# What does it mean to understand gameplay?

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## Abstract

Understanding gameplay requires a consideration of basic epistemological questions about the nature of understanding. Grounded in a tradition of philosophical hermeneutics, it is possible to approach the understanding of gameplay as a matter of generating mappings to explanatory frameworks in alternative interpretation paradigms. It is especially useful to consider gameplay from perspectives of cognitive science, semiotics, consciousness studies and aesthetics. Each of these approaches provides a different but compatible perspective on understanding play. Integrating these perspectives without losing their differences provides a comprehensive theoretical framework for play analysis.

**Key words**: Gameplay, epistemology, cognition, consciousness, semiotics, aesthetics.

## 1. Introduction

The gameplay experience is at the centre of interest for gamers, and whatever the other qualities of a computer game, its commercial success will ultimately be founded in the quality of its gameplay. Interest in studying play within game research has increased dramatically over recent years, resulting in an increasing diversity in approaches to research on gameplay, with little consideration to date of how this diversity may be unified. To this end, this paper outlines a general epistemological stance from which it is possible to pursue research into play in a way that illuminates play in diverse but coherently integrated ways. We do not present a detailed philosophical analysis, but summarise the foundations of our epistemological position. We then go on to describe a number of orientations towards understanding play, based upon this epistemological perspective. These orientations generally amount to broad interpretation paradigms, based upon cognitive science, semiotics, consciousness studies and aesthetics. Each of these perspectives is summarized, considering the forms of understanding that they may provide, together with a consideration of their complementarity and the different but compatible dimensions of play and games that they can inform.

## 2. A Poststructural Epistemology for Understanding Gameplay

Central questions leading to an understanding of gameplay include: i) why do players play, ii) how do players play, iii) what are the effects of game play upon players, and how do the answers to these questions depend upon both iv) game design features and v) identifiable discriminations between different players? Each of these central questions may be regarded as requiring a taxonomy for articulating any kind of answers, taxonomies describing respectively: i) player motivations and rewards, ii) play behaviour, iii) the consequences and affects of play, iv) game design features and v) player types. Taxonomies provide named conceptual (and linguistic) categories providing meaningful differentiations within and among play motivations/rewards, play behavior, consequences/affects, game designs, and players.

In effect, these five conceptual/linguistic taxonomical areas map out the conceptual space to be understood. Any *specific* taxonomy represents an ontological theory, i.e. a theory of what may exist. E.g. the widely used taxonomy dividing player types into achievers, socialisers, explorers and griefers [1] embodies a theory that these categories represent actual groups of different types of players.

*Describing* any particular example of gameplay or its components amounts to categorizing it according to available (and selected) taxonomies. There is a critical interrelationship between available taxonomies and the ontologies that they embody on one hand, and what is perceived among classifiable phenomena in the world on the other, as captured in the well known *Sapir-Whorf hypothesis* that our language conditions our thoughts, and hence the reality in which we live [34]. The Whorf hypothesis has tended to prioritise (verbal and textual) linguistic forms over other carriers of meaning, but here the point is extended to consider non-linguistic systems of signification and symbolization, such as sounds/music, visual creations (pictures, films), games, etc.. In this perspective, our designed artifacts condition our perceptions of reality, indeed largely construct our reality beyond the bounds of those artifacts. We also consider the Lacanian point [15], that linguistic structures encode power relationships, to be extended to non-linguistic semiotic and symbolic systems; an important function of many contemporary artistic practices is to foreground these relationships.

Alternative taxonomies from this perspective provide mechanisms for restructuring reality. Hence *understanding* a phenomenon is not merely wrapping it up within some descriptive system, since different descriptive systems encode different realities. This does

not, however, mean that reality can be arbitrarily changed simply by adopting a different description scheme. We take the ontological foundational state to be a highly structured phenomenology within which linguistic constructs such as subject/object, self/other, nature/culture, personal/social, etc. are heavily involved with all other elements of that phenomenology[1], the whole evolving in what may internally be formed as a continuous movement towards increasing coherence. Arbitrary adoption of descriptive schemes may promote incoherence, in this sense being incompatible with other layers and complexities of the teleological project of phenomenology. Principled adoption of descriptive schemes can be regarded as a systematic evolution of phenomenology towards greater coherence, even if sometimes at the expense of a short term reduction in coherence as conceptual structures must broken in order to be superceded by new concepts within a more coherent overall structure.

