© **Steve Swink**

Game Programming and Design
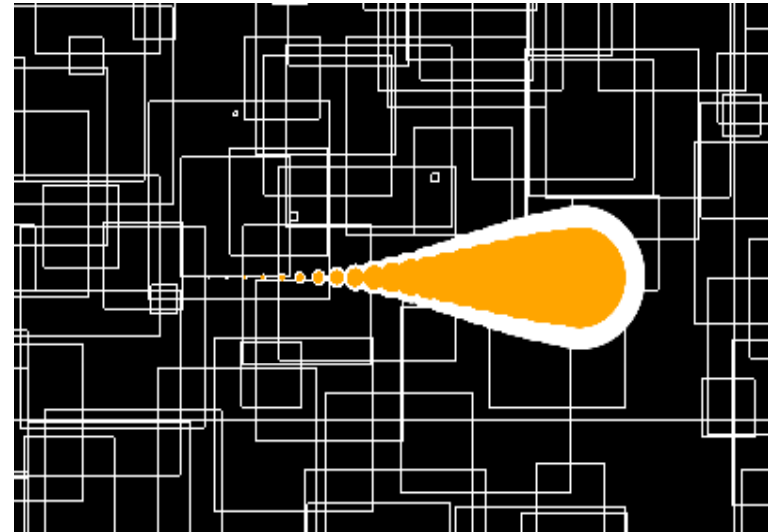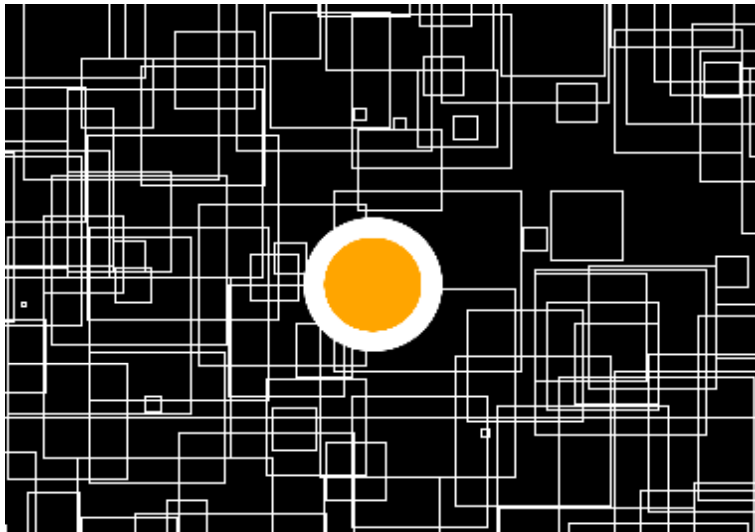
Game feel

