What Is a Game Mechanic?

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Abstract. The term "game mechanic" is often used when discussing games, but are we all talking about the same thing? While game studies and related fields have produced several notable definitions, there is currently no accepted standard for the term within the broader community. Through a systematic literature review spanning six academic venues and several prominent books, we identify and analyze 49 explicit definitions for the concept of "game mechanics". Though some of the definitions are similar, they are all fundamentally distinct. Our work demonstrates the importance of providing or citing a definition when discussing game mechanics, and we provide a wide range of options to choose from.

1 Introduction

"Game mechanics" are often referenced in game studies research as a defining quality of a game [10, 48]. As such, they are a central concept in games research and they are widely used outside and inside the field. For example, searching for the term "game mechanics" on Google Scholar yields roughly 969,000 results.

Despite the term's widespread use, there remains some dispute regarding a single accepted definition of what "game mechanics" are. This is in part due to the nature of game studies as a research field. The games research community is multidisciplinary across several domains (e.g., design, humanities, social science, computer science, human computer interaction, psychology) and has produced a number of specialized research areas and sub-communities. Likewise, the field has also produced a number of notable definitions of game mechanics. This is expected given differences in focus and scope across sub-communities, but it also suggests that the manner in which the term is defined and used can differ between these groups and the disciplines they represent.

As described by Aarseth and Grabarczyk (2018), a shared vocabulary would support discussion between scholars, developers, and journalists [2]. While it might be useful for each discipline to have the ability to choose the most suitable ontological perspective, it is also important to understand how different definitions of terms are related to one another. It is reasonable for researchers in the community to have some perception of there being at least partial agreement

on what game mechanics as a concept is meant to refer to, especially given its centrality to the work and widespread use. However, such assumptions can lead to misunderstanding and incompatible use of terminology. In this work we aim to answer the following questions: How are game mechanics defined as a term in games studies literature, and how much overlap exists between these definitions?

Substantial research relating to this topic was originally presented in the 2000s, including the MDA (Mechanics, Dynamics, Aesthetics) framework [24], game design patterns [11], the game ontology project [62], and definitions of game mechanics [27, 35, 51]. The field has grown significantly since then and has produced a number of specialized subdomains of research, each of which might use the same kind of terminology in vastly different contexts. For example, the concept of game mechanics is commonly applied to identify genres, understand how people play, and evaluate and analyze games [7, 9, 12, 14, 39]. The field has further diversified into the business and educational sectors (mostly via gamification [8, 33, 34, 46]), providing additional contexts for the use of the term.

While significant effort has been invested in developing a common language for discussing games as a collection of elements (e.g., mechanics, entities, rules, interfaces, etc.) [1, 2, 29, 48, 62], our goal is different. We aim to analyze and compare definitions across different sub-communities and specialized areas of games research. To our knowledge, this has not been done for game mechanics.

To answer our stated questions about the definitions of game mechanics, we performed a systematic literature review of related research. Our objective in the review was to identify definitions of the term "game mechanic" and to identify associations between existing definitions. In our sample, we collected literature from well-known game research venues and journals such as CHI PLAY, CoG, DiGRA, FDG, ICEC, and ToG (previously T-CIAIG), in addition to books.

2 Related Work

"Game mechanics" have been defined in a variety of different ways, ranging from relating mechanics to specific player (inter)actions (e.g., verbs) [24, 26, 27, 51] to referring to mechanics as components/tools for interactions with the game world (e.g., code, data) [11, 16, 24, 51]. There are several definitions of mechanics that have become widely cited and used (e.g., from the MDA Framework [24] or Salen and Zimmerman's *Rules of Play* [48]). However, the field has yet to reach an agreement. Definitions can be so specific that special cases are needed to fit a particular system or application, or so general that the correct interpretation is unclear. Although there is some overlap between definitions, the spectrum of specificity allows the concept to be applied very flexibly. While over-specification can hinder creativity, leaving too much room for interpretation can lead to misunderstanding and disagreement between those who build and analyze games. Thus the question of how a work defines game mechanics becomes significant to understanding, recreating, or applying that work.

2.1 Game Mechanics

In one of the earliest related works on game studies, Lundgren and Björk (2003) defined a game mechanic as any part of a game's rule system that covers a single possible type of game interaction [35]. Furthermore, the authors discussed potential limitations of using the concept of game mechanics and proposed the use of Game Design Patterns instead. They claimed that it can be difficult to use the concept of game mechanics since they are "*neither precisely defined nor put in relation to each other in a structured fashion*". Nonetheless, the concept is still used widely by researchers, designers, and developers.

