



ISAGA Conference
July 9 - 13, 2007
Nijmegen, The Netherlands

Thematic session:

Improving the quality of gaming simulations: What can we learn from evaluation?

Presentation:

Assessment methodology: the validity of my Ferrari

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www.kmpc.nl

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Reference: **Chapters 6 & 7** of

The Magic Circle: Principles of Gaming & Simulation
Jan H. G. Klabbers, KMPC, The Netherlands
Rotterdam: SensePublishers, 2006.

SERIES: MODELING & SIMULATION FOR LEARNING & INSTRUCTION

Visit:

http://www.sensepublishers.com/catalog/product_info.php?products_id=202&osCsid=070c4b1087e45f28e077a2f93dae3347



Content

1. The gaming profession
2. Central role of modeling
3. Classes of objects & approaches - design & analytical sciences
4. Wrap up of evaluation methodology

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The Gaming Profession

1. Gaming professionals use theoretical and conceptual **models**, and speculative conjectures about the social world, couched in terms of those models.
2. They also have views about how gaming works and what you can do with it; how games can be designed, modified, and adapted.
3. Typically, games do not behave as expected. The world resists. Game designers and facilitators have to accommodate themselves to that resistance.
4. They can:
 - do it by correcting the major theory under investigation,
 - revise beliefs about how the game works,
 - modify the game itself, and
 - use it anyhow as an intervention to enhance organizational change and learning.
5. The end result is a robust fit between all these elements.

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Preconditions
for evaluating the validity of my Ferrari.

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Central role of modeling

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Model M is an image of an Object O:
symbolically

$M = \{Im, Rc\}$

M = Model (mini-theory);

Im = Image (medium of representation of reference system)

Rc = Rules of correspondence.

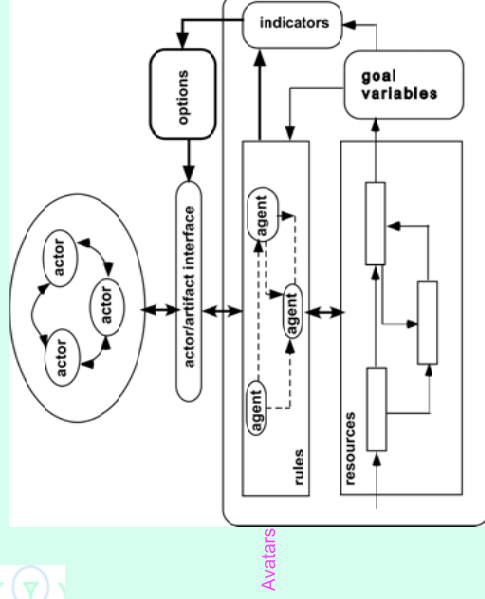
Question: How does this definition of a model apply to a game?

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Model of a Computer-based game



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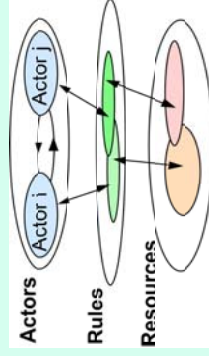
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Basic architecture of games

Three interrelated faces of knowledge:



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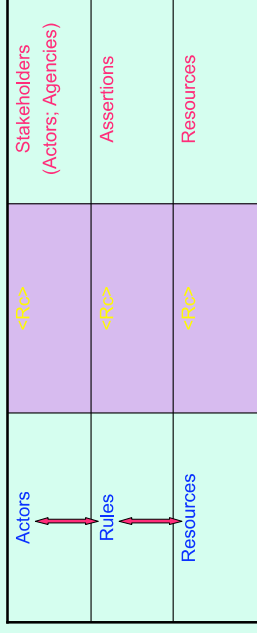
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Mapping a reference system into a game-model:
establishing & validating rules of correspondence

Game-Model ← Reference system



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Construct validity

Is it possible to establish unequivocally the **construct validity** of a game, considering the multiple degrees of freedom of modeling:

1. The actors;
2. The framing and interpretation of the rules;
3. The great variety of the parameters for modeling resources through a variety of media of representation?

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Construct validity

Is it possible to establish unequivocally the construct validity of a game, considering the multiple degrees of freedom?

