

Digital Games as Simulations

This session focuses on the dichotomy between modern digital games and traditional simulations.



Prepared for
SCS M&S MTSA
July 31 - Aug. 2 2006

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July 2006

K.Becker & J.R.Parker SCS M&S MTSA '06

Digital Games as Simulations



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Games vs. Simulations...

Introduction (what's in a name?)

Walkthrough Essentials of Digital Simulation

Then, what is a Computer Game?

Game Genres & Activities

Fidelity & Validity

Virtual Worlds

CS vs. Education perspectives

What can Simulations Take from Games?

On a computer:

All Games Are Simulations

Even though not all simulations are games

So?



Exposure (again)

Simulations (including games) are once again
being noticed by other disciplines -

Education

Military

Health & Medicine

Advertising

Social Change

Politics

Again, SO?

Sticks & Stones.....

"The interdependence of thought and speech makes it clear that languages are not so much a means of expressing truth that has already been established, but are a means of discovering truth that was previously unknown. Their diversity is a diversity not of sounds and signs but of ways of looking at the world."

Karl Kerényi

Problems arise when terminology is used in different ways by different groups:

Comparing Conceptual Structures

		Terminology	
		Same	Different
Attributes	Same	Consensus Experts use terminology and concepts in the same way	Correspondence Experts use different terminology for the same concepts
	Different	Conflict Experts use same terminology for different concepts	Contrast Experts use different terminology and different concepts

Simulation:

A computer simulation or a computer model is a computer program that attempts to simulate an abstract model of a particular system.

Common feature is the attempt to generate a sample of representative scenarios for a model in which a complete enumeration of all possible states of the model would be prohibitive or impossible.

[http://en.wikipedia.org/wiki/Computer_simulation]

Simulation in CS:

- *Computational model of a phenomenon, environment, or experience*
- Perspective is software design (Internal)
- Simulation & Modeling are synonymous
- Simulation & Gaming have been associated from the start.

compare

Simulation is a mathematical construct that bounds the possible properties and activities of the objects being described... which can also apply to:

Which need not be restricted by the bounds of the known universe - but which still must have integral consistency.

Virtual Worlds

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Digital Games as Simulations

2004 May

1 sat

2 sun

3 mon

4 tue

5 wed

6 thu

7 fri

8 sat

10 mon

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11 tue

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22 sat

23 sun

24 mon

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29 sat

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31 mon

What is a game, *really*?

Real-time system

Takes input from user (through peripheral device)

which controls a simulation including graphical and audio displays

Everquest

Games require:

input systems,
networking systems (possible) Network interfaces,
real-time systems,
rendering engines,
display systems,
sound systems,
artificial intelligence engines,
asset managers(large amounts of multimedia data),
physics engines,
front end (which is the only part the user gets to see)

Parallel computation (distributed)

