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# Themes in Videogame Research:
# A Content Analysis of Scholarly Articles

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# Themes in Videogame Research:
# A Content Analysis of Scholarly Articles

**by**

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## Abstract

### Themes in Videogame Research:
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In trying to provide access to videogame materials for scholars, collecting organizations must build standards for building and structuring collections, and in turn information professionals must assess the information needs of users. In order to begin the assessment, this paper presents a content analysis of scholarly videogame articles. The results of the analysis will provide the basis for structuring videogame archives, libraries, or databases. Metadata schemas are important to access, and to collecting. That metadata will aid patrons is widely accepted, but too often schemas and vocabularies are based on only experts' opinions without taking into account patrons' ideas of what is important. To address this dearth, the content analysis presented in this paper combines historical ideas of metadata standards from expert archivists with an analysis of what themes are important, common, and sought for in the literature of videogame scholars, who are the likely users of videogame collections.

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## INTRODUCTION

Possible online resources for videogame scholars include digital libraries, archives, and reference databases. In providing access to videogame materials libraries and archives should be structured based on expert metadata standards as well as user needs. Information professionals must assess the information needs of their users to begin building videogame collections, and especially so in order to provide usable access to the collections. In order to begin an assessment of user needs, this paper presents a content analysis of scholarly videogame articles. The results of the content analysis presented will provide the basis for structuring videogame resources online for optimal access and usability. Metadata schemas are important for information institutions for a variety of purposes, not the least of which is so that scholars and patrons can better search and understand the materials that a given collection holds. In order to best serve users, this analysis combines traditional metadata standards with a user-driven approach by beginning from an understanding of what scholars write about.

The content analysis presented in this paper combines historical ideas of metadata standards from expert archivists with an analysis of what themes are important, common, and sought for in the literature spanning the last three decades. The articles selected for the study span a range of disciplines, including health, computer science, communication, and gender studies. In order to analyze the articles selected, I use a content analysis methodology based on Klaus Krippendorff (2005). From the results I develop a

foundation for metadata elements that can be used within the context of existing standards, suggestions for controlled vocabularies, and a basis for organizing materials in order that they can be searched and browsed.

Archives and libraries hold our cultural heritage, and make information available. Online databases or digital libraries can incorporate both of the roles above; they may store and provide collections of creators who wrote, painted, or worked in politics; these collections may include published volumes, correspondence, legal documents, or unpublished work. Videogames are an important aspect of modern society, and the interest in documenting gaming is growing; in fact, videogames have been mainstream in the United States since the late 1970s. They are now an important part of mainstream media and consciousness (Williams 526). Compared with more typical digital libraries, an aggregated videogame resource will encounter deviations from standard book or item collections in the types of materials they must manage, and the metadata and structure for those materials.

There are many metadata standards for a variety of media and those should inform any metadata among collections. Information professionals organizing videogame materials, however, do not have a foundation to look to for structure and metadata. To fill this gap, I present guidelines for important types of videogame objects, suggestions for metadata, and a structural foundation that digital libraries can build on. The metadata and structure arise from the content analysis and are based on a long history metadata standards combined with the analysis of a body of works from videogame scholars over

the development of that field from the 1970s to the present to reveal important themes in that body of work.

If it is important to collect and structure information about our culture today, and games have become an integral part of that culture, then it is important to provide access to information about that aspect of our culture.

> [Games] are important to our industry, to our culture, to our society, and to ourselves. They are important because we make them, and put heart and soul, blood, sweat, and tears into their creation: for that reason alone, we need to preserve them. Games are also a significant part of contemporary culture (Monnen 9).

To better understand videogame themes, content analysis serves as the method to understand videogame scholars' research in their own words. "Content analysis provides an empirical starting point for generating new research evidence about the nature and effect of specific communications," (Kolbe 244). The result of this study is the identification and recommendation of several metadata and structural elements to be used in videogame collections. Zeng and Qin define *data content* as fits inside METS as a *data structure* (2008, 15), and in this paper the recommendations for metadata are for *data content* rather than preservation or administration metadata, which will likely be based on institution-by-institution decisions.

The purpose of this study is to formulate recommendations for any archive or library attempting to save and distribute videogame information to scholars, students, and teachers now and in the future. To that end, the following research questions will be pursued in the analysis.

1. What characteristics about in-game environments do game scholars write about?
    - What game information is cited within scholarly videogame articles?
    - What game elements or themes are prevalent in a videogame research?
2. What contextual information about games is common in scholarly videogame articles?
    - What external characteristics related to videogames do scholars write about?
    - What cultural or societal topics do scholars cite in videogame articles?
3. Who are the scholars researching videogames and what disciplines do they come from or write in?
    - Which fields, institutions, or educational backgrounds are videogame scholars from?
    - What disciplines are journals publishing videogame research in?
    - What subjects are videogame articles about, if not solely focused on videogames themselves?

**Definitions**

This study is focused on videogames and the libraries, museums, or archives that present them to users. The resources that may benefit from this research could be online collections or archives, a digital library, or reference database—any online collection of videogame related material that provides access to scholars or researchers over the Internet. The concept of digital libraries can prove elusive. Digital libraries consist of collections of digital or digitized materials and share those collections via the Internet. This definition allows for many kinds of digital libraries and many different types of collections. After all, "Is it not to be expected that there will be many digital collections (i.e., libraries) just as there are presently many traditional libraries, or does the idea of a digital library preclude boundaries in some extraordinary way?" (Miksa and Doty 1994).

For this paper videogame scholars are defined as the primary users or patrons of the videogame resources. Videogame websites for collectors and enthusiasts do exist, such as Moby Games[1] and GameFAQs[2]. But in this study, I will focus on resources for scholarly resources. There are both academic research venues online (e.g. The Daedalus Gateway[3]) and digital library collections for research games (e.g. Gameology[4]). The paper is focused on the second type of resource: collections of videogame information intended for use by scholars and researchers in their work and publications.