Principles of virtual sensation

Controller mappings

Game Feel

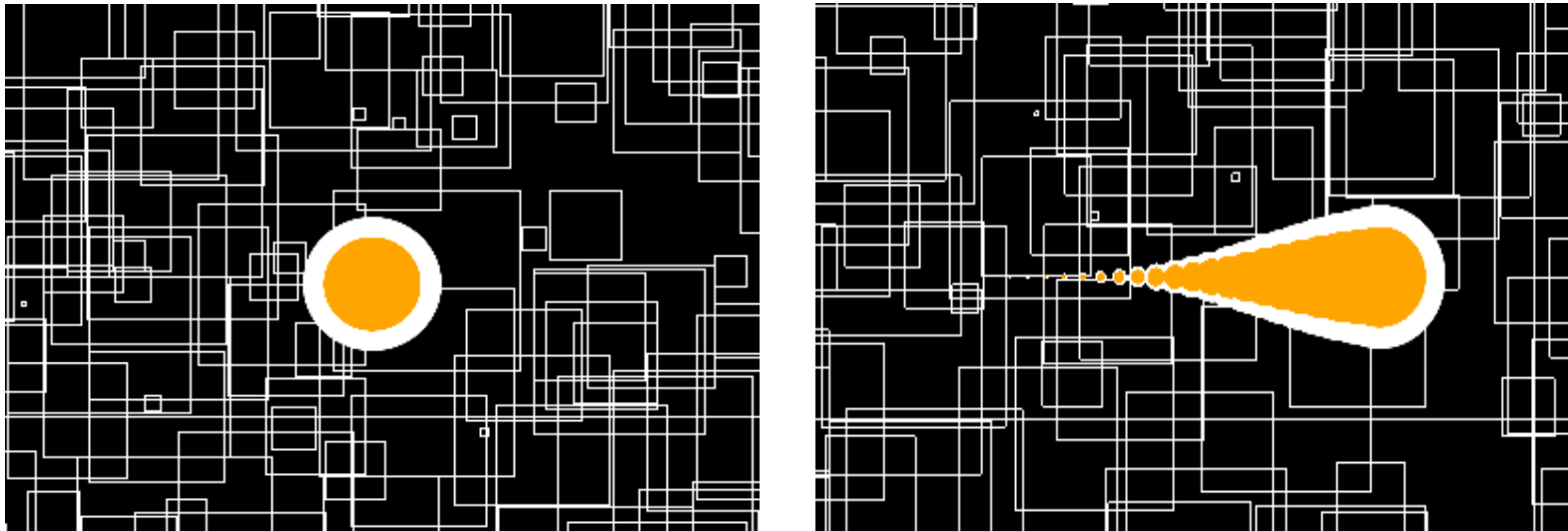Steve Swink, *Principles of Virtual Sensation*

Game Feel Experiment

- Any (small) difference(s) in control + physics ?
- Which version is more **fun** to control ?

Game Feel Experiment

Results

- Result: no differences in control + physics …
- What changed ?
  - Maybe helpful / eye candy: motion trail
  - Eye candy / obfuscating: dynamic background

Game Feel

General

- ## Sensation of
  - Kinesthetic feeling (e.g. Super Mario)
  - Controlling some virtual avatar (direct / indirect)
  - Making the character an extension of your will

- ## Principles of virtual sensation / Game Feel
  - Based on gamasutra essays/papers by Steve Swink
    `http://www.steveswink.com/`

- ## Deeply embedded in Human-Computer-Interaction (HCI) research

© Nintendo

Principles of Animation
Thomas & Johnston: The Illusion of Life

- Squash and Stretch
- Timing
  - spacing actions to define the weight and size of objects
- Anticipation
  - the preparation for an action
- Staging
  - presenting an idea so that it is unmistakably clear
- Follow Through & Overlapping Action
  - the termination of an action and establishing its relationship to the next action
- Straight Ahead Action & Pose-To-Pose Action
- Slow In and Out
- Arcs
- Exaggeration
  - Accentuating the essence of an idea via the design and the action
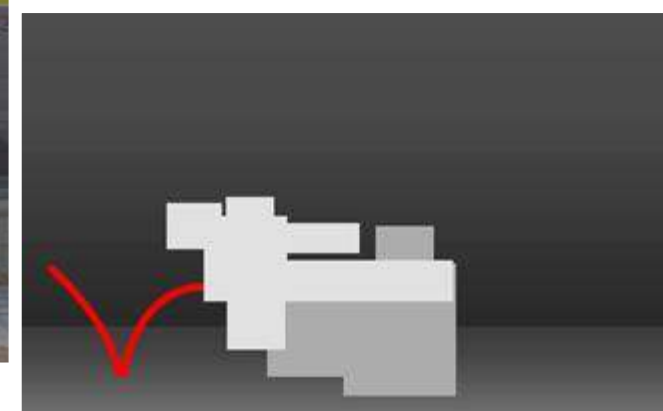- Secondary Action
- Appeal
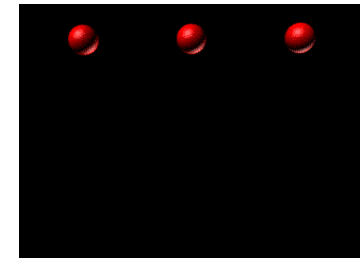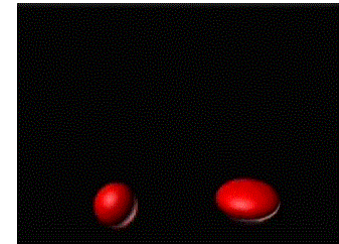
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http://www.siggraph.org/education/materials/HyperGraph/
animation/character_animation/principles/prin_trad_anim.htm
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Game Feel
Towards a More Formal Definition

- We often use physical analogies

    - The game feels: floaty, smooth, slow, loose

    - Best/Worst Game/Control/Camera ever

- How to delineate animation and virtual sensation?

