Underneath and Beyond Mechanics

An activity-theoretical Perspective on Meaning-making in Gameplay

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INTRODUCTION

The idea that when players engage in a game they enter a "magic circle" (Huizinga 1949) is, in my view, a romantic and yet accurate portrayal of the player's experience seen from a systemic perspective. When players play they enter a more or less complex fictional game space, secluded in a well-defined spatiotemporal dimension. In this game space players voluntarily suspend rational disbelief and accept as "real" a dimension, which is actually defined by "artificial" meanings, purposes, values, roles and norms. This space is in fact a system of elements that are related by causal rules as much as by deeper meanings. Players interact with these elements in order to pursue game goals that they have accepted as meaningful and worth overcoming the challenges that the game presents to them.

The reasons that make players decide to enter and stay within the "magic circle", the nature of play and games, and the impacts that games can have on players have been studied for a long time. In particular, the mechanisms that define game systems and the player experience have been investigated and theorized through different perspectives, with the emergence of what I believe are two core trends in the study of game mechanics. One is strongly focused on the structural analysis of game systems, and how the causal mechanics that regulate game system dynamics afford and constrain player-game interactions through defining gameplay action possibilities and rules (cf. Sicart 2008; Larsen/Schoenau-Fog 2016). The other trend focuses on the psychological factors that may drive players to engage in a game, and consequently examines game features that may rep-

resent motivational drivers capable of triggering and sustaining player engagement (cf. Przybylski/Rigby/Ryan 2010; Boyle et al. 2012). Both perspectives are useful, and have originated relevant contributions to support the study of games and the gameplay activity (e.g. Sicart 2008; Przybylski/Rigby/Ryan 2010; Adams/Dormans 2012). However, both have limitations and associated risks for the study of games.

On the one hand, structuralist approaches focused on the game system can provide interesting mechanistic models to investigate gameplay procedures in terms of "what" players can do and "how" they can do it (cf. Sicart 2008). This, however, may lead to overemphasizing the importance of "what" and "how". Gameplay is more than "procedure", and the gameplay experience is defined by more than mechanistic aspects of a game system. Players play because something motivates them, because there is a "why" supporting the "what" and "how". The "why" in the end determines players' choices (cf. Bedny/Karwowski 2006), and it cannot be fully explained in terms of abstract mechanistic relationships between game entities. Purely mechanistic models are therefore insufficient to investigate and explain the reasons why players pursue game goals embracing challenges and leveraging affordances presented by the game.

Approaches focused on players' motivational levers, on the other hand, are clearly centered on the "subjective why" of the player experience. Studies embracing this focus have produced interesting taxonomies of motivational affordances, identifying psychological needs that drive human activities, and abstract game features that may satisfy these needs and consequently motivate players (e.g. Przybylski/Rigby/Ryan 2010; Weiser et al. 2015). These studies, however, may lead to overemphasizing the importance of isolated game features and the related motivational drivers. When it comes to motivation, one plus one may equal two, four, zero or even minus one: the effects of motivational drivers are systemic, rather than additive. Motivation is the outcome of the interplay of different psychological needs, which are in turn affected by the interplay of different conditions defining people's activities and their environments (cf. Ryan/Deci 2000). Hence, identifying isolated motivational affordances in games may not be sufficient to explain how their interplay may foster (or in fact even hamper) player engagement.

Thus, I believe that the discourse on game mechanics can benefit from perspectives allowing the focus on both the game system and the player in an integrative way. Meaning-making processes involved in gameplay are pivotal in this sense. If we accept that games can be regarded as systems, then we should also regard players as system thinkers who play through making sense of things, consciously and subconsciously interpreting meanings and establishing relationships

to understand what has happened in the past, what is happening in the present, and predict what could happen in the future. This represents a meaning-making process that is core to the gameplay experience. Meaning-making is the source of rational understandings required to purposefully interact with the environment (cf. Bedny/Karwowski 2006). At the same time, making sense of the external world is a preliminary step required to attribute personal significance to it, and consequently form personal motivations to act within it (cf. Leontiev 1978; Ryan/Deci 2000; Bedny/Karwowski 2006). The analysis of games and gameplay should therefore account for the importance of meaning-making in games, exploring how it unfolds, and which aspects of a game system may influence the comprehension of mechanistic aspects as well as "designed" meanings underpinning and orienting the player's activities. For this, analytical approaches suitable to interpret human activity as a meaning-making-driven process are required. Activity theory (henceforth referred to as AT) is one such approach.

AT is a theoretical framework that conceptualizes human activity as purposeful interaction between subjects and their environment, driven by meaning-making that integrates cognitive, behavioral and affective processes to motivate, orient and drive conscious human acts. AT originated in the Soviet Union during the 1920s and 1930s, pioneered by the leading Soviet psychologists L. Vygotsky, A. N. Leontiev and S. L. Rubinstein. From the 1980s AT has undergone significant developments in Western Europe as well, primarily thanks to the Scandinavian strand of AT spearheaded by Y. Engeström (cf. Wertsch 1981; Bedny/Karwowski 2006; Kaptelinin/Nardi 2006). Since the 1990s AT has been broadly adopted for the study of Human-Computer Interaction, because of the unsuitability of cognitivist information-processing approaches to fully account for the influence of motivational processes and real-world contexts in computer-mediated human activity (cf. Kuutti 1996; Kaptelinin/Nardi 2006).

In this chapter I will discuss the nature and importance of meaning-making in games from an activity-theoretical perspective. Based on AT I will model key aspects of games and explore their implications for meaning-making processes in gameplay, with a special focus on a key meaning-making device in games: the game context. Accordingly, I will highlight the importance of game feedback, and propose a framework of guidelines to support the analysis of game feedback accounting for its potential influences on meaning-making.

For starters, how can the gameplay activity be conceptualized through an activity-theoretical perspective?

ACTIVITY AS OBJECT-ORIENTED, PURPOSEFUL TRANSFORMATIVE PROCESS

AT regards human activity as a purposeful process of interaction between a subject and the world, through which the subject attempts to transform objects in the world into desired outcomes (Kaptelinin/Nardi 2006). Thus, all human activity is object-oriented, in that it is directed at transforming objects of the external world (cf. Leontiev 1978; Kaptelinin 2005; Engeström 1987).

An external object of activity is a system of heterogeneous and interrelated elements that can be shared by the activity participants and subjected to material and/or conceptual transformations (Leontiev 1978; Bedny/Karwowski 2006; Engeström 1987). For example, an external object of activity could be: a material system (e.g. food, to be cooked by a cook in order to eat); capabilities of the acting subject (e.g. musical skills, to be developed by the apprentice in order to play an instrument); or a legislative framework (e.g. fiscal regulations, to be modified by a parliamentary committee in order to improve the distribution of wealth).