[1] http://www.mobygames.com/home
[2] http://www.gamefaqs.com/
[3] http://www.nickyee.com/daedalus/gateway_intro.html
[4] http://www.gameology.org/

Amongst these diverse digital libraries, collections are made up of information resources that may contain both fixed and permanent information sources, as well as changing resources (preprints or listserv messages). The mix of sources blurs the line between libraries and archives somewhat, and the term "digital archive" is not as familiar as “digital library,” but due to computer science uses of both terms the differences between the has become more blurred than before the digital emergence of information resources. Libraries may in the future have more of a responsibility to preserve, and archives may move to provide wider access. For the purposes of this paper, I will use the term digital library to encompass both currently used information sources, and the records of entities that are perhaps past the lifetime of their original intent.

Metadata is information about information. It helps users to find and understand materials in a library or archive. For this study, “metadata” is structural and administrative information about items that helps users and information professionals find, track, and understand materials. The structural and administrative metadata suggested in my study is primarily for improving access to materials. Metadata that helps users and information professionals understand materials may assist in descriptive preservation metadata, but preservation metadata will also need to include more technical information about objects. Metadata that assists users in finding and tracking materials is concerned with access. In this study, access generally refers to the method that one uses to locate and view or read a conceptual digital object.

Videogames differ from many games in that they require a computer of some kind to operate (Mortensen 2009). For this study I consider a videogame to be any electronic

game with automated parts. A game requires interaction from the player and provides set feedback in the form of rewards, new levels, or story; thus a software program for creating music is not a videogame, but a musical program on the phone that rewards interaction with visuals could be considered a videogame. Players should have to accomplish set tasks according to set rules; thus a virtual world such as *Second Life* is not a videogame, but *World of Warcraft* is a videogame. For this article "videogames," "electronic games," and "computer games" are synonymous. In my writing I have chosen to use the spelling "videogame" rather than "video game," but either term has the same meaning.

For this study, "videogame" literally refers to the hardware and software that run the game. For some games, the culture and surrounding game experience are also important, and coding should incorporate this surrounding culture of gaming. However, without the videogame hardware and software the other gaming aspects would fall into a different game category such as live action role-playing or a board game. So, for example, I would code the cultural themes discussed in an article about multiplayer games, but the defining characteristic that makes it appropriate for inclusion in this study is the hardware and software that make it a videogame and not another type of game.

## LITERATURE REVIEW

This literature review is presented in four sections. In the first section I explore content analysis and other bibliographic surveys in fields of research. In order to discover what research has been conducted looking at videogame research and scholarship and its

associated information needs I review several articles in the second section. In section three I present articles that did past content analysis work in the field of videogame studies. The final section sets the stage with an overview of videogame history.

**Content Analysis Background**

Content analysis as a field may have begun with newspaper analysis, but has developed since then. Commonly used in consumer research (Kassarjian 1977, Kolbe 1991), it has also been used in the videogame field and in news analysis. Content analysis is not limited to a single discipline; in fact, content analysts have analyzed propaganda, newspapers, popular media, letters and notes, and scholarship (Krippendorff 2009). Content analysis generally involves to dissecting a text with the goal of describing that text portions of that text and themes therein.

In designing a content analysis it is important to include strict systematization or rules, which the codebook (see Appendix B) for this study represents. Any conclusions from content analysis should be used either to assess trends, for comparative analysis, or for another generalization (Kassarjian 9). The study presented in this paper analyzed according to the first category: to assess trends. For this study I decided to follow the types of units defined by Kassarjian: themes, characters, items, symbolic units, and measures, and a word as the smallest unit of measurement (Kassarjian 12).

In their review of methodologies in content analysis, Kolbe and Burnett critiqued several past methods. One interesting theme they note is the use of multi-method research to improve the validity of a content analysis study. In addition, the authors identify

discussion of key terms among coders to resolve disagreements, an approach also taken in the study presented in this paper. Kolbe and Burnett identify several system applications of content analysis, and the study presented here conforms to their data collection category. Collecting data about communications without a specific theory can help foster future research and build theories, which is exactly what the study presented here is designed to do (Kolbe 1991).

In 1980 researchers had already begun to use computers for word-frequency counting (Krippendorff 1980, 125). However, while counting words automatically is very reliable, it is not necessarily valid for answering questions about the meaning of those words in context. In other words, the results may not inform us of anything new or interesting (Krippendorff 1980, 130). The codebook for this study presents several measurement units to decipher themes and meaning in the articles analyzed.

In general, simple units are more reliable since coders will agree on them easily, but this trades off with the deeper meaning latent measurement may bring in content analysis (Krippendorff 1980, 63). Since little has been done to identify the topic areas, metadata and structure that should be implemented to convey the important aspects of videogames and the surrounding culture, this study does focus initially on simple units that are more reliable in the first sections of the codebook, but also focuses on coding more latent characteristics in other sections of the coding schema.

Before beginning analysis it is necessary to determine the units of enumeration, and in order to determine a sample size and scope, it is necessary to understand the population. Content analysts can use frequency or inference to indicate trends; frequency

counts the occurrence of terms, while the other approach notes the presence or absence of a unit of measurement (Krippendorff 2009, 145). This study utilizes both frequency counts of countable terms as well as noting the absence or presence of subjects in a binary way.

**Information Needs**

This study is not intended to provide guidelines for how to preserve hardware or software, rather to provide a basis for what materials to provide and how to provide access to those materials. Without a proper structure and metadata plan, the best information may not be reachable by scholars. It is important that any collection's structure be based on both topic-specific patron needs and existing metadata standards. Any format that ignores either is not likely to be useful. In this section I review several necessary background documents on building structures for collections in a digital realm. Some are videogame specific; others are not.

According to Zeng and Qin, Metadata describes resources, allows resources to be found, facilitates interoperability, and provides digital identification (4). "Multimedia content can be described as either as *data-driven* or *knowledge-driven* approaches" (Zeng and Qin 80). Data driven multimedia are numeric in nature, or directly extracted, while knowledge driven multimedia are high-level, for example: ontologies. Developing a schema for any collection begins by looking into the community and users of that collection. Archives should use collection level metadata, while museums should use

item level, and libraries use volume level (Zeng and Qin 88-90). This study is meant to provide a basis for structure at the item level so that users can navigate online resources.

