

CHAPTER 12: Studying Game Mechanics

In a formal sense, the essence of games is how they work, i.e. how they display system behaviour and afford player behaviour. In other words, the essence is in how they incorporate players into the formal structure, and vice versa. In this chapter we will move from defining game elements to conceptualising their interaction, without forgetting the player as a behavioural entity. The perspective will be from the standpoint of a player, i.e. how does s/he engage with the game system and its elements. Game mechanics is the key element class, almost literally, as it provides the players means to access the game system and create combinations of two or more elements in the hope of performing a successful plan in relation to a goal – whether it is considered ‘a play’, ‘a turn’, ‘a move’, ‘a sequence’ or something else in the rhetoric of the system. Game rhetoric also relates to the set of cognitive abilities the game necessitates for successful play: By privileging certain abilities, a game system constructs a rhetoric of those abilities, e.g. a rhetoric of physical abilities as with sports games, or a rhetoric of quantitative reasoning as with games such as Sudoku.

This chapter will introduce the basis for a method with which to distinguish and analyse the set of game mechanics in a game. This will lead into a collection of game mechanics, i.e. a ‘library of game mechanics’ that is documented in Appendix B. The library will be taken advantage of in the subsequent analysis methods (see Part IV), and applied into other case studies as well.

What are game mechanics and dynamics: a Review

There is some semantic confusion among game research and design references on the use of the concept ‘game mechanic’: both ‘mechanics’, ‘mechanic’, and ‘mechanism’ are used. Merriam-Webster's Collegiate Online Dictionary provides a number of meanings to the word ‘mechanics’: it refers to ‘physical science that deals with energy and forces and their effect on bodies’ and ‘mechanical or functional details or procedure’.⁵ In the context of games, the ‘energy and

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<http://www.britannica.com/dictionary?book=Dictionary&va=mechanics&query=mechanics>

forces' of the first definition are best understood as parts of the ruleset that govern the players and their efforts in changing game states towards attaining goals.

This definition relates directly to the formalisations of games as a structure with ends and means (e.g., Parlett 1999, 3): The means give birth to a struggle in achieving one or more objectives, i.e. goal rules, that constitute the ends. Fittingly, the dictionary definition of 'mechanism' states that it is 'a process or technique for achieving a result'. It would seem, then, that mechanisms exist in games in order for the player to achieve particular results, i.e. attaining goals of various orders (in the context of a goal hierarchy). Regarding the semantics, the conclusion is that in the context of game studies and design, the terms mechanics/mechanism are used as synonyms, and it is largely a question of taste which one to use. I have opted for 'mechanics'.

Another word often closely associated with mechanics is 'dynamics'. It has been defined, for instance, as 'a branch of mechanics that deals with forces and their relation primarily to the motion but sometimes also to the equilibrium of bodies', or 'a pattern or process of change, growth, or activity'⁶. So, if mechanics presents instances of specified processes that affect a particular game state or a sequence of them, dynamics is about the patterns and variations of these processes that influence a number of game states throughout the course of game play. Dynamics, then, is what goes on when the game system is operated, i.e. being played in a gaming encounter. In terms of *Games without Frontiers*, it equals system behaviour.

Regardless of the semantic disparities, let us review existing definitions of game mechanics and dynamics, and references to them. As with many other concepts frequently used in game design and research, 'mechanics' or 'mechanism' is often mentioned in passing but not rigorously defined (as in Adams 2001; Crawford 1982, 10, 26, 27; Hansson 2002; Hardin 2001; Johnson 2001; Klevjer 2002; Larsen 1999; Mackay 2001, 37–60; Parlett 1999, 9; Rollings & Morris 2000, Rollings & Adams 2003).

Alternatively the concept is defined in such a broad fashion that it is not useful for analytical purposes. For example, a glossary in the popular boardgaming web site Boardgamegeek.com states the following definition for mechanics: 'Part of a game's rule system that covers one general or specific aspect of the game.'⁷ As with this definition, it is not clear what particular game elements or features the notion of 'mechanics' relates to, or mechanics is left undefined and the focus is on explaining what a certain prefix for the notion means.

This is the case with game designer Charlie Cleveland's discussion on 'meaningful game mechanics' where he states that 'game mechanics are rules,

⁵ <http://www.britannica.com/dictionary?book=Dictionary&va=dynamics>

⁶ <http://www.boardgamegeek.com/gameglossary.htm>

⁷ Found in Boardgamegeek.com's glossary: <http://www.boardgamegeek.com/gameglossary.htm>

player choices, and other designs that have been created with intent and consequence in mind' (Cleveland 2002, 85). Cleveland wants to encourage the implementation of mechanics that give players chances to make meaningful choices and force the players to think about the consequences of their choices. This is a valid design goal, which can be systematized through typologies of choice, for instance (see chapter 11). Cleveland does not define mechanics in detail, but for him, mechanics clearly has to do with the feedback loop of available player choices, and how the players deal with them. In terms of the concepts addressed in chapter 6, Cleveland is discussing the process of goal monitoring, as it plays an important part in this feedback loop. Another designer, Joshua Mosqueira (2003, 73) treads along the same lines as Cleveland, when he gives a broad definition: 'game mechanics and interface are the media through which the player interacts with the system'.

The 'prefix-syndrome' is evident in the thinking of two other game designers: Trond Wingård Larsen (1999) treats the 'visibility' of game mechanics by taking the meaning of mechanics for granted, as does Anders Hansson (2002) in discussing the mechanics of a particular sports game subgenre.

In the context of board and card games, according to Andrew Hardin (2001), there is debate among game design communities on the importance of mechanics vs. theme. He discusses the issue in relation to how the game takes hold of the player, i.e. 'immerses' her into the game. This tension between mechanics and player's sense of involvement is apparent elsewhere as well: according to Mosqueira (2003, 73), 'A player's immersion rests solely upon the seamless integration of the game's mechanics into the world'.