The desirable outcome of the object transformation process represents an overarching activity end goal (Bedny/Karwowski 2006). In order to attain this goal, the subject transforms relevant properties of the activity object, modifies relationships between the object and other elements of its context, and/or creates an entirely new object. The activity terminates when its end goal is achieved.

In the case of games, it is easy to conceive gameplay as an object-oriented activity consisting in purposeful transformations of the environment. Players normally play in order to attain desirable objectives, which therefore can be considered activity goals. For this purpose, they interact with their environment transforming its state. The "objects" that players transform in this process can be viewed as systems of game entities of varying complexity, ranging from simple blocks to be arranged in desirable ways, to complex geopolitical systems to be created and maintained.

Then, what does "meaning-making" exactly mean, and what is its role in gameplay?

THE CENTRAL ROLE OF GOAL-ORIENTED MEANING-MAKING IN (GAMEPLAY) ACTIVITY

According to AT, a subject acts driven by psychological needs that can be satisfied through achieving an activity end goal (Leontiev 1978). This can be viewed

as the subject's mental representation of a desirable future state of affairs to attain through transforming reality (Bedny/Karwowski 2006). The possibility of satisfying psychological needs makes an activity personally significant and motivating to the subject (cf. Bedny/Karwowski 2006; Kaptelinin/Nardi 2006). Oriented by the end goal and driven by her motives, the subject interacts with the environment, iteratively interpreting and transforming it. In this process the subject construes meanings in order to explore and pursue possibilities to attain her goals. Meaning-making thus enfolds activity as it unfolds through it, and is core to all forms of conscious and purposeful human activity, games included.

Through meaning-making a subject integrates analysis and synthesis processes to form and adjust mental representations of reality, which then guide her interactions with the external world (cf. Leontiev 1978; Bedny/Karwowski/Jeng 2004). These representations are based on the subject's perception of the situation she is tackling. They reflect her comprehension of objective properties and relationships of relevant entities (e.g. physical, chemical and biological features of objects, and cause-effect relationships), as well as their socio-cultural valorization (e.g. ethical significance and socially-accepted uses of things) (cf. Leontiev 1978; Kaptelinin/Nardi 2006). Mental representations also reflect motivational connotations that the subject may attribute to relevant aspects of reality, influenced by personal psychological factors including needs, desires, inclinations and self-perception of capabilities (cf. Leontiev 1978; Bandura 1997; Ryan/Deci 2000). Last but not least, an acting subject forms mental representations relying on her previous knowledge of the world (cf. Bedny/Karwowski/Jeng 2004). Through meaning-making the subject processes mental representations in order to project possible future states to attain and organize her actions accordingly. As action and meaning-making unfold, the subject adjusts mental representations based on environmental feedback (cf. Leontiev 1978; Bedny/Karwowski 2006).

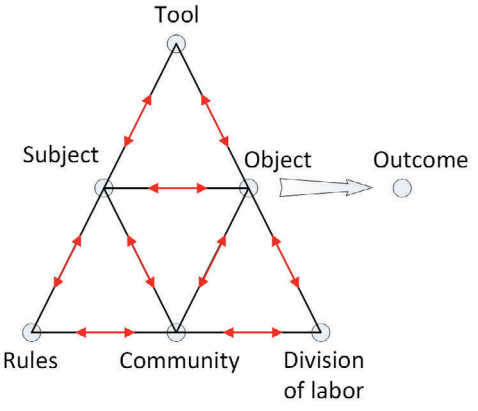
Meaning-making thus allows people to understand "what", "how" and "why" things "are" and events "happen", comprehending what is technically feasible as well as culturally meaningful. In turn, this comprehension allows people to attribute personal significance to things, events, and their own activities in the external world, based on their personal backgrounds and psychological factors. Gameplay is no exception. In order to pursue game goals, players need meaning-making to make sense of cause-effect interactions between game entities, understanding "what" entities interact, "how" they interact, and "why" actions and interactions happen the way they do. In this sense, meaning-making is central to formulate rational understandings required to support effective and efficient interaction with the game world. At the same time, players need meaning-making

to understand "what" is accepted and valued in the game space, "how", and "why". This is central for players to comprehend what is deemed meaningful within the game and, by extension, the "objective" meaningfulness of their acts in the context of the game. Thanks to this, players can then form a sense of what matters to them, attributing personal significance to their gameplay activities and embracing game goals and the challenges that their pursuits entail. Finally, meaning-making is not the product of mere observation of reality. Rather, it stems from active exploration of the external world (cf. Leontiev 1978; Bedny/Karwowski/Jeng 2004). Meaning-making is therefore bound by the possibilities that the game offers to actively explore things, interactions and events. Then, what exactly do players make sense of? What information, which "meanings" feed their meaning-making processes, and what originates them?

CORE CONSTITUENTS OF THE GAMEPLAY ACTIVITY: INFLUENCING COMPONENTS AND CORE SCHEMAS

From an AT perspective activity can be regarded as process that unfolds within and through a system of interacting components that can directly influence it, either positively or negatively (fig. 1). These elements, their interactions and the way they can affect the subject's acts represent the most direct sources of meaning that the subject has to process.

Figure 1. Model of an activity system based on Engeström's (1987) conceptualization



Source: Fabricatore

AT emphasizes that all human activity is tool-mediated (cf. Leontiev 1978; Engeström 1987; Bedny/Karwowski 2006). Tools can be regarded as conceptual, material or digital artifacts that enable mental activity, communication with other activity participants, and the practical transformation of material objects.

Activity can be either individual or collective, in which case the subject interacts with a community in order to attain a common purpose (cf. Leontiev, 1978; Engeström 1987; Bedny/Karwowski 2006). Collective tasks are organized according to division of labor schemas. Thanks to rules and division of labor schemas the community functions as an activity enabler, since cooperation between subject and community allows achievements otherwise unattainable by the subject alone.

Besides enablers, activity can also be influenced by "resistances", which may interfere with the player's acts (cf. Bedny/Karwowski 2006; Kaptelinin/Nardi 2006). These could be regarded as hindrances, elements of the activity system that hamper the attainment of activity goals.

Based on these ideas, games can be straightforwardly conceptualized as activity systems. Video games can be generally viewed as dynamic systems composed of interoperating components, in which players pursue desirable objectives through engaging in gameplay activities (Fabricatore 2007; Fabricatore/López 2012, 2014). While pursuing game goals players interact with and/or transform digital artifacts. Depending on the context of the game, these may be user interface elements (e.g. a timer), non-volitional entities (e.g. a vehicle), and volitional entities (e.g. a creature). Still depending on the context, they may enable or hinder the player's activities.