Principles of Virtual Sensation (1)

- 1. Predictable Results (Input + Response)
  - Allowing a sense of mastery and control by correctly and consistently interpreting player input
- 2. Novelty
  - There are an infinite number of results from the same input
- 3. Good Feedback
  - Enabling mastery, control, and learning by rewarding player experimentation
- 4. Low Skill Floor, High Skill Ceiling
  - Making the mechanic intuitive but deep; it takes minutes to pick up and understand but a lifetime to master
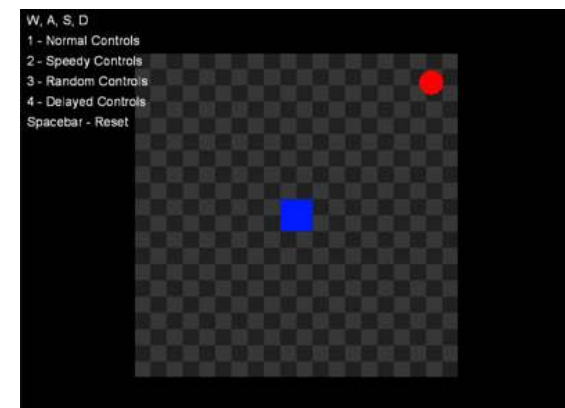
Principles of Virtual Sensation (2)

- 5. Context
  - Giving a mechanic meaning by providing the rules and spatial context in which it operates

- 6. Impact and Satisfying Resolution
  - Defining the weight and size of objects through their interaction with each other and the environment

- 7. Appealing Reaction
  - Producing appealing reaction regardless of context or input

1. Predictable Results (1)
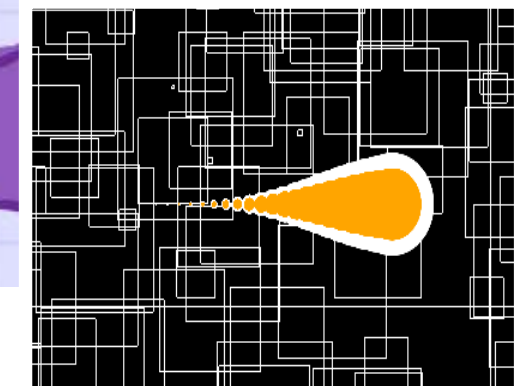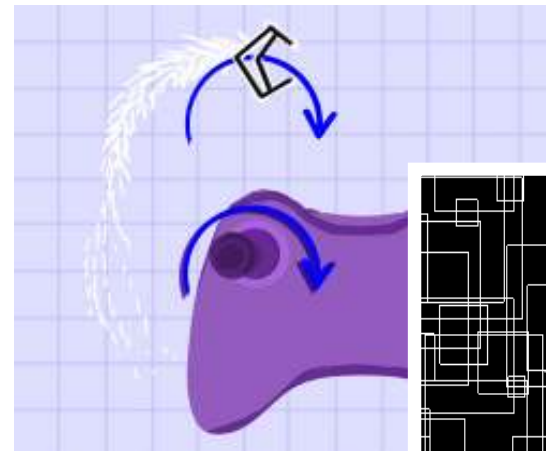
Principles of Virtual Sensation

