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**Design**

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# TWO HALVES OF PLAY

## Simulation versus Abstraction and Transformation in Sports Videogames Design

FARES KAYALI AND PETER PURGATHOFER

In-your-face marketing. Extreme camera angles. Trash-talking superstars. Sound like TV sports? Try sports videogames. (Ratliff, 2003)

Sports videogames have been one of the defining forces throughout the history of videogames. The installation generally accepted as the first video game was a sports game - *Tennis For Two* (Higinbotham, 1958), which used an oscilloscope as a display. The first commercial success in video games was a sports game - *Pong* (Alcorn, 1972) - and the game that sold the most copies in 2005 (Campbell, 2006) is a sports game - *Madden NFL 06* (EA Tiburon, 2006). Sports games contribute substantially to a positive public perception of videogaming through the emergence of e-sports.

Unlike most videogame genres, the ongoing quest for more realistic representations causes sports games to become more like the "real thing". Looking at a current generation sports videogame it appears to be a consummate emulation of reality. From authentic stadiums, jerseys and perfectly recreated player tattoos, the cheering crowd singing songs apt for the teams on the court, the presentation and statistical inserts that often exceed even the most professional sports television coverage to the colorful commentators, sports videogames actually are nearly a perfect replica of reality regarding their audiovisual appearance.

*Wii Tennis*, a part of *Wii Sports* (Nintendo, 2006), has gone a long way since *Pong* towards a simulation of reality. Or has it? While in some aspects, *Wii tennis* is without doubt more realistic than *Pong*, it introduces new elements to specifically enhance gameplay; like the power serve, the ninja-like jumping skills of players or the way twists that you use to spin on the ball. On the other hand, leaving out many of the complex characteristics of real tennis, *Wii tennis* becomes much more enjoyable as a game.

It should be noted that this dichotomy is fundamentally different from the narratology/ludology dualism that has been discussed widely in literature [eg. Frasca (2003), Aarseth (2004)]. In most sports games, the narrative is superficial and "tacked on". While it does provide for a more exiting overall experience, the core mechanics of the game is untouched by it. We will try to show that in this core mechanics, the concept of story has a different specificity.

It is generally accepted that a simulation alone does not constitute a game (since simulations in itself have no goals and are rarely fun), but in what ways can we deviate from a pure simulation in order to make a good game? What do realism and simulation mean in the context of sports videogames? What aspects of games are subject of simulation, and when do we experience a game as realistic? And finally, how can we map the complex movements of a real sports onto the limited interaction space of videogame controllers.

This article presents a simple model to suggest answers to these questions.

## **MAPPING REALITY: ABSTRACTION AND TRANSFORMATION**

Representational games that try to simulate reality to every extent possible raise the bar for success very high (Wolf, 2003). Every shortcoming in the quest for complete realism is fatal and destroys the "*willing suspension of disbelief*" (Coleridge, 1817). Tolkien (1966) describes the importance of this willingness in the context of fairy tale reading. Here, the creation of worlds with their own rules and laws preserve an "*inner consistency of reality*", as he puts it. An argument derived from drama is made by Laurel (1991) who argues that "*it is key to the success of a dramatic representation that all of the materials that are formulated into action are drawn from the circumscribed potential of the particular dramatic world*".

To properly support the player in her "*willing suspension of disbelief*", sports videogames don't really simulate as much as translate or map a real world matter onto a gratifying and consistent game experience. In respect to gameplay this mapping necessitates significant design decisions. Sports have innate rules, and videogames can be described as rule sets themselves. As Juul (2005) puts it: "*To play a video game is therefore to interact with real rules while imagining a fictional world, and a video game is a set of rules as well as a fictional world*".

In contrast to other games, rules in sports games have two sources: the rules of the game simulated, and the rules introduced in order to make a videogame the simulation a videogame. The rules of the modeled sport can be transferred without loss, while the modeling itself introduces implicit rules that come, among others, from the fact that simulations always have to simplify. Grünvogel (2005) writes about the second kind of rules: "*Models are idealisations of a system, in which certain aspects of the system are captured and other aspects are ignored. [...] Good models are those who are simple yet still manage to reproduce even quite roughly a large number of features of a particular system. [...] the main difficulty to construct a model is to identify the important aspects of the system*".

The principles of this mapping of reality to a constrained playable game are the focus of this research paper. It will be argued that besides plain simulation there are two distinct ways to mediate between reality and gameplay; *abstraction* and *transformation*.

The former follows Juul's (2007) definition of abstraction. Juul describes *abstraction* as the level of detail of the represented world that is implemented in the fictional world. "*The level of abstraction is the level on which the player can act: The actions that are available to the player*".

The most apparent examples of abstraction are found in control schemes. The complex and malleable actions that have to be executed by a human in a sport have to be mapped onto the layout of controls on a game controller. This process requires decisions to be made specifically about which actions (or in an even more constrained view: which manifestations of an action) should be offered to the player to perform or initiate, and which actions should be left out of the game. In that sense *abstraction* can also be understood as form of *designing by constraints*; *abstraction* is about the constraints that are defined upon the players' actions in order to liberate her from decisions that are deemed unnecessary in the context of the video game.

Often aspects of a real game are included in a videogame in a way that distorts or transforms them such that they retain their meaning and/or function within gameplay, but leave little else of what there was originally. This process can be referred to as *transformation*. As an example, imagine a trick-ski challenge. In the real world it would be scored by judges. In the imaginary game, the score will still be the central factor to grade player performance and further to decide who has won. Nevertheless the score's manifestation in the game may change completely, while still retaining this defining quality; e.g. the judges may be transformed to collectable score items and multipliers. This process of mapping a real world matter onto the game world, saving only theme, meaning or function but changing other qualities is what we call *transformation*.

This paper aims to provide a determination of various possible qualities of realism that can be implemented in sports videogames. These qualities can be used to assess design decisions as a trade-off between simulation and gameplay. For this purpose, we chose an example from each of a number of informally defined sports videogame genres and analyzed it by evaluating their degrees of simulation, abstraction and transformation in a number of dimensions.

## GENRES

The following list of genres is not to be understood as a precise method to divide sports games into different categories but as a means for understanding the different approaches sports videogames may take. Some of the terminology loosely follows Conway's (2007) approach. Even though the number of presented genres has been increased by introducing *the fun sports simulation* and *the deep sports simulation* to accommodate genre transcending games the distinction still has to be understood as being fuzzy.

### The extreme sports game

In this context the genre of extreme sports games does not exclusively signify the simulation of extreme sports like skydiving or free climbing but an exaggerated vision

of any sport. Examples include the ridiculous heights and aerial stunts that can be achieved in version 3 of the SSX snowboarding series (EA Canada, 2003) or the high-flying, physics-defying dunks of Midway's NBA Jam (Midway, 1993).

Realism is exchanged for action, and gameplay does not focus on providing a realistic experience of the sport but on skillful moves that lead to equally skillful looking results on the screen. The endless combinations of artistic moves in the SSX 3 more resemble the combo scheme of a beat-'em-up than of a realistic approach to the moves possible when really snowboarding.