What does this mean? Game theme was discussed earlier as the subject matter that is used in contextualising the ruleset and its game elements to other meanings than what the game system as an information system requires. In other words, a metaphor for the ruleset is designed. In light of game mechanics, the function of meaningful context becomes apparent from this explanation of theme: 'Having rules and mechanics based on assumptions regarding the subject matter of the game.'⁸ As was noted when discussing theme as a metaphorical concept for the game system, the mechanics should make sense in relation to the metaphor that the theme articulates and upholds. Conversely, in an abstract game without a theme, the mechanics are not attached with any other meanings than the functional means to keep the game going, i.e. affording the player to attain the goals stated in the ruleset.

⁸ Before we can compile a list of common game mechanics, we have to look at existing categorisations. Boardgamegeek.com lists 41 game mechanics (in March 2006) that exist in board games and card games. There are obvious overlappings among the mechanics listed, as the criteria for categorization are not unambiguous. Moreover, some of the listed mechanics seem to be proportionally different: 'simulation' as a mechanic is not as specific as 'dice rolling' or 'singing', for instance. Many of the mechanics listed are used in digital games as well, such as 'Point to Point Movement' and 'Unit deployment'.

In terms of the theory of player experience, the question is whether the game mechanics' relation to goals is understood

- through cognitive processes, such as conceptual blending, where the action the game mechanic puts in motion is blended in the player's mind with its possible effect, i.e. its consequences for attaining a goal
- or through a process of recognition, where the schemas and scripts articulated by the theme element as a metaphor help the players to anticipate what the consequences will be.

In any case, the arguments referring to the inter-relations between theme and mechanics point out that even though mechanics are deducted from goal rules, there are mechanics that have particular relations to other game elements, as the goal rules are embodied into game elements – components, information, environment, and so on. In this light, mechanics are quite fundamental to games as compound elements between players and other elements. They are also what the players use in order to produce effects in the game as world, and thus performing game mechanics may be a source of pleasure in itself, as the notion of effectance suggests (see chapter 9).

Game mechanics as embodiments of effort

Overall then, 'mechanics' is obviously another fuzzy game-related concept – players, designers, journalists, and theorists seem to know its meaning but few have gone to the trouble of explaining it thoroughly (much like with the terms 'game play', 'playability', etc.). There are some noteworthy exceptions.

Game designer Marc LeBlanc (2003) and his colleagues (Hunicke et al. 2004) have defined mechanics as 'The rules and concepts that formally specify the game-as-system', and game dynamics as 'The run-time behavior of the game-as-system'. These definitions are useful but need some revision in light of the theory formulated here – especially 'mechanics', which, if understood according to the above, has basically already been deconstructed into smaller parts with the definition of game elements in Part II. That is why I want to keep game mechanic as a distinct element with a very concise scope of meaning within the overall theory, even if it is a central concept, especially concerning player experiences.

Game mechanics as individual player actions

Game researchers Sus Lundgren and Staffan Björk provide a definition of 'game mechanic' that is helpful in refining the definitions:

A game mechanic is simply any part of the rule system of a game that covers one, and only one, possible kind of interaction that takes place during the game, be it general or specific. A game may consist of several mechanics, and a mechanic may be a part of many games. The mechanic trading, for example, simply states that during the game, players have the possibility to trade with each others. (Lundgren and Björk 2003, 4. Cf. Lundgren 2002, 18.)

The keyword in this definition, as with the others, is 'interaction' – how the player and the game system correlate to each other, and consequently 'co-behave'. Let us adapt this definition to the theory of game elements. The 'general or specific' interaction that Lundgren and Björk refer to equals the interaction of two or more game elements – e.g., component, environment, and the player in a board game. The key point is that this interaction is put in motion by the player or the game, and the interaction is governed by the ruleset. Understood this way, game mechanics is something that is available to both players and designers; for players to perform within the game and for designers to implement into the game in order to both afford and constrain the players by means to take action, and/or encourage certain kind of game play in relation to goals and their design. For instance, a 'trading' mechanic is obviously a means to stimulate interaction between players in a gaming encounter with multiple players, and encourage transactions in game component ownership status from components-of-self to other and/or system. Similarly, a 'Contract' mechanic would represent actions where a player proposes a pact to another player so that they would gain advantage in the game. Both of these examples of game mechanics imply social interaction and encourage players into it.

So, game mechanics bring the ends and means of the game together in a specified way. There are always game mechanics, minimally one, from which the player can make choices when planning to attain a goal by taking actions in a game. In a turn-based game, for instance, the player's turn consists of choosing from the available mechanics and operating one or more of them in the hope of affecting the game state towards the attainment of a goal. Various alternative mechanics afford a wider variety of strategic choices for the player, and they might also broaden the set of abilities that the goals necessitate the players to perform.

The difference between a rule and a game mechanic is that there can not be a mechanic without rules, i.e. without prescribed game element relations. A game mechanic makes a particular set of rules available to the player in the form of prescribed causal relations between game elements and their consequence to particular game state(s). This is followed by other players, or the game system itself operating a ruleset procedure in the form of an algorithm, such as adding to the score, or introducing a new challenge by instantiating a new goal defined in the ruleset. Therefore, in terms of design, game mechanics are means to guide the player and the game into particular behaviour by constraining the space of possible plans to attain goals.

Core mechanic: Sequences of game mechanics

In conclusion: Game mechanics is a functional game feature that describes one possible or preferred or encouraged means with which the player can interact with game elements as she is trying to influence the game state at hand towards attainment of a goal. The practical realization of a game mechanic is a sequence which starts from a player and is conducted via a direct or indirect interface to the system, thus combining at least two game elements (the player and another element) into interaction. Moving a piece (i.e. a component element) on a game board (environment) with a mouse (interface) presents an example. The resulting combination of game elements as a result of player performance, i.e. a game mechanic, has prescribed consequences to the game state. Thus, game mechanics assign causal relations between player performances, game elements and game states and the ways rules (especially goals) are embodied into them.