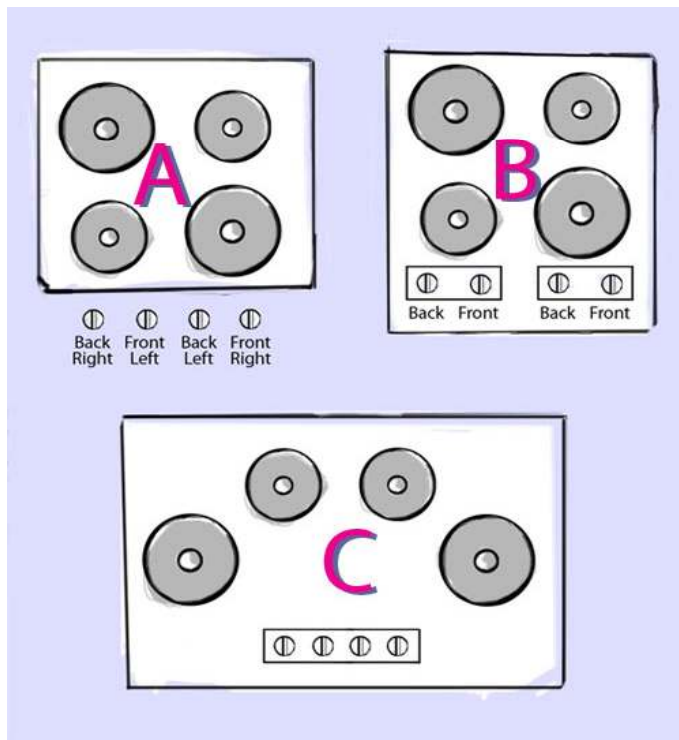- Design **clear, simple and consistent** player controls
- Pitfalls
  - Mapping inputs to results that are too difficult to process
  - Creating mappings that are unnatural or counterintuitive
  - Overwhelming the player with states and possibilities
- These pitfalls make consistent results seem random

W, A, S, D
1 - Normal Controls
2 - Speedy Controls
3 - Random Controls
4 - Delayed Controls
Spacebar - Reset

1. Predictable Results (2)

Principles of Virtual Sensation

- ## Use Natural Controller Mappings
  - ### E.g. "genre conventions"

Back Right · Front Left · Back Left · Front Right

Back Front · Back Front

Back Front · Back Front

- ## Exceptions
  - Some experiments, Resident Evil 1-3, GTA IV

1. Predictable Results (3)

Principles of Virtual Sensation

- Clearly differentiate between player states
- What are player states ? Example:
  - Mario's controls on the ground
    as opposed to
    Mario's controls in the air   **Demo**

- (Discernable) state changes are important
  - Expressivity and improvisation + Increase reaction sensitivity
- Too many states may cause confusion
  - Feel of control is lost
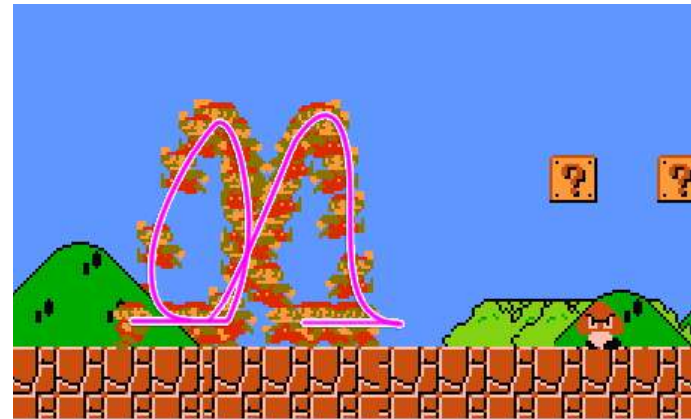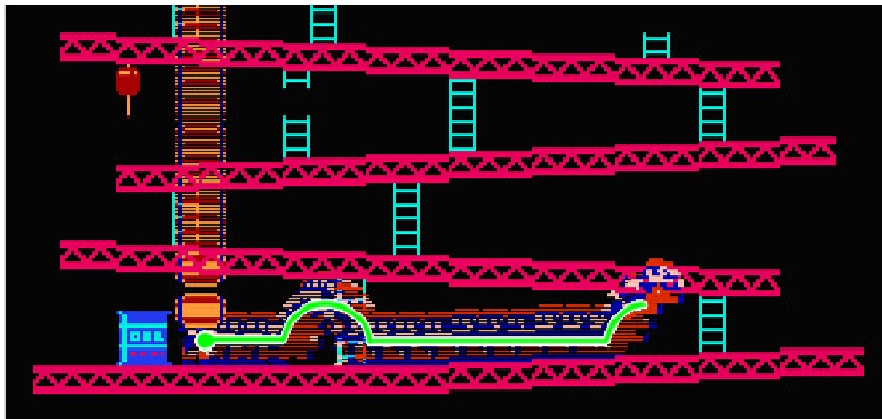 - Example: Tony Hawk Skateboarding series

