

Video Games, Learning, & Unintended Consequences

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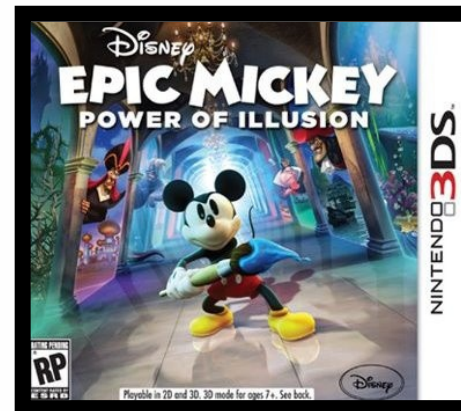


GAME DEVELOPERS CONFERENCE™ NEXT
FEATURING APP DEVELOPERS CONFERENCE™
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Background

Ara Shirinian

❖ Game Designer Professionally Since 2004



❖ Adjunct Faculty at ASU, School of Computing, Informatics, and Decision Systems Engineering



The Value of Learning in Video Games

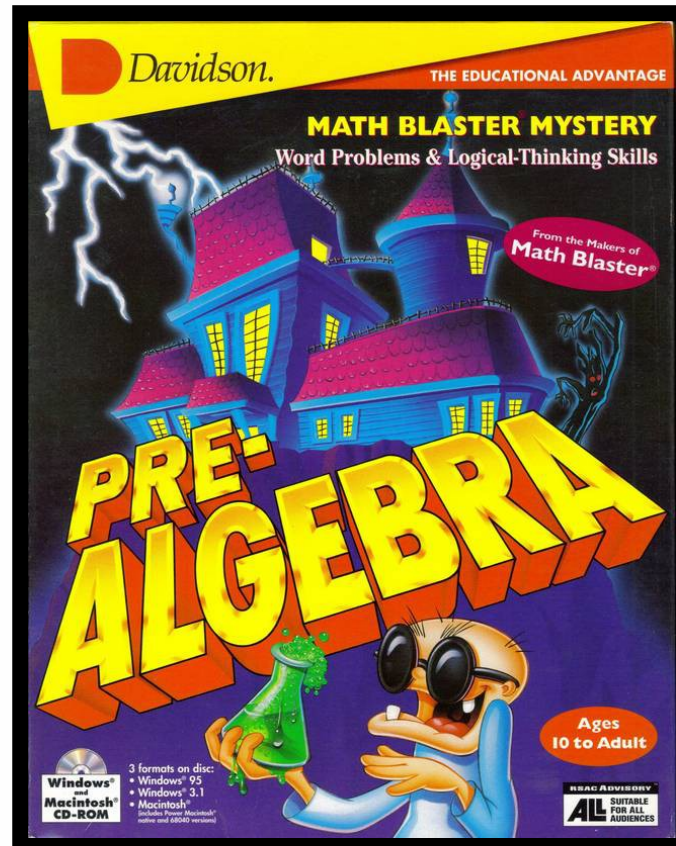
"Pleasure is the basis of learning for humans and learning is, like sex and eating, deeply pleasurable for human beings. Learning is a basic drive for humans... These pleasures are connected to control, agency, and meaningfulness."

(Gee, James, Learning by Design: Good video games as learning machines; E-Learning, Vol. 2, No. 1 (2005))