Indeed, metadata does facilitate the road to information resources, which means that catalogers must attempt to predict what tags and features will be useful. However, describing every item in minute detail can be a mistake. Although it may seem necessary to describe each detail, or lazy to leave anything out, this is not always the wisest course as too much data can become clutter. "Simplicity means to include only data elements required to maintain a minimum set of elements," (Zeng and Qin 99).

The descriptive elements a collection settles on should also be interoperable, and fit into an existing standard. METS is an example of an extensible metadata schema designed for digital objects. It provides a general framework, allowing specific types of materials to be described within descriptive, administrative, and structural categories (McDonough 2006). METS allows materials to be broken down; for example, movies can be separated into scenes. The METS schema is well suited to videogames, which also have small components to be recorded via metadata. METS is a wrapper that can hold a variety of other standards in its various administrative and descriptive sections. In order to be interoperable, it will benefit institutions that decide on METS to use standardized schemas based on, for example, Dublin Core, or PREMIS (McDonough 152).

In a 2006 article on preserving digital materials, Hedstrom et al. study what users consider worth preserving from the digital realm rather than only looking from an archivist's perspective; they used an interview method, while this study provides an analysis of the users (scholars) writing. Hedstrom et al. used a computer game as their

sample of digital materials; they concluded that users were satisfied equally no matter whether the game was the original, a migrated, or an emulated version, but that they preferred equally migrated or emulated versions. Combined with this study, an analysis of scholar's needs for how to structure that content will be useful.

> Three types of contextual information were particularly critical for the subjects in our experiments: information about the context in which the objects were originally created and used; information about the purpose and audience for the materials; and information about the original computing environment. Typically, archival finding aids provide information about the creators of materials in collections and the context in which the materials originated… Our findings suggest that contextual information about the creators, uses, and provenance remains important for interpreting and using digital archival materials. (Hedstrom et al. 2006, pp 186-187)

A 2010 study found that users consider descriptive information about content the most useful type of metadata for making a decision about using the item. Content information was followed by information on size, rights, description and creator or title; The same study found that users want more description and tags of items (Fear 41-49). Creating more description and tags can prove a time-consuming burden for information professionals, however, so the most efficient metadata for a given type of collection is necessary.

To understand games, we must understand the history behind the games and information surrounding them (Monnens et al., 12). Documents related to videogames that should be provided for access include artwork, books, letters, photographs, videos, games, magazines, and technology. Megan Winget explored representation for new media art based on the accepted archival strategies of migration, refreshing, emulation

and interpretation. (2005). Any metadata we save must consider all of the above and be chosen selectively so that our collections remain sustainable.

Users do not yet always understand the terminology archives and libraries use for metadata or searching (Fear 31). Perhaps if we ground our metadata and structure in studies based on those users we will understand each other better.

**Videogame Content Analysis**

Content analysis and videogame research are not strangers to one another. In this section I review prior studies on videogames using the content analysis method. In particular, Dmitri Williams offers an excellent example of a content analysis of videogame news articles.

In 2003, Dmitri Williams used content analysis to paint a picture of media realities in the '70s, '80s, and '90s via videogames. The author bemoans the fact that historical accounts of videogames are lacking; perhaps better collections will help to remedy this in the future. What we collect and provide access to will influence research. For example, as Derrida claims, archives affect outcomes; in fact, items they save have the "force of law" (Derrida 7). The least we can do is allow our choices to be as influenced by historians and scholars since what we provide will shape what material is written about when scholars choose. The very popularity of videogames becomes an argument that they are important in society and worthy of study (Williams 2003), but how aspects and items are organized must be argued for by the scholars' own words.

Williams' content analysis was meant to prove his hypotheses that people fear that videogames will replace constructive activities and healthy living with bad values and behavior. Williams analyzed news from popular news magazines. The study sampled articles from *Times*, *Newsweek*, and *US News & World Report* to determine whether these fears were evident in that media. Using content analysis Williams also found that news coverage of videogame related topics grew after the 1980s (2003).

The above spike in interest may be reflected in the scholarly literature as well, and for this study, I began with the theory that academic writing would reflect this growth to some extent. Williams discusses this as well, "Such fears and tensions may also have been playing a reciprocal role with academic research, which has taken up the search for negative effects of videogames," (Williams, 544).

Williams also found that the media framed videogames as male centric, and that women disliked them (532-533). Williams uses both ads and articles in his analysis. He notes, however, a decrease in discussion of the age of game players over time (536). Williams found several themes in the news media, some of which are related to categories I determined should be searched for in the analysis, such as the categories of games as education, social activities, and entertainment, as well as the negative categories of displacement, health, and behavior effects. These categories informed the final codebook.

Violence is another measure the codebook in this study focuses on. Smith et al. analyzed 60 videogames to determine whether violence in videogames adversely affects those who play them. The Smith study built on prior content analysis studies that were

based on arcade games and assessed violence. The Smith study focused on home videogames and attempted to discover the amount of violence in games and to show that this violence is detrimental. The authors found that violence was prevalent, and that a more mature rating increased the chances of the game containing violence. In fact, the study found that there were more than four violent interactions in videogames rated for older players (Smith 2001). Gender was also important in the study, showing that women were less likely to be victims in games for younger players. Rewards for violence were also common.

In a 2006 content analysis, Ivory used videogame reviews to assess gender representation in videogames. This approach differs from other studies that have used the games themselves as a source for the sample and analysis. An entire review of videogames can be read for a content analysis, while generally a complete game cannot be played. Content analysis of games may be useful as a non-linear exploration of gaming content, but analyzers may not have the skill necessary. Ivory allows that the analysis of reviews is removed from the game, however, and also may not paint a complete picture. Ivory points out that there is a lack of set guidelines for studying videogames, and the same is true for digital libraries providing videogame information.

Content analysis may be better suited to determining types and amounts of content in a particular context. Since little work has been done to build guidelines for videogame collections and the structure of the information they provide, this study will focus on determining what information is used in articles, not to prove or disprove any theory. The reviews, codes and analysis presented here should not be taken as an attempt

to argue for or against anything except a better organization of videogame information for scholars.