The player's interactions with the game are always mediated by artifacts that function as tools. Without hardware input/output devices (I/O) the player would not be able to send control signals to the game system, and receive acoustic/visual/haptic feedback from the game. Without at least one digital tool the player would have no means to transform her practical inputs into meaningful interactions with the rest of the game system. Hence, she would not be able to have a presence and exert agency within the digital world. Even though I/O artifacts are essential tools, for the remainder of this discussion I will focus on digital gameplay tools, i.e. digital artifacts that the player can purposefully leverage to define, execute and evaluate gameplay acts. Then, digital gameplay tools can be elements of the game scene (e.g. an avatar controlled by the player), components of the visual user interface (e.g. a health bar), or aural artifacts whose source has no objective visual embodiment (e.g. a background speech narrating events). Digital gameplay tools can mediate the player's acts by providing information

(e.g. a status bar) and/or enhancing the player's possibilities to transform other entities in the environment (e.g. a weapon).

Besides tools, the gameplay activity is influenced by hindrances. These are usually represented by non-volitional entities (e.g. environmental objects), and virtual agents controlled by artificial intelligence (e.g. adversaries, enemies and hostile creatures). Hindrances in games could either function as mechanistic barriers to the activity process (e.g. traps and obstacles) or, in the case of agents, operate intentionally as opponents (e.g. adversaries and enemies). This conceptualization likewise covers the case of competitive multi-player video games, whose presence would likely be represented by an in-game agent.

Finally, many games involve a "community", intended as a group of volitional agents that can somehow interact with the player, functioning as aiders to facilitate her progression. Human players constitute an enabling community in multi-player cooperative games. Virtual agents can also serve as aiders, as in the case of non-player characters in a role-playing game.

Within the game environment interactions between game entities are governed, to a large extent, by designed core schemas. Core schemas can be seen as patterns that define how specific types of interactions can change the state of the involved elements, under what conditions, and with what indirect implications for the rest of the game system. Hence, core schemas define the player's possibilities to transform elements of the game space, either directly or indirectly.

Some core schemas define interactions between game entities merely in terms of cause-effect mechanistic rules. These causal-mechanistic schemas may govern player acts as well as other external physical environmental (e.g. meteorological) events. Other core schemas define interactions within the community, between player and community, and among different social groups in the game, based on cause-effect rules as well as deeper socio-cultural meanings involved in the game. Thus, depending on the context, these in-game socio-cultural schemas can function as division of labor patterns (e.g. roles, responsibilities in a team involving AI aiders) and social norms (e.g. deprecation of aggressive behaviors in demilitarized zones by means of player-ban, or specific AI behaviors triggered by an incident). Core schemas may also define interactions and occurrence of events altering the game environment regardless of the intervention of the player (e.g. seasonal environmental changes).

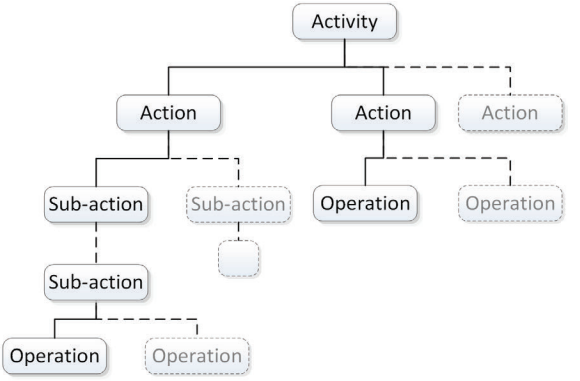
From the perspective of meaning-making, comprehending causal-mechanistic and socio-cultural schemas is therefore key for the player to make sense of "what" things can happen "how" and "why", and consequently embrace game goals and decide how to best pursue them. Causal-mechanistic and socio-cultural schemas, however, are by themselves not sufficient to understand how

and why gameplay can unfold in a game system, given that in video games progression possibilities are usually bound by designed hierarchies of objectives. Then, how is the gameplay activity generally articulated, and how can this affect meaning-making?

THE HIERARCHICAL STRUCTURE OF THE GAMEPLAY PROCESS

According to AT, activity is structured in a three-layer hierarchical system (Leontiev 1978). The highest level of the hierarchy is represented by the whole activity, driven by its overarching end goal, and the target object system to be transformed in order to achieve it. Then, an activity is carried out in practice through a hierarchical system of actions. These are processes that the subject consciously plans and executes to attain sub-goals of the end goal (cf. Leontiev 1978; Bedny/Karwowski 2006; Kaptelinin/Nardi 2006). Actions are therefore a means to an end, "building blocks" for the whole activity. An action consists of a hierarchy of sub-actions when its goal can be subdivided into sub-goals requiring conscious planning and execution. Otherwise, an action is merely composed by operations. These are well-known routines that the subject uses subconsciously to adjust her behavior in reaction to specific conditions (Kaptelinin/Nardi 2006). Progression through an action hierarchy may be more or less linear, depending on the overarching activity end goal and the possibilities of action offered by the environment.

Figure 2. Articulation of an activity system



Source: Fabricatore

The structure of an activity may change depending on the development of the subject's mastery (cf. Leontiev 1978; Kaptelinin/Nardi 2006). For example, learning how and when to execute a specific action could eventually allow the subject to carry that action out subconsciously. The action would then become an operation. Conversely, specific circumstances such as the onset of a problem might require the subject to consciously plan and carry out a process that would have otherwise been a subconscious operation. As the subject develops her mastery, more actions will be operationalized. This, in turn, will allow the subject to perform more complex higher-level actions. Thus, the development of mastery will at the same time facilitate the execution of activities and expand the subject's possibilities to engage in new and more complex activities (Engeström 1987).

The gameplay activity is generally structured mirroring the hierarchical model proposed by AT. For the purpose of this discussion I will assume that canonical games can be differentiated from other types of playful activities because they are organized based on objectives to attain and rules that regulate player actions (cf. Caillois 1961; Salen/Zimmerman 2003). Hence, a game can be generally regarded as a whole activity, with an overarching end goal to attain, corresponding to a desirable game state to achieve (e.g. imprisoning a tyrant) or to maintain (e.g. keeping possession of a flag).