The Value of Learning in Video Games

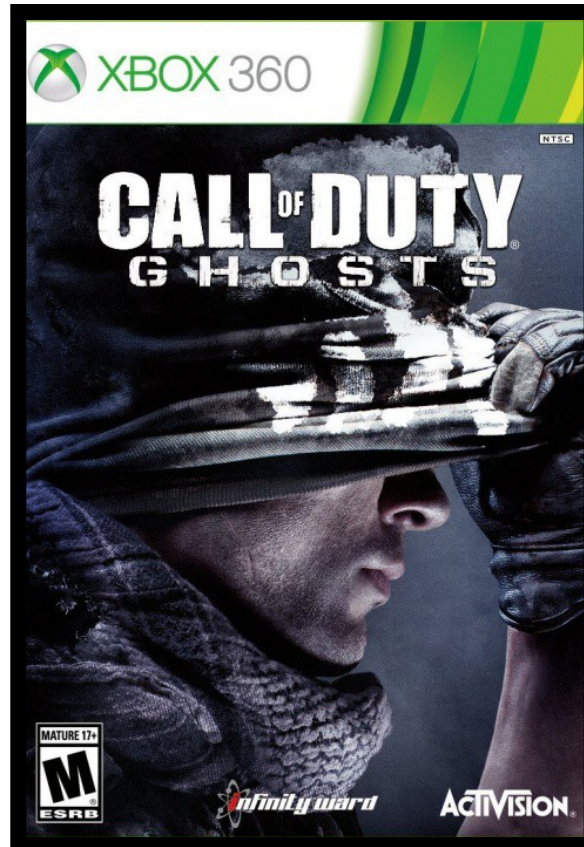
Learning != School





The Value of Learning in Video Games

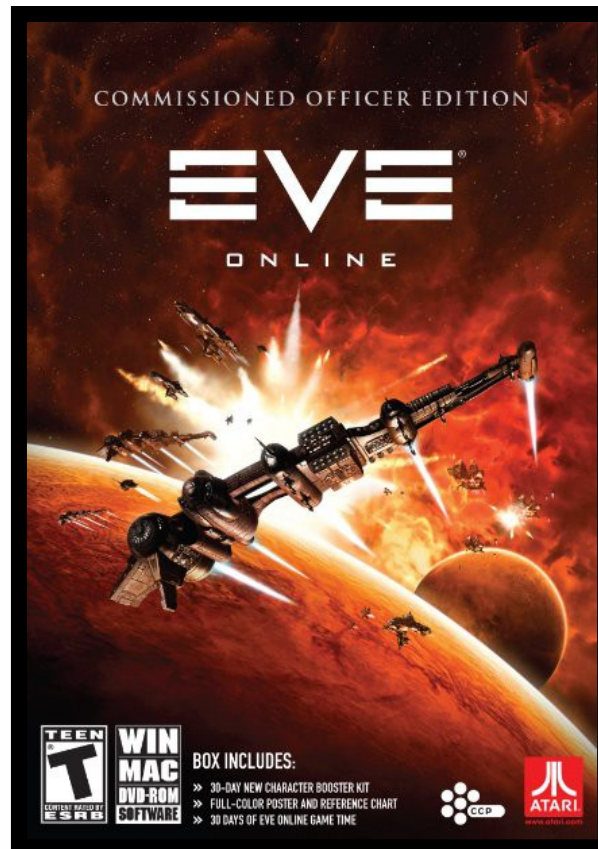
Learning != School





The Value of Learning in Video Games

Learning != School





The Value of Learning in Video Games

Learning Competency, Experiencing Autonomy Through Playing + Practice

- ❖ Basketball, Chess, Street Fighter, Rock Climbing, Rock Band.





The Value of Learning in Video Games

Feelings of Competency, Autonomy Boost Intrinsic Motivation

- ❖ cognitive evaluation theory (CET)

(Deci, E. L. & Ryan, R. M., The Empirical exploration of intrinsic motivational processes (1980); Intrinsic motivation and self-determination in human behavior (1985))

- ❖ Competency: "need for challenge and feelings of effectance."

- ❖ Autonomy: "sense of volition/willingness to do a task."

- ❖ Intrinsic Motivation: "motivation based in the inherent satisfactions derived from action."

(Ryan, R. M. & Deci, E. L., Intrinsic and extrinsic motivations: Classic definitions and new directions (2000))



The Value of Learning in Video Games

Games That Make You Feel Autonomy Boost Intrinsic Motivation

- "Provisions for choice,
- use of rewards as informational feedback (rather than to control behavior)
- and non controlling instructions

have all been shown to enhance autonomy and, in turn, intrinsic motivation."

(Ryan, R. M., Rigby, C. S., Przybylski, A., The Motivational Pull of Video Games: A Self-Determination Theory Approach (2006))



The Value of Learning in Video Games

Games That Teach You Competence Boost Intrinsic Motivation

"factors that enhance the experience of competence, such as:

- opportunities to acquire new skills or abilities,
- to be optimally challenged, or
- to receive positive feedback

enhance perceived competence, and, in turn, intrinsic motivation."