In their book *Rules of Play*, Katie Salen & Eric Zimmerman talk about the ‘core mechanic’ which is defined as the actions that players repeat in a game, again and again (Salen & Zimmerman 2004, 316–22). The useful distinction to the term dynamics comes from the fact that whereas core mechanics focuses on the player’s actions, dynamics focuses on the operation of the gaming encounter as a whole, i.e. the operation of the ruleset through ruleset procedures and run of information between players and the system. Thus we can actually define the system-responses that facilitate and govern the core mechanic as the core behaviour pattern of a game system. In a game like Tetris, this pattern consists of the core mechanic of the player arranging the blocks, and the game system responding with ruleset procedures, such as producing new blocks (components) onto the game space (environment) and adding to the score (information). These are the mechanics that the system has available to it, and thus we see that there is a reciprocal relationship between player and system actions – this is what can be conceptualised as their co-behaviour. When the behaviour has expanded to all the players participating, in repeated fashion, there emerges a dynamics, which is the dynamics of the gaming encounter.

Both core mechanic and core behaviour pattern are useful in defining genres, as we will see in chapter 14. I will now move on to study the inner structures of core mechanics. In order to identify if there are popular, wide spread core mechanics shared across various games, we have to see what individual game mechanics these core mechanics consist of. Are there primary, secondary, or other types of roles for mechanics in the particular core mechanics they combine into? What could be the criteria according to which their role and importance is defined? These questions will be studied in the following.

Mechanics as affordances for performing abilities and skills

Game mechanics’ consequences are often potential in the sense that their realization is dependent on the player’s skill, chance factors and/or how other players perform game mechanics. The game system evaluates, or acknowledges

an evaluation by other players, concerning whether the mechanics was correctly performed or not, and to what extent it was a success or failure. The skill in performing game mechanics is related to a set of cognitive and/or psychomotoric ability, tactical skill, performative aptitude, etc., depending on the game genre and the challenges particular to it.

An anecdote serves to highlight how game mechanics' relation to goals and player abilities distinguishes games from one another. A colleague of mine once presented, at a lunch table discussion, his perceptive analysis on why football ('soccer') is the most difficult team sports game to master. His explanation was based on a categorization of sports games into 'games with a dead ball' versus 'games with a moving ball'. Another categorization was based on whether all players had their own ball or whether there was one common ball in play. In his view the games with a dead ball are always easier, as the ball is static, so its movement does not interfere with one's play, i.e. with performing game mechanics. **Golf** is a prime example of a game with a dead ball, and also of a game where every player possesses their own ball, i.e. components-of-others do not directly figure in one's own actions towards attaining goals. The hardest games to master are the ones with a moving, single ball which every player desires (i.e. the ownership status of the component element is always open to change, and bound to change, as it is incorporated into the goal hierarchy of the game). However, even among these kinds of games there are differences. According to my colleague's analysis, basketball is easier than football because the players use hands, i.e. the primary human limbs to hold on to objects, in trying to achieve the main goal of throwing the ball through the hoop. In football, the use of hands (the goalkeeper notwithstanding) is not allowed, which increases the difficulty of the game, and as one's performance is, due to the configuration of the environment element, constantly disturbed by others (unlike in, e.g., volleyball where the net divorces the opponents from oneself), football is, logically, the hardest team sports game to master there is.

The point to learn from this anecdote is how game mechanics are affected by the configurations of other game elements, such as the organisation of players, environment rules, goal structure, etc: as a result, the dynamics of a gaming encounter of Golf is different from the one of football. Also, introducing a chance factor (via a ruleset procedure) into a core mechanic consisting of a set of game mechanics, is a way to make the game less competitive, as the outcome will not be entirely down to the players' skills, i.e. developed and trained abilities. Chance has been mentioned, thus, as a feature that contributes to a game being 'casual' (as opposed to 'hardcore' or 'expert' games where training and experience have a significant role). Chance makes the gaming encounter more equal to players' individual differences regarding the required abilities, but also, in doing so prevents display of individual cognitive and/or psychomotor styles in play.

In digital games, game mechanics are mapped to control mechanisms such as specific gamepad buttons (or combinations of them) on the interface peripheral, or they are icons, menu bars, etc. on the screen interface, and the player has to manipulate them in a certain sequence. In the **Tony Hawk Pro Skater** series,

game mechanics are combinations of skating moves mapped to the control schema, and their realisation depends almost entirely on the player's skill in handling the controls (for a particular example of similar mechanics, see Hansson 2002). In other words, the interface element, in this case the console game pad, becomes the embodiment of the metaphor for the different movements and tricks. Then again, games such as Dance Dance Revolution and others with the dance mat peripherals, or the Sony EyeToy camera, try to remove the more or less arbitrary metaphor. The competitive edge of Nintendo's Wii game console, with its motion-sensor controller, is based on 'naturalising' video game controls by removing the metaphors that have been dominating video game play (e.g. 'press A to jump'; the controller button as a metaphor for a jumping game mechanic).

Trond Wingård Larsen's discussion of 'visible game mechanics' relates to this difference between digital and non-digital games:

Most people have played one board game or another, such as Monopoly, Ludo, and so on. In these games, the game mechanic is totally visible. In Monopoly, players roll the dice and move that number of squares. That square has an effect on the player that is explicitly written on the square itself or on a corresponding card. Novice gamers are used to visible game mechanics. (Larsen 1999.)

In Chess, game mechanics' consequences are (at least supposed to be) more far-reaching in nature, as there are less options available to the player, mechanics-wise. Actually, there is only one mechanic consisting of manipulating components (moving a component-of-self, i.e. a piece) in relation to the game environment (the grid that usually takes the shape of a board). Nevertheless, the game is complex due to the countless different game states that may potentially emerge as relations of components on the 8 x 8 grid environment. Moreover, as with board games in general, carrying out a game mechanic – such as 'moving' – is not usually dependent on the player's psychomotor skills in adapting to a interface control schema, rather, it is dependent on basic psychomotor abilities we use in everyday life to engage with objects. Therefore, game mechanics related to chance and luck are often introduced in order to create balance in player success and counter-balance players' different skillsets. An 'Operating' mechanic that produces a variable that affects the potential consequence of the mechanic in a quantitative fashion, such as throwing a die in order to find out the maximum distance for moving on a board, is a popular example. On the other hand, in digital games such as a platform jumping games, operating mechanics are more or less a question of performing according to one's psychomotor abilities, such as skill in manual dexterity (see chapter 7).