1. Predictable Results (4)

Principles of Virtual Sensation

- Expressivity and improv with digital (!) input
  - Compare Donkey Kong to Super Mario Bros.

- SMB achieves *analog* feel through simple (Euler) time integration (see XNASandbox)
  - But be careful: chosing timesteps and spring stiffness
- One more example: Precision (a Cactus game)

1. Predictable Results (5)

Principles of Virtual Sensation

- Consider direct vs. indirect input methods, or a combination thereof

- Some examples

  - Ico: Great sense of emotional ties

  - Lost Winds: Control player indirectly via control of air flow

1. Predictable Results (6)

- We have very little time to hook the player
  - If they don't feel successful and oriented within the first couple minutes, we've lost them
- The lowest order feedback loop is the virtual sensation
  - The moment-to-moment control
  - If it doesn't feel good at an intuitive level they'll stop playing
- Virtual sensation + predictable results are the gatekeepers to all other game experiences

2. Novelty

Principles of Virtual Sensation

- Infinite number of results from the same input
- Examples
  - Improve character abilities over time (Metroid, Mega Man, etc.)
  - Deterministic physical simulations
  - Interesting player states and combinations thereof
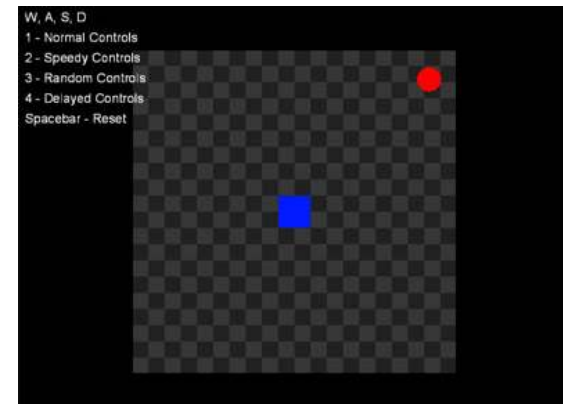
- Demo: Ski Stunt Simulator

Demo

3. Good Feedback (1)

- Enable mastery, control and learning by rewarding experimentation
- Allow player to
  - Understand the structure and challenges of the game
  - Give immediate, clear and useful (Audiovisual) feedback

- Without immediate feedback there is no virtual sensation

3. Good Feedback (2)

- Clearly communicate the game state
  to the player
- Example: Mario Kart
  - Powerslide:
    Smoke + Sound
 - Powerslide boost:
    Blue / Red Sparks

- Giving detailed audiovisual feedback results in consistent and measurable progress
  - Do not leave the player guessing and frustrated

4. Low Skill Floor, High Ceiling (1)

Principles of Virtual Sensation

- Low skill floor =
  a virtual sensation is easy to learn
- This is not a function of complexity
  - A relatively complicated input scheme may be easy to learn thanks to
    - A natural mapping
    - Predicable results
    - Avoiding state overwhelm
    - Providing good audiovisual feedback

  - Conversely, the opposite is also true ☹
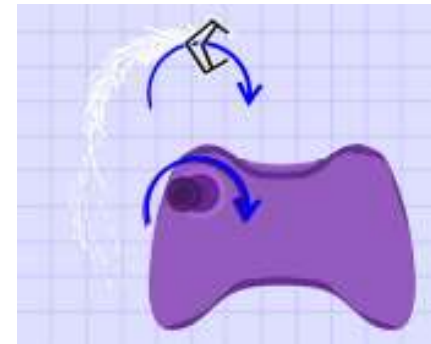
4. Low Skill Floor, High Ceiling (2)