(Ryan, R. M., Rigby, C. S., Przybylski, A., The Motivational Pull of Video Games: A Self-Determination Theory Approach (2006))



The Value of Learning in Video Games

Intrinsic Motivation is Really Good Because...

- ❖ Players Want to Play More Often.
- ❖ Players are More Deeply Engaged.
- ❖ More Evangelizing From Players.
- ❖ Players are Actually Improving Themselves by Learning.



The Value of Learning in Video Games

More Positive Psychological Effects

"...autonomy and competence predicted

- greater enjoyment and
- sense of presence and
- increased preference for future play.

When individuals played games where they experienced competence satisfactions they also experienced

- increased vitality,
- self-esteem, and
- positive affect."

(Ryan, R. M., Rigby, C. S., Przybylski, A., The Motivational Pull of Video Games: A Self-Determination Theory Approach (2006) p.357)



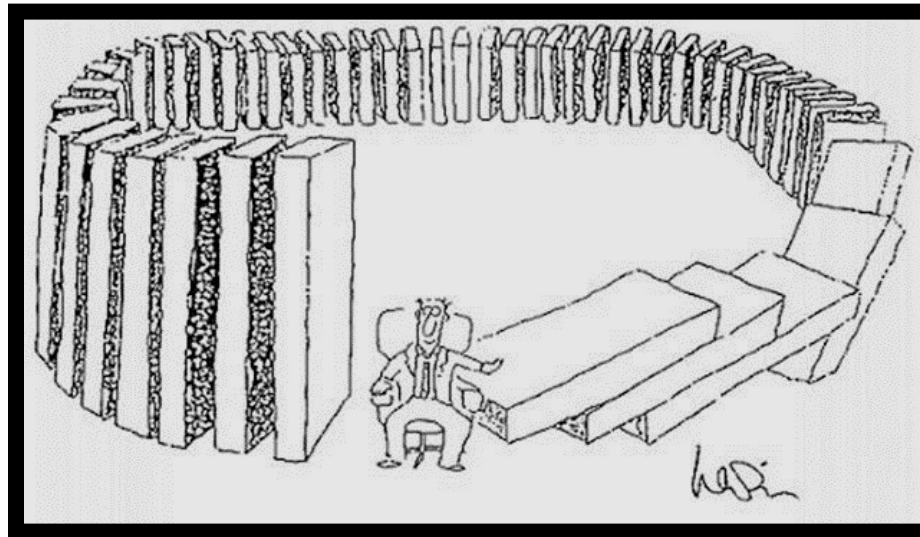
The Value of Learning in Video Games

Learning through Video Games is Very
Powerful, but...



The Value of Learning in Video Games

Some Of Our Practices Unintentionally
Damage The Learning Experience





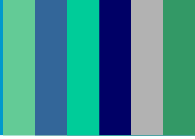
The Value of Learning in Video Games

Some Of Our Practices Unintentionally Damage The Learning Experience

1. Accessibility Measures
 2. Stat Simulation Systems
 3. "Rubber-banding" Systems
 4. Monetization via Progression Tapering
- ❖ Hope to show subtleties of these trades, not value judgments.



