Philosophy of Computer Games 2015 (Berlin)

How to Approach Health Packs in the Wild. Meta-ontological Reflections

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Introduction

Originally, this was supposed to be a modest and pragmatic paper. The initial observation was that healing items in games in virtual worlds often show a pronounced disconnect between their function as gameplay relevant objects and their referential dimension: a syringe of painkillers may heal just the same as a generic, featureless health pack, yet instead of being a neutral, unequivocal healing agent, it references the complex ambiguity of pharmacology at the heart of drug abuse - the ambivalence of the *pharmakon*, the agent that can be both a cure and a poison. This inherent ambivalence has made the *pharmakon* a powerful trope of cultural criticism that has been traced back to Plato by Jacques Derrida (1981) and is, according to Bernard Stiegler (2011), the central mental model for critically engaging with information technology. Perceived in this context, the health pack appears no longer as an ubiquitous and seemingly simple in-game object, but as an integral element of both a game ecology and a discursive tradition, the discussion of which holds great potential, but is very challenging at the same time.

As procedural rhetorics was developed for studying this sort of complex relationship between mechanics and signification, it seems natural to take it as a starting point. After all, according to Treanor and Mateas, it "[...] strives to understand a game's meaning in the context of the processes that its system affords" (Treanor & Mateas, 2013, p. 2). However, although their revision of Bogost's (2007) theory includes semiotics, we find that it emphasizes operational logics and procedures rather than the contextual meaning making that players perform when

engaging with the game. Sicart (2011) attempts to re-focus the attention to the player in *Against Procedurality,* but nevertheless does not elaborate on the player interaction with in-game objects.

We concluded that established models did not allow us to deal with the expanse and complexity of the phenomenon, and that we would have to find our own methodology for arriving at a thorough understanding of in-game objects. Considered through the lense of health packs, the limitations of current models of meaning-making in games appeared to stem from their attempt at universal applicability and systemic totality. To overcome the limitations we perceived in existing models, we realized that we needed to take a middle-ground approach that would allow us to attain a better understanding of healing objects and their diversity. To this end, we began to typologize them according to in-game function and referential qualities. This undertaking soon proved to be extremely complex, in part because an understanding of health packs presupposes a fundamental concept of the workings of in-game objects. As the identification of blind spots in current theory and the struggle with typologizing health packs fueled an extensive reflection process, we decided to discuss not only our findings, but elaborate upon the resulting meta-perspective on identifying, typologizing, and interpreting in-game objects.

Instead of merely presenting a finished typology, we offer a discussion of the methods and parameters necessary for the formulation of a comprehensive ontology of a specific type of gameworld object. The goal is to offer a test-case of a middle-ground approach to game ontology, located between general, strictly formal ontologies (Zagal et al., 2005), practice-oriented game design approaches (Hunicke et al., 2004), and holistic models with limited heuristic potential (Jørgensen, 2013).

Conceptualizing health packs

Health packs are among the most frequently encountered objects in gameworlds, and at the same time among the most unequivocally game-specific ones. The simple, instantaneous health-power-up is radically at odds with the controversial discourses of health, healing and pharmacopeia in practically all cultures (Carson-DeWitt, 2001). But in order to not only discuss

health packs in the specific game context, but also their cultural and historical meaning, we must first arrive at a comparative understanding of the enormous variety of implementations. We will achieve this through description, conceptualization, and categorization within a common framework. Through this typology of health pack objects, procedural and semiotic meaning-making processes facilitated by them become tangible.

Our field of study is limited to games in virtual environments (Aarseth, 2004, p. 364) which have health-system that can be influenced through objects which we identify as "health packs".[1] We use this term as a synecdoche for a wide variety of healing objects. This means, however, that we address means of healing that are not connected to concrete in-game objects - healing spells, contextual healing (e.g. resting at inns in *Dungeons and Dragons* (1974) based CRPGs like *Baldur's Gate* (1998)), and auto-heal (as popularized by console shooters like *Gears of War* (2006)) - only as a contrast to the objects under investigation.

Early digital games tended to use multiple 'lives', a paradigm in which the fragility of the avatar is offset by allowing for several attempts at solving a problem or overcoming an opponent. Fighting games of the early 1980s move from the threat of instant death to fights between human opponents that allow for multiple hits. This concept of partial health loss created a more nuanced implementation of health, life, and death. The new paradigm of health as a continuum, manageable through an ecology of health points, has its roots in the quantification strategies of pen-and-paper role-playing games (Peterson 2012). From this common basis, a wide range of health-based game mechanics have evolved in digital games. Starting with *Wolfenstein 3D* (1992), First-Person Shooters used health-packs and a dynamic healing systems as a part of their genre conventions. As the FPS hybridized with RPG and Action-Adventure games throughout the 1990s, this approach to health became ubiquitous in games in virtual environments - and thus highly diversified and complex.

[1] We limit our attention to objects used by the avatar/player, not NPCs/Bosses.