Principles of Virtual Sensation

- If controls are too complex to learn fast,
  use Helpers / Assists
- No longer physical, but rather physically plausible
- Examples
  - Jugglers (arc prediction and force attenuation)
  - Aim assist in 3D shooters on consoles
  - Grav Ball (simple ball pass control)
  - Forza Motorsport (oversteer control)
- Why overcomplicate the control scheme?
  - Let players do what they can, computer does rest

4. Low Skill Floor, High Ceiling (3)

Principles of Virtual Sensation

- High skill ceiling =
mastering a virtual sensation is time consuming

- What is mastering a virtual sensation ?
  - Try competing in Counterstrike or Ikaruga
  and you will know what I mean ☺
  - Both games are easy to get into, but take forever (literally) to master

- Design mastery as learning a layer of skills
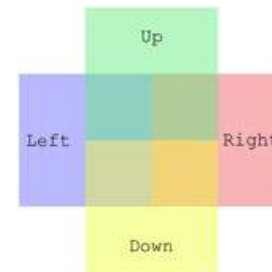 - Start with skill atoms, and combine them later
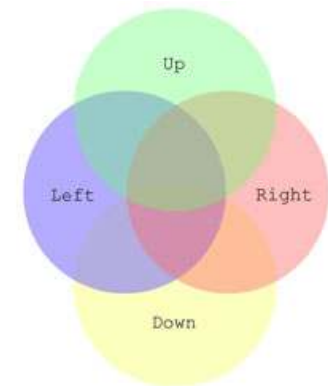
4. Low Skill Floor, High Ceiling (4)

- Try tuning the relation between input and reaction sensitivity

    - Low Input, low reaction
    - Low Input, high reaction

    - High Input, low reaction
    - High Input, High reaction

Low input, low reaction   Low input, high reaction
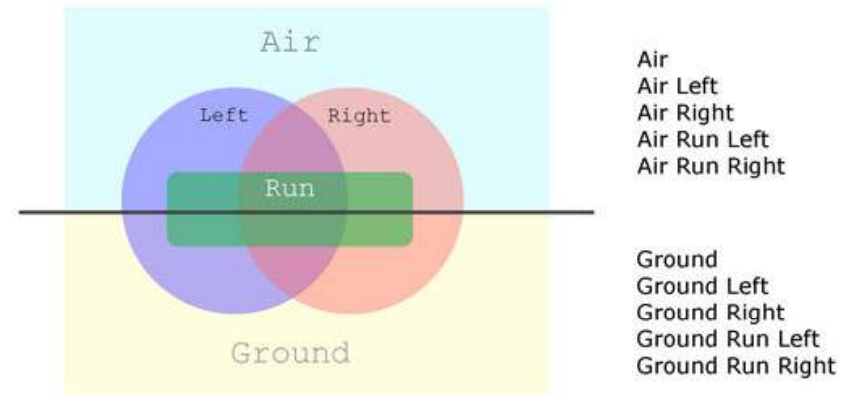
4. Low Skill Floor, High Ceiling (5)

Principles of Virtual Sensation

- State switching
- Mario has
  Left, Right, Jump, Run
  - State switching creates many overlapping states
  - Holding jump button longer results in higher jump
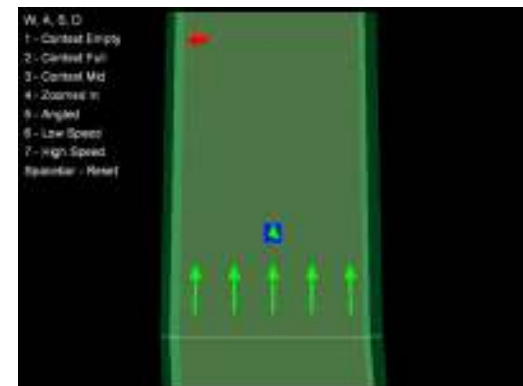 - Height of Jump also influenced by speed
- Other examples of state switching
  - Combos, Spatial states (demo)

5. Context (1)

- Give a mechanic meaning by providing
  rules and spatial context

- Examples
  - Mario in empty space ? Boring ...
  - Turning a car on an infinite field ? Boring ...