1. Improving Accessibility

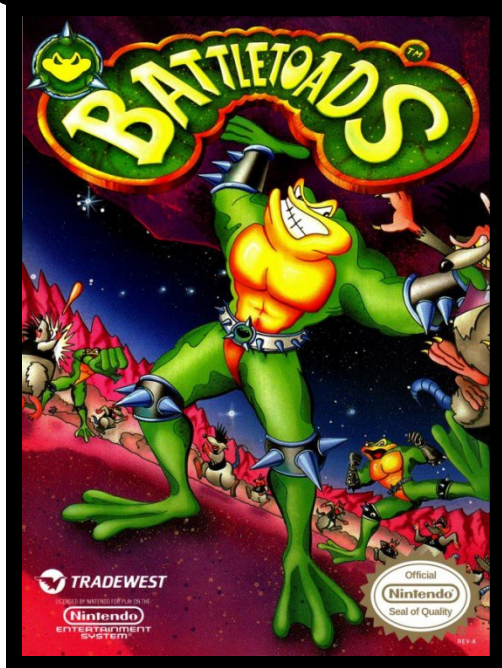




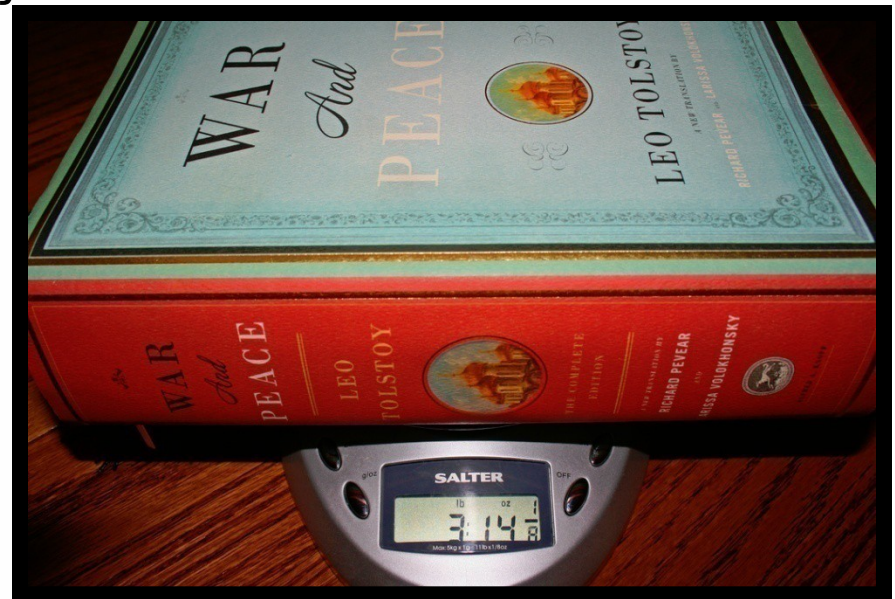
1. Improving Accessibility

Unique properties of Games vs. other media:

- ❖ Games challenge you in ways Books, Movies, Music can't.



VS.





1. Improving Accessibility

Unique properties of Games vs. other media:

- ❖ Games challenge you in ways Books, Movies, Music can't.
- ❖ You won't buy a game you don't think you can play.
- ❖ Accessibility bounds audience size.
- ❖ More accessibility = more potential customers = more sales.



1. Improving Accessibility

Circumstances Encourage Quick Solutions

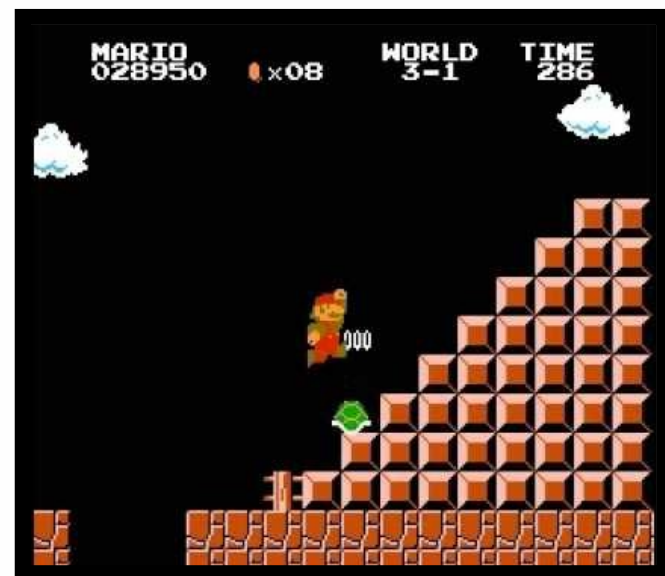
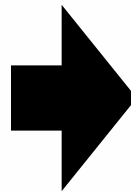
- ❖ Often Accessibility Problems Discovered Late.
- ❖ More Original Design → Increased Risk of Later Discovery.
- ❖ Highly Constrained Time is Par.

→ Common Quick Solution is Barrier Removal.

1. Improving Accessibility

Barrier Removal

- ❖ Subtraction of elements identified to limit player progress.