Healing items are rarely represented as purely abstract health-powerups. More frequently, they are integrated into the logic of the gameworld. This process invariably connects properties with representational elements, yet not in a straightforward and commonsensical manner. Some games attempt to naturalize healing by forming a coherent whole between these three dimensions. In this rare case, the reference to a cultural context is congruent with a certain health simulation. *Minecraft* (2009) distinguishes between healing through food and healing through potions in such a fashion. Yet more frequently, properties, affordances, and signification are disjunct.

Two prime examples of how health and healing can be a discourse in games are *Half-Life* (1998) and *Fallout 3* (2008). In *Half-Life*, the Hazardous Environment Suit worn by avatar Gordon Freeman reacts to major damage by voice feedback, diagnosing the damage incurred and announcing the countermeasures taken. One of the most frequent reactions of the suit is to 'administer morphine'. This has no gameplay relevance, but explains through a naturalizing discourse how Freeman is able to withstand the extreme physical damage he suffers. The amount of morphine administered to Freeman throughout a regular playthrough is enormous, and the question of how the suit actually heals his wounds is never answered. However, other games have reacted to it. *Crysis 2* (2011) revolves around the idea that eventually, the body inside the protective suit will no longer be able to exist without the protective shell. *Half-Life* only implies such questions, and the offhand manner in which morphine is mentioned combined with its irrelevance in the healing mechanics does little to stimulate reflection upon these issues.

A much more involved procedural reflection upon morphine usage is found in *Fallout 3*. The game integrates the drug in a health model in which many factors, some of them correlated to the character's medicine skill, replenish lost health, from undisturbed sleep to the use of Stimpacks. But in addition to this cumulative health value, *Fallout* games allow for individual body parts to get crippled. Until they are healed, they create various detrimental effects, and healing them involves extra effort. Additionally, there is the constant threat of radiation poisoning, which can be cured in a similar fashion as regular health, with its dedicated medicine, RadAway. Combat

and health system use derived character values called damage resistance and radiation resistance to reduce up to 85% of damage or radiation, respectively, thus giving each character something like natural armor and radiation protection. The values can be boosted with dedicated drugs, Med-X and Rad-X, and whereas Rad-X is purely beneficial, Med-X is one of several performance enhancing drugs in *Fallout 3* with addictive potential. Repeated use of the medicine comes with the chance that the character will become addicted, which reduces some of her statistics. Not only is a probability check executed every time this occurs, but the game logs the characters drug usage and increases the risk of addiction according to the frequency of usage. Med-X is one of the most addictive substances in the game, and its nature as a *pharmakon* would have been even more apparent had the publisher not (in reaction to a threat of banning the game in Australia for the depiction of real-world drugs) changed the name from the originally planned Morphine to Med-X (Booker, 2008).

At some point in the campaign, the avatar may come into possession of a prototype medic power armor, which will automatically dispense Med-X when the wearer is gravely injured, and in this case, there is no danger of addiction. The comparison between the various means of healing in both games not only identifies the prototype medic power armor in *Fallout 3* as a clear reference to *Half-Life*, but substantiates a close reading of *Fallout 3* and its engagement with health and healing discourses.

Even when considered in isolation, a health system can suggest discourses of drug use. The overpower mechanic found in several First Person Shooters is a good example: the Big Keg o' Health in *Unreal Tournament* (1999) 'heals' to a maximum of 199% of the avatar's health, and *Wolfenstein: The New Order* (2014) allows for health boost over 100% through standard healing items. Here, the dimension of healing objects as *pharmakon* is at least implicit. If one does not naively accept at face value that health is shortly higher after ingesting a lot of healing items, the boost has to be rationalized as something beyond mere healing: a performance enhancing drug.

Prince of Persia: The Two Thrones (2005) has 'the Dark Prince' as a secondary avatar, a demon version of the regular Prince. Playing him reverses the two resources, life and sand. The Dark Prince's life energy stems from the collected sands of time, which are constantly trickling away, so to keep him alive, sand has to be collected constantly. This change forces the player into a different, more aggressive pace. Crucial for our topic is, of course, the coexistence of two health paradigms in the same game, applying to the player's avatar, which reinforce the question posed on the game's story level, namely whether Prince and Dark Prince are essentially the same character or not.

Semiotically similar healing methods can differ drastically in terms of game mechanics. In *The Darkness II* (2012), the avatar's demonic powers spawn a number of Serpent Heads, which feed off enemies hearts and give health back to the avatar. This eating of hearts is quite similar in its signification to the healing of vampires by ingesting blood, which is the only way to regain health in *Blood Omen: Legacy of Kain* (1996). However, mechanically, the games are very different: *The Darkness II* implements healing as a part of the regular fight mechanics - using the Serpent Head attack also replenishes health -, whereas *Blood Omen: Legacy of Kain* makes feeding a somewhat time-consuming affair that leaves the avatar vulnerable to attack.

In *Grand Theft Auto III* (2001), sex with prostitutes replenishes the avatar's health; in *Warhammer 40.000: Space Marine* (2011), the only way to regain health is to execute enemies; and in *Fable II* (2008), food has healing power, yet is also a factor in the game's morality system.