Games and simulations have many freely adjustable parameters. As a result it will be very difficult, and maybe even impossible to establish their construct validity.

In case, theorists try to make predictions, and the predicted effects are not seen, they can keep the related theory alive by changing the value of one or several parameters, to make it easier to see in experiment and practice.

Such procedures undermine the internal validity vis-à-vis the external validity of a game.

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A fully estimated game seems a contradiction in terms.

Games (as particular forms of social systems) consist of reflexive actors. Their behavior is contingent and emergent.

The ambiguity of play ducks out of experimental control, and the related reductionism of the analytical sciences.

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Scientific research distinguishes two classes of objects and three approaches:

<p>Natural objects:</p> <ul style="list-style-type: none"> atoms, molecules, rats, monkeys, plants, stars, etc. 	<p>Analytical science approach:</p> <ul style="list-style-type: none"> develop & test context independent theories
<p>Artificial objects:</p> <ul style="list-style-type: none"> Airplanes, cars, computers, robots, games, etc. 	<p>Design science approach:</p> <ul style="list-style-type: none"> Build (assemble) & assess in context of use

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Scientific research distinguishes two classes of objects and three approaches:

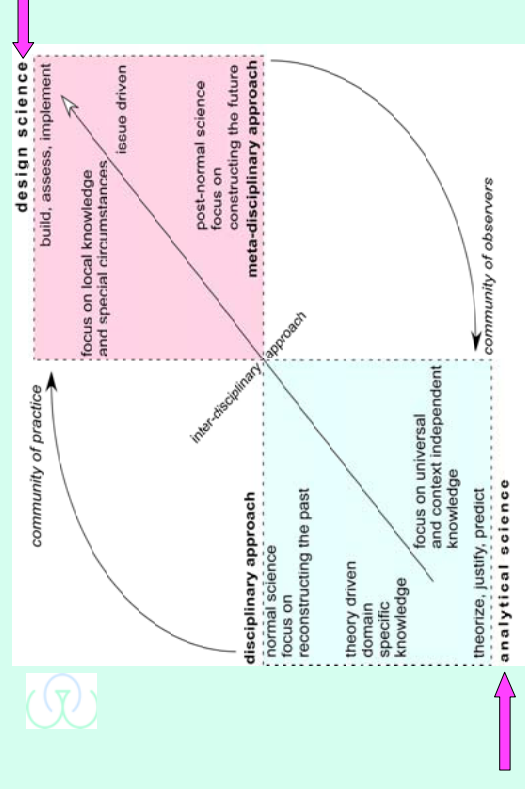
Natural objects;	Analytical science approach
Artificial objects	Design science approach
<p>Artificial objects:</p> <ul style="list-style-type: none"> Genetically manipulated laboratory rats & monkeys; games, etc. "Science", June 28, 2007 -- Genome Transplantation in Bacteria: Changing One Species to Another. ==> Synthetic organisms ==> Design organisms 	<p>Quasi-analytical science approach</p>

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Gaming communities



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Statement:

It is not correct to talk about the validity of this Ferrari.

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SECOND LIFE



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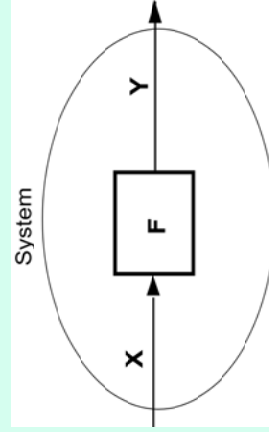


Ceci n'est pas une voiture.