Do mechanics exist as part of the player experience, in code as part of the game software, or perhaps they are something else entirely? Juul's "classic game model" (2005) describes a game as "*a rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome, and the consequences of the activity are optional and negotiable*" [29]. Juul cites Hunicke et al. [24] in a definition of mechanics on the companion website to *Half-Real* [28] and considers mechanics to be synonymous to the rules of a game.

Järvinen (2007) proposed that game mechanics are the actions that players take to achieve goals when playing [26]. In his dissertation, he expands on his definition describing game mechanics as "*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*" [27] (p. 255). This definition has been criticized, as it risks implying that mechanics exist only for the purpose of accomplishing goals [51]. It is unclear whether Järvinen's notion of goals includes only in-game objectives, or if it also includes the player-made goals. While some sandbox-like games might not have in-game objectives, the player might have their own motivations to explore and play.

According to Sicart (2008), game mechanics are "*methods invoked by agents for interacting with the game world*" [51]. For Sicart, rules and mechanics are distinct: game mechanics are the actual interaction with game state (which potentially contradicts the idea that mechanics are methods *for* interacting) while rules define the possibility space where the interaction is possible. However, there are limitations and exceptions due to specifications such as "core mechanics" being used to achieve a "systematically rewarded end-game state", which does not exist for games like *SimCity*. Consequently, this definition may be too precise to be appropriate across a variety of game genres.

The development of formalized frameworks and models has emerged as one way to build a common vocabulary for discussing and understanding games and game mechanics. For defining and clarifying game mechanics specifically, Aarseth and Grabarcyzk (2018) presented a meta-model for game ontology comprising four main categories: physical, structural, communicational, and mental [2]. Within this context, game mechanics belong to the mechanical subcategory of the structural layer. According to the authors, rules are "*mechanics that the*

player perceives, while mechanics are embedded in the structure independently of what the user thinks of them" [2].

2.2 Similar Concepts

Some authors argue against the use of abstract terms such as "game mechanics" and "rules" [21, 35, 60]. At the same time, other works seem to assume that the audience is familiar with "game mechanics" and do not provide an explicit definition (e.g., [22, 45]).

Salen and Zimmerman's *Rules of Play* (2003) describes a "core mechanic" as an essential gameplay activity that players perform repeatedly [48]. It is interesting to note that the book does not contain any mention of "game mechanics" – only "core mechanics".

Hofmann (2018) [23] focused on three theories of game mechanics: by Fabricatore [16], by Sicart [51], and by Adams & Dormans [4]. Hofmann describes the need for a game mechanics framework and found that there "*seems to be some disagreement regarding the question of whether game mechanics encompass the formal* ***rules*** *and structures of the game or 'the* ***actions*** *afforded to players by those rules' (Sicart 2008), or indeed both*" (emphasis added). These potentially opposing perspectives point to a potentially wide range of definitions for game mechanics, which we demonstrate in this work.

3 Methodology

Our systematic literature review was conducted by two researchers in three phases: collection and filtering, eligibility assessment, and analysis. For the remainder of this section, all work that is explained should be attributed to them.

The first phase involved obtaining a broad collection of literature from notable game research venues (CHI PLAY, CoG, DiGRA, FDG, ICEC, ToG, and T-CIAIG). The dataset was supplemented via searches through academic search engines (Google Scholar and Semantic Scholar); this helped catch additional notable and widely cited work in the space, outside of the listed venues. Every publication was required to include the word "mechanic" at least once.

Long and short research papers were collected constituting the entire proceedings of each of the venues listed above, spanning 3976 publications in all.[4] To minimize finding publications via the search engines that pertained to non-game uses of the word "mechanic" (e.g., in Physics research) and maximize the chance of finding publications that include *definitions* of mechanics (rather than only mentions), a set of keywords was developed. These were: "game mechanics", "rules", "game ontology", "game design", "ludology", and "game analysis". These keywords served as the inclusion criteria for the first round.

[4] PDF proceedings were downloaded directly from publisher or venue-hosted libraries online. Links to the first two years of FDG, then called GDCSE, were unfortunately down at the time of writing, and hard copies could not be obtained.

The researchers processed the dataset by reading titles and abstracts and judging whether the work was likely to include a definition of "game mechanics". Works were selected for further processing if they met any of these criteria:

- the title or abstract included "mechanic",
- the title or abstract included "ontology", "framework", "model", "vocabulary of games", "game language", "what is a game", or other phrases that suggested content about how games are structured, or
- the work seemed to analyze a specific game or genre of games.

After this step, 286 of the 3976 publications remained. An additional 43 works from other venues were found via the search engines using the keywords above.

For each of the total 329 publications, relevant meta-data was added to its dataset entry (e.g., year of publication, venue/publisher, author(s), title, and relevant keywords found in the paper). The dataset includes book publications (found through the search) that both fulfilled the criteria and had high citation counts – more than 3000 overall as counted by Google Scholar.