Subsuming the observations made above, health packs are characterized by the relationship between how they are integrated into calculation processes, how players interact with them, and how they appear in the gameworld. In other words, we can observe a relational triangle between:
1. the abstract, discrete, numerical properties of objects in the game's code,
2. the experiential dimension of gameplay as it manifests in the affordances, and
3. the denotations and connotations of the semiotic representation.

Approaches to and terminologies of object understanding

In-game objects and the three ontological dimensions identified above - properties, affordances, and semiotics - have been defined by many, and we will in the following account for these approaches to the terms, to be able to clearly define our own usage and relate it to previous work within the field. We have divided the existing approaches to in-game objects into two loosely defined groups: theoretical approaches to game ontology and applied game design. Given that objects have some relevance to many, if not most discussions of games, we have tried to select a number of paradigmatic positions; chronicling the usage of the relevant terminology in general would be the subject for a book-length study.

Game Ontology

In the classifications of the Game Ontology Project, objects feature prominently under the term "entities", a broad category that encompasses both objects that can be manipulated by players and those that cannot (Zagal et al., 2005, p. 5). It is thus all the more surprising that objects remain "the least developed section" of the ontology (Zagal et al., 2005, p. 8). Instead, the authors focus on the ways objects can be manipulated, and in doing so seem to ignore Norman's observation (which will be explored in detail further down) that affordances are not properties of objects but a relation between agent and object. This leads them to conclude that objects "posses [sic] a set of attributes (e.g. velocity, damage, owner, etc.) and a set abilities (e.g. jump, fly, etc.). Entity manipulation consists of altering the attributes or abilities of game world entities" (Zagal et al., 2005, p. 8). Ignoring the relational nature of affordances leads them to (mis-)perceive every object manipulation as an altering of the object. The close scrutiny of an object, be it 'looking at' it in an adventure game or reading an object description in an open-world game, does not alter the object, neither its attributes nor its abilities (to stay in the GOP's terminology). Instead, the description of an object in e.g. *The Secret of Monkey Island* (1990) reveals as much about the perceiver, avatar Guybrush Threepwood, as it does about the object itself. In *DayZ* (2014), the object descriptions tie into and expand a general game discourse of post-apocalyptic

desolation. This semiotic dimension of objects goes completely unnoticed in the Game Ontology Project.

Consalvo and Dutton's (2006) analysis toolkit places similar emphasis on objects, inquiring into their role and importance in the game. They suggest that researchers list and categorize "all known objects that can be found, bought, stolen or created, and produce a detailed list or spreadsheet that lists various properties of each item" (Consalvo & Dutton, 2006).[2] This call for a cataloguing of all objects that can be obtained is, at the same time, very inclusive and exclusive, as it strives for completeness, yet only of one class of objects, ignoring objects that are usable but not part of the avatar's inventory, as well as passive yet meaningful objects like barriers (which are included in the Game Ontology Project). However, Consalvo and Dutton offer a non-comprehensive list of meaningful categories for the distinction of objects: general description, number of uses, varieties of usage, dynamic or static qualities, and cost. These descriptors have been relevant for our own categorization attempts. Yet also in their model, the semiotic dimension is only tentatively connected to gameplay.

Game design

Given their central role as the focus of most interaction in games in virtual environments, objects remain surprisingly peripheral in some approaches to game design. In the MDA framework (Hunicke et al., 2004), objects are merely implied between the central categories of 'mechanics', 'dynamics', and 'aesthetics', yet remain undefined and feature vaguely in the discussion of content, assets, and resources.

Fullerton, on the other hand, directly addresses objects as basic building blocks of a system, defined by their properties, behaviors and relationships with other objects (Fullerton, 2014, p. 33-34). In her rather technical approach to objects in games, they are synonymous with resources, a part of a game's system dynamics crucial for the balancing of games, which in turn

[2] We interpret 'found' here in as an act of appropriation by the avatar. It could also be read as all that can be found in the gameworld by the player, which would then include all objects. The context of the other three mentioned actions makes the first interpretation the more likely one.

influences the player experience. She characterizes affordances as being dependant on relationships to other objects; a system with no relationships between objects is merely a collection (Fullerton, 2014, p. 129). Besides this formal perspective with its focus on rules, goals, etc., she also acknowledges a dramatic dimension, concerned with character, world, etc.

This perspective is favored by Salen & Zimmerman (2004), who have argued for the relevance of a semiotic approach to the game design process, where the designer must be aware of subjective nature of the semiosis and how this in turn forces upon the player an active role as an interpreter of the game's signs, and hence its objects. They tellingly talk about objects primarily as contextual and not structural elements: "The context of a game takes the form of spaces, objects, narratives, and behaviors" (Salen & Zimmerman, 2004, p. 41). Salen and Zimmerman address the semiotics of in-game objects rather extensively, yet without taking into account the complexity of signification. When they speak of character classes denoting different play styles in an RPG, the *locus*, elements, and process of signification remain underspecified: "A graphic designer, for example, uses typographic signs (letterforms) representing words to design a book; a fashion designer uses silk as a sign representing 'beauty' or 'femininity' in a new spring line; a game designer uses the classes of Fighter, Wizard, Thief, and Cleric in a fantasy role-playing game to denote four kinds of player-characters within a game. Thus, signs are the most basic unit of semiotic study and can be understood as markers of meaning" (Salen & Zimmerman, 2004, p. 42).[3]

