    - PLUS the cost of missed opportunities
  - Ex: Cost of this session is
    - The value of this talk
    - PLUS you missed other talks!
- Thank you for attending!
- The Impact *(10, 7, 30)*
  - Breaks Flow!
    - Increases difficulty
    - Adds distractions

5-Immersion and Engagement *(24)* 27

- Immersion ← Passive
  - Becoming engrossed in a story
  - **Positive feelings**
  - Passive consumption of material
- Engagement ← Active
  - Working to solve a puzzle
  - Trying to apply an idea
  - Actively thinking - increases **motivation**

Games Use Both! 28

- Games = Immersion + Engagement
  - Creates **intensity**!

Immersion

Red Dead Redemption

Engagement

7 Little Words

6 - **Practice**

29

- This is obvious…
  - I hope (26,30)
- Games use practice to promote mastery
- Games encourage replay
- Games use failure
  - With games, "failure is a part of the process that leads to success" – Beck *(13)*
- Caution – don't break flow! *(27)*
  - Excessive practice – boredom
  - Instant death
  - Long recoveries

Repetition… Again…

30

- Practice
  - Games encourage replay
- Example
  - Closing doors. Over…
    - And over
      - And over …
      - Until …
  - Transference!
- Beware of:
  - Repetition without learning *(26)*
    - Ex: What's on a Penny?

7 - Fun

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- ‘Fun’ is hard to define
  - But it matters
- Includes (26,30)
  - Immersion
  - Engagement
  - Satisfaction
  - Fiero (triumph)
  - The joy of doing

→ **Positive Feelings**

- Fun is “Another word for learning” (12)

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The Psychology Minute

Carol Dweck

Mindset *(32)*

#2

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The 'Natural'

'Gifted'

'Smart'

It's a Trap, Luke!

FIXED MINDSET

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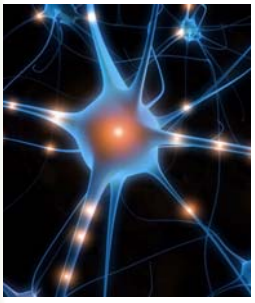
The Reality!

"With Games, Learning is the Drug" - Koster

Growth Mindset

Effort + Learning == Success
We never stop learning
Failed? Try again!

Learning is Fun!



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PART 3

The Science of Learning

“Teaching is a wonderful way to learn.”
Carol Dweck *(32)*

What Improves Learning?

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Laws of Learning

- **Motivation**
- **Feedback**
- **Practice**
- **Positive Feelings**
- **Intensity**
- **Choice**

(refs – 1,2,3,4,5,6,20,21,22,25,31)

Motivation and Feedback

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- Motivation
  - "Quite simply, motivated students learn more than unmotivated students"- US Navy
  - Increases involvement with learning, retention, and student performance
- Feedback
  - Is how we perceive progress
  - Correlates actions to outcomes

Practice and Feelings

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- Practice
  - "A student learns by applying what he has been taught." – USAF
  - Time on task creates opportunities to learn
- Positive Feelings
  - Learning is stronger with pleasant emotions
  - Keeps students engaged

Intensity and Choice

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- Intensity
  - Learning is increased with intensity
    - Positive or negative
  - Active involvement > Passive learning
- Choice
  - Choice affects motivation
  - Coercion and external rewards decrease learning
  - Is complex (aka Paradox of Choice)

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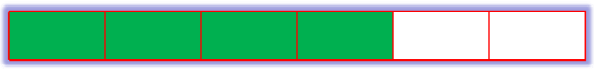
PART 4

Why Games Work

"It is inconceivable that people are motivated solely or even mainly by external incentives" – Bruno Frey *(19)*



The Question

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"Why Do Games Work?"

- It's not just art
  - It's not mystical
    - It's not a secret

The Answer

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- **Games work for the same reasons that learning works** (30)

Motivation

Feedback

Practice

Positive Feelings

Intensity

Choice

The Point!

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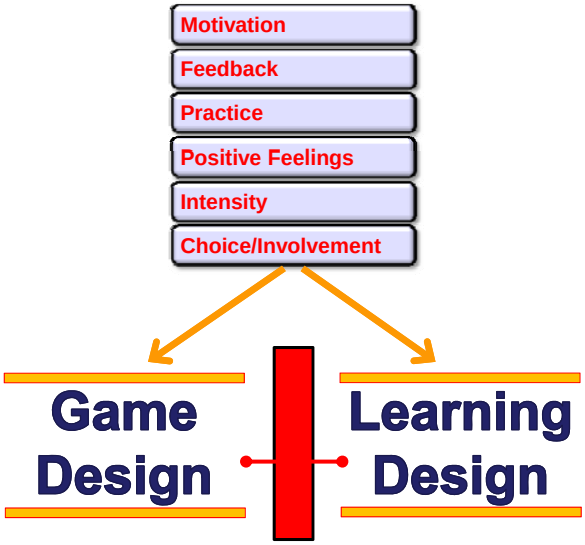