Extreme sports games simulate the excitement, flair and clichés of the sport rather than the sport itself. Controls usually have simple basics and do not reflect reality but allow for a vast array of moves when (randomly or intentionally) exhausting the combinations of the often provided modifiers. EA Big's SSX 3 (short name: *ssx*) is chosen as the representative of this genre.

### **The fun sports game**

Fun sports simulations provide a very reduced, accessible version of the represented sport. Earlier examples include the diverse summer-, winter- or world games collections which very intensely relied on hefty button mashing or wagging of the joystick to simulate running – a feature found in many of the offered disciplines. A feature of many fun sports games is to center the interaction around the use of one physical metaphor, which is used as a strong simulation. As Rusch (2007) states, providing strong and consistent metaphors allows for a quick orientation of the player within a fictional world. Through this feature, fun sports games usually are very accessible and the rest of the game is subordinated to this central gameplay element. A prime example is Wii Tennis, which even excludes player-controlled movement in favor of offering a very haptic experience of metaphorically striking the ball with the controller.

### **The sports simulation**

The sports simulation attempts to provide a realistic experience of a single player sport. While not allowing for exaggerated moves as the extreme sports games its focus lies on skillful execution of moves and correct handling of physics in a generally more realistic virtual world.

EA's Skate (EA Black Box, 2007), which posts a contrast to the established *Tony Hawk's* skateboarding series (Neversoft, 1999-2007) through its innovative controls, was chosen as the example for this category.

### **The team sports simulation**

The team sports simulation is the genre that maybe has the greatest tradition of all. Characterized by extensive licensing and annual revisions the team sports simulation usually implements team sports like football, basketball or baseball. Controls are

complex and allow execution of as many realistic moves as possible. Team sports simulations ideally excel in using sophisticated AI to provide the sensation of control over a whole team while being able to actively control only one player at a time. The Pro Evolution Soccer series (short name: *pes*) (Konami, 2001-2007) was examined as a representative of the team sports simulation genre.

## The deep sports simulation

“Yes, it's the best... but is it only for the most dedicated?”

*IGN Magazine* (Magruder, 2003) on the Formula 1 racing simulation *F1 Challenge '99-'02* (Image Space Incorporated, 2003)

The deep sports simulation extends the underlying framework of the (team) sports simulation by providing opportunities and challenges beyond the actual gameplay. These extend to in-depth team management, multi-season-play and a flurry of statistical data upon which player decisions can be based. In games that strictly focus on management, active gameplay is or may even be excluded. The additional depth in racing simulations stems from the vast possibilities in car configurations that need to be made according to one's individual driving style while factoring in weather and track information. A good example is *Gran Turismo* (short name: *gt*) (Polyphony Digital, 1997-2007) which features a career mode that allows playing for extended time offering several hundred vehicles. These vehicles are very characteristically modeled not only regarding their visual style but also in respect to driving characteristics and physical attributes. When set to the highest degree of realism, the configurable driving model in conjunction with a steering wheel and pedal provides as close an experience to real driving as you can get sitting in front of the television set.

## METHODOLOGY

To evaluate the chosen genre representatives according to their degrees of abstraction and transformation, gameplay is analyzed according to four distinct categories; *implementation of rules*, *player control*, the *course of action* and *presentation*. The proposed categorization does not intend to be a formal model for the description of digital games as a whole but as a specialized tool to describe and analyze decisions made in the design process of sports videogames. Yet several analogies to other models can be drawn to explain our approach.

*"Interaction Map"* is one of four areas for a methodological analysis of games presented by Consalvo and Dutton (2006) and posts research questions like *"Are interactions limited?"* or *"What is the range of interaction?"*. These questions are answered in the *player control* category.

Lindley (2005) posts four levels of temporal structure in his analysis of ludic space and time. The *"discourse level"* signifies long-term narration while the more short-term *"performance level"* regards the plot. In our model both of those aspects of story-telling are covered in the *course of action*. The *"simulation level"* deals with

player interaction and is equivalent to our category of *player control*. The "*generative substrate*" addresses rules and is likewise covered in the *implementation of rules*.

Zimmermann and Salen (2004) suggest the following categorization of game rules; "*Implicit Rules*" cover social aspects. In our model those are not dealt with explicitly but can be attributed to the competitive aspects of playing sports videogames. "*Constitutive Rules*" are the mathematical core of the game rules. How rules of the original sport are implemented in the game is dealt with in the *implementation of rules*. This mathematical core also plays a role in our proposed category of *presentation* where modeled player skills and physical attributes are often based on formal mathematic expressions. "*Operational Rules*" deal with player behavior and interaction and can be attributed to the category of *player control*.

In the following, the games are examined separately regarding these categories (implementation of rules, player control, the course of action and presentation). The categories are then individually discussed and illustrated, using examples from the prior analyzed games as well as from other games. Following Scott McClouds (1993) taxonomy of comic styles, we use a triangle to visualize the results. The bottom left of the triangle signifies a complete simulation, the bottom right a complete transformation and the top corner stands for a fully abstracted implementation. In this display, the distance from the bottom left corner denotes the quality of the game as simulation. The direction of the vector between the left corner and the data point shows the weighting between abstraction and transformation that led to the removal from reality.

The games are examined in the following categories:

### **Implementation of Rules**

On the one hand, this category deals with the game's implementation of the sport's rules, and if and how physics and other rules of the real world are represented. On the other hand, it includes what additional rules have been implemented.

### **Presentation**

"[...]you'll remember the pluses and minuses popping up over a player's head to indicate stat increases and decreases. This time around, that same structure is in place, but the cosmetic side is different. Instead of symbols, it's all about the animations this time around, as the players will shake their head in disappointment or pump their fists in jubilation."

Games magazine *PSX Extreme* (Dutka, 2007) on *NCAA March Madness 08* (EA Canada, 2007).

This category defines the presentational layer of sports videogames. This not only includes graphical and acoustic realism but also true-to-life statistics and player skills / gear properties as well as an authentic setting. The term graphics not only implies the visual quality but also factors such as an accurate representation of real athletes through licensing. Audio qualities, like having commentators, factor in as well. As

Steven Poole (2000) stated: "*The modern sports game is no longer a re-creation of an actual sport so much as it is a re-creation of viewing that sport on television.*" This notion of realism is applicable to many modern sports videogames.

### **Course of action**

The *course of action* stands for everything amounting to the whole of one game played, race carried out or match fought out. Using this category, it is analyzed how the game represents time, if results resemble reality and if attained statistics are accurately compared to the real world. The course of action also includes if there are eventual implementations of momentum, or if raising her skill level is left to the player herself. Essentially this describes whether the player can immerse herself into a *game flow experience* (Csikszentmihalyi, 1990) and how the game assists this factor by temporarily raising ratings when playing well. Further, it is explored how and if games create drama and if some kind of storytelling can be attributed to the game experience.