1. Improving Accessibility

Barrier Removal

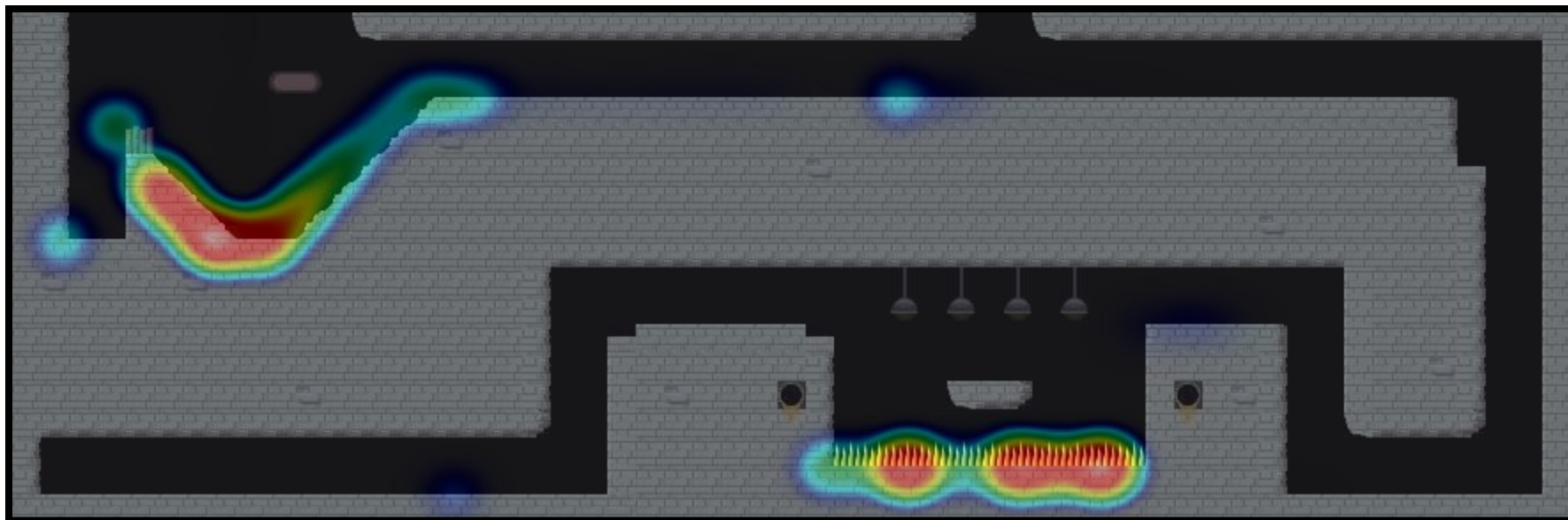
- ❖ Subtraction of elements identified to limit player progress.
- ❖ Common because it's cheap, fast & produces obvious metric results.
- ❖ Watch Out for those Metrics.



1. Improving Accessibility

The Danger of Metrics

- ❖ Metrics will tell you What, Where, How Much, but not Why.





1. Improving Accessibility

Development Story: *The Red Star* (2004, 360, PS2)





1. Improving Accessibility

Level 1 Evolved from E3 Demo, Too Hard

- ❖ Design Consideration: Infinite Player Health in Level 1?
- ❖ Consequence: More players reach Level 2, but do so without having learned as much, and are now unprepared for Level 2's challenge.
- ❖ Progression funnel only locally improved, not globally.



1. Improving Accessibility

The Red Star: Barrier Removal by Health Inflation

- ❖ Add health units until game is "easy enough."
- ❖ As Penalty is Reduced: Accessibility increases, Learning decreases.
- ❖ Danger: Sufficient



become ignored.

Contra (1988, NES)

1. Improving Accessibility

Alternative Method: Ratchet & Clank (2002, PS2)

- ❖ Difficulty surreptitiously reduced upon retry.





1. Improving Accessibility

Alternative Method: Ratchet & Clank (2002, PS2)

- ❖ Difficulty surreptitiously reduced upon retry.
- ❖ Noticed by few.
- ❖ Clever compromise between extremes.
- ❖ Learning only prevented if:
 - ❖ Player gives up.
 - ❖ Challenge reduced to triviality.