We will close the definition of mechanics with a reference to perceptual psychology. J.J. Gibson's theory of affordances (see, e.g., Gibson 1977) describes how we perceive objects' potential uses, for instance how seeing a chair instantly is associated for its specific purpose to provide an object to sit on. The chair affords sitting, a vehicle affords driving — and game mechanics afford playing a game. Learning to play, i.e. mastering the execution of game

mechanics in a particular game, is largely about realising the mechanics' affordances and learning their consequences (cf. Gee 2005). An experienced player knows that a lever in a digital adventure game affords pulling, and therefore she is most probably bound to manipulate the game-object by the mechanics available to her.

We 'know' that a die affords rolling, a hoop affords a ball being thrown through it, a racquet affords hitting a ball, and so on. The established affordances of games are numerous, and new ones are introduced by taking existing objects and transforming them and their affordances into game elements, such as the microphone and its affordances for **Singstar** the Karaoke game. Player strategies consist of conceptually blending together the available game mechanics, the current game state, and the potential but yet unrealised future game states. A goal embodies a desirable future state, and the game mechanics afford thinking about its realization. If there were no game mechanics, there would be no conceivable way to achieve the goal.

To summarise, game designers and visual artists construct metaphors for game mechanics by often taking advantage of players' general awareness of affordances. Thus, 'naturalised' or 'conventionalised' affordances are found across games: Doors to be opened, buttons to be pressed, dice to be thrown, microphones to sing with, etc.

These observations are significant in the context of meaning-making and interpretation processes and games. They all add to a particular game rhetoric. These issues were already addressed in relation to theme and metaphors in chapter 4, but we will return to the topic in chapter 13 on game rhetoric.

From mechanics to dynamics and gameplay

The concept 'game play' can be explained as the relation between game mechanics, the configuration of game elements in a game state, and the dynamic behaviour of the game system from one game state to another during the gaming encounter. Gameplay emerges from the sum of the 1) temporal sequences of players deploying the mechanics made available to them and 2) the responses of the game system in relation to the change in game state. This is the 'run-time behavior' (Hunicke & al. 2004) of game dynamics, i.e. sequences of game mechanics as realized in the feedback loop between the players and the game. Drew Davidson (2003) employs 'gameplay' in similar fashion, 'to describe and define the mechanics of interactions within a game which enable players to engage and progress.'

In this context, analysing game play equals analysing a number of game states, and the game mechanics performed and game elements engaged into interaction between individual states. Here it is useful to note the differences between single-player and multiplayer dynamics: in the first case, the analysis focuses on the interaction of the player and the game system in a number of states, as there are no other actions. In the case of two or more players involved,

the game system functions as a hub for the dynamics of a gaming encounter. Therefore, analysing this dynamic means that one has to identify what happens between game states.

Dynamics relates to the theory of 'cybertexts' (Aarseth 1997), and its adaptation to the study of games by Markku Eskelinen. He writes about 'textonic' and 'scriptonic' game elements (Eskelinen 2001), i.e. textonic elements that exist in the game and scriptonic elements that get realised through their presentation to the player. The relationship of mechanics and dynamics presents essentially the same phenomenon: in a game, there is a repository of available mechanics, and a number of them, in varying sequences, realized as the game dynamics, as the player plays the game. The more mechanics there are, the more their realization through dynamics potentially varies between one player and another – i.e. individual sessions playing the game diverge from each other due to variations in the dynamic behaviour the gaming encounter takes. This is due to differing player choices and strategies, i.e. when and in what succession to perform the mechanics that are available, and with what degree of success.

One of the particular features of digital games is that they can impose their dynamics on the player(s) in algorithmic and automated fashion. This happens, e.g., by introducing challenges in a temporal, spatial or random sequence (or a combination of these). Rhythm games and, e.g., **Space Invaders** present an example of the temporal kind, **Tetris** of the random and temporal kind, and **Half-life** of the spatial and temporal kind. For instance, **Parappa the Rapper** (NanaOn-Sha, 1996) and **Frequency** (Harmonix, 2001) feed the game dynamics with challenges based on their music and in particular its rhythm, which is fundamentally a temporal phenomenon. Tetris accelerates the tempo of the falling components, the shape of which is determined by random. In games that produce a detailed, multi-dimensional game environment, such as **Half-life** or **Halo**, the challenges are located within the spatio-temporal continuum of the environment that is being simulated.

games. In games such as **Black & White** (Lionhead Studios, 2001) and **Grand Theft Auto III** (Rockstar Games, 2001), or **Dead Rising** (Capcom Entertainment, 2006), there are numerous mechanics available to the player at the same time.

Reverse engineering game mechanics as an analysis method

In order to arrive at a library of game mechanics I have analysed a sample of games with the purpose of detecting their game mechanics. From this analysis, I have synthesized a library of game mechanics where mechanics classes can be grouped into a number of categories based on multiple criteria: Which game element a game mechanic privileges in its deployment, or which goal type it is performed in the hope of attaining, or which cognitive or psychomotor player abilities performing it successfully requires. These criteria link the findings into aspects of the theory of player experience, such as how eliciting conditions for emotions are embodied into game elements. E.g., a game mechanic that is used in capturing components-of-others, such as in **Checkers** awakens eliciting conditions into the prospect of changing the ownership status of the components. As a consequence, the game mechanic and the components (which embody goals) also embody predictions of future emotions in the moment of performing the mechanic.

In order to understand the function of game mechanics, I suggest reverse engineering a number of well-known core mechanics. Analysing the mechanics serves, first, the purpose of uncovering the specific combinations of other game elements within the sequence the game mechanic consists of. The above example of Checkers illustrates how this gets us towards analysing player experiences as sequences and prospects of emotions. Second, deconstructing core mechanics is useful in pointing out whether the mechanics is actually part of another mechanics or a concrete realisation, an occurrence, of a more abstract mechanics type. Third, analysing existing mechanics sheds light on how mechanics are often organised around one game element, making it – e.g., a specific component and/or the game environment – the reference point when trying to influence a game state. This has consequences for the player experience as well, as the eliciting conditions for emotions emerge through the prospects of performing game mechanics, and the prospects are affected by the local variables that affect emotional intensity, such as degree of desirability and likelihood (see chapter 11).