Within this view, it may be asked what constitutes a *good* explanation, or a *better* explanation, or *any kind of explanation at all*. In general it may be said that an explanation consists of an expression of one or more associations among the terms (and hence concepts) of one or more taxonomies or their instances. A *theory* may be understood as "a coherent group of general propositions used as principles of explanation for a class of phenomena" [25]. The propositions of a theory are expressed as associations among taxonomical categories. Hence a theory can provide an explanation for the observed behavior, features, etc. of instances of taxonomical categories.

The associations between the terms of a theory or an explanation may take many different forms, including mathematical functions, existential dependencies, causal relationships, and logical relationships (e.g. inferences). Scientific theories and explanations rely upon these kinds of associations. Many other kinds of explanations and theories are possible, e.g. of personal preference or disposition ("I went to the bar because I didn't feel like being alone"), appeal to authority ("don't do *x* because the priest says it is wrong"), assumed teleology ("go the the secret door under the bridge to find an artifact" that will help you to defeat the level boss, explaining how to finish a level), etc.. Associations between categories and/or their instances may also serve functions other than explanations, such as metaphor, poetry and analogy.

A theory is valuable for what it may explain and value is relevant to purposes. The nature of *scientific* theories has been a topic of extensive philosophical investigation. Perhaps the most widely known and used characterizations of science are those of Karl Popper [24] and Thomas Kuhn [14]. Popper stipulates that a good scientific theory should be falsifiable, i.e. it should have implications that in principle may be disconfirmed by observations; if not, then it is no better than any alternative unfalsifiable theory, providing no basis for choice and having no explanatory power. Conversely, a falsifiable theory that has not been falsified is never proven to be absolutely true, since it is always in principle possible that an observation may one day falsify it.

Popper's criteria for scientific validity are widely accepted, but suffer from a number of fundamental problems. Firstly, falsification makes sense as a criterion, but by no means has this principle been strictly followed in the history of science. Many major theoretical changes have occurred despite their initial falsification at their time of formulation; e.g. the many steps from an Earth-centred view of the universe to our contemporary cosmology (e.g. see [8]). Based upon these historical considerations, Kuhn developed a conception of science founded upon the concept of *paradigms*, where a scientific paradigm is a body of theory based upon a set of foundational assumptions. In Kuhn's model, science proceeds in three phases: a *pre-paradigmatic phase*, where the foundational assumptions are yet to be articulated and established, a *normal science phase*, where scientists operate in terms of a set of established assumptions (e.g. the laws of Newtonian physics), developing details but without questioning the foundational assumptions, and a *revolutionary phase*, where a set of new assumptions takes over from the established canon (e.g. relativistic physics superceding Newtonian physics). A revolution occurs in response to the accumulation of falsifications within the old paradigm, representing a transition to a new set of foundational assumptions in a new paradigm that better accounts for observations. This does not in itself diminish the importance of falsifiability in science, but acknowledges a kind of cultural inertia in research communities that may lead to them being slow to respond to falsification. As Kuhn notes, some established scientists may never change the paradigms in which they work, new paradigms often being most actively pursued by new researchers.