### **Control**

When considering control in sports videogames, several aspects must be studied. Firstly, there is *individual control*, which deals with the controls implemented for the fully controlled avatar or vehicle (e.g. movement, passing, steering,...). Individual control includes the mapping of possibilities of the real world onto the game world. This factor is influenced by the chosen control scheme. Secondly, *Team Control* deals with the amount of control the player is given over the rest of the team in team-sports games and how deeply strategic options are implemented. Further it is analyzed how the game provides challenge, emulates skillfulness and rewards mastery.

## EVALUATION

### SSX 3

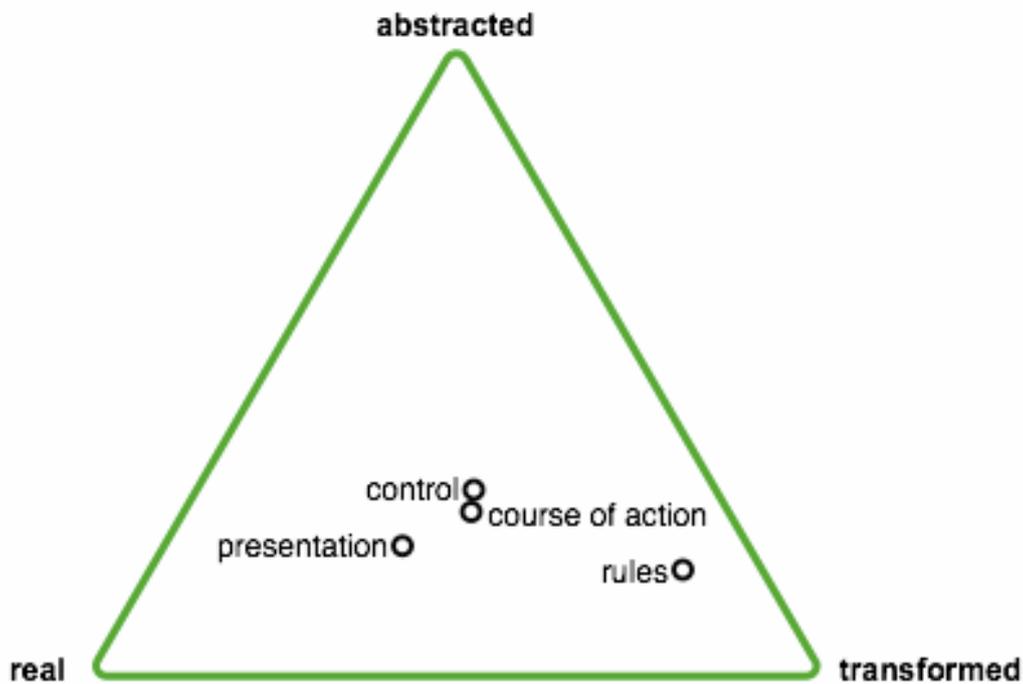


Fig. 1: SSX 3

*Rules:* SSX transforms the judging that takes place in snowboard contests to a flurry of bonuses and multipliers for individual tasks. Physics are present but have been transformed to allow crazy gravity-defying jumps and stunts. The usual track boundaries are partially removed as the player acts in a free environment where additional areas are unlocked as the game progresses. In contrast to reality the player is invulnerable but crashing is punished; damage is forfeited but the time loss remains which is an abstracted version of a crash in the real world.

*Presentation:* SSX 3 does not implement actual snowboarding stars or legends; it presents abstracted versions of them. By implementing stereotypical characters it does well in recreating actual clichés within the game's fictional world. These clichés are enforced by the addition of licensed music from the mainstream punk and rap genres. Graphical realism is important as avatars are physically modeled very accurately and have a tremendous choice of branded gear to wear. SSX is displaying animations realistically but in a move of transformation allows so-called "uber-moves" that are accompanied by special animations and light tails. The environment or playground is a transformed version of reality. The amount of ramps, rails and other features present in SSX cannot be found on any real mountain.

*Course of action:* In the later iterations of SSX all races and challenges happen on one mountain and all tracks are connected like they are in a real ski-region. Thereby time is represented realistically to a certain degree as the player has to drive to the race she wants to take next. Some abstraction still occurs as the player lives on that

very mountain for her whole career. When racing or doing trick challenges - even if they are graded differently than in reality - results are presented hierarchically like in real contests as the player is mostly competing against AI controlled opponents. Game flow is represented artificially and thereby transformed as the multiplier rises when chaining moves and not crashing for stretches. The same moves are then scored higher than usual and the so called "uber-tricks" become available. The game does not involve much drama apart from occasional close finishes in races but tells a clichéd story of a snowboarding career that is abstracted to having more sports apparel and tracks available over the course of a career.

*Control:* In extreme sports games gameplay does not focus on providing a realistic experience of the sport but on a vast array of moves that lead to skillful looking results on the screen. The endless combinations of artistic moves in SSX 3 are transformed and more resemble the combo scheme of a beat-'em-up than a realistic approach to the moves possible in real snowboarding. There is a deep choice of moves but executing them does not require a high degree of skills as tricks can also be pulled off randomly with ease. On screen results are designed to immediately satisfy the player rather than to show of individual skills that need to be learned. The control scheme is mostly transformed for gameplay purposes as tricks are handled by including many modifiers rather than having to pull off different moves with the controller. Strategic options are not present and the configurable gear has no influence on the gameplay.