1. Improving Accessibility

Summary: Removing Barriers to Improve Accessibility Also Removes Learning

Without consequential challenges that test player ability, we miss out on:

- ❖ All the positive motivation & retention effects of learning.
- ❖ Preparing players to surmount further challenges.
- ❖ Actually addressing the underlying accessibility problems.
(teach the activity better vs. remove the activity)



2. Time Hoarders





2. Time Hoarders

Statistical Skill Simulation a.k.a. RPG style stats



Final Fantasy VII (1997, PS)



2. Time Hoarders

Statistical Skill Simulation

- ❖ Players trade time investment for accrual of statistical power.
- ❖ Success often goverened by: stat factor + skill factor.
(stat factor increased by repetition or grinding, skill factor increased by learning)
- ❖ When skill factor = 0, Learning is not possible.
(Pure Grind: repetitive & uninteresting task that increases player agency)
- ❖ If game activity remains interesting (skill factor > 0), then learning is possible.
(and can happen concurrently with repetitive metagame structures e.g. PAD)



2. Time Hoarders

Good Things About Grinding

- ❖ Alternative road to success for players who would otherwise give up due to lack of ability.
- ❖ Promise of certainty: Predictable reward per time unit invested.
- ❖ Promise of safety: Low risk/ low cognitive demand activity.



2. Time Hoarders

The Framing Strongly Biases The Choice

overcome by grinding:

- ❖ Promise of certainty: Predictable reward per time unit invested.
- ❖ Promise of safety: Low risk/ low cognitive demand activity.

vs. overcome by skill:

- ❖ Uncertainty of not knowing if challenge can be overcome, at all.
- ❖ High cognitive demand activity.
- ❖ Strong tendency to over-grind when given free choice, even if it occupies much more time or results in a worse experience.



2. Time Hoarders

Summary: Grinding Permits Success While Avoiding Learning

- ❖ Actually, Grinding= Player Initiated Barrier Removal.
- ❖ So all same negatives as Barrier Removal.
- ❖ Consider human tendency to take easiest way out.



3. Rigged For Excitement



3. Rigged For Excitement

"Rubber-Banding" or "Catch-up" Methods



Mario Kart Wii (2008,
Wii)



NBA Showtime (1999,
Arcade)



3. Rigged For Excitement

"Rubber-Banding" or "Catch-up" Methods

- ❖ Implemented in competitive games e.g. racing, basketball.
- ❖ Usually to heighten excitement.
- ❖ Statistical modification of player or opponent ability in real time according to position.
- ❖ Mario Kart: Random Power-Up frequency modulated for 1st/last place.
- ❖ Showtime: Shot success % chance modulated.

3. Rigged For Excitement

Dev. Story: *Cars: Mater-National* (2007, PC, 360, PS3, PS2, Wii)





3. Rigged For Excitement

Catch-up in *Cars: Mater-National*

- ❖ Opponent speed boosted when you are winning.
- ❖ Implemented as a measure against "Lonely Racer Syndrome."
- ❖ Side Effects We Discovered:
 - ❖ Only performance-minded players notice.
 - ❖ Players feel cheated, if they notice the effect against them.
 - ❖ "Ridge Racer style" approach solves inherent fairness issues without catch-up.
 - ❖ False problem: Running in 1st is intrinsic reward for skillfully overtaking all the opponents; it should not be a punishable offense.



3. Rigged For Excitement

What's Good About Rubber-Banding

- ❖ More frequent position changes during competition.
- ❖ Competitors finish closer together.
- ❖ Improves accessibility: less skilled players enjoy greater & more frequent success than otherwise possible.



3. Rigged For Excitement

Unintentional Side Effects

- ❖ Knowledge of effects leads to bizarre optimal strategy:
Don't give 100% effort or avoid becoming the leader until the end.
- ❖ While less skilled player's results are boosted, the result of skilled play is dampened.



3. Rigged For Excitement

Effects Depend on Player's Mental Frame

- ❖ Strictly positive effects for:
 - ❖ Players who don't care to learn how to perform better.
 - ❖ Players who don't feel they *can* get better.
 - ❖ Players who don't take the game outcome seriously.
 - ❖ Spectators.
- ❖ Defeats primary motivation of performance minded players by teaching that learning new skills to drive faster will be punished.



3. Rigged For Excitement

Summary: Rubber-Banding Damages Learning Because It's Cheating

- ❖ Less skilled players win more often.
(by statistics instead of by learning)
- ❖ More skilled players win less often.
(are penalized for learning)
- ❖ Produces a climate where learning skill is devalued.