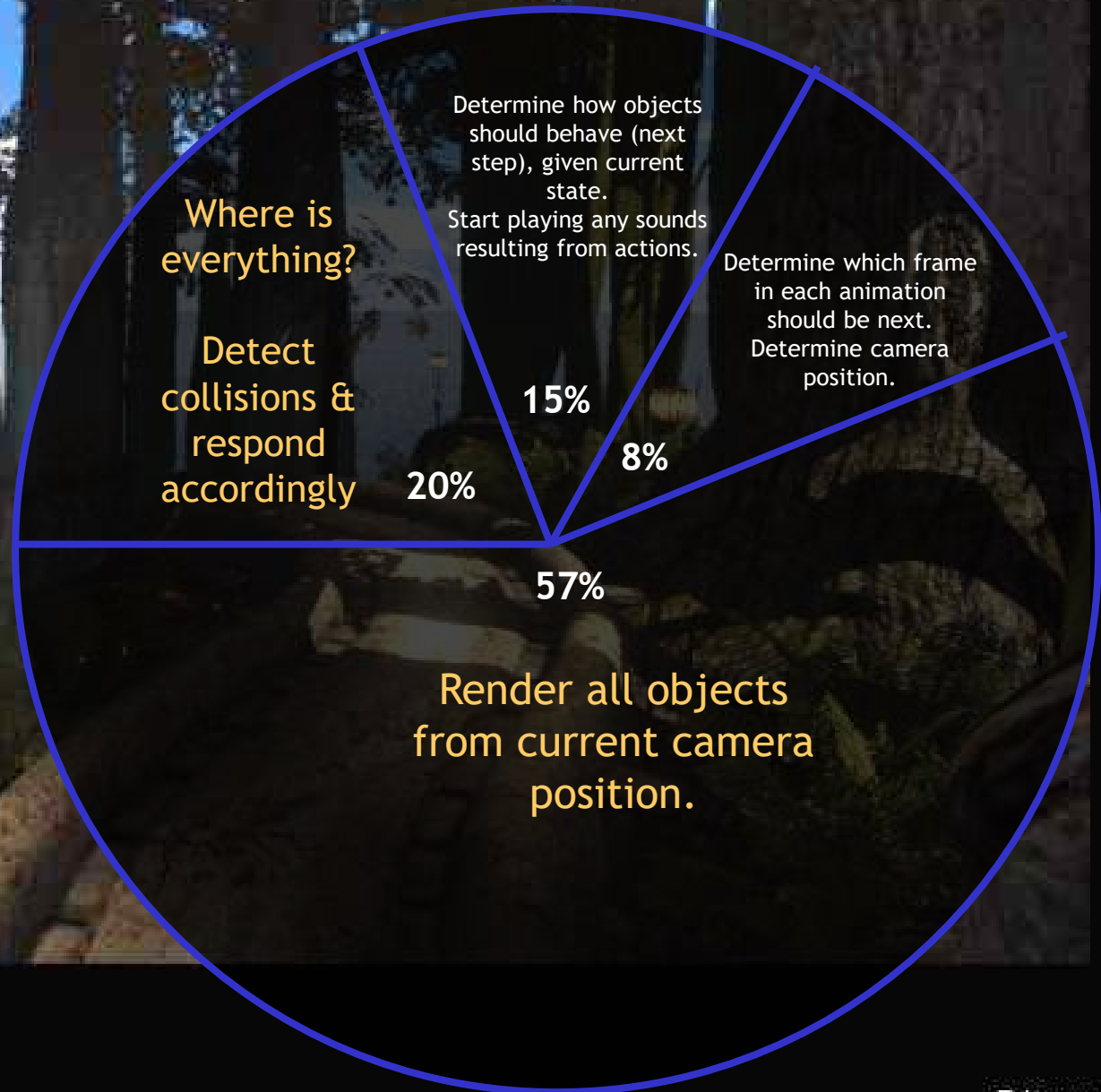
Walkthrough:

Games are largely
visual: 24 frames
/ second

Essentially a discrete
event simulation.

EACH 1/24 of a
second:

Order MATTERS.



Game Genres

Action games, including first person shooters (FPS) and fighting games

HALO 2



Game Genres

Role-playing games,
including real time and
turn based versions.



Game Genres

Simulators, within which the sports genre, flight simulators, and driving games reside.

Game Genres

Strategy games,
including military
games.



Game Genres



Puzzle games, including pinball and tetris type games.