**Videogame Background**

Before developing the coding schema and recommending a structure, I present here an overview of videogame history to set a context for videogames themselves to preclude the resulting schema. This section expands on my initial definition of videogames and provides a historical context.

Videogames started out with simple, short coding and were originally separated by hardware as what genre the game would be, whether puzzle oriented or shooter oriented. "Between this Frankenstein crossbreeding and the hardware convergence, videogame genres are getting all blurry around the edges," (Herz 25). Despite stating this, Herz defines several videogame genres: adventure, fighting, puzzle, role-playing, simulations, sports, and strategy.

The first game to be developed for a computer was *Spacewar* in 1961 (Herz 21). Videogame research began to blossom a bit later than 1961, however. Research on games has become especially widespread since 2000 (p. 3). In light of this, it will probably behoove the analysis presented here to view the articles throughout time, by date.

In chapter one Mortensen defines six characteristics that define games: console, structure, story, technology, and arena (2009). According to him, genre is important in gameplay (p. 36). Mortensen claims that games cannot be studied unless they are played (56). Both textual analysis and quantitative data gathering have been used to analyze

games, as well as interviews, and in fact any data collection technique is valid for game research if it fits the study goals (59-75). Art and appearance in videogames is also important and should be considered when structuring collections (85). Community and effects on players are two more important topics (117).

Nostalgia is an important aspect in cultural memory, and videogames are no exception. Vintage videogames are collector's items (Herz 65), but what is valuable in a collector's market may or may not be most important aspect to scholars. Nevertheless, some videogames are considered cult classics, which should be considered when coding to uncover whether this theme is important to scholarly research of videogame culture. The concept of plot has evolved as well, from none to games that struggle to break out of the norm and succeed to varying degrees, but there continues to be a division between story driven games and those more focused on reaction time. (Herz 141)

Multiplayer games began in 1978 with the first MUD (Multi-User DUNGEoN) and continued to thrive until the massively multi-player virtual worlds of the current decade. According to Bartle, new videogame players and experienced players categorize genres differently. "Newbies" use Fantasy, Horror, Science Fiction and others—basically book genres—while experienced players and game designers think of the way a game works to group games conceptually (Bartle 2004). In the coding book, I incorporated both views in order to best describe the trends in scholarly articles.

Gaming is stereotypically known as a male past time, but there is lively discussion of gender in gaming, and no shortage of opinions on the subject. According to Dickey in a review of studies about female gaming (2006), female gamers are increasingly common

and prefer certain types of games. Gender themes, and more broadly stereotypes in general deserve attention in the coding scheme.

Historically, videogames have been a driver in technology innovations, just as many forms of entertainment have driven innovation over time (Kent 79-92). The by-play between technology, both hardware and software may be an important aspect to structure and record when providing research resources for videogame culture. Cheating and hacks have also been a part of gamer culture since the 70s and 80s (187).

## METHODOLOGY

To recognize what information, metadata, and structure a videogame digital library should hold, I began from the likely users of such a collection: the researchers. Analyzing their work will serve as a foundation for understanding their needs by inferring themes from their own work. “One could say that content analysis has evolved into a scientific method that promises to yield inferences from essentially verbal, symbolic, or communicative data.” (Krippendorff 1980, 20) This content analysis finds symbolic meaning through text to reflect attitudes and identify intentions, both important to understand in our users.

### Sample

Ninety-eight articles about videogames are represented in the sample. These articles came from a cross-database search of scholarly, peer-reviewed journals resulting in a total initial pool of 1396 articles. I generated ninety-eight unique random numbers

between 1-1396 to determine the final set of 98, or 7 percent of the pool. The academic disciplines of the journals ranged from computer science to psychology to media and communication. Articles were retrieved by conducting database searches using the following keywords: "video game," "videogame," "computer game," "electronic game," and "game AND computer AND video." I saved the top 40 results (sorted by relevance) from each of the following databases:

- EBSCOhost: Academic Search Complete
- EBSCOhost: ERIC
- JSTOR
- ACM Digital Library
- PubMed Central
- ScienceDirect Journals
- IEEE Xplore
- Academic OneFile
- The Muse Project

These top results formed the initial pool of 1396 articles, which I narrowed down by randomly selecting 7% or 98 articles. These 98 sample articles were given alphanumeric identifiers beginning with "g001." To get the random numbers from 1 to 1396, I used the APU random number generator[5] to generate 140 random numbers with no duplicates. I then read through each of these 140 articles' by title and abstract to exclude any that did not fit my criteria, which I outline in more detail below. There may have been articles related to videogame subjects not returned by this method, or articles in the initial pool of 1396 not strictly fitting the criteria, but I believe it is a sufficient sample for a content analysis that extracts general themes across the body of research.

[5] http://stattrek.com/Tables/Random.aspx

Without considering duplicates, there were 120 results from each database in the initial pool, but as some databases had journal overlap, duplicates and removals meant a lower total number for each.

I used the bibliographic software, "Sente," to collect the references, and at times one or more references on a page would not import for some reason, in these cases I used the DOI look-up in the quick add menu to add that paper. Some imports on JSTOR would not work at all, for these I used the full title to look up each article and add it to the initial pool. In addition to excluding duplicates, I excluded descriptions of conferences, short reviews, or editorial notes that occasionally came up in the search results. Each of the 98 papers got a number beginning with g (g001, g002 and so on).

The exact criteria for the articles were that each one should be a complete scholarly article published in a peer-reviewed scholarly journal that mentioned videogames in the research in at least one paragraph. After the list of 98 was originally selected, some articles were found to be unrelated to videogames, or otherwise fell short of those criteria so the next random number from the list of 140 was selected.

I removed ten articles from the sample list because they did not conform to the criteria, and one because I could not locate full-text of the article online or in the library. This project was without funding, so I could not purchase the article ("Game Design as Textual Poaching"). The articles that were removed for not matching the criteria did not fit for a variety of reasons.