A new paradigm has its own language and conceptual categories, representing a move into a new and different ontology. A new paradigm also typically involves new methods of investigation, and may be formed as a consequence of falsifying data obtained by new observational technologies, which in turn require new experimental methodologies. Bearing in mind the discussion above about the role of language in our perception and construction of reality, this model of scientific progress needs to be understood not as a process of gaining better knowledge of an absolutely knowable objective reality, but as an evolution in the conceptualization of the world in interrelationship with methods of action (research methodologies) and observation technologies, moving towards a greater

[1] The following discussion makes many references to highly structured elements of phenomenology, the other being a prime example. Without further justification we take these constructs to serve a higher coherence within phenomenology, as opposed, for instance, to solipsism.

overall coherence in how the world is conceptualized. Part of this coherence is achieved by the scientific criteria of reliability and predictability. *Reliability* increases the value of a theory in that its predictions are preserved across certain systematic changes of context (a study replicated in another place and time should have comparable results, if aspects of the structure of the study are preserved). *Predictability* increases the instrumental value of a theory in that it not only successfully abstracts from observed phenomena but can be used to predict the behavior of future phenomena under specifiable conditions.

These factors are described by Cronbach and Meehl [5], who also characterize the overall working coherence of a body of theory together with its methods of empirical investigation as *construct validy*. Construct validity can be described as the degree to which inferences can legitimately be made from the operationalizations (i.e. practical experiments) in a study to the theoretical constructs on which those operationalizations are based. Cronbach and Meehl describe how a *nomological network* provides construct validity, where a nomological network includes "the theoretical framework for what you are trying to measure, an empirical framework for how you are going to measure it, and specification of the linkages among and between these two frameworks". It is a necessary condition for a construct (i.e. a distinction, concept or theory) to be scientifically admissible that it occur within a nomological (or 'lawful') net having at least some laws involving observables. We can extend this point with the hermeneutic observation that the conceptual framework and language of a nomology include its empirical and observational concepts, constructs and procedures.

A scientific approach can therefore be regarded as one seeking nomologies having maximum coherence among abstract theories, observations and actions in the world, leading to construct validity, predictive validity and reliability of knowledge embodied in the nomology. This characterization does not rely upon any kind of absolutist or positivistic interpretations of knowledge, and also does not imply arbitrary relativism. All conscious elements of our experience are interpreted, and as such form a generalized "text" of experience. Then, as stated by Paul Ricouer [26], "If it is true that there is always more than one way of construing a text, it is not true that all interpretations are equal…. The text is a limited field of possible constructions. The logic of validation allows us to move between the two limits of dogmatism and skepticism. It is always possible to argue against an interpretation, to confront interpretations, to arbitrate between them and to seek for an agreement, even if this agreement remains beyond our reach".

There are, of course, paradigms of interpretation that are not scientific, and are unscientific to the degree to which they are incoherent, or lack falsifiability, construct validity, predictive validity and/or reliability. Science is fundamentally concerned with instrumental effectiveness, the development of theories that provide foundations for maximizing the predictability of future observations and the outcomes of action. Scientific approaches may be severely limited in making aspects of phenomenology coherent that are not concerned with optimizing instrumental action. Even in the sphere of action, science may provide the best understood ways of acting efficiently, but generally provides no guidelines for *why* to act or *what to create* when we are involved in the manufacture of our reality by our actions and their consequences.

## 3. Interpretation Paradigms for Understanding Gameplay

Against this very high level background, we now consider how we approach the task of understanding gameplay. The first implication of the epistemological ideas above is that to understand a phenomenon is to map it within an interpretation paradigm, and that such a paradigm will shift both due to its own internal dynamics and its interrelationships with other interpretation paradigms with which it may be compatible to varying degrees. Clearly there is no single dominant paradigm in contemporary studies of game play. Nor should there be: the crucial meta-theoretical task is to map out different approaches and develop a high level perspective for interrelating them as a higher level, coherent body of work, each specific approach formulating different kinds of questions and developing its own nomologies for creating answers. Overall coherence lies in recognizing the different purposes and forms of knowledge that the various paradigms involve.