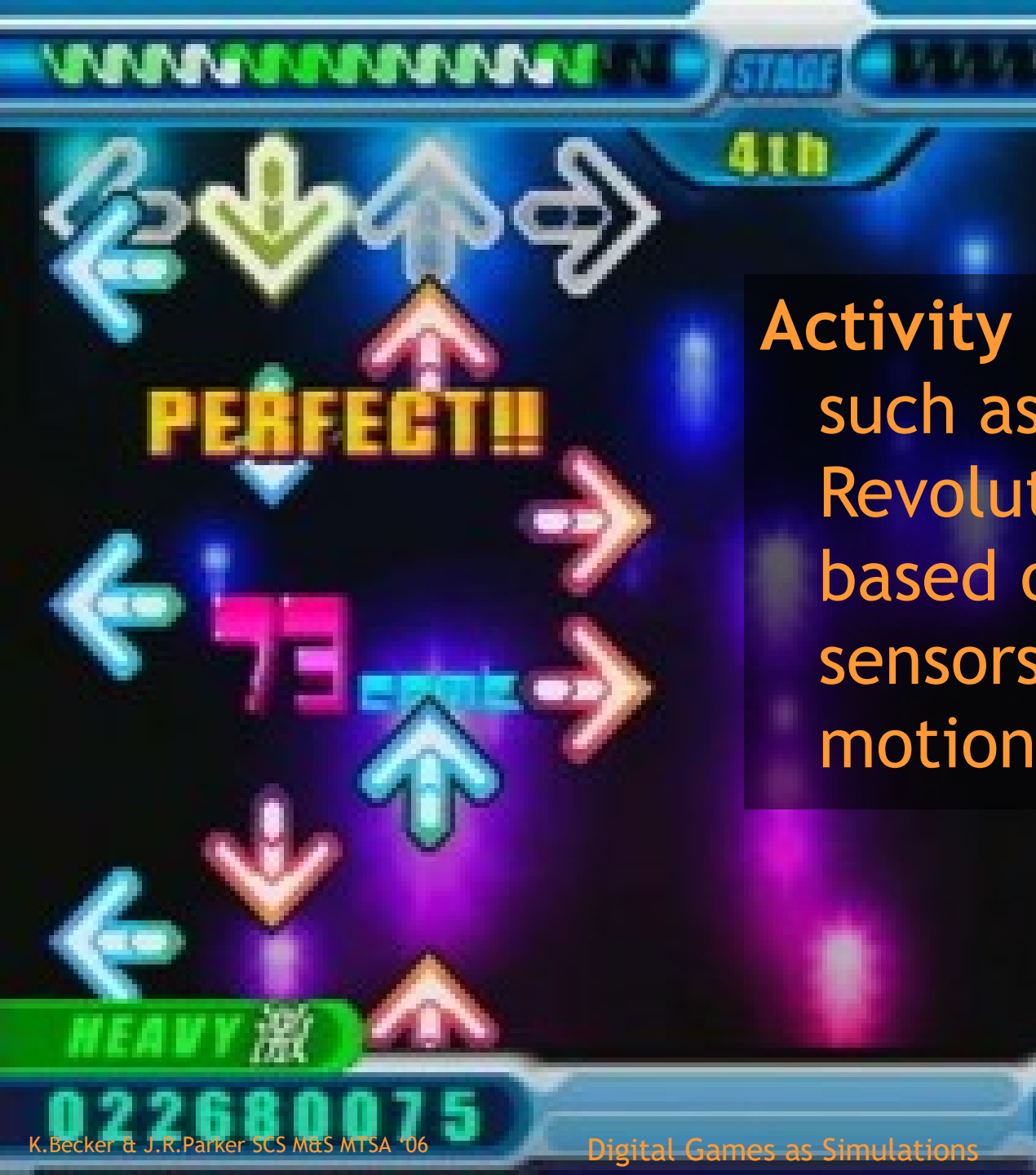


Game Genres

Adventure games,
which sometimes are
text based.



Game Genres



Activity based games such as Dance, Dance Revolution, that are based on external sensors that detect motions of the player.

Genre Activities

Many games blend multiple genres
RPG/shooting, simulation/fighting,
strategy/puzzle



Simulation to the Education community:

Reality; fidelity; validity

Perspective is end-user (External)

Simulation different classification from instructional game

(there's even a *simulation game*)

Based on different criteria from those accepted in simulation & gaming community.

compare

Simulations vs. Games

according to Gredler (AECT), Alessi & Trollip



Simulation =

Must be complex & REAL (referred to as fidelity or validity)

Participants have defined roles

Data-rich environment, where students can execute range of strategies

Feedback is in form of changes to situation

Realism is essential to effective learning.

Learning the model is educational objective.

Understanding the model is the goal.

Games vs. Simulations

according to Gredler (AECT), Alessi & Trollip

Game =

Games rarely played differently from the way they were intended.
Winning will take precedence over experimenting
Games are less efficient learning models than other methodologies
Educators have negative beliefs about games

Educational Game =

Learning embedded in game, not part of it
Has rules, winning is important
Winning should not have random factor for Ed
No distracting bells and whistles
Include directions in booklets
Students shouldn't lose points when wrong

Fidelity

CS: fidelity = accuracy of the representation.

If simulating real-world system, then fidelity is measure of closeness to reality.

Education: fidelity = level of realism *presented to the learner*.

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Validity

CS: validity = are results usable? Do they allow for accurate predictions, descriptions, explanations?

(accuracy = closeness of data (in & out) to thing being simulated)

Education: validity = methodological measures: algorithmic, conceptual, construct, content, educational, event, external, internal,...

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What can Simulations Take from Games?



Higher profile for Simulations,
generally (games aren't just for kids)

A way to inspire new practitioners.

What Game Technology Offers Us

Drives hardware development.