By understanding what game mechanics are made of, we can detect and extract them from existing games for analytical purposes. This helps in coming up with both new mechanics and combining known ones to achieve new forms of game system behaviour, and consequently (and ideally) new kinds of player experiences. For finding out what are the primary and secondary game mechanics in a game, we need a systematic method of analysing game

mechanics, the goals they are related to, and the human abilities their performance requires.

Mechanics in relation to goals as challenges

For the sake of analysis and design, it is important to pinpoint the distinction between goals, the player abilities they afford and necessitate, and game mechanics as exercises in those abilities, i.e. as actions that players perform to the best of their abilities.

Extracting the game mechanic from the goal is not always unambiguous. For example, ‘recall’ and ‘protect’ are tasks that imply challenges in the form of goals, but they are not necessarily directly embodied into game mechanics, such as a recalling or a protecting mechanic. In any game, the game mechanics are designed to empower the player with means to carry out the tasks, but in the process, they might get thematized with the help of another metaphor, and/or the same game mechanic might be used in various other tasks relating to different goals. The goal protect is achieved via e.g. combat, and the combat game mechanics are designed to protect something, e.g., a goal embodied into components or environments, but they could also relate to a set of other Achievement and or Instrumental goals. The goal of recall is to submit an answer to a question, for instance, and cognitive abilities in the domain of memory (e.g. Memory span, Associative Memory, etc., see chapter 7) are exercised in attaining the goal.

This example highlights another distinction, i.e. the one between the player ability, roughly cognitive and/or psychomotor, that is needed to perform the mechanics, and the game mechanics itself. In terms of Carroll’s model of cognitive abilities (see chapter 7) pattern recognition has to do with abilities known as Closure speed, Closure flexibility, and Perceptual Speed. Pattern matching is a common cognitive procedure related to goals in games, but there is always a distinct game mechanic available to the player to express the recognition of a pattern to the system – e.g. placing as in Tetris, Carcassonne or Dominoes, or arranging, as with **Bejeweled** (Popcap Games, 2000). Certain player activities, such as co-operation, do not necessarily require specific mechanics, but the forms of co-operation can be designed (i.e. be constrained) with specific mechanics that supports the co-operation of players, such as a contract game mechanic which, when performed, feeds information about player relationships into the game system, and subsequent ruleset procedures (such as dividing points, etc.) are run based on this information.

The players’ wants and needs are not game mechanics, even though the game system tries to manipulate them via goals. The players use the game mechanics of a given game to express their will and desires to the game system, but the game system (or its proxy, e.g., the game master in table-top role playing games) dictates whether and how the input is accepted into the system. For example, if the player desires a card (or any other component) that is in another player’s

possession, the player has to use the available mechanics, governed by the system, to try to get it. He can not just go ahead and take it, unless the ruleset defines such as game mechanic. In card and board games, these means usually include such mechanics as trading, collecting, bidding, etc. In digital games, there might be specific combat mechanics available to defeat the other player in order to get to her belongings, and in sports games, such as in basketball, the ruleset defines what means one is allowed to use in trying to steal the ball from an opponent: for example, a football type of tackling (mechanic) with full body contact is not allowed.

Game mechanics as verbs: Three Categories of Game Mechanics

Game mechanics are essential elements in that they are always about doing something significant in the game. In everyday experience, they are what playing a game is about. Game mechanics are best described with verbs: Choosing, guessing, moving, aiming, shooting, collecting, kicking, trading, performing, bidding, etc. Thus the nature of a mechanic, i.e. the action it conducts, might come to define the game experience as an interactive experience for the player. For instance, jumping defines ski jumping, and guessing or knowing characterizes quiz games.

Quite often in a game there is a certain game mechanic that characterizes the game as taking choices and actions. In games with a single game mechanic, it literally is what the game is about. Submitting a stake by placing it on the table is what characterizes **Roulette**. Placing a stone on the grid is what characterises **Go**. Moving, fighting, and conversing with characters-of-system is what characterises many digital games of the ‘adventure’ genre, such as the **Legend of Zelda** (Nintendo, 1986-)series, etc.

In addition to these characteristic, ‘game defining’ mechanics, there are often game mechanics that seem to be in a supporting role, yet they are instrumental in attaining a goal. Their function is to assist in performing another, primary game mechanic. In basketball, moving by running and dribbling supports the goal of throwing the ball through the hoop, as movement closer to the hoop makes the goal less difficult to achieve. In digital games like **Defender** (Atarisoft, 1982) or **Half-life**, the reciprocal nature of moving and aiming & shooting mechanics manifests itself in similar manner. One has to move, which requires a certain ability, to the best possible location in order to make a shot, which requires another ability. Parallel to this cognitive/psychomotor sequence runs the emotional sequence with its variables and eliciting conditions: valenced reactions to goal monitoring, under which there is the event of moving, the fellow or opponent players’ (agents) actions, and the aspects of objects in the gaming encounter.

In games with multiple components-of-self, there is often first a choice of which component to act upon, i.e. which component will the primary mechanic

focus on, and after that, the player performs the game mechanic. Chess presents an example.

To summarise, it seems evident that there are game mechanics in different roles. Next, I will divide them into three categories with the help of distinguishing their position in the goal hierarchy. Besides this, there is the question of whether a game mechanic is available to the player in a constant or a conditional fashion; always or temporarily.

Primary game mechanics and submechanics

I will employ the global–local variable familiar from our discussion of games and emotions to explain whether a particular game mechanic is available in relation to any game state or certain game states.

In the first case, it is a global game mechanic. If a game mechanic is only available conditionally, e.g. only in a specific location or during a specific time, or for a certain duration spanning a number of game states, or to a player with certain role attributes, it is a local game mechanic.

The core mechanic of the game often consists of a set of game mechanics that are available globally but only one at a turn, i.e. use of one rules the other one out for that particular game state. This is the set of primary mechanics. It is primary because it is related to the highest order goal that the game presents to its players at that time.

Primary game mechanics often have another mechanics in a supporting role: player performs the mechanic and another (or a set of them) becomes available to her. Hitting the ball out of your opponent's reach definitely characterizes Tennis, but there is also a mechanic having to do with moving to the best possible position from where to hit the ball (in similar manner as choosing the piece to be moved in Chess).