Such rather one-sided takes on signification in games have been instrumental in sparking the proceduralist approach and its argument for the important role of the simulation process in meaning-making in games. Still, in-game objects have - just like the role of the player (Sicart, 2011) - received little attention in the proceduralist discussion, which is all the more surprising as e.g. Sicart (2013) highlights that this approach to games is founded on "the argument that objects

[3] It is revealing that Salen and Zimmerman choose to discuss the difference (and, in their eyes, ultimate irrelevance) of in-game and real-world meaning of objects through an example of offensive words in *Scrabble*, i.e. talk about objects by using one of the few examples where objects are abstract words with a very concrete meaning outside of the game's logic.

can embody values in their design" (Sicart, 2013, p. 36). The "objects" in Sicart's argument are games (as designed objects), and while their capacity to be carriers of meaning is foregrounded, the same potential of in-game objects remains largely unexplored.

We want to connect these observations about object usage and meaning production in games to arrive at a better understanding of how players make meaning of objects through usage on both the level of gameplay relevance and cultural meaning, and how those two dimensions are themselves interwoven. As we will later argue, a careful re-evaluation of the original meaning of 'affordance' is highly relevant in this respect. The relational nature of this concept is difficult to account for in extensive arguments, yet it is exactly the fact that it does not privilege object or agent, but manifests only in their relation to each other, that makes affordances such a unique and powerful concept. Its potency becomes only fully obvious once the complexity of in-game objects is made apparent, which we try to illustrate through a typology.

General considerations of typologization

Taxonomies and Typologies of computer games are abundant, both in descriptive/analytical (e.g. Elverdam & Aarseth, 2007) and prescriptive/design-oriented studies (e.g. Fabricatore et al., 2002). A comparison of these approaches shows not only the inherent differences between multidimensional, polythetic categorization and hierarchical, monothetic taxonomy, but also highlights the difficulty of creating stringent, hierarchically consistent categories and types (Bailey, 1994, p. 4-13).

Even though our investigation is less ambitious in scope than that of the typologies just mentioned - it is not trying to categorize all facets of computer games, after all -, it has to achieve a finer granularity in its approach to a clearly defined element of games. We encountered the following challenges:

1. It is not immediately apparent which elements can be considered health packs. Even in our inclusive definition of the concept, we still operate with the concept of in-game

objects. While this term is sufficiently well-defined on the computational level (Fullerton, 2014, p. 128), it requires additional investigation on the phenomenological level, because there might be marked differences between what a player perceives as an object and what is an object in the computational system of the game.

2. The delimitation of the field of research and the choice of categorization procedure are both mutually dependant. With a more specific, rarer phenomenon, it would be relatively simple to identify pertinent examples and derive theoretical categories from a primarily empirical process of classification. As our research interest lies in exactly the variety of health objects, health paradigms, and their integration in the overall gameplay, considering the greatest possible range of paradigms is essential. This means we have operated with a variation of multiple discriminant analysis (Bailey, 1994, p. 6-9), in which a hermeneutic circle between empirical and qualitative classification has used every additional example to suggest a sometimes drastic modification of criteria. Thus we constructed the property space of our subject matter as well as the necessary and exhaustive descriptive dimensions from a concurrent process of evaluation based on empirical sampling.
3. The empirical analysis confirmed our initial observation that health packs can be integrated into so many aspects of gameplay that the number of classes becomes unmanageable and unintelligible (Bailey, 1994, p. 16). We present a draft version of a taxonomy of health packs, only to argue that a drastically simplified categorization based on the logic instead of the ontology of classes is more efficient. The final part of our argument develops this simplified typology and demonstrates how it directly derives from the essential properties of in-game objects.

These challenges will be addressed in following section.

What are In-Game Objects?

The question of what to consider as in-game objects is not as trivial as it may seem. Do we consider only movable objects that the avatar can carry? Initially, it seemed meaningful to

distinguish between location-based and object-based healing. A health station in *Half-Life* appeared to be essentially different from a health pack in the same game. While this distinction might hold true in this example, it is not generalizable on grounds of the apparent distinction between movable and immovable objects. Upon closer inspection, even the materiality and tangibility of many healing objects in the game-world is dubious. Consider all shooter and action games without inventory systems in which healing is the result of 'picking up' a healing item by running over (*Wolfenstein 3D*) or through it (*Quake Live* (2010)). This engagement with the 'objects' is inherently different from dealing with a healing item in an RPG e.g. *Fallout 3*, where the object has not only healing properties, but other properties such as weight, monetary value, radiation, etc. and is therefore embedded in several resource management mechanics. In direct comparison, the statically spawned, run-over health items of simpler shooters appear much closer in nature to the location-based healing of health stations and similar static healing objects (e.g. fountains in *Prince of Persia: The Two Thrones*).