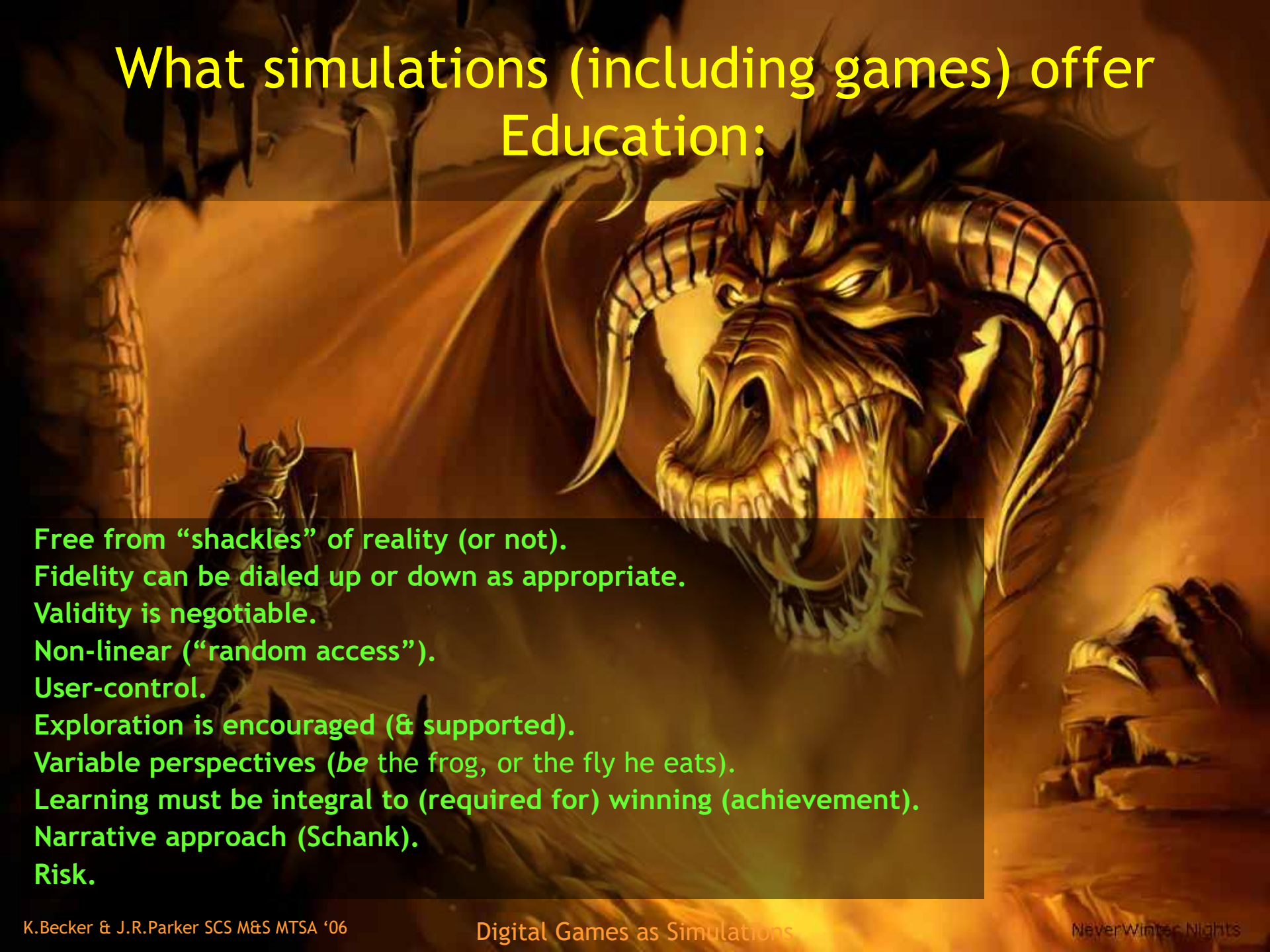
High-end games now serve dual-purpose (Full Spectrum Warrior)



Tomb Raider

Traditional simulations & commercial games are converging

What simulations (including games) offer Education:



- Free from “shackles” of reality (or not).
- Fidelity can be dialed up or down as appropriate.
- Validity is negotiable.
- Non-linear (“random access”).
- User-control.
- Exploration is encouraged (& supported).
- Variable perspectives (*be* the frog, or the fly he eats).
- Learning must be integral to (required for) winning (achievement).
- Narrative approach (Schank).
- Risk.

Simulation & Gaming



Back together again...

PIKMIN²

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Last Words

Why it matters:

There are aspects of work & progress
and development that hinge on how
we define the terms.

Thanks!!

Game Images courtesy of:
Official Game Sites
Fan Art

Mobygames.com

Gamespot.com