Attempting to achieve a game end goal may require the performance of a single, one-off action (e.g. pulling the lever of a slot machine). However, gameplay activity is usually articulated in stages requiring the player to transform transitional target objects in order to achieve sub-goals (e.g. a platformer game requiring to collect treasures in a network of underground caves; a quest-based game requiring to defeat enemies until the opportunity comes to finally imprison a tyrant). In these cases, gameplay is organized in hierarchical structures of tasks and sub-tasks, which can be analogized to AT actions and sub-actions (e.g. levels and checkpoints; quests and sub-quests). The simplest forms of gameplay tasks are gameplay acts that produce small progress-relevant transformations in the game state (e.g. shooting at an opponent; collecting an item). These can be executed either consciously or sub-consciously, depending on the players' expertise and the context of performance (e.g. depending on the circumstances, shooting at a target may be a subconscious reaction to the appearance of the target, or may require conscious aiming and timing of the shot).

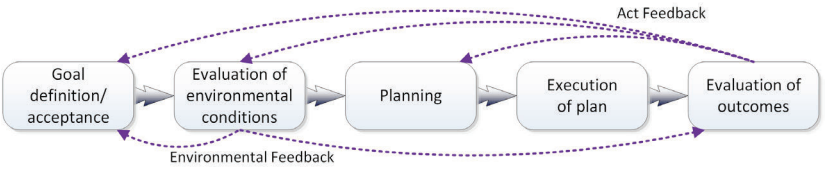
Progression through a hierarchy of game tasks is always regulated to some extent by designed workflow schemas. These define dependencies between game (sub-)goals, therefore determining how the player will be granted or denied access to different game stages. Workflow schemas implement more or less

linear progression possibilities, consequently providing to the player some flexibility to choose tasks to tackle and methods of performance (cf. Salen/Zimmerman 2003; Fabricatore 2007). Workflow schemas may depend on logical relationships between game (sub-) goals (e.g. in a quest-based game, a quest aimed at defeating an opponent might be accessible only after successfully completing another quest aimed at obtaining a weapon). Otherwise, progression through game stages may be regulated by abstract sequencing rules (e.g. in an arcade game where all the pellets presented in a labyrinth should be collected in order to access "another" labyrinth). In any case, workflow schemas define to some extent what the player could/should achieve in order to progress through the game, when, where and why. Thus, understanding workflow schemas is a further important purpose of meaning-making in games.

GAMEPLAY AS AN ITERATIVE, FEEDBACK-DRIVEN PROCESS

As previously discussed, AT regards activity as an iterative process of interactions with reality driven by environmental feedback. Integrating leading perspectives from AT and organizational theory (cf. Argyris/Schön 1978; Bedny/Karwowski 2006), I propose that human activity can be conceptualized as a multiple loop process through which a subject: self-defines or accepts externally defined goals; evaluates environmental conditions in which she operates; plans a courses of action to attain the goals, accounting for the evaluated conditions; executes the plan; and evaluates (provisional) results. Feedback loops from the evaluation of conditions and results of action may lead to the re-formulation of goals and plans, or the re-evaluation of conditions and outcomes (fig. 3).

Figure 3. Activity as a multi-looped iterative process



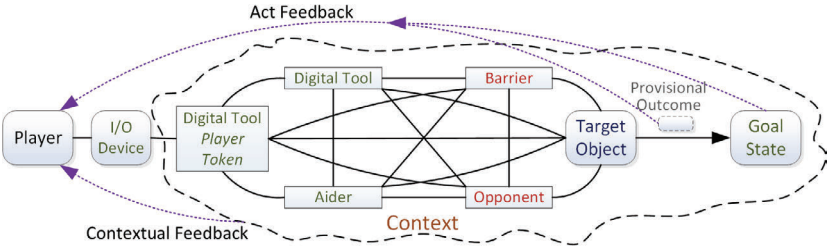
Source: Fabricatore

Goal definition/acceptance, planning and execution of actions, and evaluations of environmental conditions and task outcomes are sub-processes that might be

carried out somewhat simultaneously (Bedny/Karwowski 2006). Planning and evaluation processes may happen through simple mental operations carried out subconsciously, leading to very quick decision-making and assessment of activity (Bedny/Karwowski/Jeng 2004).

Based on this multi-looped model of activity, I propose that gameplay can be conceptualized as a system of iterative tasks, each one of which can be modeled as an interaction network involving the target object to be transformed, enablers (tools and aiders) and hindrances (barriers and opponents), and driven by feedback loops from outcomes of action and from the context in which the task unfolds (fig. 4).

Figure 4. Model of video game tasks as multi-looped interaction network



Source: Fabricatore

As the player acts to perform a task, she iteratively attempts to transform a system of game entities (the target object) in order to achieve a desirable goal state. Through this process, the player interprets the situation she faces, evaluating target object, enablers, hindrances and other relevant contextual conditions. Accordingly, she identifies possibilities to act and plan her interactions. As the player executes planned interactions she evaluates (provisional) outcomes, adjusting her plan and modifying the corresponding interaction network as needed. For example, a contextual puzzle game might require the player to build a contraption with parts available in the environment, whilst dealing with environmental hazards. In this case, the desired state would be a specific configuration of parts. To achieve this the player would likely explore and evaluate contextual conditions relevant to plan her strategies (e.g. position of parts in the scene; distribution of tools, such as trolleys to move parts; position of hindrances, such as live electrical wires; etc.). These evaluations would then allow the player to iteratively plan how to build the contraption (e.g. how and when to move parts avoiding dangers, and how to connect them in the right order). Planning would guide the player's practical attempts to position and connect the parts in the right

way. Throughout the puzzle-solving process, the player would evaluate relevant environmental changes (e.g. activation/deactivation of hazards) as well as progression towards the target configuration of the contraption (e.g. which parts are missing). The results of these evaluations would then drive further iterations of the activity.

In terms of meaning-making, conceptualizing gameplay as a system of contextualized and iterative tasks stresses the importance of the availability of relevant game feedback on a timely and ongoing basis. Through iterative gameplay loops players continuously perceive and process relevant aspects of the game space, formulating, developing and updating meanings accordingly. Therefore, their meaning-making processes unfold iteratively as well, fostered by the availability of environmental feedback, or hampered by the lack of it.

Feedback should also be contextualized. According to AT, activity only exists as a contextualized process: no one acts if not in specific circumstances, and it is only by comprehending circumstances that a subject can fully make sense of her activity (cf. Nardi 1996; Bedny/Karwowski 2006). Gameplay is always situated in specific contexts comprising key environmental conditions that players need to interpret in order to define their tasks, and to fully understand the results and implications of their acts. Then, what defines the context of a game? Which elements of a game context are key to influence meaning-making, and how?