The question then is how to structure such a map, a question that will no doubt have many exploratory answers over time, with no final answer as long as the study of gameplay continues to develop. Interpretation paradigms are also highly complex, often nested, being vaguely bounded, with numerous overlaps, congruencies and contradictions, and change over time. There is an ambiguity too in relation to fields of enquiry, where different fields may be identified by their own typical motivating questions, foundational theories, histories and methods, but where within a field there may be competing paradigms of interpretation of their subjects of interest. For example, gameplay may be investigated within fields including: i) cultural studies of games (i.e. game studies), ii) research in the technical platforms and infrastructure, facilitating technologies (e.g. new rendering techniques, AI, physics simulation, network technologies, etc.) and production tools for games, iii) design research into new forms of games and play, iv) scientific studies of games, play and affects upon players, v) research in the philosophy of games and play, and vi) social scientific studies of players, communities and the role and nature of games and play in society.

Our own interest is in research leading to a better understanding of how game designs motivate and affect players (especially in terms of cognitive outcomes), the

development of innovative designs and understanding their affects. This is a matter of increasing the self-consciousness of design processes (explained at length in [19]) with a view to facilitating game design in general and enhancing innovation in design concepts. In developing a theoretical framework to support these goals, we are focusing upon the integration of what we regard to be among the most interesting and/or promising approaches or paradigms for understanding gameplay, with a view to creating an overall coherent paradigm addressing different levels of gameplay functionality. The approaches that we are seeking to integrate include: cognitive science, semiotics/symbology, aesthetics and consciousness studies. In many ways cognitive science can include all of the other approaches, but there are limitations in the cognitive perspective. This is elaborated in the sections below.

## 4. Cognitive Science

Cognitive science seeks an understanding of cognitive functions based as far as possible upon scientific methods. A more scientific understanding of the motivations, rewards and affects of game play can be a valuable contribution to understanding how design features function, and also lead to clearer ways of creating designs that more readily achieve specific targeted affects (e.g. for training, therapy, or emphasizing specific elements of entertainment experiences). Gameplay is, amongst other things, a cognitive skill acquisition and performance process, whether played for entertainment or other purposes.

Cognitive science is a broad, multidisciplinary field, characterized by Thagard [33] as: "the interdisciplinary study of mind and intelligence, embracing philosophy, psychology, artificial intelligence, neuroscience, linguistics, and anthropology". Within this broad scope, it is possible to seek those approaches and theories that appear to have the most to say about gameplay. In this spirit, Lindley and Sennersten [18] present a theory of the underlying cognitive systems involved in game play based upon schema theory and attention theory. Schemas are cognitive structures that link declarative (or factual) and procedural (or performative) knowledge together in patterns that facilitate comprehension and the manifestation of appropriate actions within a context. While the taxonomical structures of semantic or declarative memory can be modeled in terms of object classes together with associated features and arranged in subclass/superclass hierarchies, the elements of schemas are associated by observed contiguity, sequencing and grouping in space and/or time ([20]. Schemas can refer to declarative knowledge and taxonomical types with their features and relationships, and integrate these with decision processes. Schemas include *scripts* for the understanding and enacting of behavioural patterns and routines, a classic example being Shank and Abelson's [27] example of the *restaurant script* that includes a structure of elements for entering a restaurant, sitting down, ordering food, eating, conversing, paying the bill and leaving (etc.). Scripts, as structures used for both comprehension and behaviour generation, represent a structure of cognitive functions that may include cognitive resources, perceptual interpretations and preconditions, decision processes, attention management and responsive motor actions. *Story schemas*, are patterns representing a structure of understandable elements that must occur to make stories comprehensible. The presence of story schemas in the cognitive systems of storytellers, listeners, readers or viewers of stories allow stories to be told and to be comprehended, including the inference of missing information. If a story deviates too far from a known schema, it will not be perceived as a coherent story. Script and story schemas are concerned with structures of both space and time, while *scenes* are schemas representing spatial structures, such as the layout of a house, a picture or an area of a city.

While schemas have been interpreted in many different ways, here a *game play schema* is understood as a cognitive structure for orchestrating the various cognitive resources required to generate motor outputs of game play in response to the ongoing perception of an unfolding game. A game play schema is therefore the structure and algorithm determining the management of attentional and other cognitive, perceptual and motor resources required to realise the tasks involved in game play. Examples of types of game play schemas described by Lindley and Sennersten [18] include story scripts for understanding high level narrative structures designed into games, and scripts for the combative engagement of an enemy, exploring a labyrinth, interacting with a trader non-player character, and negotiating and carrying out quests.