The first reason was that a few returned results were not articles at all, but rather posters or conference abstracts. The second reason was that two articles were news pieces

rather than scholarly articles. The third reason was that two articles were book reviews, not scholarly articles. One article was removed because it was a tutorial, not a peer-reviewed scholarly article. Two articles were removed because they did not contain a single sentence about videogames; one was about television broadcasting, the other about video. Finally, results that were books and not articles were removed from the final list.

The final sample list was culled more thoroughly than the initial pool of articles. The initial pool was culled, but only by considering title, author, and source. If the article obviously did not belong in the large pool because of being in a non-academic journal or not being a full article, I deleted it. However, once I narrowed pool of 98 I culled much more thoroughly by reading the abstract and in some cases the entire paper to ensure that it belonged in the study.

For a full list of the sampled articles and source journals see Appendix A.

**Coding Schema**

I developed the codebook based on Krippendorff's Content Analysis Reader (2005). The following categories were selected and coded in order to ascertain what themes are important to scholars. Content analysis should use as its indices frequency, bias, and intensity (Krippendorff 1980, p. 40). Some of the codes confirm established practice, while others go a bit further. As suggested in Krippendorff, reporting by assigning overt or verbal behavioral items to the units can improve reliability.

The units of measurement in the codebook ranged from manifest units that were overwhelmingly explicitly stated in the text, such as titles and characters to latent units

that were conceptual portions of text relating to videogame themes both in-game and in the surrounding culture of gaming. Lastly, units of measurement related to the publication were included.

For this study, more than one unit of measurement may have been found within one semantic sentence. Two codes may apply to the same words, but it was important to remain cautious when applying two codes to the exact same words. In cases where a distinct instance of the unit is mentioned in a paper, a new code was recorded, but if the same element is repeated, no new code was applied. Pictures, graphs and charts were not coded.

Characteristics related to game environment information included some manifest units: *title*, *system*, *engine*, *character*, *creator*, and *rating*. Internal game information also included some units recording latent internal characteristics of games: *gear*, *plot*, *cues*, and *layout*. Units recording external characteristics of gaming included: *technology*, *hack*, *culture*, *popularity*, and *violence*. Lastly, the units measuring characteristics of the publications were: *affiliation*, *journal*, *date*, and *theme*. Any code might be manifest (written of explicitly) or latent (a conceptual unit).

The codebook was divided into three sections containing units of measurement that were be coded in 2010 for a content analysis of scholarly articles about video games. The units of measurement in the first section were manifest units that were either be explicitly stated in the text, such as titles and characters, or units regarding game environments that were latent and required a minor amount of interpretation by coders. In part two the measurement units to be coded related to the culture and environment

surrounding game playing. The final section contained both manifest units and latent units regarding the metadata of the articles themselves and their themes. The general coding guidelines given to coders follow here.

More than one unit of measurement may have been found within one semantic sentence, while others may have crossed several sentences. I did not instruct coders to include units from pictures, images, figures, references, charts or graphs; only titles, abstracts, and text were coded. Some articles did not contain any codes except the *theme*; that is acceptable. As long as the article includes a mention of video games in at least one sentence it was included in the final sample. All codes were considered as related to video games; general mention of movie ratings or other non-game ratings were not be considered, for example. We used words, word sets, sentences or clauses, and paragraphs as code units. We used spaces or periods as stopping points.

Distinct codes: In cases where a new instance of a countable unit was mentioned in a paper, a new code was recorded, but if the same element was repeated, only a binary was noted. For this study, only *title*, *character*, and *genre* are countable. For example, when Mario was mentioned repeatedly, only one instance of *character* was recorded, but when Luigi is mentioned, a second code will have been applied.

***Game environment characteristics***

This section of the codebook contained relatively simple codes that refer to easily identifiable video game information as well as implicit game characteristics. Typically, the units of measurement from this section were written out explicitly in the articles. This

section contains the only countable units: *title*, *genre*, and *character*. The list of game environment units is:

- TITLE
- SYSTEM
- ENGINE
- CHARACTER
- GENRE
- CREATOR
- COMPANY
- RATING
- GEAR
- PLOT
- CUES
- ATTRIBUTE
- LAYOUT
- RELATEDTO

***Cultural and societal characteristics of gaming***

This section of the codebook included cultural artifacts, items external to game play, and other social elements that are expressed in relationship to games and game playing. Codes in this section were manifest at times, but usually latent. The list of units measured surrounding game playing is:

- TECHNOLOGY
- HACK
- G.CULTURE
- G.VIOLENCE
- A.VIOLENCE
- SEXUALITY
- STEREOTYPE
- POPULARITY

***Characteristics of videogame publications***

This section of the codebook contained codes that related to the style and affiliation of the article itself. The first units of measurement from this section were usually found in the articles' metadata, although the general theme or topic was assessed after an overview of the entire article. Each of these units required that the coder record the metadata from the article itself rather than simply using a preset code. *Date*, *affiliation*, and *journal* were manifest, but *theme* was a latent unit tagged by individual coders. The units recorded about the articles were:

- AFFILIATION
- JOURNAL
- DATE
- THEME

I adapted the themes to be used in coding journals and articles from the ISI Web of Science's list of disciplines:

- Agriculture
- Anthropology
- Archaeology
- Architecture
- Art
- Astronomy
- Biology
- Chemistry
- Computer Science
- Education
- Gender Studies
- History
- Information Science & Library Science
- Law
- Linguistics
- Literature
- Mathematics

- Medicine
- Music
- Neuroscience
- Philosophy
- Physics
- Political Science
- Psychiatry
- Psychology
- Public Health
- Sociology
- Radio, Television, & Film (RTF)
- Religion
- Veterinary Science
- Videogames

For the full codebook with complete definitions and examples, see Appendix B: Codebook.

**Execution**

According to Krippendorff, at least two coders must be used to check for reliability (2009). Two coders were used for this study. The author coded 74 out of 98 of the articles. A second coder analyzed 38 of the articles. Before beginning, both coders analyzed four articles as a pilot, and had an inter-coder reliability of 86%. We used TAMSYS[6] to log our codes and store the data. The coders overlapped on 8 articles in the pilot and 6 articles for the final study.