Excluding such static objects from the typology would have at least two adverse effects: a) it would limit the games under scrutiny to a comparatively small number of designs with RPG elements; b) it would exclude a whole range of interactions with game-world elements that give the appearance of object use.[4] Especially when the run-over items are highly concretized and the interaction is made to appear as "picking up and using" (e.g. through accompanying audio cues), it would take a white-box analysis to determine whether the game logic actually handles the healing effect as a zone of influence that is merely represented to the player as an object, or whether the player is dealing with an object that is removed from the gameworld upon interaction. To not unnecessarily complicate our inquiry into meaning-making processes, we have therefore decided to include static healing objects in our study.

[4] *Wolfenstein: Enemy Territory* (2003) is a multiplayer game with a difficult to categorize implementation of health recovery. In its class-based model, the medic class can heal other characters actively with a syringe or passively by dropping health packs on the ground, thus combining various healing paradigms.

A traditional taxonomy of healing objects

As can be seen from the discussion of examples in previous sections, health packs have some significant similarities among each other, yet appear as parts of very different game ecologies. Health packs can be described and categorized in various dimensions. The most straightforward dimensions are those common to in-game objects in general, such as their affordances and constraints. Adding the dimension of healing introduces a number of complicating factors. The function of an object as a means of healing can only be understood within the overall logic of life and death and the operationalization of health in a game's logic. This is especially apparent when single-player games use respawn and health models concurrently. Comparing healing items in *BioShock* (2007) and *Prey* (2006) would not only have to account for their individual health models, but for their integration with respawn mechanisms both on the level of gameplay, where they essentially function as a sort of naturalized savepoint, and signification, where genetic re-assembly evokes a completely different cultural context than rebirth.

The specific health models in themselves are often quite complex. Both from a gameplay and a signification standpoint, it makes a difference whether health is treated as a continuum or a number of discrete units. *Half-Life* (1998) uses a combination of health stations and instant-healing health packs to restore a continuous reservoir of health. *The Chronicles of Riddick: Escape from Butcher Bay* (2004) uses healing stations and a modular health counter, i.e. health is always only replenished up to a certain value at a time. *Wolfenstein: The New Order* (2014) uses instant-healing health packs and a contiguous health counter, but combines these with modular auto-healing to full 20% values. *F.E.A.R. 2* (2009) offers yet another variant by combining a modular health counter with inventory-based partial- and full-amount healing items. All these health segmentations are found in combination with manually replenished or auto-regenerating healing. Not only do these dimensions interact with each other in complex manners and create a number of clearly distinguishable cases. There are still further factors that contribute to the avatar's overall resilience. Armor or shields can be handled in very different manners and can even, as the example of Med-X in *Fallout* discussed above shows, hybridize

with health through mechanics such as ‘damage resistance’. Arranging these elements in a hierarchy would be quite difficult, especially considering their interactions with each other.

The central position of health packs between different areas of a game’s design lets even seemingly simple, non-hierarchical categories (e.g. single-use vs. multiple uses) interact with others in complex ways: as soon as an object is part of an inventory, the inventory system becomes relevant, because it determines e.g. how many items of its type can be held at a given time. Inventory objects are almost always part of trade mechanics as well, connecting health mechanics to commodity mechanics. In complex gameworld ecologies, detrimental factors, such as radiation in the *Fallout* universe, can balance healing items through interrelations with negative resource management, when eating irradiated fruit adds to the positive health value as well as to the negative radiation value. All these factors can be tied to further dimensions of health paradigms in games that make subsistence a mechanic, necessitating the inventory and money management of items needed to keep the avatar healthy. As a final complicating factor, object-based healing often co-exists with non-object based healing such as healing spells.

Typologizing health packs in such a fashion would be a very interesting, yet extremely time-consuming enterprise with an unwieldy result. As we are inquiring into types of healing objects out of an interest in meaning-making, variables pertaining to signification would have to be included as well, adding the in-game audio-visual appearance, object description, specific as well as broader discursive references. There is no hierarchical relationship between health mechanics and the related resources that would allow for the creation of a tree-shaped taxonomy. Arranging the different cases linearly would result in an abundance of types, with many types only containing one or two examples. Our preliminary categorization operates with 15 variables in five groups and produces 20 types, without yet accounting for most of the interrelations between different resource mechanics. The resulting categories are of great descriptive and analytical value in analyzing examples, but don’t produce a useful, simple typology.

A three-dimensional typology of health packs

The problems of creating a linear, formalistic typology of health packs led us to re-assess the possibilities for typologization and attempt a rather post-structural, functional classification of health objects.

Key to improving on existing typologies is the inclusion of the player's perception in our model, because it allows for a seamless integration of the semiotic layer into the understanding of objects. However, without any qualitative studies on player perception, this dimension becomes more abstract than evaluative; we must study the specific signification of the health pack in order to assess the level of complexity for the player's decoding process. Therefore the dimension of perception becomes the study of meaning making as a result of the investigation of the complexity of the sign.