In the second phase, the dataset was evaluated to determine the eligibility of each publication for analysis. The researchers rated the relevance of each publication in the dataset using a 4-step ordinal scale as follows:

- **High Relevance:** Includes an original or extended definition of game mechanics that is general across multiple games. Implicit definitions were accepted (e.g., a list of examples), but only with an explanation of how other examples could be identified.
- **Medium Relevance:** Includes an original or extended definition of game mechanics that is either specific to one game or implicitly defined without any accompanying explanation.
- **Limited Relevance:** Refers to mechanics at least twice in the context of games, but lacks an original or extended definition of game mechanics.
- **Very Low Relevance:** Lacks a definition of game mechanics and does not refer to mechanics more than once in the context of games.

After the ratings were made, 45 works were rated of high relevance, 47 were of medium relevance, 125 were of limited relevance, and 112 were of very low relevance. For every high relevance publication, definitions of game mechanics were extracted along with details about any prior works that were cited in support. If such a supporting work was cited by two or more high relevance papers, it was added to our collection and its relevance was rated. Four additional works were found in this way, all of high relevance.

For the third phase (analysis), the researchers examined the 49 works of high relevance in greater detail. Furthermore, to gain further understanding of each work, all material referenced directly in relation to either the definition itself and/or any discussion thereof (e.g., other definitions, frameworks, models) were read. The following questions were considered for each of the 49 publications:

- How is the term "game mechanic" defined in the context of the work?
- What terms are used as part of the definition?
- What prior definitions are cited in support of the current definition?

4 Results of Analysis

According to our analysis, there are at least 49 different definitions of "game mechanics" distributed across the literature. While some of the definitions are similar to one another, they are all different in the sense that each contains an original or extended definition of game mechanics that appears nowhere else in the set. Many of these definitions share some overlap: ten include "rules" as part of their definition [4, 20, 28, 34, 40, 47, 50, 54, 55, 63] (though all in different ways), while four include "actions" as part of theirs [24, 26, 48, 51]. Other terms used to define mechanics were less common, including "behaviors" [24, 36], "control mechanisms" [24, 55], "design decisions" [7, 46], and "procedures" [20, 50].

While some of the definitions clearly share some agreement, others seem likely to be in conflict with one another. For example, consider "mechanics are rules" versus "mechanics are actions". When authors who define mechanics as rules also discuss actions in the same context (e.g., [55]), it seems likely that they view mechanics to be something *other than* actions, and so a conflict between definitions would exist. Some potential conflicts might be resolved by expanding the set of things that game mechanics are, like how the MDA Framework includes "actions", "behaviors", and "control mechanisms" in a single definition [24]. Nonetheless, it is unlikely that the set of 49 definitions is free from conflicts.

Our analysis revealed 329 publications that mention "mechanic" at least once in the context of games. This highlights the widespread usage of the term in games research, while at the same time showing a potential pitfall of having competing definitions. For example, of the 135 prior ICEC papers that have mentioned game mechanics at least once, 110 of them (91.5%) do not clarify what they understand game mechanics to be – they offer no definitions, no examples, and no citations to other work. With competing definitions for mechanics to choose from, how are we to fully understand those papers?

Table 1 shows how the 49 works we analyzed cite one another for support. As shown in the table, some definitions have been more influential than others among those who have defined "game mechanics". Hunicke et al.'s MDA framework [24] was cited for support most commonly across the 49 works, and it has been cited over 2630 times according to Google Scholar. Notably, the work seems to contain more than one definition, including both "*Mechanics describes the particular components of the game, at the level of data representation and algorithms.*" (pg. 2) and "*Mechanics are the various actions, behaviors and control mechanisms afforded to the player within a game context.*" (pg. 3).

By examining the connections between citing and cited papers from our corpus (via Table 1), a few chains of influence can be seen: Juul's definition [29] was informed by Hunicke et al.'s [24]; Järvinen's [27] was informed by Juul's [29], Salen & Zimmerman's [48] and Lundgren & Björk's [35]; and Sicart's [51] was informed by Juul's, Järvinen's, and Lundgren & Björk's.

Overall, works by the design-focused community (e.g., DiGRA, CHI PLAY, FDG, and ICEC) tended to describe game mechanics in relation to human-computer interaction and player behaviours (e.g., [18, 53, 57]). On the other hand, works by the computation-focused community (e.g., FDG, ToG, T-CIAIG,

Table 1. Data from our corpus of 49 works showing how earlier definitions of "game mechanics" have been referenced in support of later definitions.