4. Progression Tapering



4. Progression Tapering

Monetization Technique in F2P

- ❖ Common in F2P games; not a definitive component.
- ❖ Algorithmic & metric- driven dynamic where statistics gradually dominate success outcomes over time regardless of player skill.
- ❖ Threshold point where progress via skill is constrained by statistical factors: Player most susceptible to accept item purchase offer to statistically boost performance.
- ❖ Sometimes called 'Pay Wall.'



4. Progression Tapering

Pay Wall Tradeoffs

- ❖ Very effective monetization technique, but not without risks.
- ❖ If your game outcomes are determined by statistical draw then learning can no longer take place.
- ❖ After that threshold, all future play motivation relies upon loss aversion and extrinsic reward.
- ❖ Players lose ability to progress via learning, but can only gain progress via purchase of statistical power.
- ❖ If perceived, player can lose intrinsic motivation to play.



4. Progression Tapering

Summary

- ❖ Effectiveness of Progression Tapering works because it limits player progress via skill.
- ❖ = limiting learning.
- ❖ Reliance on stats, extrinsic rewards means repeated play cannot be motivated from the experience of learning.



Learning Tradeoffs in *PAD*

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Puzzle & Dragons (2012, iOS,
Android)

Core Gameplay

- ❖ Maximal Match-3 Accessibility:
No Invalid Moves.





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hours learning curve to
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Learning Tradeoffs in *PAD*

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Core Gameplay

- ❖ Maximal Match-3 Accessibility:
No Invalid Moves.
- ❖ Incredible depth: Over 100
hours learning curve to mastery.
- ❖ Excellent Game as Teacher:
Repetition structure affords
intrinsic learning of new
techniques & subtleties.





Learning Tradeoffs in *PAD*

Random Orb Fall Distribution Disrupts Learning:

- ❖ Can arbitrarily scramble difficulty of board per move.
- ❖ Can arbitrarily limit max player agency per move.
- ❖ When Statistical factors overpower Player Skill factors:
 - ❖ Player is taught that ability did not matter in success outcome.
 - ❖ Players loses intrinsic reward from activity. (nothing you can do)
 - ❖ Intrinsically-motivated players will give up when subjected to too much domination of statistical outcomes.

