

## Video Game Play and Design: Procedural Directions



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### Procedural Techniques for Interactive CG Dominic Mallinson



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### What do I mean by a “procedural technique?”

- Any description that is not explicit
  - triangle meshes are explicit
  - motion capture animation is explicit
- Procedural techniques
  - modify a description via an algorithm
  - change with the state of the simulation
  - are calculated on the fly



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### PROS of Procedural Techniques

- Interactivity
- Scalability
- Variety
- Cost
- Storage and bandwidth



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### CONS of Procedural Techniques

- Not suited to everything
- Not as good as Art and Capture
  - (in a fixed situation)
- Can use lots of processor power
- Can be complex and unpredictable



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## Modeling with Procedural Techniques

- Generally Good For
  - Plants
  - Terrain
  - Biological forms
- Generally Bad For
  - man made objects
  - precise representation



## Animation with Procedural Techniques

- The goal is interaction
- Simulating the Physical World
  - dynamics, cloth, fluids, smoke, fire, fracture
- Modified Animation
  - I.K. , motion blending etc.
- Behavior and Autonomous Characters
- Controllers



## Modified Animation

- Using key frame artist generated or motion capture data as basis
  - interactivity requires procedural modification of the animation
  - motion blending
  - inverse kinematics
  - physical modeling



## Physical Simulation

- Makes interaction look real
- Computationally very intensive
- Difficult to make robust
- Can be inconsistent in performance
- Lots of research still to be done!



## Autonomous Characters

- The goal is life like character behavior
- Simple scripting and FSM
- Cognitive modeling
- Steering behaviors and path finding
- Learning algorithms
  - neural nets, genetic algorithms
  - off line vs. real time learning



## Controllers

- Where behavior meets physics
  - How an 'action' becomes a 'motion'
  - "Walk Forward" through an arbitrary environment
  - Avoid obstacles, balance
  - Look natural





## Examples

- Lifeforms :- Latham and Todd
  - an example of procedural modeling
- Bird-Fish-Mouse
  - autonomous characters
  - modified animation
  - procedural water