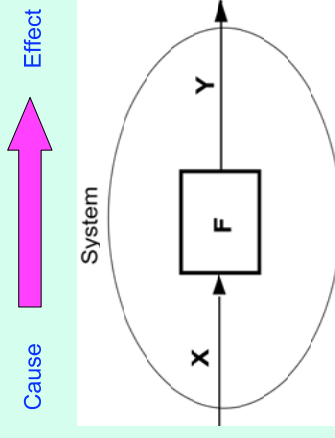
Evaluation Schemes



Evaluation scheme 1

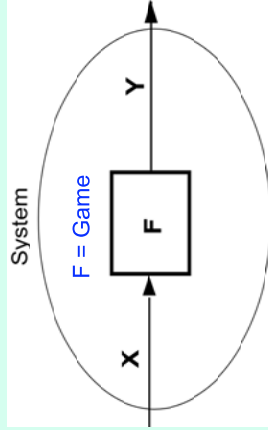


Evaluation scheme 1



Evaluation scheme 1

Cause → Effect



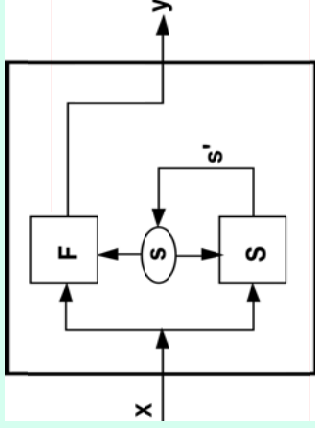
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Evaluation scheme 2

Cause → Effect
NTM = Game



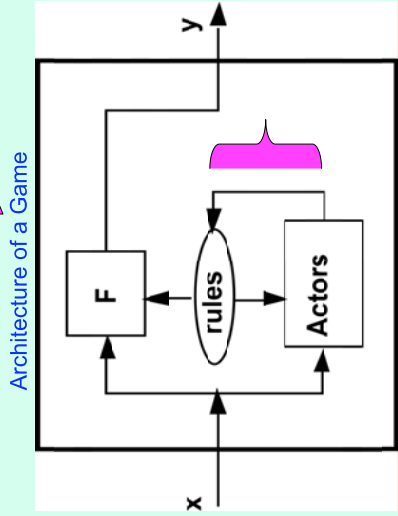
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Evaluation scheme 3

Cause → Effect



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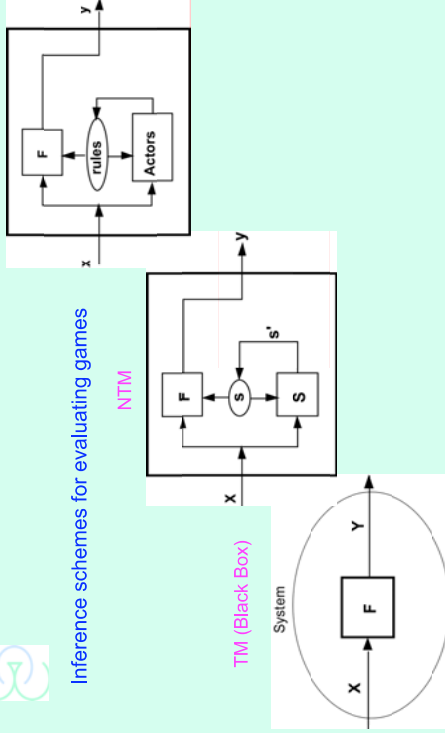


Cause



Effect

Game



Inference schemes for evaluating games

NTM

TM (Black Box)

System



Statement:

Talking about the validity of this Ferrari
 =
 a wrong quasi-analytical science approach to
 design sciences artifacts.



Artifacts are designed to operate in a certain environment,
 under well-defined conditions.

Under those conditions, they will demonstrate their **usability**.



Usability:

- Applies to all aspects of the game (actor-artifact organization), including installation and maintenance procedures, and its impact on the operational environment.
- Addresses the question of whether the functionality of the game in principle can do what is it supposed to do/what is needed to achieve some desired goal.

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usability

Providing that a game is socially acceptable, usability implies:

- **instrumental usefulness** - Design-in-the-Small;
- **conceptual usability** - Design-in-the-Large.

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usability

instrumental usefulness - Design-in-the-Small:

is a more dimensional property, encompassing multiple components:

- **Learnability** - easy to learn so that the player(s) can rapidly start;
- **Efficiency/compatibility** - enabling the player(s) easily leveling up their competency;
- **Memorability** - the game's symbols and rules should be easy to remember, enhancing the casual player/user to return to the game without having to learn everything all over again;
- **Robustness** - the game's use having a low error rate, and if errors occur, the game can easily be recovered;
- **Satisfaction** - the game should be pleasant to use (fun of playing).

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Conceptual usability addresses all aspects of change processes that are triggered and sustained through a game.

On such occasions, a game becomes an **action-support**, or **policy-support** system.

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