- Demo

  - Empty vs. Full vs. Med
  - Perception
    - Zoom vs. Angled speed perception
    - Textured vs. Empty speed perception

5. Context (2)

Principles of Virtual Sensation

- Make use of player perception
- Provide a sense of scale and weight
  - Example: Shadow of the Colossus
  - Great use of speed (slow), sound (heavy) and visuals (particles, dust, size, style, etc.)

- Context and gameplay aesthetics

- Example: Super Mario Kart vs. Mario Kart 64
  - Love SMK. Do not like MK64. Not challenging at all
  - Many love MK64: „fun to play with friends"
  - Think about your aesthetics early on !

6. Impact

Principles of Virtual Sensation

- Define weight and size of objects through interaction with each other + environment
- Allow player to
  - Extrapolate the physical laws of the virtual world
  - Make good, educated guesses
- Bad interaction modeling breaks immersion (flow)
  - Do this too often and the player will stop playing
- Adapt rendering style to physical style
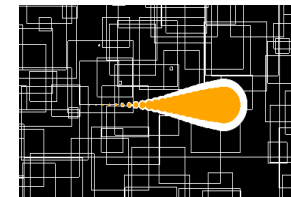 - Fake / Exaggerate them both ☺ (+ use particles)

W, A, S, D
1 - Plain Interac
2 - Scaled Interaction
3 - Pop
4 - Pop Small
5 - Pop Large
Spacebar - Reset
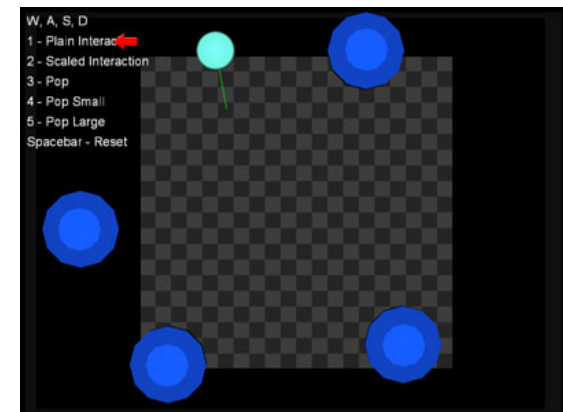
7. Appeal

- Produce appealing reaction regardless of context or input

  - Remember the demo in the beginning ?
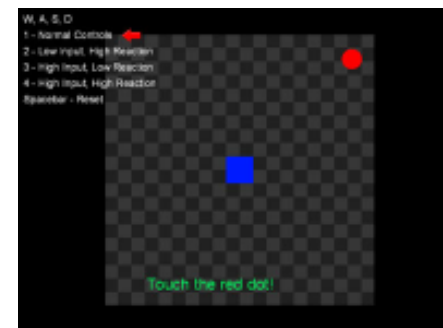
  - Think about failure states

    - Ski Stunt Simulator crashes are fun, even if the goal were unclear

  - Demo of cube movement

    - High input, high reaction is clearly the most fun in the absence of context

The Bottom Line

- Goal
  - Create a feeling of control and mastery
  - So powerful that it transcends context and platform and becomes a powerful tool for self expression
- Create a sense of ownership
  - Personal (time) investment
  - Replayability and evangelism
  - Mastery and resulting ability to improvise

- Adhere to these principles and you are more likely to succeed

Further Reading

- **Principles of Virtual Sensation**
  `http://www.gamasutra.com/features/20061114/`
  `swink_01.shtml`

- **Game Feel: The Secret Ingredient**
  `http://www.gamasutra.com/view/feature/2322/`
  `game_feel_the_secret_ingredient.php?print=1`

- **The Chemistry of Game Design**
  `http://www.gamasutra.com/view/feature/1524/`
  `the_chemistry_of_game_design.php?print=1`

- **Ron's Rules for Playtesting**
  `http://2dboy.com/2007/11/12/`
  `rons-rules-for-playtesting/`