## Wii Tennis

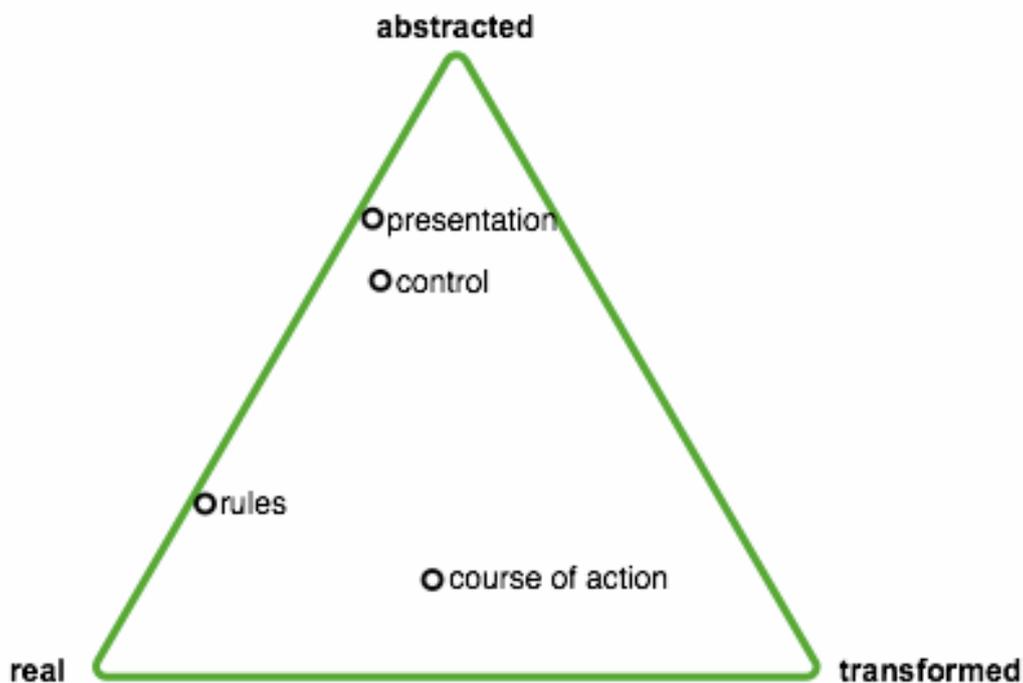


Fig.2: Wii Tennis

*Rules:* Wii Tennis implements all of the rules present in real world tennis. The only difference is scoring, which for the sake of dynamic and fast paced changes of player pairings is abstracted to the possibility of playing only one set with a maximum of five games without a tiebreak. Ball physics are reduced to several primitives of strokes but are present in general. The transformed player movement (which is controlled by the AI) sometimes stretches the rules of physics enabling the player to return virtually unreachable balls. Wii Tennis implements a dramatic additional rule as, in a move of abstraction, it eliminates single player matches. When just 2 players are available it is still only possible to engage in double matches with each player controlling two avatars at the same time.

*Presentation:* Wii Tennis' graphical style is highly abstracted from reality even excluding arms and legs reducing the avatars to head, torso, hands and a racket. All features of a tennis court are present. Audio is functional with added realism stemming from the sound of hitting the ball separately being played on the speaker of the Wii Remote, with which the player strikes the ball. No real tennis professionals are included. Players use their Mii alter egos that are created outside the actual game. Overall, with the exception of the sounds played through the Wii remote, Wii Tennis presents a highly abstracted, functional representation of tennis.

*Course of action:* Through the restrictions regarding the number of games that can be played (see above), Wii Tennis matches are fast paced and last five to ten minutes, which is way shorter than in reality. Individual rallies sometimes still are longer than in real matches as players tend to catch more balls than normally possible and lengthy duels between two players volleying are common. Wii Tennis presents a transformation of time as it stretches and contracts it to ensure fast paced yet dramatic gameplay. Besides experience points that are given out after matches against the AI, there are no statistics recorded or displayed. The controls that eliminate the necessity of movement allow the player to focus on the next shot. The intuitive way of striking is the only point of focus for the player and allows her to immerse herself quite easily. The drama of a lengthy rally, that occurs in real tennis as well, leaves players and spectators in awe after a hard-fought point is finally earned.

*Control:* Wii Tennis' controls are abstracted to a certain degree. Movement is eliminated and the usual positioning relative to the ball is controlled by timing. Through the intuitive way of striking the ball with the controller many things like spinning the ball, serving or the distinction between forehand and backhand are represented quite accurately. Possible shots still are reduced to an amount of primitives. Strategic options are not present but Wii Tennis presents quite a tactical challenge; as skillful players return most balls with relative ease opponents need to apply a kind of "short-term tactic" for each individual rally. Skillful play is implemented very elegantly as the game is highly accessible to novices (which is made apparent by the Wii spreading among casual players) but appeals to expert players, too, as there is little to none random present and as the game gets quite tactical when no unforced errors are made.

## Skate

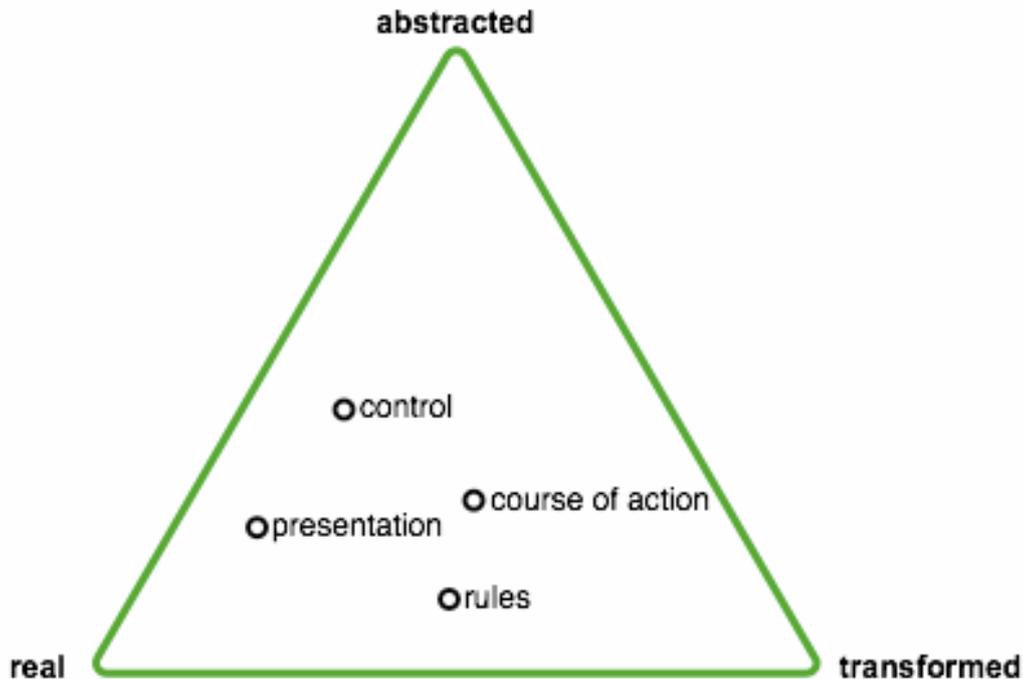


Fig.3: Skate

*Rules:* In Skate scoring is handled similarly to the aforementioned SSX 3. Physics are quite accurate and allow mildly exaggerated maneuvers at the most. Skate also is situated in a free world, thus transforming the bounded area of a skating contest to a city-wide playground. Vulnerability is abstracted to awkward landings displayed in close-ups. Crashes are only sanctioned by breaking the current scoring streak.

*Presentation:* Just like SSX, Skate does not feature real skateboarding professionals but uses stereotypical, clichéd and thereby abstracted characters to accurately capture the flair of skating. Avatars are modeled physically accurate with branded boards and apparel available for customization. In contrast to SSX's *uber-moves* Skate's animations are modeled realistically. All moves present in Skate can be executed in reality and vice versa. Skate's game world is believable but the city and its playgrounds are slightly transformed from of reality; all walls have rounded edges to the floor for gameplay purposes.

*Course of action:* As Skate is located in a city, time is represented quite realistically since the player has to travel between locations. Time is not a significant factor because Skate's objectives mostly amount to various distributed challenges. Skate's many moves are all derived from real skateboarding and are all represented by accurate names. The game also keeps track of moves that have been successfully executed at least once. A transformed game flow is forced on the player only in the sense that chained moves raise a multiplier that is immediately decreased by inactivity. Just as SSX tells the story of a rising snowboarding star, Skate's career allows the player to live the cliché of a skateboarder that is mostly abstracted to

unlocking areas and gear and to learning new moves over the course of action.