*Attention theory* provides an account of the energetic resources available to cognition, together with principles for the distribution of energy (or attention) to the cognitive resources that use (or manifest) it. Attention theory addresses issues of attentional focus, management of attention (including attentional selection), and the allocation of cognitive resources to cognitive tasks. Ongoing research is addressing the question of the detailed operation of attentional mechanisms, including questions such as the degree to which attentional capacity is specific to specific cognitive resources (or modes) or sharable among resources according to demand, and the stage of processing of perceptual information at which perceptual information is selected for attentional priority. Schemas can be regarded as mechanisms or algorithms that, amongst other functions, determine the allocation of attention to cognitive tasks.

In the context of game play, attention and the operation of game play schemas is driven by hierarchical goals that set tasks for a player. Goals include those intended by designers and those created by players as allowed by a game design. A hierarchical decomposition of game play goals might at a high level include the completion of a game, which decomposes into the subgoals of finishing

each of its levels, each of which in turn decomposes into goals of completing a series of game challenges.

We hypothesise that this hierarchical goal structure is mirrored in a hierarchical structure of schemas within a player's cognitive system, where a schema is an algorithm for completing a particular goal or subgoal. This schema structure is fundamental to many aspects of the pleasures and motivating factors behind play [18]. These include pleasures of:

- *effectance*, which is a basic feeling of empowerment created when an action of a player results in a response from the game system [13]. The cause-effect relationships underlying effectance are a fundamental premise of goal-oriented schemas for action.
- *closures* at different hierarchical levels (as described by Holopainen and Meyers, [10]), where a closure is interpreted here as the completion of the algorithm constituted by a play schema. Closures may involve completion of expected outcomes and resolution of dramatic tensions, corresponding to the completion of cycles of suspense and relief identified by Klimmt [13]. A distinction must be made here between the intrinsic pleasures of schema completion and more complex emotional experiences and rewards due to fictional identification within the game world (see the point below regarding episodes).
- *achievement* of in-game tasks, which is rewarding due to the *displacement* of a player's identity into their character [10], this being a matter of *imaginative immersion* as described by Ermi and Mäyrä [6]. Achievement-oriented reward is a more specific form of reward than mere closure, since it is associated with the completion of schemas by the achievement of specific goals.
- more complex forms of enjoyment in game tasks regarded as *episodes* [13] following from imaginative displacement into the game world. Enjoyment within episodes may include the excitement of possible action, pleasures of curiosity and discovery, the pleasures of experiencing negative emotions of suspense followed by the transference of arousal to an ecstatic experience when the challenge creating the anxiety of suspense is overcome, and enhanced self-esteem. Schemas offer greater discrimination of the pleasures involved in episodes by allowing different forms of episodes to be modelled as different schema patterns having a complex substructure with corresponding emotional effects (e.g. different scripts for solving mysteries, combat, exploration, trading and quest negotiation).
- *escape* to an alternative reality provided by the fictional world represented by a game [13] and facilitated by imaginative displacement. Players have the pleasure of being able to experience new objects, actions, social interactions and experiences at no risk. These vicarious experiences can help players to cope with felt frustrations and deficiencies in their everyday lives, a process both of catharsis and of perception and feelings of increased competence and relevance. Schemas for stories facilitate displacement, while many additional schema forms provide the foundations for comprehension of the events within the fictional world and provide mechanisms for projection of the player's sense of self into the fiction.
- achievement of a sense of *flow* [4] in game play, this being a state at the boundaries between engagement and immersion, of being totally absorbed in meeting a constantly unfolding challenge. We hypothesise that the flow state is associated with attentional demand, in particular occurring when schema execution demands attentional resources above a level that would result in player boredom and below a level that would result in excessive difficulty and consequent frustration.