Author(s)	Source	Referenced in	Unique Refs
Hunicke et al.	[24]*	[2, 5, 6, 15, 23, 29, 30, 40, 42, 38, 46, 47, 55]	13
Salen & Zimmerman	[48]*	[2, 4, 8, 17, 27, 40, 42, 47, 51, 56, 57]	11
Sicart	[51]	[2, 7, 9, 13, 15, 17, 18, 23, 40, 43]	10
Juul	[29]*	[2, 4, 21, 27, 40, 47, 51, 57]	9
Järvinen	[27]*	[7, 13, 21, 30, 43, 49, 51]	7
Lundgren & Björk	[35]	[27, 51, 61], [43]**	4
Fabricatore	[16]	[9, 23], [17]**	3
Schell	[50]	[9, 40, 49]	3
Fullerton	[19]*	[42, 49, 63]	3
Adams	[3]*	[20, 42]	2
Adams & Dormans	[4]*	[23, 47]	2
Definitions cited once or never by works in corpus		[2, 5–9, 13, 15, 17, 18, 20, 21, 23, 25, 26, 30] [31, 32, 34, 36, 38, 40–43, 46, 47, 49, 52, 53] [54–59, 61, 63]	<2 each
Referred to works outside of our corpus		[2, 15, 17, 18, 21, 30, 32, 43, 47, 51]	10

* Source contains multiple potential definitions of "game mechanics"
** Written by same author(s) as the source

CoG) tended to reference game mechanics more in relation to logical rules and their implementation in the game system (e.g., [36, 54, 59]).

5 Discussion and Future Work

It appears that the development of new theories has slowed since the introduction of game studies (early 2000's) and recent papers tend to refer to existing concepts (when they refer to anything at all). The years of publication for our collection of relevant works spanned from 2001 to 2021, although we imposed no constraints on publication date in our review. Nonetheless, it remains telling that within our sample of 329 works, 30% of them suggested different concepts of game mechanics (96 works of high and medium relevance), and 49 of those were sufficiently clear and general to apply easily to different games. It is unclear whether a larger sample would reveal even more discrepancies or similarities across definitions.

Our findings suggest that the field has started to gravitate towards some specific definitions for the concept of game mechanics. However, even the similar definitions in our set are not *the same* in all their nuance, and there is a lack of clarity in whether there is actual agreement in the use and definition of specific terms and concepts. As a result, it is unclear at this time how widely used concepts like "rules" and "actions" map across different definitions of mechanics.

Our work shows the scale of the potential miscommunication within the field of game studies and more broadly for understanding and communicating about

designs and systems. Our findings suggest that, broadly, different research communities use similar framing in their favoured definitions of mechanics. This indicates that there might be overlap within sub-fields and communities in their use and conceptualization of game mechanics. Identifying common characteristics and their manner of use could suggest how mechanics might be best analyzed and understood in relation to specific aspects of game studies, and thus help identify potential areas of mutual interest.

This study focused explicitly on "game mechanic" as as a term. As a result, papers might have been excluded that define or discuss concepts that are highly relevant to our dataset (e.g., rules or actions) without explicitly mentioning the term "mechanic". We sought to explore the breath and number of existing definitions to determine how they interconnected and overlapped, and have intentionally left the comparison and analysis of how similar terms are defined to be done in a subsequent study.

Future work entails deepening the study of this dataset to further analyze and compare its individual definitions, including where they overlap and disagree. Further, we argue that the key concepts used in several definitions such as "rules" should be examined in greater detail, as they seem to represent fundamental units through which definitions of mechanics can be compared. Expanding the dataset to more relevant venues would help identify further differences and similarities in how "game mechanics" is defined across different communities. This can help the field develop a more comprehensive and multidisciplinary ontology for games.

A variety of different perspectives exist on the concept of what elements constitute a game, some of which even refute the use of the term "mechanics" for being vague and not suitable for all types of games [60]. For instance, the mechanics of a narrative-based game (e.g., visual novels) can be difficult to distinguish from other categories like dynamics or aesthetics. Other terms have also been used to describe mechanic-like concepts such as rules [29], game design patterns [35], and operational logics [37, 44], which are challenging to compare against texts that explicitly discuss "game mechanics". It would be interesting to relate these alternative ideas to the different definitions of game mechanics.

6 Conclusion

As new generations of games researchers enter the field, they will likely be heavily influenced by the first definitions of terms that they encounter; a student who is taught a certain framework in class would have little reason to search for and use other definitions, and a developer at a game studio might be unlikely to oppose the company's existing standards. As such, certain perspectives will inevitably become more popular while others will become overlooked. Nevertheless, we argue that the field would benefit and be enriched by an increased awareness of how we understand and talk about ambiguous concepts like game mechanics – particularly when they are so widely used that definitions are often omitted altogether. While the vague nature of "game mechanics" is commonly understood, our work demonstrates that the problem is much wider than we

expected. When we talk about game mechanics, it seems quite unlikely that we mean the same thing.

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