*Control:* "In essence, Skate transforms the button pushes. They are no longer random hits, but little metaphors for the swoop of an entire body." states Clive Thompson (2007) in Wired Magazine. Skate is controlled by representing body and skateboard with the gamepad's two analogue sticks. This control method, while still abstracted from reality, is more authentic than the usual button mapping. An equally abstracted part of the control scheme is the handling of grabs; it is done using the shoulder buttons of the appropriate side / hand that is to be used for grabbing the skateboard while in mid-air. Skate's arsenal of moves virtually includes every labeled move present in skateboarding. All of these moves can be executed intuitively with the described control scheme. This also means that moves differ greatly in their difficulty and the required mastery. Reward is given appropriately by the score and by the gratification of having accomplished something that might have been difficult to learn (as more realistic controls draw the player nearer to her avatar she better understands the difficulty of the executed move). Strategy is not involved and the customizable gear does not influence the gameplay.

## Pro Evolution Soccer

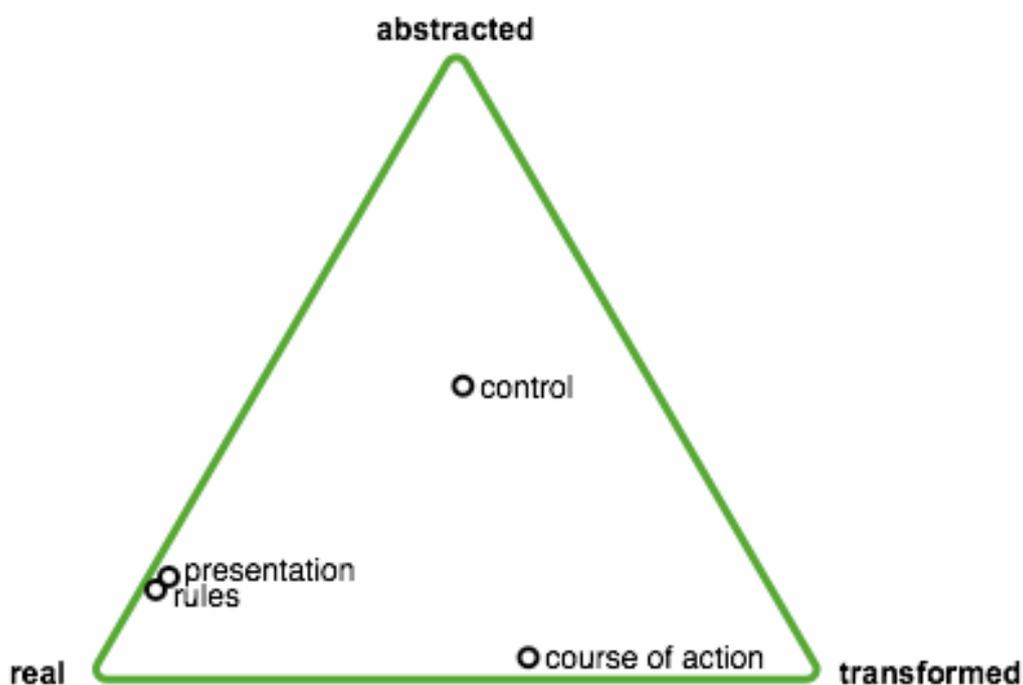


Fig.4: Pro Evolution Soccer

*Rules:* Pro Evolution Soccer emulates all of the rules of real world football. Even the inconsistencies between referees regarding fouls are factored in by having the option to determine a random strictness for the referee before the game. This strictness is not displayed but players have to find out while playing what moves they can get away with. In contrast to many other ball sports games Pro Evolution Soccer has

always taken pride in having independent ball and player body-physics. Still there exists a little invisible rubber-band that slightly attaches the ball to the player's feet (in a slightly abstracted version of ball handling) and player collision physics sometimes fail when players appear to "warp" through one another.

*Presentation:* Pro Evolution Soccer has always been known for its realistic animations that also add to the gameplay experience. Further it is quite representative of the team sports simulation genre as most of the teams and players are licensed and represented with the appropriate logos and dresses. The shortcomings of player rosters are addressed by a healthy community that regularly provides updated content. Player looks are very real and feature distinct shooting styles and goal celebrations for several star players. The graphical realism is typical as other team sports simulations like NBA 2K8 (Visual Concepts, 2007) take it even further to recreate every tattoo, head- or wristband players wear in real basketball games. Pro Evolution Soccer also features commentary and presents game statistics that add to the TV style presentation of the game. Because the graphic representation is not perfect it is a mild abstraction of the real world looks of football and its players.

*Course of action:* Pro Evolution Soccer distorts and thereby transforms time to a high degree. A match that lasts 90 minutes in reality can be played in 10 minutes. The score and the usual offensive statistics displayed in football broadcasts match those of real football matches. This is done by eliminating most of the gameplay that takes place in the midfield, by generally increasing pace and by shortening the field. Momentum is implemented by the option of randomly determining player condition and by modifying this condition in season play according to fatigue and experience gained. Though hard to determine, transformed team momentum during individual matches seems to be present as well. The team that is playing better is seemingly being favored by temporal improving its ratings. Drama takes place in close finishes just like it does in real football games and additional (and thereby transformed) drama is provided by the huge amounts of shots that do not just miss the goal but hit the goal's post or crossbar for additional moments of frustration or relief (depending on the player's perspective). In Pro Evolution Soccer 2008's "World Tour" mode, the player gets put into dramatic finishes of games with a given challenge like "*There is only 10 more minutes to play and you are trailing 1-2. Win the game!*"

*Control:* Pro Evolution Soccer gives the player a great choice of available moves that are mapped to a very arbitrary control scheme. The depth of learning new moves and how to use them is great. This means that the game is not highly accessible and complete mastery is quite elusive. Some rules are imposed by the highly abstracted control scheme that is greatly influenced by the history of sports videogames. There are various fixed running speeds, movement is only possible in angles of 45 degrees, passing targets can only be chosen by the length of the button press and an by giving an approximate direction, and more of the like.

Team control is enabled in two ways; the game presents a host of configurable strategic options even though their degree of influence is only partially apparent to the player. During the game, teammates can be controlled partially by play-calling, double cross passes and by calling for assistance on defense - all abstracted options of real world football. The AI tries to support and anticipate player actions as much as possible to establish a feeling of control - not only over the individual player but the

team as a whole. The added strategic depth and tactical settings suggest even more control over the directly uncontrollable. As UK game magazine Edge (2007) states this wrestling for control over a whole team is just what makes Pro Evolution Soccer so emotional and compulsive: "No outcome is guaranteed. All you can do is maximise your odds. Infuriating? Often. Unfair? Possibly. But the compulsion lies in taming the unpredictable, using a combination of your hard earned skill, experience and sheer bloody-minded force of will."