Schema theory therefore has the potential to provide both an explanation of the decision and operational processes underlying game play and an explanation of the detailed reward and motivation factors behind play. Validating this potential requires detailed study of play resulting in the development of empirically validated hypotheses about the detailed structure and functionality of game play schemas, for individual players and across groups of players.

## 5. Semiotics/Symbology

Semiotics is the study of signs, signification and sign systems, including how meaning is constructed and understood. The semiotics of computer game design is fundamental to design practice, but is generally involved in an unselfconscious way by designers by the adoption of existing design conventions. In this context it refers to the way that perceptual and active elements are organized to convey meanings (e.g. see [21], [7], [17]).

Schema models provide very useful abstractions representing the cognitive 'algorithms' involved in gameplay, irrespectively of the more difficult philosophical question of how a schema model is to be interpreted ontologically. Hence schema models can be used to analyse gameplay without resolving the linguistically conditioned questions of whether or how the abstraction of a schema model exists as mind and/or matter within the cognitive system of a player, or whether the mind/matter distinction is an unnecessary construct. A schema model is an abstract representation of mappings from perception through decision processes to action. However, such a mapping is far from exhausting the possible meanings of perceptual and action phenomena. While meanings can be mapped from many perspectives, we might say that a specifically *semiotic* perspective considers the internal logic of signifying systems, independently of the underlying cognitive mechanisms of signification (which would provide a more specific *cognitive semiotics*); it may be that a variety of different underlying cognitive architectures could operate the same given semiotic system. Moreover, within human cognitive systems, very much is a matter of the internal structure of knowledge,

beliefs, concepts, etc., for which cognitive mechanisms are very generic, and most of what is interesting is within the abstract relational structures of knowledge and concepts. Semiotic analysis focuses upon this level of structure. From this perspective it is possible to analyse the semiotic processes involved in gameplay in terms of a hierarchy of semiotic and symbolic complexity, for example and in order of increasing symbolic level and complexity:

- basic cognitive functions and emotional rewards associated with their operation
- task-oriented cognitive mechanisms
- semiotic and symbolic constitution of the self
- semiotic and symbolic constitution of immediate social relationships
- semiotic and symbolic constitution of subcultural contexts
- semiotic and symbolic constitution of general cultural contexts

Cognition provides the foundations for semiosis, while semiosis provides the rich content of dynamic conscious experience.

## 6. Consciousness

As discussed earlier in this paper, structured phenomenological consciousness provides the foundations for all epistemological projects. For the understanding of gameplay, the conscious experience of play provides the connecting nexus between observed behavior and reported experience. A scientific nomology for the explanation of play should ideally include methods and taxonomies for interrelating observed play, psychophysiological measurements, inferred schemas, and subjective reports of the conscious experience of play.

The subjective experience of gameplay, however, is not straightforward to describe. Many studies on games have developed taxonomical terms for different modalities of gameplay experience, aside from general emotional experiences (e.g. see [16]), including: emotional affection [31], immersion ([2], [6]), frustration [9], presence ([32], [11]), and flow ([12], [3], [30], [29], [23]). Concepts such as immersion, presence, engagement and flow are often unclear, with no consensus about their precise meaning or how to clearly distinguish one state from another under all circumstances: Novak et al. [22] describe 16 studies conducted between 1977 and 1996 based upon different concepts of flow.

This diversity in the use of basic terms reflects the fundamental difficulty of assessing states of consciousness. Ideally a nomology should provide empirical measures by which different measurement results can be correlated with differences between states of consciousness captured by descriptive taxonomical categories. However, it is intrinsically difficult to devise taxonomies for reporting subjective states, since validation must rely upon verbal reports, the quality of subjective experience being externally inaccessible to any kind of direct observation. Consciousness cannot, however, be neglected, since it is the foundation of gameplay experiences and epistemic projects that seek to understand them.