THE ROLE OF CONTEXT IN GAMEPLAY ACTIVITY

For the purpose of this discussion, I will consider context as a system of interrelated conditions defining circumstances in which the player's activity happens. All video games can be regarded as contextualized systems of activities, albeit not all game contexts are equally rich.

In simple games the context is fully defined by entities and interactions that the player can closely perceive and influence. In these cases, in order to perform game tasks players only need to understand the game goals, and the causal-mechanistic and workflow schemas that govern interactions between target objects to be transformed, enablers and hindrances. For example, in a simple game the context might be fully defined by a paddle, a ball, an array of bricks framed by three walls, and schemas that govern interactions between paddle, ball, bricks and walls. Then, in order to play the game, the player would only need to understand that: all bricks have to be destroyed to progress to a new level; the player can move the paddle horizontally; the paddle can hit and direct the ball towards the bricks; the ball can hit and destroy a brick; the ball bounces off the walls;

missing an incoming ball eventually leads to the end of the game. Goals, causal-mechanistic and workflow progression schemas would be all that matters.

In simple games as much as in complex ones enabling and hindering functions of game entities may be context-related. In such cases, understanding contextual conditions may be important to interpret possible functions of an entity and decide how to interact with it. For example, in a platform game, pits might at the same time function as obstacles to be avoided and as tools to entrap opponents, depending on the circumstances (e.g. escaping enemies vs. ambushing them).

In complex games, the "world" is "larger" and "deeper" than what the player can directly perceive and consciously influence. In these games physical, socio-cultural and historical background conditions define the game environment and the schemas that govern it. Background conditions are integrated in comprehensive fictional contexts defined by settings, storylines and overarching aims. Settings define key aspects of the time and place in which gameplay activities happen (e.g. natural environment, social communities, cultures, political systems and historical backdrops defining a feudal country governed by a tyrant). Storylines can be viewed as narrative articulations of events related to the end game goals and the player's role (e.g. background events that compelled the player character to rise up against the tyrant; unfolding stages of a plot that the player character devised to topple the tyrant). Explicit game aims reflect the in-game socio-cultural valorization of game goals, and hence justify "by design" the necessity to achieve them (e.g. imprisoning the tyrant – end game goal – to liberate the country from her oppression – designed game aim).

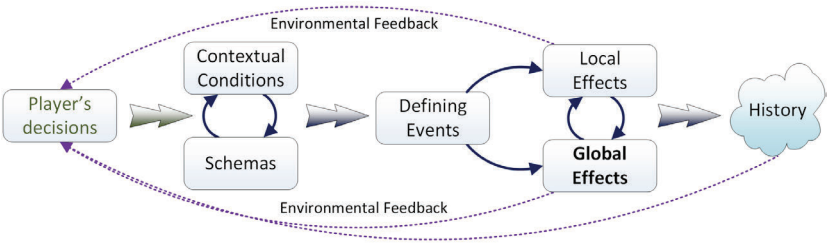
Contexts in complex games are deeply dynamic. Schemas and background conditions originate defining events, which, in turn, may modify background conditions. Some of these events are a direct result of the player's deeds. Some others, however, are not. Some defining events may happen as an indirect and unplanned consequence of the player's acts (e.g. support spontaneously offered to the player character by a neighboring country after news of her successes against the tyrant's troops). Others may be originated regardless of the player's acts (e.g. a drought affecting the populace of the country). In any case, defining events usually correspond to game state changes that directly or indirectly affect the player's role. Furthermore, they may reflect the socio-cultural significance of her achievements, as these are valued "by design" within the game world (e.g. vigilante groups organized by the populace to support the player character).

All accounted for, game contexts foster meaning-making through relating things and events within a specific spatiotemporal dimension, defined by socio-cultural, physical and historical environmental conditions. Contextual conditions

allow the player to wholly understand the schemas that define and regulate interactions between entities, and comprehend the significance of these interactions as defined "by design". Interpreting schemas in context allows making sense of game entities, the possibilities to transform them to achieve game goals, and the enabling and hindering functions that they may have in the process. Interpreting background conditions allows for comprehension of the immediate causes and effects of defining events as they happen in the game space, as well as the way these are valorized in the game world.

Further to all this, contextual conditions define deep and broad meanings, which transcend what the player is closely surrounded by, what is "immediate" to her. Game contexts influence meaning-making by situating things and events across spatiotemporal borders. The player is constantly involved in local contexts that she can directly perceive and influence. However, she can also influence and be influenced by global contextual conditions originated by the interaction of local contexts and the implications that defining events may have across space and time (fig. 5).

Figure 5. Influence loops of local and global contextual conditions



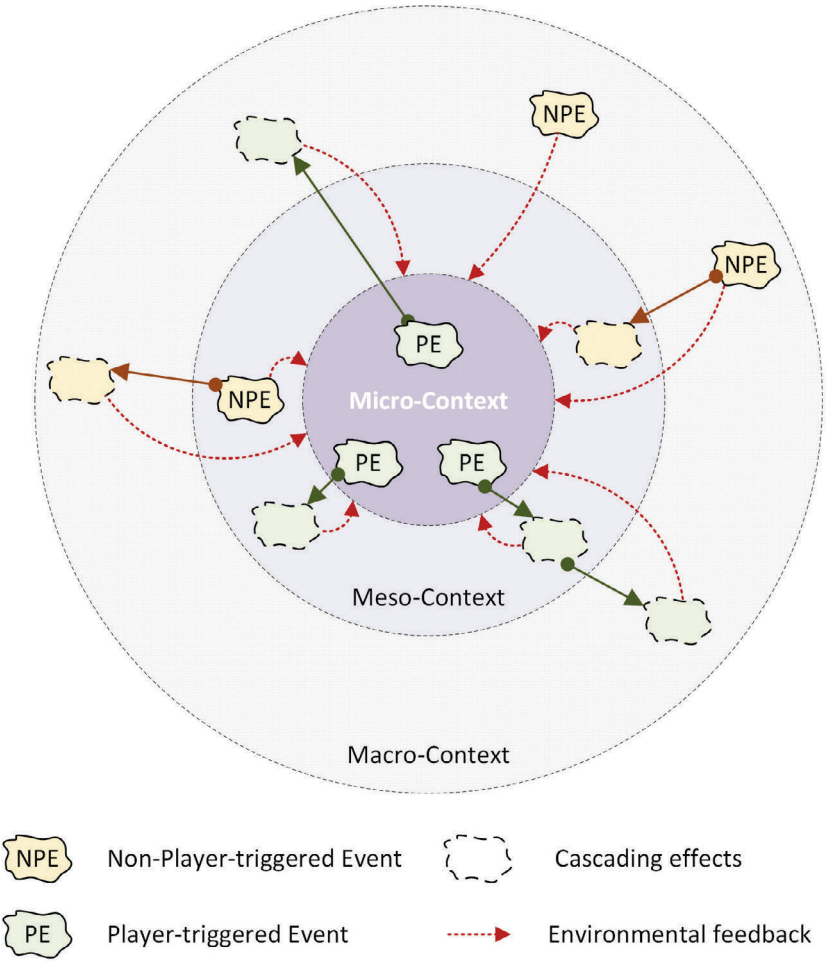
Source: Fabricatore

Defining events may generate broad and remote game state changes related to the player's actions even though the player might not be able to directly experience them (e.g. an insurrection in a remote country inspired by news of the player character's deeds). By extension, defining events generate a history of game state changes crucial for meaning-making processes, even if the player cannot directly interact with all of it (e.g. the historical events that led the tyrant to seize the power).