These I will call submechanics. They are related to lower order goals, yet these goals are instrumental (i.e. they belong to the corresponding goal type) in completing the highest order goal. In order to hit the ball out of your opponent's reach you will have to be in a position to perform the point-winning and goal-completing hit. Moving alone does not win the point for the player – the hitting does, and that is why it is the primary (directly goal-related) game mechanic in this case.

How the players manage to perform a submechanic often sets her expectations of attaining the goal. Consequently, this performance also produces predictions of future emotions, i.e. prospects for them. Let us continue with the Tennis example: My perceived ability to hit a winning shot is higher if I manage to move into a position that allows me more time to aim and perform the shot. My predicted emotions are thus ones of positive rather than negative, as I have played successfully in effecting a game state where the likelihood of positive result regarding the goal is high. In similar fashion, the hand dealt to me in a game of Poker produces a baseline of emotional prospects for the future choices of betting or folding.

Sequences like these constitute the core mechanic globally available to players, and the behaviour of the game system that facilitates and governs it constitutes the core dynamic. Primary mechanic is the essential singular aspect of what ‘game play’ in a given game is about, and submechanics often introduce variety and unpredictability into the dynamics. It might also be that the cognitive and/or psychomotor abilities that performing the primary game mechanic necessitates become to characterise the player experience. For example, the player experience of **Dance Dance Revolution** is rather characterised by dancing (as a set of cognitive and psychomotor abilities) than expressing and sequencing, even if these two mechanics would represent it in terms of the library of game mechanics.

Modifier game mechanics

Regardless of how many game mechanics a game system employs in total, all mechanics might not be always available. A game might have mechanics that are only locally available to players. They might be available only during certain game states or for a certain temporal duration encompassing a number of game states. Game mechanics might also be conditional, e.g., a player has to have a certain role or other player attribute to perform them, or obtain a certain component or a certain location in the game to be able to perform the mechanics. A turn-based structure imposes a condition, ‘on one’s turn’, for deploying mechanics. Many so-called ‘power-ups’ function in a way that is conditional in relation to time, game state, or place: If a player drives over a symbol in the kart-driving **Mario Kart** game series (Nintendo, 1996-), the character-of-self is awarded weapons or special attributes for a limited time or number of turns.

These kinds of locally available game mechanics will be called modifier mechanics. They may be instrumental, or give advantage for completing higher order goals, but not necessarily. In Tennis, the strength with which to hit the ball may make one hit completely different from another. Thus there is a game mechanic of applying strength in the appropriate moment and place – a set of specific psychomotor abilities – which function as a modifier mechanic the primary one of hitting.

Global, Local, and Glocal goals

However, there is one more distinction to be made. The goal of the core mechanics is not necessarily the same as the ultimate, highest order goal of the game. For instance, the goal of the core mechanic as an individual set of player choices and actions might be to accumulate points, but the goal of the game might be to have the most points after a number of rounds, i.e. rounds of core mechanics between players. In Tennis, the core mechanic accumulates points, which amount to games, which amount to sets – and the highest order goal of overcoming one’s opponent is defined either as two or three sets to be won.

Thus, the goal of core mechanics is not necessarily always a global goal but in instrumental relation to it. Therefore I will name the goal of core mechanics as glocal goal, referring to its simultaneous relation to global victory and/or end conditions, and local goals.

Method for collecting the Library of Game Mechanics

The library of game mechanics is gathered from a sample of games played via various media and technologies. The sample is evident in the examples, even though the process with which the library has been gathered is somewhat of a chicken and an egg dilemma. However, in general the work has been conducted in line with the general, iterative and cyclical research process which was outlined in chapter 2. In the following, I will illustrate this process with a brief example of how the mechanics classes have been abstracted from analyses of actual games.

Wario Ware case

Wario Ware Inc., Mega Microgames (hereafter WW) is a game by Nintendo for the Game Boy Advance and GameCube consoles, released in 2003. The analysis will concentrate on the Game Boy version.

WW is an interesting subject because the game consists of over 200 so-called micro-games that last about five seconds each. In the games, the player is presented with goals that range from catching a falling stick to stopping a penalty shot in soccer, or taking a photo of a flying squirrel, etc. However, it is not only the short duration that makes these games within a game ‘micro’ – it is also the fact that each game equals a single goal that requires only few mechanics, often only a single one. Each level, i.e. a set of micro-games, in the game culminates to a ‘boss’ level, where multiple game mechanics are used, but usually – as we’ll see – these are combinations of the handful of mechanics the mini-games employ (Gingold 2003).

From the standpoint of my overall theory, WW is also interesting since each micro-game is preceded by an imperative that gives the player an idea of what to do in the next few seconds. In terms of game rhetoric, these imperatives are rhetoric figures that guide and persuade the player to play. The figures, such as ‘Jump!’, ‘Drop!’, ‘Eat!’, ‘Catch!’ are thus also included in the analysis. I believe that analysing the ‘micro’ nature of WW and its game mechanics is useful, because the game displays a number of fundamental game mechanics that are used in all kinds of games across media and technologies, despite the fact that their embodiments are displayed here in digital form.

Examining these games with few mechanics and how they are combined in the slightly more complex boss levels also enables us to see how more complex digital game systems like Grand Theft Auto: Vice City combine their primary

mechanics (e.g. manoeuvring, aiming & shooting, combat, manipulation, etc.) into other game elements, such as a complex simulation of an urban city and its inhabitants as the game environment, and the numerous components and ruleset procedures within it.

The WW analysis also illustrates how the mechanics are always fused with the goal of the game, and therefore in the design of two games, the same mechanic might be used but for inverted goals. It is also worth noting that the game rhetoric figure of imperative voiced before the beginning of each micro-game in itself ‘names’ the mechanic to be used, or states a metaphor for it. This points out the fact that each goal description, definition of victory or losing condition, mission briefing, etc. is basically a recipe of the mechanics to be performed, but the style and tone of game rhetoric that is used, and its semiotic modes in general, translate the recipe into a particular thematic form employed in a particular game. In other words, a recipe of manoeuvring and combat becomes a tale about how the prince or princess must be saved, or another similar metaphor, possibly dictated via narrative means for the player. We will return to these aspects in the next chapter on game rhetoric, but these tentative observations serve to show how my research process has progressed, and how it has benefited the overall theory.