We observe that there are three dimensions in which health packs are extremely central and complex at the same time: as in-game objects, they are tied to many core game mechanics; as carriers of affordances, they are therefore one of the central ways in which players interact with the gameworld and the gamestate; and on the semiotic level, they cannot but connote all the conflicting properties connected to healing items in cultural history addressed by Derrida.
We will thus point out individually where the complexities of these dimensions are located, which questions would have to be asked to approach them, and which results are to be expected. In the next step, we present a dynamic model for their interrelation, which we then use as a basis for typologizing criteria.

The dynamic model facilitates an abstract assessment of various categories, rather than the typical tree-shaped typology; as can be seen in the model which we will introduce below, it is the relationships between respectively player and object and avatar and object, hence the player's perception and the functionality of the object within the game, which determines how the object is categorized, according to its complexity. Thus our typology is more philosophical and to some

extend ontological than e.g. methods for categorizing as presented by Zagal et al (2005) in their game ontology project and Hunicke et al's (2004) MDA Framework.

A relational model of object understanding

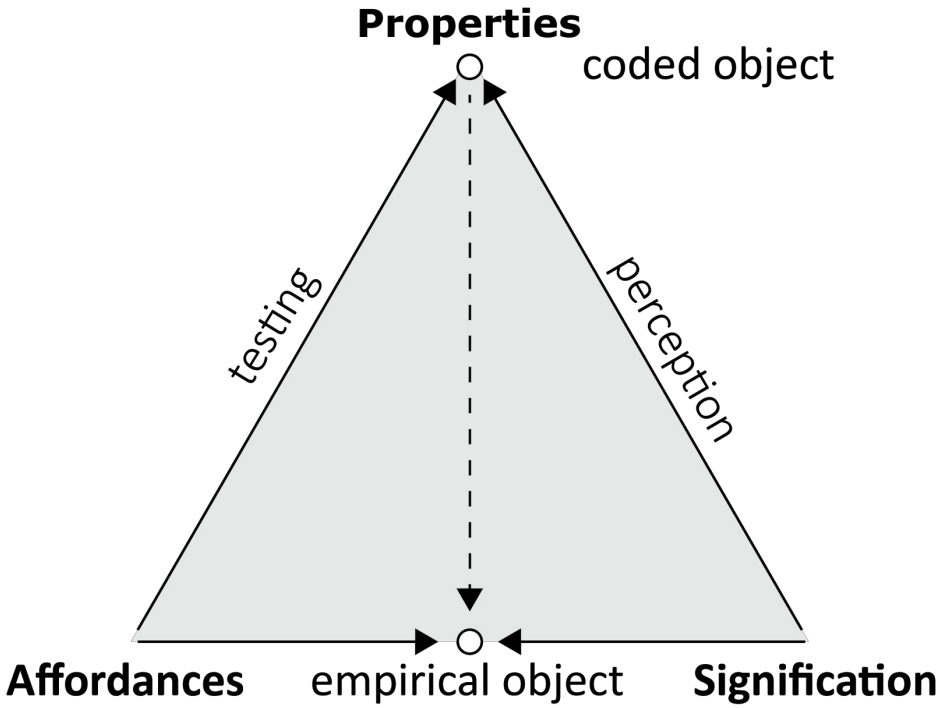

Figure 1: Relational logic of in-game objects

Our model consists of three dimensions; properties, affordances, and signification.

Affordance is a key concept in the discussion of objects, especially those designed specifically for usage by human actors. Although this is a technical term with little ambiguity due to everyday usage (unlike a term like game with its ubiquitous usage in countless discursive fields), the concept of affordance is not without problems. It has been re-defined and re-appropriated several times for usage in different disciplines and contexts, from ecological psychology to design theory and from there to game studies.

As pointed out by Cardona-Rivera & Young (2014, p. 2), we find at least two major schools of usage of the term within game studies, one directly drawing upon its psychological origins in the work of J. J. Gibson, and the other more strongly influenced by the application of the newer approaches of Donald Norman and William Gaver as appropriated to computer interfaces by HCI. Both are quite specialized in their foci (which are, grossly simplified, game-based learning and interface design, respectively) and have therefore shifted attention primarily towards the user.

The role of affordances in the overarching meaning-making processes of games has not been at the center of attention so far. A problem with this application of the concept is Norman's ambivalent stance towards signification. He defines an affordance as "[...] a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used" (Norman, 2013, p. 11). Thus the affordance itself is independent of perception, interpretation, and understanding of the object. His theory deals only with designed objects, and he argues that the designer needs to make use of signifiers in order to communicate the affordances of the given object: "For me, the term signifier refers to any mark or sound, any perceivable indicator that communicates appropriate behavior to a person" (Norman, 2013, p. 14). This has often been misunderstood as affordances being properties of objects. Rather, as Norman points out, an affordance is the relationship between agent and object. A hammer has certain affordances to a human, whether a person is aware of them or not. To a dog, the same tool would have different, lesser affordances, not because the hammer does not communicate 'appropriate behavior', but because the dog has different capabilities of interacting with the object. The role of signification in Norman's model is merely utilitarian: as in his favorite example, doors, the use of an object can become much easier when attaching unambivalent signifiers with instructions, such as 'push' or 'pull'.