As a pilot, the two researchers, or coders, began with four articles to analyze and compare in order to check against each coder for coding reliability. Each of the 100 papers got a number beginning with "g" (g001, g002 and so on), and each coded instance was added to the database. Thus tables of codes, the papers they were from, the page

[6] http://tamsys.sourceforge.net/

number, and the text of the coded unit could be compiled using TAMSYS, the software we used for the project. After the first pilot, we met to discuss our findings. We then performed a second pilot with the last four articles on the list. After coding was complete, I split the total sample in half, and the two halves should have the same results, showing greater reliability overall (Krippendorff 1980, p. 69).

**First Pilot**

For the first pilot study each of the two coders analyzed four articles from the sample group (g001-004). When we completed our coding we met to compare and discuss each code. We had several questions to talk about. Agreement on manifest units was acceptable, but our discussion on latent units demonstrated a need for a second pilot study.

After the first pilot study we discussed my original plan to code all units as countable. Some units—especially latent units such as *technology* —are not countable because the beginning and end of that subject cannot be determined. I decided to code as countable only manifest units whose beginning and end can be clearly defined. At this stage I also combined several codes whose meaning was too similar, such as *visual* and *layout*. I originally meant *visual* to be applied for visual characteristics caused by design and use of mechanics or designed to add a certain look and feel to the game and such as use of color, lightness/darkness, special effects, or resolution. I originally meant *Layout* to be applied when an article mentioned the spatial characteristics of the game

environment. I combined the two under *layout* to refer to any game environment mentions.

Also during the first pilot it became clear that *genre* was not defined sufficiently as the concept of genres in videogames has changed over time. I created a list of genres to work from. If a unit was not on the list as such, as an acronym, or as a colloquialism (i.e. a first person shooter might be referred to as an FPS, a "shooter," or a "shoot-em-up") then that unit would fall under *layout*.

Finally, the first pilot revealed several weaknesses in my code definitions. I redefined the difference in applying the codes *system*, *engine*, and *technology*. *Engine* is always game-specific software the runs an entire game. S*ystem* is always game-specific hardware that runs an entire game. *Technology* is hardware or software that is either game-specific peripherals such as controllers, or non-game specific hardware or software being used for gaming such as floppy disks.

**Second Pilot**

During the second pilot study, each of the two coders analyzed the same four articles from the sample group (g095-g098), coding a total of 53 units including countable units. The sets of codes agreed in 46 cases. The rate of consistency was therefore 86 percent. After the second pilot I made additional refinements to the codebook based on my discussion with the second coder. I changed the wording of the *popularity* code to include game-related peripherals like platforms rather than only

games. I also clarified that items on the list of genres could also appear as acronyms or colloquialisms representing that item.

Finally, I also added one code: *avatar*. Since *character* was countable, it only applies to those manifest game units named and created by the developers. The *avatar* code should incorporate the instances of an article talking about characters that are latent, such as a discussion of the projection of self that players may put into avatar creation.

## RESULTS

This section is divided into five sub-sections: the first to indicate overall word frequency counts, the three segments from the coding book to illustrate examples for each segment of the codebook, and a final sub-section to show the spread of results by year.

### Word Frequency Counts

Using the software "Word Counter 2.10," I took an initial count of word frequencies across the entire set of 98 articles. I removed common stop words such as "the," "and," and "if." I also combined stemmed words such as "game" and "games". I found that the top four most frequently used words were *game*, *video*, *computer*, and *learning*. All four have over 1000 instances of use across the sample. The first three are expected in the corpus and not likely to help us to organize videogame digital libraries. The fourth, *learning*, is more surprising may or may not provide a clue into the topics common to videogame research. Out of context this could refer to educational games, to machine learning, or to some other learning context.

| Count | Word | Count | Word | Count | Word | Count | Word |
|---|---|---|---|---|---|---|---|
| 6899 | game(s) | 798 | based | 603 | playing | 552 | high |
| 1970 | video | 723 | level | 585 | children | 544 | behavior |
| 1440 | computer | 696 | play | 572 | social | 543 | school |
| 1139 | learning | 691 | virtual | 571 | player | 531 | human |
| 935 | study | 681 | data | 560 | different | 529 | training |
| 891 | research | 669 | players | 556 | results | 524 | university |
| 853 | students | 624 | group | 552 | high | | |
| 817 | design | | | | | | |

Table 1: Word frequency of words with over 500 instances.

The next tier of words, those with 500-1000 unique instances in the sample, included words that are probably common to scholarly articles such as *research*, *design*, *data*, and *participants*. The following words were more interesting and may provide some insight: *level*, *virtual*, *play*, *children*, and *social*. These words indicate a trend towards thinking of games both in terms of literal gaming aspects such as levels and virtual worlds and more recent developments in the culture around gaming such as social aspects and games for children.