## 7. Aesthetics

The final approach that we sketch here is that which we refer to as aesthetics. Here aesthetics is understood to mean a concern with design form from the perspective of design tradition, formal innovation and the perspectives of contemporary arts practice (this is *not* aesthetics in a classical sense of a 'love of beauty'). Aesthetics in this sense may be regarded from the perspective of cognition or of semiotics, but we separate the approach as one that is best pursued by understanding a design in relation to other contemporary and historical designs. This is intended to capture the sense of *direct theory* as described by Small [28] in the case of avant garde cinema. In the case of gameplay, this means the understanding of a game obtained via playing it and in relation to the experience of playing other games, with their similarities and differences. This is the situated understanding of the meaning of a game, manifest in the experience of play and experienced as part of an ongoing discourse of play, a discourse about play conducted via play.

This approach to understanding play does not rely upon cognitive or semiotic analysis, but it does rely upon creating and playing games. Including such a perspective is critical in order not to lose sight of the constructed nature of other interpretation frames, and the alternative possibility of understanding play in the language of play itself as a unique mode of apprehension facilitated by games as a (reality constructing) form. This is to return to the foundations of our epistemological position: all epistemology begins within a highly structured phenomenology. The starting point for understanding game play is the experience of the highly structured phenomenology of the play experience (or of the observation of others playing), before its mappings to the other structures in phenomenology that provide paradigms for understanding via interpretative mapping. Our knowledge and understanding of play is grounded in this direct experience, which ultimately may not need to be mapped to any other interpretation frame in order to be understood. Art speaks of art by art.

## 8. Conclusion

The framework for approaching the analysis of gameplay presented in this paper seeks to understand games from several complementary perspectives within an overall epistemology founded upon philosophical hermeneutics. Cognitive science incorporates empirical, scientific methods for studying gameplay, including consideration of neurophysiological foundations and providing explanations in terms of cognitive operations,

functions, structures and affects. Many higher level cognitive functions, however, are highly distributed and represent complex learned functionality from a cognitive perspective. In these areas, it is more productive to examine abstract conceptual and linguistic operations than to focus upon more basic cognitive capabilities. This leads to a consideration of knowledge in itself, independently of its cognitive substrates. Semiotics then takes over, examining the meanings of perceptual and cognitive experiences as more abstract systems. Signifiers are understood as belonging to systems of signification, with the ability to express different and new meanings by combinatorial operations upon signifiers, e.g. the production of linguistic statements by the applications of rules and terms from languages, or the assembly of the signifiers of interaction affordances within computer games into a coherent play concept. Semiotic principles apply to non-linguistic signifiers, such as any meaningful elements of perception and encompassing designed form in all media. The study of meaning from a semiotic perspective does not need to consider underlying cognitive foundations, and in many (or even most) cases there are few adequate comprehensive cognitive theories of semiosis.

Studies from either a cognitive or semiotic perspective tend to be articulated in verbal and written languages. However, non-linguistic media function in direct semiotic ways that may not always be accountable in cognitive and/or linguistic semiotic terms without the loss of some meaning. Undertaking a discourse aimed at creating deeper understandings of media (in the current case, of games and gameplay) without the loss of media-specific meaning must then be conducted in the languages of non-linguistic media themselves, e.g. by exploring game forms that provide a commentary upon game form itself. In this process, a process that we here characterize as an active project of creative aesthetics, discourse may also proceed via cross-media production, e.g. making games that comment upon dance, dance performances that comment upon games, etc.. Aesthetic discourse may be examined from cognitive, semiotic and linguistic perspectives, but cannot be exhaustively appropriated into these modes of interpretation without potential loss of meaning. A game that is played has meanings that escape descriptions of play, just as a dance that is danced always has meanings different from descriptions of the dance. Finally, consciousness studies is concerned with the ground of all other experiences, the starting point and the end point of all projects of understanding. All of the other interpretation paradigms serve, articulate and (in-)form consciousness. There are no vantage points outside of consciousness from which it can directly be compared with its models, and every new model or variation of a model changes consciousness itself. Hence the process of knowledge generation must be regarded as a process of expanding consciousness, the various interpretation paradigms representing alternate and complementary dimensions of expansion.

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