Our understanding of *signification* goes beyond this. As the discussion of examples throughout our argument has demonstrated, in-game objects signify much more than only their proper usage.

They have referential relationships with other elements in the same game, with other games, with real-world places, items, etc. The often photorealistic quality of signifiers in games makes them ambiguous and polyvalent, and these signifying qualities can be interpreted as any case of artistic (meta-)referentiality in other media - as long as their integration in a game logic is accounted for (Wolf, 2009).

Properties are identified by Fullerton as "[the] qualities or attributes that define physical or conceptual aspects of objects. Generally these are a set of values that describe an object" (Fullerton, 2014, p. 128). We follow this definition, as it allows us to talk about the objects in the game system, their complexity, and their relationship with other objects, which determine potential interactions (ibid).

The *coded object* is defined by its properties, and refers to the ephemeral, non-actualized object prescribed in the code that will be actualized upon its execution. It is clearly defined, has fixed, usually hard-coded properties.[5] In general programming terms, it has its fixed variables and list of methods, which can be invoked by the system or the player, but which are static until execution and play. It is both an element of the algorithmic structure of the software and the logical structure of the game's rules.

When the player interacts with an in-game object, she tests the relationship between perceived affordances and actual affordances by interacting with the coded object. As such, the concept of affordances refers first to the perceived affordances, and after the testing process, to the actual affordances that are identified through the interaction between avatar, object, and gameworld. It is only through continuous testing, through gameplay, that the player will uncover the full functionality of the in-game object, and combined with the decoding process of the perception, arrive at what we term the *empirical object*.

[5] Traditionally, object properties have been authored by the game designer. With the growing use of procedurally generated content, the connection between 'game designer as author' and game assets becomes potentially more complicated, as it removes her authorial impact to a second-order design (within the second-order design of a game).

As the player goes through the process of testing to make meaning of the in-game object, she may learn more about the coded object than that which is necessary for "normal" gameplay. Through continual testing of perceived affordances, aspects of the coded object can be understood through the black box. This is a part of what occurs when players conduct *theorycrafting*. Following Paul (2011), theorycrafting is the search for optimal strategies for a game. Although the motivation for understanding the coded object in the case of meaning-making is not necessarily the same as when conducting theorycrafting, many of the same processes are evoked; in search for optimizing strategies and becoming a better player, the theorycrafter continuously tests various hypotheses about the system (ibid). The same thing occurs when the player through testing evaluates whether perceived affordances are actual affordances, and how these may relate to the properties of the specific object in question. Both are processes of reaching understanding of the coded object and its properties. Hence when the player makes meaning of the in-game object, she may reach a point where she conducts low-level theorycrafting, without necessarily being aware of it.

In a potentially disconnected process, the player will make meaning of encountered gameworld objects based on their semiotic layer, correlating appearance and prior knowledge in complex hermeneutic heuristics (Goodman, 1978). An object with healing capacities will be decoded in different contexts whether it appears as e.g. a medical item, food, or an alchemical concoction.

Once the player has gone through the processes of respectively testing and perceiving that which can be decoded from the coded object, she arrives at an understanding of the empirical object. The empirical object is never identical to the coded object, but is that which the player believes the object to be. This mental and experiential model may become fully congruent with the coded object in simple cases; with more complex objects, players may not fully grasp some dimensions of its functionality, discover unintended modes of usage, and interpret them in very personal ways.

Where Bogost (2007) argues that meaning is inherent in the coded object, we argue that it is the empirical object that a) matters to the player, and b) has the potential for enabling meaning-making processes. Thus there is no direct relationship between the coded object and the empirical object as such, and this is where we take a critical stance towards Bogost's (2007) theory of procedural rhetorics, and emphasize Sicart's (2011) point that the player holds an important role in the decoding of a game. The player must go through processes of testing and perceiving the coded object before she can arrive at an understanding of the object - the empirical object. It is in this process that cultural meaning-making occurs as the player finds the empirical object's affordances and signification aligned or misaligned. This process has been defined by Hocking (2009) as ludonarrative dissonance.

A synthetic typology of health packs

We distinguish between three different dimensions in our typology; the complexity of understanding of the object, the complexity of the use of the object, and the complexity of the signification of the object. Each of these dimensions follows the same hypothesis; the more complex a case, the higher attention a full understanding will require, and the more likely it is that the player will conduct a cultural interpretation of the health pack.

The complexity of the understanding of the object is determined by studying the healing paradigm of the game. A simple case is that of health packs in *Quake Live - Team Deathmatch* (2010) where there is only one type of healing, namely health packs, which are instant pick-ups that come in four different variants; 5 hp, 25 hp, 50 hp, and 100 hp (also referred to as MegaHealth which may exceed the normal limit of 100 health points). Thus there is only this single type of healing - using health packs. An example of a complicated case is *World of Warcraft* (2004), where there are various healing paradigms at play. There is auto-heal which is implemented as slow health regeneration, but as the player engages in e.g. raids this auto-heal is not close to being fast enough to be sufficient. Hence other methods for healing are used; dedicated players play as healers who can cast various healing spells. Moreover, players can consume various objects to regain health such as healing potions and food. Life-steal is a feature

of some weapons and spells, which cause the avatar to inflict damage on an opponent and gain a certain percentage of that life herself. Finally, objects such as trinkets and talismans facilitate healing, both as auto-heal (e.g. Lifestone restores 9 hp every 5 seconds) and multi-use (Lifestone can be used to instantly heal 438 hp, but has a cooldown time of 30 min). This illustrates how complex overall healing in the game is, but also the many elements which must be considered when using one of the objects listed above.