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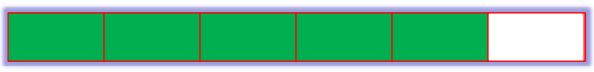
PART 5

More Lessons

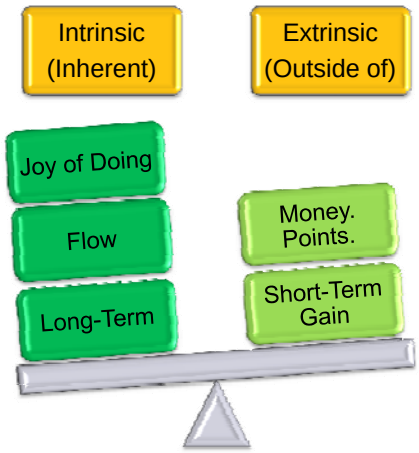
Moderation in All Things



Motivation *(4, 5, 6, 15, 19, 20)*

45

- 2 types
  - Intrinsic
  - Extrinsic



- **Intrinsic > Extrinsic**
  - Increases creativity
  - Increases **long-term** interest!
  - Increases motivation

Which is Which?

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- It's not so simple…
  - Maybe we enjoy earning external rewards
    - And so strive for them - intrinsic
    - Operant conditioning can be motivating
  - Maybe the points are feedback
    - Shows progress - affects intrinsic motivation
- Which is which?
  - We need a rule of thumb…

The Issue is Control

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- Beware control *(5, 6, 15)*
  - Rewards that attempt to control behavior have negative consequences
    - Danger - people perceive this intuitively
  - Acknowledgement (w/o control) is okay
  - Humans need autonomy (some is enough)

- This REALLY matters
  - "Try to encourage a kid to learn math by paying her for each work-book page she completes – and she'll almost certainly become more diligent in the short term and lose interest in math in the long term." – Pink *(6)*

my game

my game

Just for Fun

48

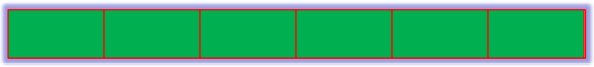
- Headphones are 'teh debil!'

- Cutscenes do not matter!
  - UCF studied this extensively
  - They are expensive to make - $$$$$

PART 6

Conclusion

“Optimize years of life per program”
Jonathan Blow



7 Game Techniques

1. Flow #1
2. Feedback
3. Simplicity
4. Choice
5. Immersion and Engagement
6. Practice
7. Fun

Why Games Work

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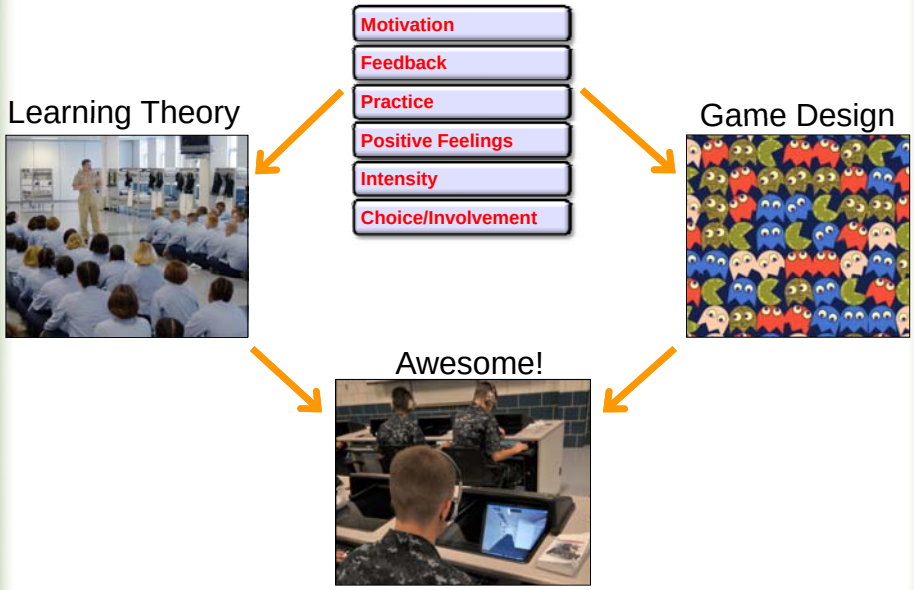

Growth Mindset #2

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- Never stop learning
- Don't be 'smart'
  - Work harder
  - Learn more!

THE END

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Thank you for attending!
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  - Everquest 2 (Sony)
  - Royal Envoy (Playrix)
  - League of Legends (Riot)
  - Tiny Wings (Andreas Illiger)
  - Red Dead Redemption (Rockstar Games)
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  - Green Pac-Man (Patrick Hoesly)
  - Electric me with more lazers (navfy)
  - Red Dead Redemption (Gamer Gourmet)
  - Magic of the holidays (jmtimages)
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  - I will meet you in the garden gate (bitzcelt)