## Gran Turismo

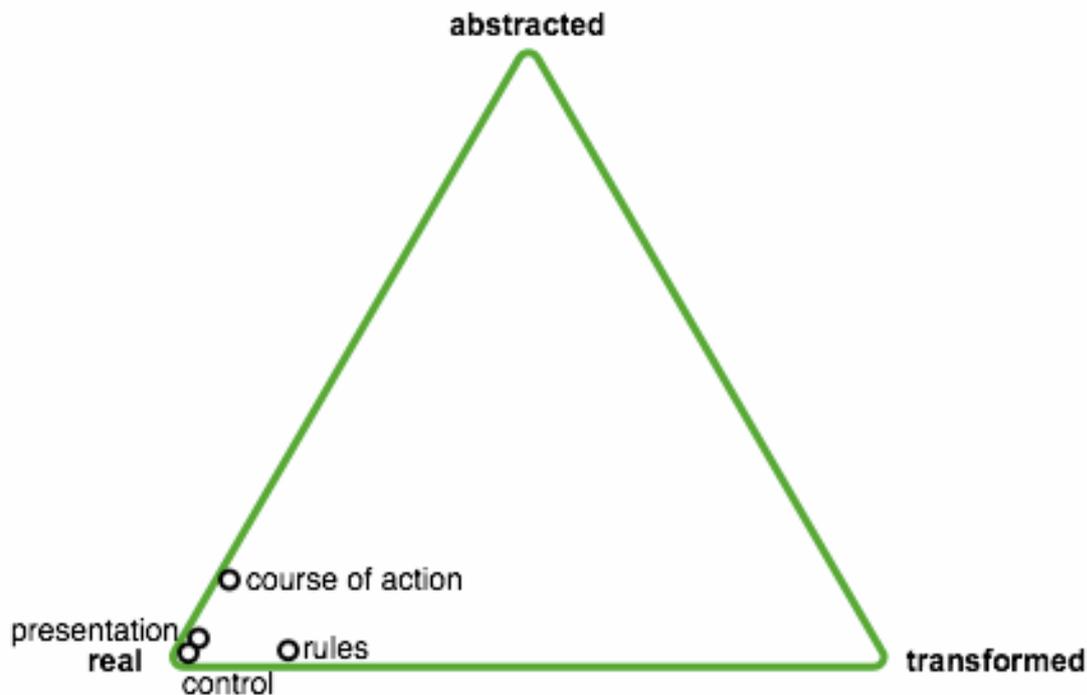


Fig.5: Gran Turismo

*Rules:* In the Gran Turismo series driving has always been as real as possible. All car settings are configurable and represented in the driving model. With all driving aids turned off and when using a steering wheel with a manual clutch there is little difference in its driving physics from reality. Races come in all different lengths and modes available in real life with the possibility to even take part in 24h marathons. Were it not for the non-existing damage model that pulls the player out of the otherwise complete illusion of driving a car the moment she crashes, Gran Turismo would stand as an almost perfect simulation of the rules of the real world.

*Presentation:* When playing the latest demo version of *Gran Turismo 5 Prologue*, its graphics and sounds appear to better and shinier than in the real world. Every car detail has been modeled as accurately as possible and engine roars are very distinctly marking different vehicles. The many non-fictional tracks in the Gran Turismo games also are true-to-life. A feature that has been abstracted from reality is

that not even a particle of dirt smuts the shiny car models over the course of a race.

*Course of action:* In Gran Turismo time is represented accurately. Due to the accurate simulation of the used cars and tracks lap times are realistic as well. Gran Turismo does not implement a racing career in the sense that a full racing season can be played. Progression in the game instead unlocks new tracks and cars. When races are close to finish, drama is present just like in real races. The amount of drama is reduced by the missing damage model (which is an abstraction) as risk and thereby tension decrease.

*Control:* When playing Gran Turismo with the best possible controller configuration using a force feedback wheel with pedals, clutch and handbrake, controls are mapped 1:1 from the real world to the game world. Driving a car to its limits is almost as challenging in Gran Turismo as it is in reality. Options in Gran Turismo allow for simplifications of the control; automatic transmission as well as braking and traction assistance can be turned on to ease driving. Strategic options allow for the configuration of car specifics like suspension and tires. More strategic depth is not available as damage and the wear and tear of longer races are missing.

## RESULTS

### Implementation of Rules

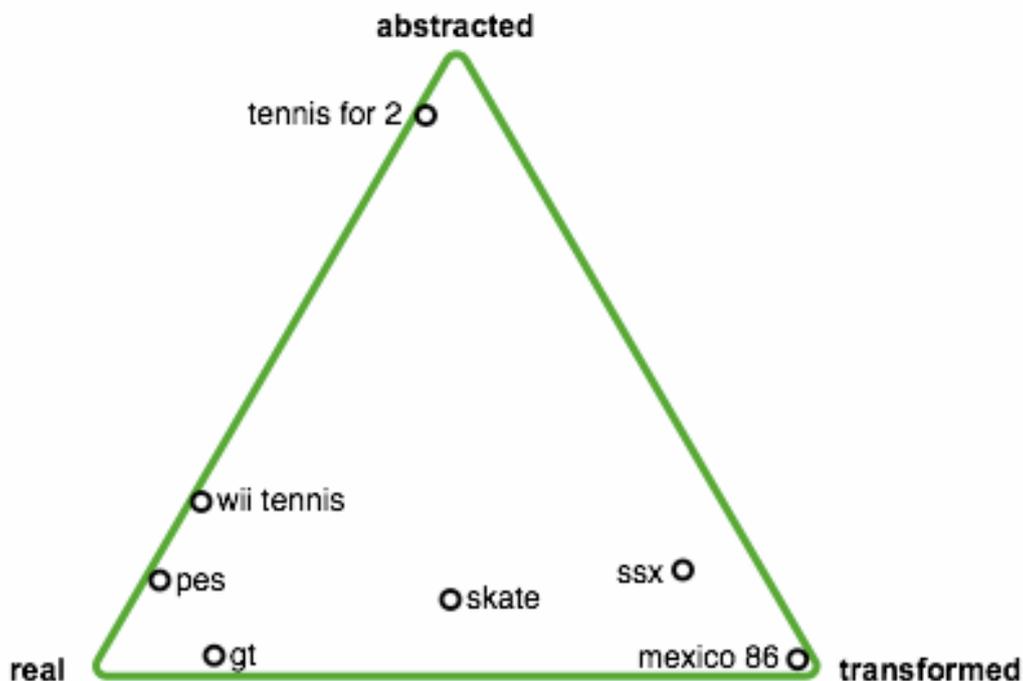


Fig.6: Implementation of Rules

The highest possible amount of abstraction is achieved by *Tennis For Two*. It reduces the original rules to a minimum (hit or miss the court) so you can still identify

it with its ancestor. One example of a complete transformation is a sports-themed pinball machine like *Mexico 86* (Zaccaria 1986). Its style is derived from the sport of football, but none of the original rules are applied in the presented pinball game.

From the figure it can be seen that a distinction can be found between games that are driven by results (score or position) and games that are driven by score. Games driven by result need little to no abstraction or transformation regarding rules, while games driven by score transform the ruleset to be more suited for video games than for sports. This distinction would be even stronger if *Gran Turismo* were not displaced due to its lack of a proper damage model.