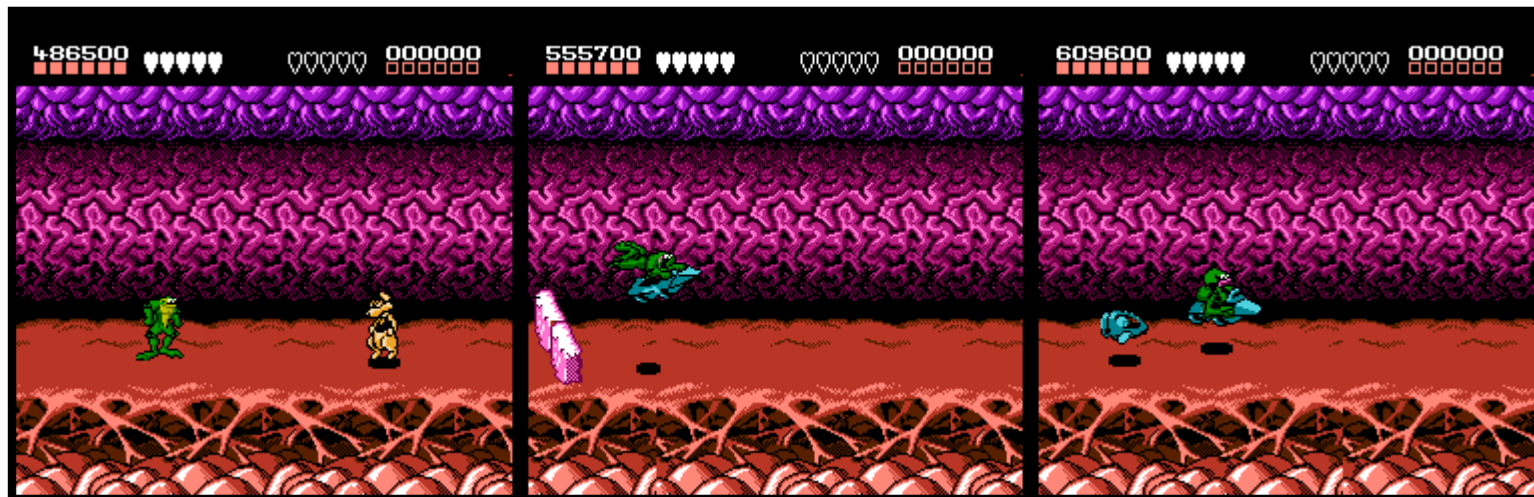
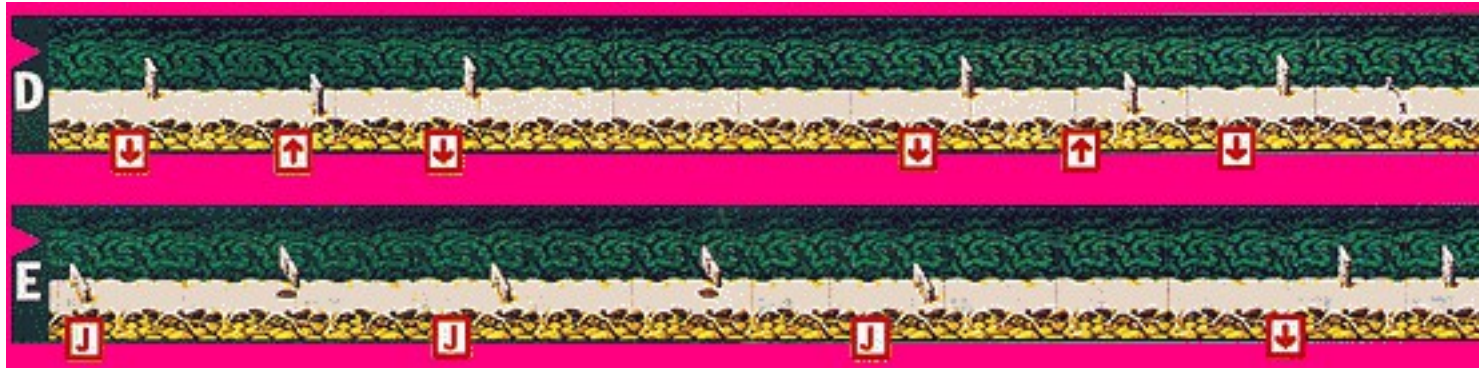


Inaccessible Depth in *Battletoads*



Inaccessible Depth in *Battletoads*

Battletoads (1991, NES) Level 3: Turbo Tunnel





Inaccessible Depth in *Battletoads*

Battletoads (1991, NES) Level 3: Turbo Tunnel

- ❖ Deep & Challenging, but 0 effort made towards accessibility.
- ❖ Low feedback + high speed= Player forced to learn through brute force trial, failure and muscle memory.
- ❖ Demands perfect performance, so no progress possible at all before full mastery.
- ❖ Equally bad vs. no demand of performance to progress.
- ❖ At least high self-determined players will experience strong intrinsic motivation if challenges are surmounted.



Inaccessible Depth in *Battletoads*

Real Accessibility = Teaching the Depth

- ❖ Telegraphs teach players to anticipate critical interactions by increasing communication.
- ❖ Repetition structures can afford learning and mastery.
- ❖ Sufficient latitude of skill in game actions vs. statistical draw.
- ❖ Modular increase of demands upon player, only after tests that prove your players can handle it.
- ❖ Mechanical Design Choice Impacts Learnability.
(some gameplay activities intrinsically afford learning better than others)



Concluding Thoughts

Better Designed Games are Better Teachers

- ❖ As Designer you are the Teacher.
- ❖ Your responsibility is to teach your players how to surmount your challenges (tests).
- ❖ Your most powerful language is the grammar you designed for your game.



Concluding Thoughts

If You Fail to Teach Them,
You Will Fail to Keep Them

- ❖ Accessibility without depth means you cannot harness the power of learning to motivate and retain players.
- ❖ Depth without accessibility means you are not being a good Teacher.
- ❖ Both are critical to produce maximally effective games.



Concluding Thoughts

The Future of Design is About Understanding How We Play

- ❖ Hope that I have been able to show:
 - ❖ How learning is critical to engagement & retention.
 - ❖ Ways we unintentionally diminish learning.
 - ❖ How understanding the subtleties of player psychology can help us make better games in all aspects.

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