| Count | Word | Count | Word | Count | Word | Count | Word |
|---|---|---|---|---|---|---|---|
| 498 | experience | 333 | videogame | 257 | ai | 221 | characters |
| 496 | visual | 332 | image | 256 | press | 221 | further |
| 491 | studies | 332 | important | 255 | aggression | 221 | television |
| 488 | control | 330 | electronic | 254 | class | 220 | violence |
| 479 | real | 330 | online | 254 | psychology | 220 | young |
| 474 | physical | 321 | male | 254 | student | 218 | character |
| 471 | effect | 321 | reported | 253 | provide | 218 | review |
| 470 | performance | 317 | among | 253 | rather | 218 | state |
| 460 | media | 309 | kids | 253 | think | 217 | complex |
| 459 | world | 308 | health | 252 | interactive | 217 | factors |
| 445 | related | 307 | female | 249 | before | 217 | hand |
| 438 | test | 307 | order | 249 | narrative | 216 | potential |
| 433 | work | 306 | interaction | 248 | following | 216 | several |
| 431 | educational | 305 | action | 246 | brain | 215 | story |
| 431 | environment | 305 | response | 244 | approach | 215 | user |
| 430 | gaming | 301 | space | 244 | boys | 214 | film |
| 427 | found | 300 | given | 242 | does | 214 | theory |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 418 | education | 294 | activities | 242 | memory | 212 | risk |
| 416 | gender | 294 | higher | 241 | child | 210 | patients |
| 405 | analysis | 294 | science | 239 | enhancement | 210 | since |
| 399 | activity | 290 | mean | 239 | similar | 210 | transfer |
| 399 | violent | 286 | screen | 238 | change | 209 | context |
| 385 | wii | 284 | role | 237 | scores | 209 | early |
| 380 | content | 283 | self | 236 | value | 209 | systems |
| 380 | significant | 282 | agents | 234 | multiple | 208 | agent |
| 377 | internet | 282 | case | 233 | community | 208 | form |
| 375 | http | 281 | general | 233 | outcome | 206 | goal |
| 375 | pain | 276 | set | 231 | paper | 202 | future |
| 374 | system | 275 | possible | 231 | positive | 202 | individual |
| 373 | differences | 275 | software | 231 | without | 202 | york |
| 371 | knowledge | 274 | specific | 230 | associated | 201 | compared |
| 367 | task | 272 | main | 230 | current | 201 | cost |
| 366 | table | 272 | tasks | 230 | shown | 201 | experimental |
| 361 | people | 272 | type | 228 | computers | 201 | kind |
| 358 | experiment | 270 | although | 227 | rate | | |
| 358 | years | 268 | levels | 227 | therefore | | |
| 350 | aggressive | 267 | present | 227 | variables | | |
| 348 | development | 266 | girls | 226 | condition | | |
| 348 | groups | 265 | less | 225 | played | | |
| 345 | cognitive | 265 | make | 223 | changes | | |
| 344 | spatial | 262 | available | 223 | presented | | |
| 343 | skills | 262 | life | 222 | measures | | |
| 340 | technology | 261 | reality | | | | |
| 337 | subjects | 259 | another | | | | |

Table 2: Word frequency of words with 200 to 500 instances.

In the lowest tier I looked at were words appearing from 200-500 times in the sample. These words were also a mix between those I thought were expected in game or research literature (*videogame*, *test*, *effect*, *experiment,* and others), and those that may have shown something more in depth about videogame research. Those I found that may show something deeper were: *Wii, gender, performance, physical, aggressive, cognitive, spatial, skills, technology, age, online, kids, health, interaction, space, activities, software, AI, psychology, brain, community, character, television, film,* and *agent*.

The Nintendo gaming system, the Wii, was mentioned in 385 instances. It is interesting to note that no other console was mentioned more than a handful of times. It is possible that the innovative nature of the Wii controller has pushed it into research more than other popular consoles. The timing of the Wii with an increase in videogame research may also be a factor. Videogame digital libraries will want to document innovation related to videogame materials.

Several words indicate a trend toward psychology or health aspects in videogame research: *cognitive, aggressive, health, psychology, brain,* and *physical. Gender* is another common theme, as is also shown in the analysis of article information later in this paper. *Television* and *film* are also common subjects. Finally, the social aspect of videogame research is present here as well with the terms *community* and *interaction*. Computer science themes also show here in *AI*, *software*, and possibly *technology*.

Naïve word counts such as this are accurate, but only provide tantalizing clues into what themes may be present or common in the research. Analyzing the context should tell us more about the meaning behind the keywords.

**Game Environment Characteristics**

This section includes units of measurement that were coded in order to answer the question: characteristics about in-game environments do game scholars write about? Traditional metadata units, or units that correlate to them are referred to frequently in videogame research. This confirms the practice of using title, creator, and keywords as metadata. Titles were extremely common in that exact form: as videogame titles. Sixty-

one out of 98 coded articles mentioned one or more videogame titles, and many authors listed several titles throughout the course of writing.

According to my research, the creator element will likely be filled out with the name of videogame companies as often as it is filled with creators or designers. Most articles used company to identify games rather than creators. Twenty-four out of 98 coded articles used *company*, whereas only six mentioned a *creator*.