Wario Ware game mechanics

WW consist of 9 levels, all of which contain approximately twenty micro-games. Wario Ware contains over 200 micro-games, which are picked randomly for the player during an individual gaming encounter. Therefore, for the sake of brevity, my analysis presents a sample that equals the games from the ‘introductory games’: game mechanics of 13 micro-games are analysed in total. Their game mechanics are analysed level by level, game by game, with the following information provided of each:

- the micro-game title and a description of its challenge
- the rhetoric figure, i.e. an imperative that readies the player for the challenge
- the mechanics classes the micro-game employs and the goal implied
- possible additional notes

Micro-game title & description:

Crazy Cars – Press the A button to execute a jump, hopping over the car (hot dog, shark, or boulder) out to run you over.

Rhetoric: Jump!

Mechanics: Performing (to jump), Manoeuvring

Micro-game title & description:

Wario Whirled – Wario is placed on a spinning plate. The player has to press the A button at the right time to stop the spinner on Wario.

Rhetoric: Stop me!

Mechanics: Operating (to stop)

Micro-game title & description:

Saving Face – Catch a pole falling from the top of the screen with the A button when it drops.

Rhetoric: Catch!

Mechanics: Catching (to catch)

Micro-game title & description:

Diamond Dig – Control Wario's drop with the control pad, and try to get him to land in the pit where the diamond is.

Rhetoric: Aim!

Mechanics: Manoeuvring (to hit)

Micro-game title & description:

Dodge Balls – Use the Control Pad to control a toy car and flee two rolling soccer balls.

Rhetoric: Flee!

Mechanics: Manoeuvring (to flee)

Micro-game title & description:

Repellion – Shoot enemy spaceships on top of the screen. The player only has as many missiles as there are ships.

Rhetoric: Attack!

Mechanics: Aiming & shooting, Manoeuvring

Notes: The manoeuvring mechanic functions as the aiming mechanic, similarly as in Space Invaders.

Micro-game title & description:

Wario Wear – Dress Wario. Move with the Control Pad to catch the shirt as it falls from the top of the screen.

Rhetoric: Dress!

Mechanics: Manoeuvring (to catch)

Micro-game title & description:

Hectic Highway – Control a car with the Control Pad and try not to hit any other cars on the highway.

Rhetoric: Dodge!

Mechanics: Manoeuvring (to avoid)

Micro-game title & description:

The Maze That Pays – Use the Control Pad to collect gold coins from the corridors of a maze.

Rhetoric: Collect!

Mechanics: Manoeuvring (to collect)

Notes: Due to the fact that the task of collecting is embodied into a game environment, a collecting mechanic is substituted into a manoeuvring mechanic.

Micro-game title & description:

Super Wario Bros. – In this version of Super Mario Bros., move Wario with the Control Pad to stomp on the Goomba characters. The player has 4 jumps.

Rhetoric: Stomp!

Mechanics: Manoeuvring (to catch)

Notes: Basically manoeuvring becomes an aim & shoot mechanic in this micro-game, but as Wario's movement is constant and the player can only effect its vertical direction, there is no shooting (in the sense of pulling a trigger) as such.

Micro-game title & description:

I Spy – The player controls the spotlight with the Control Pad and has to keep Wario under it.

Rhetoric: Spotlight!

Mechanics: Manoeuvring (to catch)

Micro-game title & description:

Mug Shot – Grab Wario's mug as it slides vertically across the counter.

Rhetoric: Grab!

Mechanics: Catching (to catch)

Micro-game title & description:

BOSS LEVEL: Sparring Wario – Press the A button to punch a sparring ball at the right time, when the ball swings near you.

Rhetoric: Spar!

Mechanics: Attacking / Defending (to punch)

In conclusion, this brief case study shows that first, game mechanics having to do with manoeuvring are suitable for micro-games such as Wario Ware's, or second, whatever the game mechanics is, it is subordinated to a type of goal that has timing as its main criteria for success. It can be said that the manoeuvring-timing combination is the basis for the core mechanic of '5 second games'.

When we move on to analysing more complex gaming encounters and their game mechanics, and the core mechanics they make up, we need to extrapolate a method from the findings in this chapter thus far. I will close the chapter by introducing a method.

Game mechanics analysis template

The table below presents an analysis template based on the principles established for analysing game mechanics above. It employs the distinctions to

- global, glocal and local goals, i.e. how the goal hierarchy is distributed in relation to individual game mechanics and the core mechanics they make up
- primary, sub, and modifier game mechanics, and their relation to respective goals, i.e. the mechanics' status in relation to game state and its goal.

| Availability in the Game as World | | Core (global) game mechanics | | | Local game mechanics | |
|---|--|--|---|------------------------|--|---|
| Status in relation to game state & goal The above categories explained from the perspective of their relevance to player | GLOBAL Goal | Primary mechanic | Submechanic(s) | GLOCAL Goal | Modifier mechanics | LOCAL goal |
| | The overall, highest order goal of the game. | What the player does in relation to the game state during a standard turn or sequence. | What action(s) the player has available to her as a consequence of the primary mechanic, or as instrumental means to perform the primary game mechanic. | Goal of core mechanics | What the player does in a specific game state which occurs on some condition (related to location, player role, time, etc) specified in the rules. | Goal related to modifier mechanic which may be instrumental to various order goals. |

Table 17. *Game mechanics and goals analysis template.*

I will illustrate the use of the above template with examples of five games from different genres: a video game, a card game, a board game, a gambling game, and a sports game. These are documented below using the table template.