## Presentation

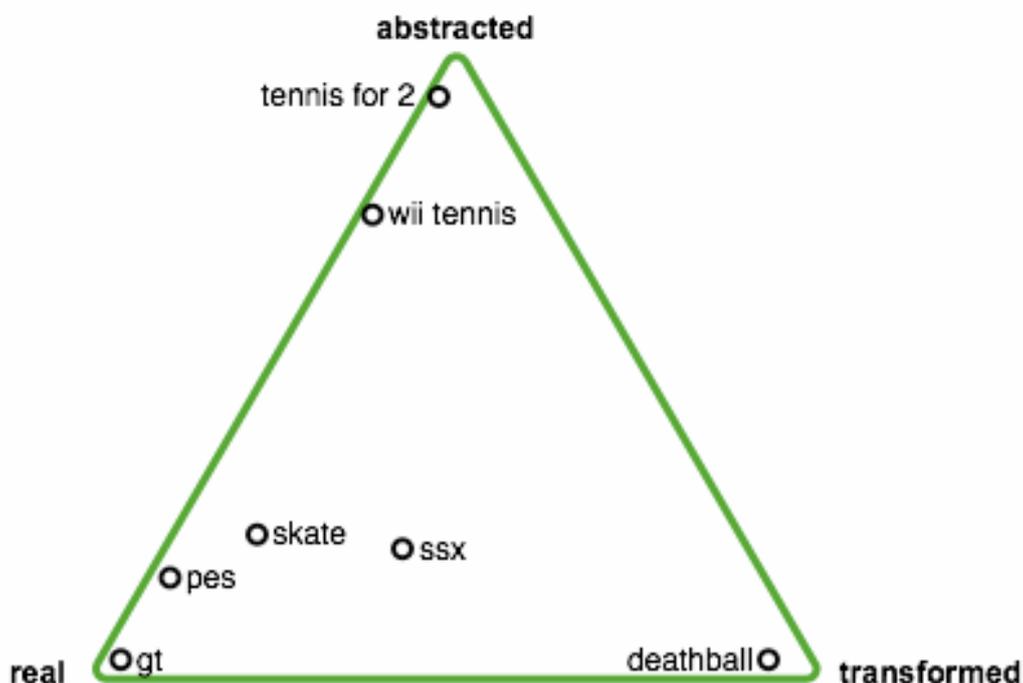


Fig. 7: Presentation

The maximum in abstraction again is reached by *Tennis For Two*. In this game, the tennis court is replaced by two perpendicular lines, a long horizontal and a short vertical line, and the ball is abstracted into a single pixel, with no players or rackets visible on screen. The example for an almost completely transformed presentation is the *Deathball* mod for *Unreal Tournament* (Team Vortex, 2002). While the resulting game can still be called football, it has very little visual resemblance with the original sport.

Thanks to technological progress, the presentational quality of sports games has improved significantly over the last couple of years. Quality and depth (e.g. through commentary and displayed statistics) almost match that of a TV broadcast. If parts of the presentation are less realistic, it cannot any longer be contributed to technological

shortcomings. Instead, it acts as a concession to gameplay as made apparent by Skate's and SSX's tweaks to their respective game worlds. The highly abstracted vision of Wii Tennis underlines the approach Nintendo has taken in creating simple and accessible games. The notion of accessibility of Wii Tennis is enforced through the functional yet likable style of its graphics.

Games like 2K Sports' NBA 2K8 have evolved the realistic qualities of the presentation in a way that it converges with other media like television and the internet, for example by displaying real-time news and game results during actual gameplay.

Also, many games featuring statistically and visually highly accurate rosters (like football or basketball games) can rely on a competent user base that keeps the game up-to-date with vast amounts of user-generated content, until the next revision is released.

## Course of action

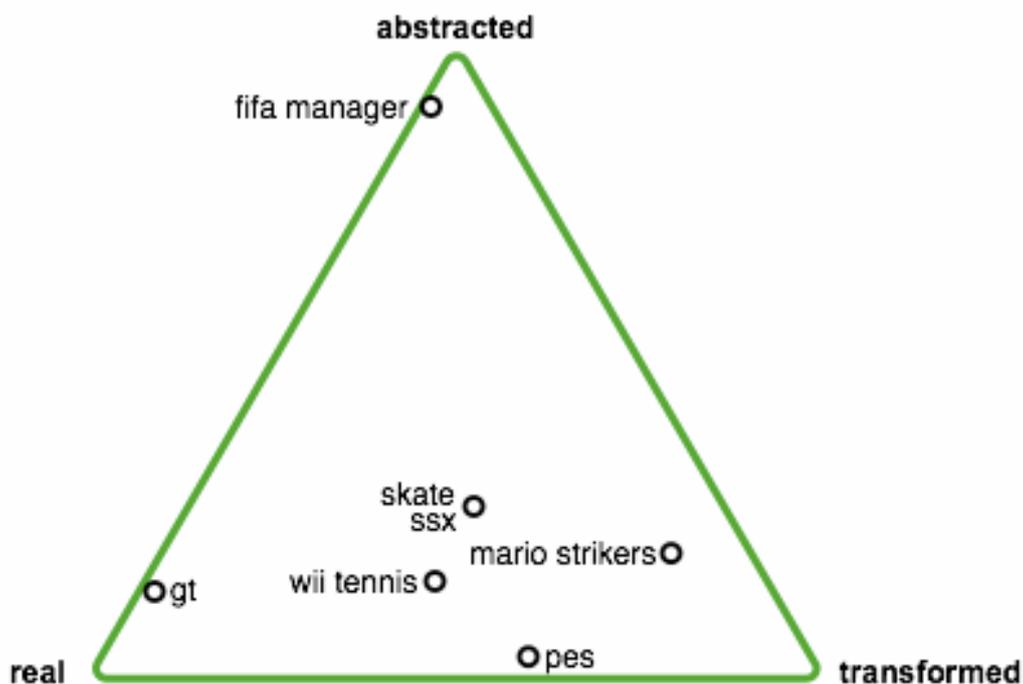


Fig.8: Course of action

The course of action of the football fun game *Mario Strikers Charged* (Nintendo, 2007) is highly transformed as gameplay amounts to either charging up the ball through passing for a chance to beat the otherwise perfect keeper or to waiting to unleash a super move that scores up to five goals at once. *Fifa Manager* (EA Sports, 2003-2007) abstracts football videogames to a few moments of waiting for the simulation to come up with the results.

*Game Flow:* To recreate the "flow" experience athletes can achieve in real life sports when in the lead, some videogames implement *momentum*. Momentum favors the player already in the lead by increasing her odds of success even more. It is disputed if this should not be left to the player immersing herself in the flow of the game rather than artificially imposing it through game mechanics. Momentum detaches the player from the simulation which would demand her to immerse herself and thereby play better, but it still is a move towards realism as it implements a distinct and important feature especially present in possession based team-sports like basketball or american football.

*Drama:* Usually it is in the player's hands to create an intriguing matchup. A new story is written with every game or season played. Some games may enforce close games to create drama but are thereby detaching the player from the simulation.