The next dimension, that of object use, or "process", can also be evaluated according to its complexity. Again, *Quake Live* serves as a good example of the simple case, as the way by which the health pack is used is simply by walking through the object. There is no inventory or resource management, and once the player knows the locations on the map where health packs respawn, and their respective time interval for spawning, there is not more to know to fully comprehend the use of health packs in the game. In *World of Warcraft*, this is again another case. Although some methods of healing, e.g. auto-heal, are easy to comprehend process-wise, others are more complicated. An example is the Master Healing Potion, which can only be made by characters that have specialized in alchemy, and whose alchemy level is over 500. Furthermore, the player must collect resources in the form of Crystal Vial and Green Tea Leaf in order to mix the potion. These resources can either be bought at the auction house, which in turn requires in-game valuta, that also needs to be obtained, or found or created in the gameworld, which is not always simple. The Green Tea Leaf, for instance, can be obtained in various ways; the player can find and combine 9 Torn Green Tea leafs, find it in drops from NPCs, or gather it from special locations. Thus the mere process of collecting the resources needed for the healing potion is a challenge in itself, and the process of healing becomes rather complicated. Other types of complicated healing processes are found e.g. in zombie survival games like *DayZ*, in which health is directly correlated to the 'level' of blood in the avatar's body, making a blood transfusion the most potent means of healing, which not only depends on a whole collection of items that are used in the process, but also on a cooperating other player and either a completely protected location or further players who will stand guard around the medical procedure.

The last dimension, the signification of objects, exhibits complexity in traditional hermeneutic fashion. A simple case communicates clear, unequivocal information limited to pertinent aspects. Identifying an in-game object as a health pack primarily allows the player to connect the situation to her repertoire of abilities (Juul, 2005, p. 96). In *Quake Live's* simple model, the floating spheres with differently colored crosses resemble the health symbol in the lower left corner of the interface. Upon contact with one of them, the interface displays a text message that spells out the value of the picked-up health pack, and the health meter increases by the same value. Even a player without prior experience can thus quickly and with little effort identify the object and its relation to the game system. There is little informational overhead, little outside referentiality, and no ambiguity or contradictions. Again, *World of Warcraft* as well as *DayZ* are excellent cases for illustrating complex signification. In the case of the Master Healing Potion, the process of crafting the object from a Green Tea Leaf denotes the assumed healing powers of green tea. Depending on the cultural background of the player, this may make more or less sense; the medical properties of green tea are less known and used in the Western world than in Asia. However, the increased focus on health in Western media has resulted in a better understanding of green tea's health benefits. Crafting a healing item as strong as the Master Healing Potion connotes a different health paradigm than what the Western world is used to (you would for example never expect a hospital to give you green tea as an emergency painkiller), and it therefore becomes more difficult to understand exactly how the combination of a Green Tea Leaf and Crystal Vial can create a strong health potion. A reason why it may not be that difficult to comprehend is that magic is an inherent part of the universe in *World of Warcraft*, and thus functions as an 'excuse' for some cases where e.g. the ingredients of a potion would not make sense in the real world.

Again, the non-magical world of *DayZ* hints at a different context. The inventory picture of a dirty hypodermic needle connotes risk of infection, which might be regarded as irrelevant 'flavor' if it was not for the existence of antibiotics in the game. *DayZ* showcases another possibility for ambiguity that stems from contemporary release practices: the original version of the game, a modification for *ARMA 2* (2009), as well as the open-alpha release of the standalone

version are volatile artefacts. Every revision of the software may introduce or remove features, as well as modify object models and descriptions, all of which are only fragmentarily documented upon release. In cases such as this, the semiotic level gains additional ambivalence, as changes in appearance will not always coincide with changes in mechanics - the appearance may change while the affordances stay identical, or the other way around.

Conclusion

The purpose of this paper is not only to suggest a typology of health packs; rather, as the title indicates, it is a study on the meta-ontological reflections of typologizing in-game objects. We have found various problems with both ontological and design-focused approaches to typologies, and tried to approach health packs in a more heuristic manner. Our observations illuminated the many dimensions of health packs, and we therefore concluded that the only reasonable way to categorize these were to suggest a more abstract model, which takes into consideration both the coded game object and the player's perception of this. Thus we argue that neither is more important, but that it is exactly the relationship between the player and the object which constitutes an interesting field of investigation.

It is, in our eyes, impossible to take the player out of the equation when studying how to make sense of game objects. At the same time the game itself is at the core of the study. We believe that the combination of both allows not only for a way of categorizing objects, but also for an analysis model which can be used by both game scholars and designers alike.

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Ludography

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