The interplay between local and global aspects of the game context ultimately defines the player's ability to wholly understand the in-game "present" through making sense of the "past", and consequently have meaningful expecta-

tions regarding the "future" and the role that she may play in it. In order to explore this interplay and its potential influence on meaning-making, I suggest that a game context can be modeled as a hierarchical system integrating a micro-, a meso- and a macro- level (fig. 6).

Figure 6. Hierarchical model of the game context



Source: Fabricatore

The micro-context comprises game elements that the player perceives as directly influential on the task she is currently performing. When it comes to meaning-making, the elements and events involved in the micro-context are the player's

primary focus of attention. The micro-context obviously involves all the elements of the current interaction network, as per figure 4 (e.g. enablers and hindrances involved in a covert attack to blow up an enemy outpost – the outpost being the target object). The micro-context may also involve other environmental elements that the player perceives as influential to define the state of the elements of the interaction network, and/or to make sense of their interactions (e.g. ambient light affecting visibility nearby the outpost; marketplace setting occasioning constraints in routes to and from the outpost).

The meso-context comprises elements that the player can directly perceive without interrupting her current task, which are not involved in the current task, but may become relevant to develop the current task or initiate a new task. Thus, in terms of meaning-making the meso-context naturally represents the player's secondary focus of attention. Meso-contextual elements relevant for an ongoing task might be potential enablers or hindrances that the player discovers as her current task unfolds. These elements may suggest alternative ways to perform the current task, possibly leading the player to modify the current task's plan and the related interaction network (e.g. an alternative route to the outpost; more manageable opponents to tackle). The exploration of the meso-context might also reveal new potential target objects associated to different goals. This may lead the player to initiate a concurrent task (e.g. collecting materials found on the route to the outpost). The discovery of new target objects might also induce the player to temporarily suspend her current task to perform an ancillary task (e.g. building a new tool to improve performance in the current task, using the new materials found), or to entirely change task (e.g. aborting an infiltration task to opt for an open combat approach, due to new weapons found). Even though the meso-context is not directly involved in the player's current interaction network, its state might be changed as a direct consequence of the player's acts (e.g. blowing up an enemy outpost – task goal, and related target object involved in the micro-context – could lead to mass arrests of innocent people in the adjacent village – elements of the meso-context).

Based on this conceptualization, I suggest that the player can (and likely will) directly and immediately try to make sense of entities, interactions and relevant game state changes happening within the micro-context. The player can also perceive things and events within the meso-context, and consequently relate them with the micro-context through broader meaning-making processes. This, however, requires broadening her focus of attention from the current task (and interaction network), through some deliberate exploration of the environment. The macro-context is a whole different story.

In complex games the macro-context represents the "big picture" of the world. Its state reflects large-scale effects of defining events as they happen. By extension, it also reflects the history that defined the current state of the game space. The player cannot directly interact with the macro-context. She can, however, influence it through indirect effects of her achievements within the micro-context, which may then propagate through the meso-context. Furthermore, comprehension of salient aspects of the macro-context may be key for the player to understand the immediate implications and broader transcendence of defining events, grasp the impacts and significance of her acts and role, and plan future tasks accordingly.

The hierarchical nature of the game context stresses that meaning-making in games requires a variety of information that transcends the scope of what the player can directly perceive and interact with. Players need to comprehend the meaning of causal-mechanistic, socio-cultural and workflow schemas, the origins and implications of defining events, and the valorization of things and events, at local and global levels, across time and space. This, in turn, emphasizes the importance for the player to rely on game feedback loops conveying contextualized and integrative information spanning across all levels of the game context, and covering its history as appropriate.

The game space should somehow "speak" to the player to tell its own stories and reasons to be. Game feedback should then be the "voice" that helps the player to make sense of what underpins and fully explains things and happenings in the game space, and to put events in perspectives useful to understand the meaningfulness of her role in the game world. Hence, based on what discussed thus far I will propose in the next section some guidelines to support the analysis of game feedback in relation to its potential impacts on the player's meaning-making processes.

GUIDELINES FOR THE ANALYSIS OF GAME FEEDBACK IN RELATION TO MEANING-MAKING

First and foremost, game feedback should be analyzed taking into account that all purposeful human activity is shaped by the interpretation of reality, and that all artifacts involved in human activity convey information reflecting the meanings underpinning their design (cf. Leontiev 1978; Kazmierczak 2003; Bedny/Karwowski/Jeng 2004). Accordingly, I suggest that games should be treated as systems of meanings in order to investigate game feedback in relation to meaning-making. Games are artifacts created to actively engage players in en-

joyable experiences. For this purpose, they are designed as systems of entities that interact to generate compelling situations, in which players are expected to pursue game goals by transforming the game environment. No matter how simple or complex games are, these situations are defined by schemas and background contextual conditions designed to ultimately determine what the game entities represent, what their relationships are, how they interact and why. Depending on the complexity of the game, the "designed why" may reflect cause-effect relationships between entities as well as valorizations of things and events rooted in socio-cultural and historical backdrops that may underpin the game. Furthermore, gameplay situations and the involved goals, entities, schemas and background conditions are designed to suggest to the player opportunities to exert agency over the game space and change it in meaningful ways. Thus, it can be argued that games are wholly designed to reflect meanings that should in the end trigger and sustain the player's engagement. Treating games as systems of meanings therefore means accepting that all the game elements that the player can perceive will contribute to convey some meaning to her. Hence, treating games as systems of meaning requires analyzing all game contents in order to identify which meanings are pivotal to understand properties and interactions of game entities, and the role of the player within the game space. Game contents should consequently be explored to identify which perceivable game elements contribute to conveying these meanings through game feedback loops, how and why.