A typical feature that adds suspense to the game is the opposite of the described *momentum*, a feature often found in racing games. When implemented, vehicles in back positions can drive faster than the leading car. This "rubber-banding" raises the dramatic moment of the game experience. Another form of dramatization has already been described in the analysis of Pro Evolution Soccer.

*Time:* While we have included time in this category, it can be seen as part of all four categories. The distortion of time is a necessity in games where the real game takes far too long for a videogame to be engaging and fun.

## Control

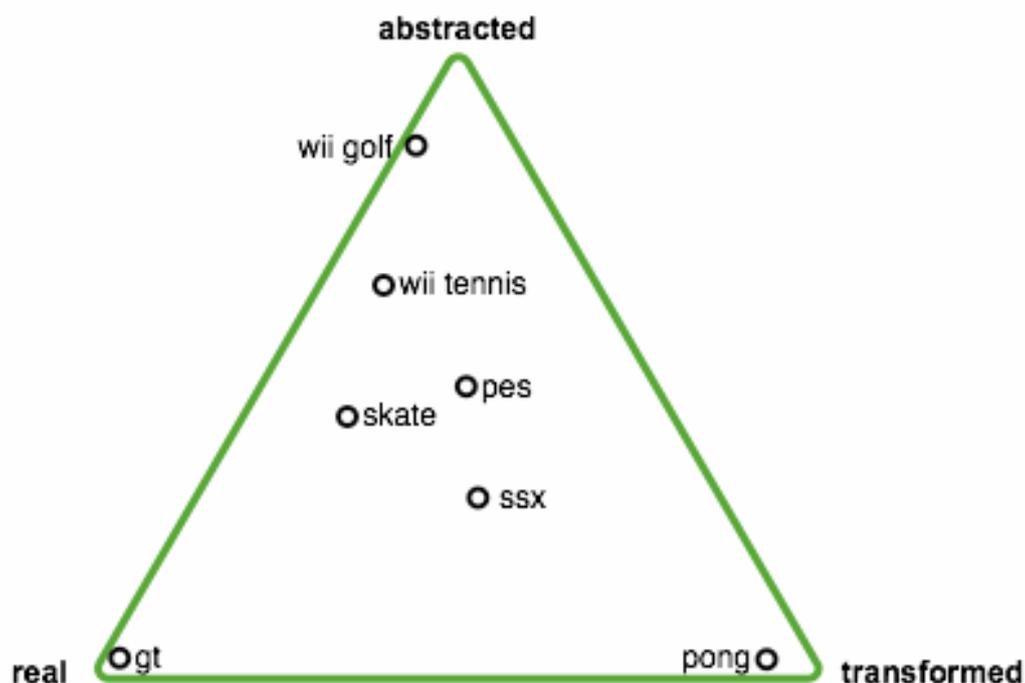


Fig.9: Control

The type of controller has a strong impact on possible mappings. To map functions to (digital) pushbuttons, almost always transformations have to be made. Special forms of pushbuttons (like shoulder buttons that call to mind the experience of grabbing something, or pressure sensitive pushbuttons) allow for more abstract mappings, like for example the board grabs in *SSX* or gradual acceleration in *Gran Turismo*. Analogue sticks facilitate abstract mappings much better when moves like pushing, pulling, changing a stance or steering are involved. The motion control offered by the *Wii Remote* lets designers create direct abstract mappings of quite complex controls. Single-purpose devices such as data gloves or steering wheels allow for simulated control.

The classic videogame *Pong* places itself in the extreme transformation corner by transforming the complex realities of tennis or table tennis into the simple task of moving a bat to the right position by turning a knob. On the other hand, *Wii Golf* (a part of *Wii Sports*) can serve as an example of high abstraction. The delicate and complicated act of hitting a golf ball is effectively reduced to a "flick" with the *Wii Remote* that essentially stands for the amount of energy put into the swing. All further qualities of striking like player positioning, the point where the club hits the ball and spinning are reduced or eliminated.

The large gap between *Gran Turismo* and all other games can be attributed to the fact that in racing games the player controls not the driver, but the car itself. As such, the mapping is not between the movements of a human being and the controller, but between the interface of the car and the controller - essentially a controller-to-controller mapping. This of course is much easier to accomplish realistically, making racing games bound for the lower left corner. All other games, where essentially human beings are controlled, are on the other hand restricted to areas sufficiently far away from realism.

This gap is often bridged with a mechanism best termed "illusion of control". In every videogame in which one controls a human being (and even more so in team sports videogames), the lack of direct influence in the game is substituted with very indirect forms of control that, in the ideal case, can still feel like direct control. This "illusion of control" is supported by the fact that many of the player's goals can be predicted (e.g. running after a loose ball in football) and thus anticipated. Using this mechanism, controls can be significantly simpler and at the same time much more powerful than direct control.

The concept of "illusion of control" explains what Church (1999) describes as the gap between intention and consequence:

In sports games, you direct players, select an action, and watch something happen in response to that action, which gives you feedback about what you tried to do. The player does direct the action — a cross-check missed, a slap shot deflected, a pass gone wrong — but one level removed. While watching the action on screen, one sees everything that happens, but can't be sure exactly why it happened. This is because the basis of most sports games is a statistical layer, and thus the same actions with the controller can lead to different results. When you combine the different player ratings with the die-rolling going on behind the scenes, the probabilities make sense, but may not be apparent to the

player. The intention is still there, but the perceived consequence is much less immediate. This removal of direct control (and the entire issue of directing action) through a statistical layer, which the player can intuit but not directly see, is often present in RPG combat. Thus, in Tekken, I can't say, "Man, bad luck, if only I'd rolled better," or "Yeah, now that I'm a tenth-level ninja, I can do that move," but in NBA Live or an RPG, I often do.

Seeing beyond the illusion of control often allows skillful players to reach new levels of mastery of such games. Mechanisms such as the "super cancel" of Pro Evolution Soccer break through the "anticipation" feature of the game and let the player do things that are unexpected as well as unpredictable. Such features are of core value for a game to make it suitable for "deep" competition and e-sports.

## CONCLUSION

Sports videogames, be they statistically accurate management games or very simplified casual games, always contain elements of simulation. Their design process involves creating a model of the sport. But modeling for videogames is very different from modeling for computer simulation. To create an accurate representation of reality is only important as far as presentation and game results are concerned at most. Even more, some aberrations from reality might be necessary in order to make the game appear more real than it would.

For example, the "willing suspension of disbelief" of the user gives the designer certain freedom to deviate from perfect simulation. Also, some aspects of reality cannot be reproduced in a game where the user only has a limited amount of control over the course of action. Thus, we have to fill in, giving the player an "illusion of control" that makes her believe in much more possibilities than are actually there.

The methodology suggested in this paper helps in the understanding of trade-offs in this specific design space. It offers a way to understand differences in genres and types of sports games. By suggesting a terminology for the types of deviation from pure simulation, it also helps us talk about sports games and simulations in a more productive way.

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