| Availability in the Game as World | | Core (global) game mechanics | | | Local game mechanics | |
|-----------------------------------|---|------------------------------|--------------------------|--|----------------------|--|
| Game | GLOBAL Goal | Primary mechanic | Submechanic(s) | GLOCAL Goal | Modifier mechanics | LOCAL goal |
| Mario Kart | Win race by being first at the finishing line | maneuvering | accelerating/ braking | achieve leading position by passing other cars | using a power-up | improve ability-of-self / detract from ability-of-others |

| Availability in the Game as World | | Core (global) game mechanics | | | Local game mechanics | |
|-----------------------------------|--|------------------------------|---------------------------|--|---|---|
| Black Jack | multiply stake by beating the house hand | placing a bet | choosing additional cards | Beat dealer's hand without going over 21 | splitting in case of two of same-valued cards | (doubles the chance) attain high order goal |
| Niagara | Deliver a combination of jewels to home base | allocating 'move' points | moving one's boats | get to move a boat and reach a shore; avoid waterfall | picking a diamond when adjacent to it | transport diamond home |
| Slot machine | Multiply stake by getting a set of symbols listed as a prize | slotting a coin | operating the machine | Get a combination of symbols listed on the prize chart | Doubling in case of a win | double the prize |
| Billiards (9 ball) | Pocket ball number 9 | shooting & aiming | strength | hit and pocket the targeted ball | opening shot | break the opening formation |

Table 18. *Five games' game mechanics and goals analysed with the method..*

The red squares are marked as relating to the local goals that are instrumental for higher order goals. The rapid analysis of the four games serves to show how it is not always the global mechanics that are instrumental to achieving victory condition, i.e. the goal in the very top of the goal hierarchy. A locally distributed modifier mechanic might be a high order goal in itself (as with Niagara's game mechanic for picking up diamonds to one's boat), and/or instrumental to the highest order goal. Also, in the above cases it might be argued that the submechanics of Black Jack or a slot machine are actually its primary mechanics, but this would be based on a scenario where there is no money at stake. Then again, that is obviously not the way players prefer to play such games.

In an analysis of which is the primary game mechanic of a game, the goal it relates to has the final say. (We addressed this principle earlier with the Tennis-

related example of moving versus hitting the ball.) Let us analyse Tetris, once again. It does not have a victory condition, but only an end condition. Nevertheless there is a highest order goal, which is to preserve free space in the game environment. This is achieved by moving the blocks and placing them into combinations with each other, which triggers the ruleset procedures where full horizontal lines disappear and space is freed. Now, the moving does not relate directly to the high order goal of freeing up space, but it supports the other game mechanic of placing. But actually there is no specific placing mechanics of any kind, as placing happens according to system procedure as blocks touch on another vertically. There is, however, a modifier mechanic that allows the player to drag the block instantly down, rather than waiting for it fall all the way. Thus, the game mechanics analysis of Tetris would produce the following result with a compact version of the template:

| Availability in the Game as World | | Core (global) game mechanics | | | Local game mechanics | |
|--|--|------------------------------|--------------------|--|---|---|
| Status in relation game state & goal | GLOBAL Goal | Primary mechanic | Submechanic(s) | GLOCAL Goal | Modifier mechanics | LOCAL goal |
| The above categories explained from the perspective of their relevance to player | Do not let a block touch the upper border of the game environment in order for play to continue. | moving the block | rotating the block | Find best position for the block, i.e. produce combinations of 8 in order to score points. | Dragging the block down; a 'shortcut' mechanic. | Accelerates moving a block in case there is vertical space below. |

Table 19. *Analysis of game mechanics and goals in Tetris.*

In fact, there is no primary mechanic quite in the sense that the games above had, because the lower order goals constantly change according to the combinatorial patterns that emerge from components being placed onto the game environment.

In this case we could state as a finding the following: What characterises Tetris as game is not so much the mechanics it allows to perform, but the procedures of goal rules, i.e. the combinations of the components (blocks) and their conditional disappearance through game system procedures. If we presume that positive emotions while playing Tetris are mostly due to the visceral animation of disappearing block, once the player is equipped in the cognitive and psychomotor abilities needed to perform the game mechanics, then the hypothesis would seem to support this finding.

What do we learn from this kind of analysis? We gather game-specific knowledge of how game mechanics work in relation to goals, and the method also helps to explain intuitive observations, such as 'one can not win a game of

billiards by using strength only' in terms of game-specific theoretical concepts. As we saw with the Tetris case, the method also highlights how it is potentially another element than a game mechanic – a verb – that characterizes playing a game. As I noted earlier, sometimes it might be the set of player abilities that the goals and game mechanics both afford and require that characterise playing the game. Thus, we could complement the above analysis method by adding the analysis of cognitive and psychomotor abilities into its course. This is important in order to understand the 'pleasure principles' of games in an analytical fashion. We will move onto a study towards this direction in the case study section, in chapter 17.

Library of Game Mechanics

I have studied a sample of games with the above method, and this study has produced a library of game mechanics. It is documented in its entirety in appendix B. Harvesting the library has been by no means a simple task, and the label of each mechanic 'species' is always up to debate, i.e. should keeping possession of a component be called 'preserving', 'maintaining', or 'manipulating'. I have had to solve issues like this by trying to keep the library coherent, yet it has to be admitted that it presents an approximation of what players do in the universe of games. The library has evolved through several iterations, which is evident also in the mechanics cards of the GameGame; they represent an earlier iteration of the library.

Still, the process of gathering the library with a sample of different types of games has also served another purpose, i.e. testing whether the goal categories introduced by Björk and Holopainen (2005, see summary in chapter 6) manage to reach beyond digital games. As a result of the mechanics study, I ended up introducing additional goal categories, such as 'Match' and 'Discard', which are quite prominent in card games.

I will close the chapter by including a list of the titles of all the game mechanics categories in the library, 40 in total, in alphabetical order:

- Accelerating / Decelerating
- Aiming & Shooting
- Allocating
- Arranging
- Attacking / Defending
- Bidding
- Browsing
- Building
- Buying / Selling
- Catching
- Choosing
- Composing

- Conquering
- Contracting
- Controlling
- Conversing
- Discarding
- Enclosing
- Expressing
- Herding
- Information-seeking
- Jumping
- Manoeuvring
- Motion
- Moving
- Operating
- Performing
- Placing
- Point-to-point Movement
- Powering
- Sequencing
- Sprinting / Slowing
- Storytelling
- Submitting
- Substituting
- Taking
- Trading
- Transforming
- Upgrading / Downgrading
- Voting