Hence, game feedback should be analyzed considering that information in games may be implicit or explicit, conveyed through diegetic as well as non-diegetic means [Iacovides et al. 2015]. Explicit information is expressed through symbolic languages with clear associated meanings (e.g. messages written in English). Implicit information is conveyed through the state and interactions of entities of the game environment, thus requiring a deeper level of interpretation (e.g. state of vegetation suggesting an incipient drought; attitudes of a character hinted by her facial expressions). Both explicit and implicit information can be conveyed through diegetic or non-diegetic means, depending on whether information is represented through entities pertaining to the game world (e.g. architecture and garments representative of a specific historical period; a speech from a game character), or elements external to it (e.g. a health bar).

Game feedback cannot be analyzed in abstract. Meaning-making in goal-oriented activity is relevant because it serves to achieve a goal and to attribute personal significance to the activity that it entails (cf. Ryan/Deci 2000; Bedny/Karwowski/Jeng 2004). Hence, I argue that the analysis of game feedback should be situated, and that designed gameplay tasks can be adopted as units of

analysis for this purpose. These should be identified as stages of the game associated to objectives designed as sub-goals of the end game goals (e.g. quests, levels or missions purposeful to the attainment or preservation of desirable game states). In terms of meaning-making, gameplay tasks would therefore represent self-contained units through which the player is expected to understand what she should transform within the game world, how and why. Feedback should then be analyzed within game tasks to understand how it supports the comprehension of scope, context and purpose of a task through providing to player contextualized and integrative information, accounting for workflow, causal-mechanistic and socio-cultural schemas, the involved entities and relationships, and the underpinning background conditions.

Feedback may be helpful for the player to identify, accept and evaluate a task, when the information it conveys relates to: i) what the task goal is (e.g. mission objective); ii) when a task is available to engage in (e.g. accessibility of a quest); iii) when a task has actually started (e.g. commencement of a new level); iv) what the progression state of the task is (e.g. degree of accomplishment of a race); and v) when a task has been completed (e.g. debriefing of a mission).

Feedback may also be useful to plan methods to achieve a task goal, when feedback information conveys: i) which target objects can be transformed in order to achieve the task goal; ii) how game entities can interact, and which hindering and enabling functions they may have, in relation to the contextual task conditions, the object to be transformed, and the goal to achieve; iii) state of entities in the game environment (e.g. position and other properties relevant to define their potential function in the task).

By integrating information regarding physical, socio-cultural and historical circumstances, game feedback may be helpful to fully understand how and why schemas afford and constrain interactions. By extension, feedback may support the evaluation of contextual conditions, which may affect task performance. For this, feedback may relate to: i) social groups, their cultures and relationships (e.g. guilds and their relationships); ii) topological and biological environmental features (e.g. geomorphological characteristics and ecosystems of an alien planet); iii) urban environmental features (e.g. layout of towns and road networks connecting them); and iv) geopolitical and economic systems. Contextual information can overall foster situational sense-making, allowing the player to understand that things and events are driven by more than abstract cause-effect relationships. By extension, contextual feedback may lead the player to attribute a deeper sense of purpose to a task. This may be the case when feedback relates to implications of the task that transcend the practical transformation of objects in the game, and which reflect how the task outcomes will be valorized based on

the socio-cultural circumstances in which the task unfolds (i.e. moral value of saving people from slavery, and implications for their future lives). Thus, game feedback should be analyzed to determine the extent to which it allows the player to comprehend the significance of her acts in the game world, as defined "by design".

As previously discussed, meaning in games span across time and space. Hence, the analysis of game feedback cannot be confined within the boundaries of game tasks. Tasks are connected with one another, and altogether they are rooted in broader socio-cultural, physical and historical environmental conditions, which define the game world perceived as it is by the player, and the history that originated it. Therefore, I suggest that the analysis of a specific task should be conducted simultaneously at two levels: a local goal-focused level, and a global integrative level. The local analysis should be focused on feedback related to elements of the micro- and meso-context that: i) may directly influence the meaning-making processes involved in the planning and evaluation of a task; ii) may facilitate the appreciation of the significance of the task within the boundaries of micro- and meso-context. The global analysis should consider micro-, meso- and macro-context in an integrative way, accounting for goal-related as much as non-goal-related events, and how and why the interplay of events through space and time defines the game world. For this, micro- and meso- contexts should be analyzed investigating how their elements provide feedback regarding: i) propagating impacts that the task goal may have in the meso- and macro-context, accounting for material transformations of the game environments, implications that these may have for the socio-cultural, physical and historical context underpinning the game, and the consequent valorization of the player's deeds within the game; ii) defining events happening in the meso- and macro- context independent of the player's acts, their potential influence on the planning and performance of a task, and the extent to which they reflect the significance of the player's acts as these are valorized in the game world.

Temporal features of game feedback should also be considered and analyzed both at local and global levels. In particular, the timing of game feedback should be examined to investigate its influence on the player's ability to establish connections between things and events in the game world. Feedback information relevant for this may relate to: i) the timeliness of provision of feedback, accounting for the time that elapses between an event and the actual provision of feedback (e.g. moment of presentation of an object to the player vs. provision of explicit information highlighting specific object features; time of occurrence of an event which the player character cannot not participate in vs. message conveying news anticipating the happening); ii) reiteration of feedback throughout

the task, possibly conveyed through different means (e.g. reiteration of the importance of specific object features by means of written and verbal messages provided throughout the game through artifacts and characters).

Last but not least, meaning-making unfolds as a subject is actively engaged in transforming the external world, and cannot be fully developed through mere contemplation and reflection on reality (Leontiev 1978; Bedny/Karwowski 2006). Hence, the analysis of feedback loops should also consider the extent to which information is provided in response to the player's active engagement with the game world, and in situations promoting its exploration and interpretation. Passive reception of information (e.g. through non-interactive scenes) might not be sufficient to comprehend deep meanings. High-pressure situations might narrow the spectrum of attention of the player to what is strictly essential to achieve task goals.

All accounted for, by integrating task-oriented local and global analyses, game feedback should be examined to understand to what extent it allows to comprehend what, how, when, where and why things have happened, are happening or could happen in the game. The analysis should focus on abstract causal relationships between game entities as much as on the significance of these relationships defined "by design". Hence, the analysis should take into account, the socio-cultural, physical and historical backdrop that may be underpinning the game.

CONCLUSIVE THOUGHTS

By embracing an activity-theoretical perspective, in this chapter I have highlighted the importance of meaning-making in games, and the relevance of game feedback in relation to it. Existing trends in the study of games, game mechanics and the gameplay experience risk to overlook the role of meaning-making as a key driver of the player experience. Meaning-making is central to all conscious human activity. In games, meaning-making is crucial for the player to form rational understandings required to inform practical decision-making as much as to grasp the significance of game events and, consequently, of her role in the game world. Meaning-making is therefore the driver of the player's agency as much as the primary source of her motivation. Game feedback, in turn, is pivotal to convey designed meanings and support their interpretation.

Analyzing meaning-making requires exploring games as systems of meaning. This involves analyzing which designed meanings are relevant to define gameplay entities, their causal relationships and significance across time and

space, as well as how these meanings are conveyed to the player, when, and by means of which game elements. The guidelines proposed in this chapter to support this process do not have the ambition to represent a comprehensive guide to analyze game feedback in relation to meaning-making. Rather, their purpose is to motivate and provide orientation to embrace a meaning-making approach to game analysis. Furthermore, by connecting game elements, game feedback and meaning-making, they may also suggest trajectories to pursue further research on meaning-making in gameplay. For example, I believe that formal ontologies of game feedback, relating types of feedback with their potential sources and possible effects on meaning-making processes would be highly useful to support both the analysis and design of games. These could in turn serve as valuable instruments to progress empirical research exploring the relationships between game contents, decision-making and motivational processes involved in games.

All accounted for, I believe that the investigation of meaning-making in games may lead to significant advances in understanding player's preferences and behaviors, as well as in the design and use of games, for leisure as well as for other purposes.

REFERENCES

Literature

Adams, Ernest/Dormans, Joris (2012): Game Mechanics: Advanced Game Design, Berkeley, CA: New Riders.

Argyris, Chris/Schön, Donald (1978): Organizational Learning: A Theory of Action Perspective, Reading, MA: Addison-Wesley.

Bandura, Albert (1997): Self-Efficacy: The Exercise of Control, New York, NY: Freeman.

Bedny, Gregory/Karwowski, Waldemar/Jeng, One-Jang (2004): "The Situational Reflection of Reality in Activity Theory and the Concept of Situation Awareness in Cognitive Psychology." In: Theoretical Issues in Ergonomics Science 5/4, pp. 275-296.

Bedny, Gregory/Karwowski, Waldemar (2006): A Systemic-Structural Theory of Activity: Applications to Human Performance and Work Design, Boca Raton, FL: CRC Press.

Boyle, Elizabeth/Connolly, Thomas/Hainey, Thomas/Boyle, James (2012): "Engagement in Digital Entertainment Games: A Systematic Review." In: Computers in Human Behavior 28/3, pp. 771-780.

Caillois, Roger (1961): Man, Play, and Games, New York, NY: Free Press of Glencoe.

Engeström, Yrjö (1987): Learning by Expanding: An Activity-Theoretical Approach to Developmental Research, Helsinki, FI: Orienta-Konsultit.

Fabricatore, Carlo (2007): "Gameplay and Game Mechanics Design: A Key to Quality in Videogames." In: Proceedings of the OECD-CERI Expert Meeting on Videogames and Education, Santiago, CL: OECD, pp. 1-18.

Fabricatore, Carlo/López, Ximena (2012): "Sustainability Learning through Gaming: An Exploratory Study." In: Electronic Journal of E-Learning (EJEL), 10/2, pp. 209-222.

Fabricatore, Carlo/López, Ximena (2014): "A Model to Identify Affordances for Game-Based Sustainability Learning." In: Carsten Busch (ed.), Proceedings of the 8th European Conference on Game Based Learning, Reading, UK: Academic Conferences and Publishing International Limited, pp. 99-109.

Huizinga, Johan (1949): "Homo Ludens: A Study of the Play-Element in Culture", London, UK: Routledge.

Iacovides, Ioanna/Cox, Anna/Kennedy, Richard/Cairns, Paul/Jennett, Charlene (2015): "Removing the HUD: the impact of non-diegetic game elements and expertise on player involvement." In: Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play, CHI PLAY '15, New York, NY: ACM Press, pp. 13-22.

Kaptelinin, Victor (2005): "The Object of Activity: Making Sense of the Sense-Maker." In: Mind, Culture, and Activity 12/1, pp. 4-18.

Kaptelinin, Victor/Nardi, Bonnie (2006): Acting with Technology: Activity Theory and Interaction Design, Cambridge, MA: MIT Press.

Kazmierczak, Elzbieta (2003): "Design as meaning making: from making things to the design of thinking." In: Design Issues 19/2, pp. 45-59.

Kuutti, Kari (1996): "Activity Theory as a Potential Framework for Human-Computer Interaction Research." In: Bonnie Nardi (ed.), Context and Consciousness: Activity Theory and Human-Computer Interaction, Cambridge, MA: MIT Press, pp. 17-44.

Larsen, Bjarke/Henrik Schoenau-Fog (2016): "The Narrative Quality of Game Mechanics." In: Frank Nack/Andrew S. Gordon (eds.), Interactive Storytelling, Cham, CH: Springer, pp. 61-72.

Leontiev, Aleksei (1978 [1975]): Activity, Consciousness, and Personality, Englewood Cliffs, NJ: Prentice-Hall.

Nardi, Bonnie (1996): "Studying Context: A Comparison of Activity Theory, Situated Action Models, and Distributed Cognition." In: Bonnie Nardi (ed.),

Context and Consciousness: Activity Theory and Human-Computer Interaction, Cambridge, MA: MIT Press, pp. 69-102.

Przybylski, Andrew/Rigby, Scott/Ryan, Richard (2010): "A Motivational Model of Video Game Engagement." In: Review of General Psychology 14/2, pp. 154.

Ryan, Richard/Deci, Edward (2000): "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being." In: American Psychologist 55/1, pp. 68-78.

Salen, Katie/Zimmerman, Eric (2003): Rules of Play: Game Design Fundamentals, Cambridge, MA: MIT Press.

Sicart, Miguel (2008): "Defining Game Mechanics." In: Game Studies 8/1, pp. 1-14.

Weiser, Paul/Bucher, Dominik/Cellina, Francesca/De Luca, Vanessa (2015): "A Taxonomy of Motivational Affordances for Meaningful Gamified and Persuasive Technologies." In: Vivian Kvist Johannsen/Stefan Jensen/Volker Wohlgemuth/Chris Preist/Elina Eriksson (eds.), Proceedings of EnviroInfo and ICT for Sustainability: Atlantis Press.

Wertsch, James (1981): "The Concept of Activity in Soviet Psychology: An Introduction." In: James Wertsch (ed.), The Concept of Activity in Soviet Psychology, New York, NY: M. E. Sharpe, pp. 3-36.