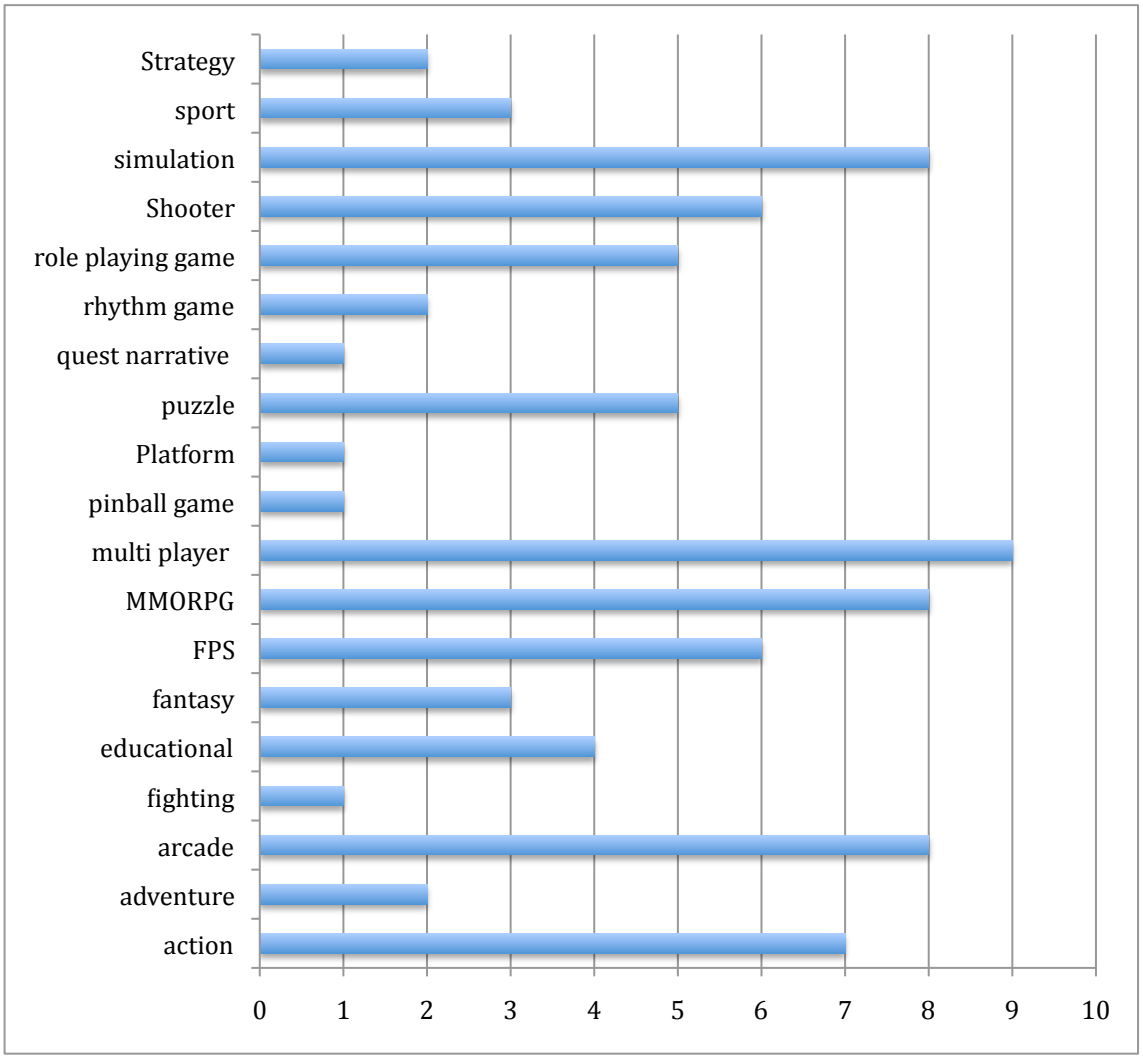


Figure 1: Genres coded by number of times mentioned.

*Genre* and *system* were also both frequently referred to. Forty-seven articles had genres coded. Nineteen distinct genres were coded, and some were mentioned more frequently than others. Action, adventure, first person shooters, massively multi-player online role-playing games, multi-player games, and simulation games were the most often mentioned genres. It is important to note that one game may be described with more than one genre. *Genre* and *system* are excellent candidates for keyword terms, along with the sometimes-appearing *character,* and the only rarely mentioned *rating* and *engine*. *Genre* and *system* are also so common that designing libraries around browsing functions by these units will likely be familiar to users.

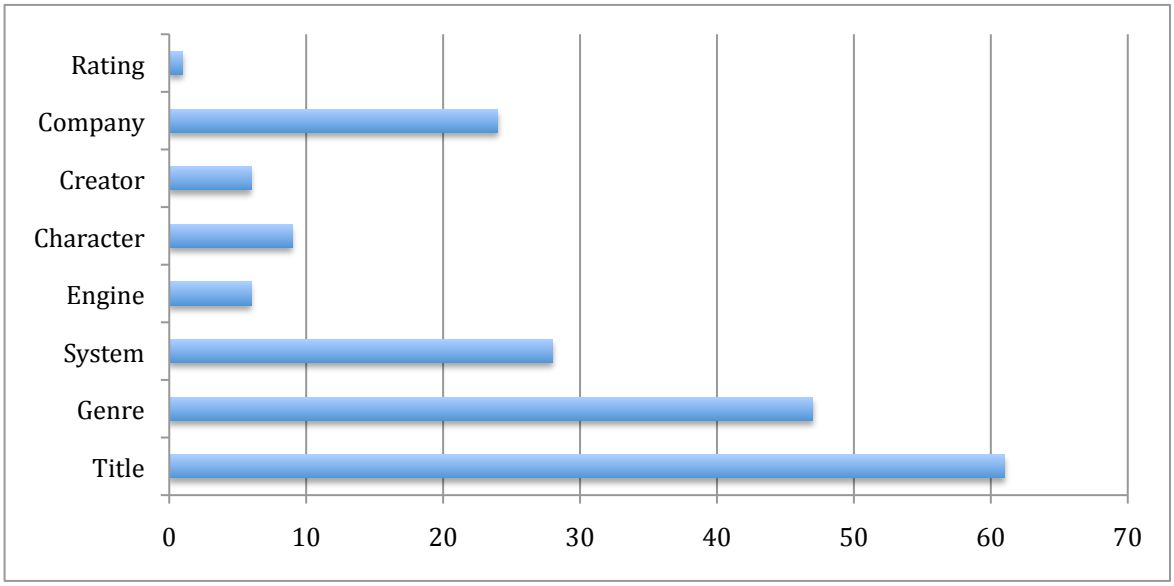


Figure 2: Game identifying characteristics by number of times mentioned.

Other common—though perhaps less tangible—characteristics of games discussed in the sample were *layout* and *cues*. *Layout* appeared in 49 articles and *cues* appeared in 19. *Gear, avatar,* and *plot* were the next most common, appearing in 9, 13

and 12 respectively. *RelatedTo* did appear in 6 articles, but *attribute* did not appear and is probably not worth recording in metadata or considering for structure.

*Layout* is a complicated code. It refers to the game environment, spatial characteristics of a game, or visual appearance of a game. Coding this unit was particularly tricky and caused several discussions during the pilot study. One outcome was that two codes were combined as being impossible to differentiate. In addition, game environments are sometimes referred to in *genre*. I bypassed this difficulty by creating a controlled vocabulary for genres and when an article discussed game environments or mechanics, or game types that were not included in the genres list the layout code was applied. The best way to use *layout* in organizing a videogame website would probably be to allow user input in addition to expert applied notes in this area.

*Layout* codes could have been applied to sentences or paragraphs. For example, both of the following were coded as layout. 1. *There is a virtual world with objects*. 2. *It is a snowball fight game, and a networked game with two remote players involved. The position tracking system makes the remote user's movement be reflected on the screen. If the game player throws a snowball to the remote player on the screen, the snowball hits the LCD screen and then bounces. However, the virtual snowball simultaneously appears in the screen and flies in the virtual space. The velocity of the snowball computed by the two IR grids determines that of the snowball in the virtual space.*

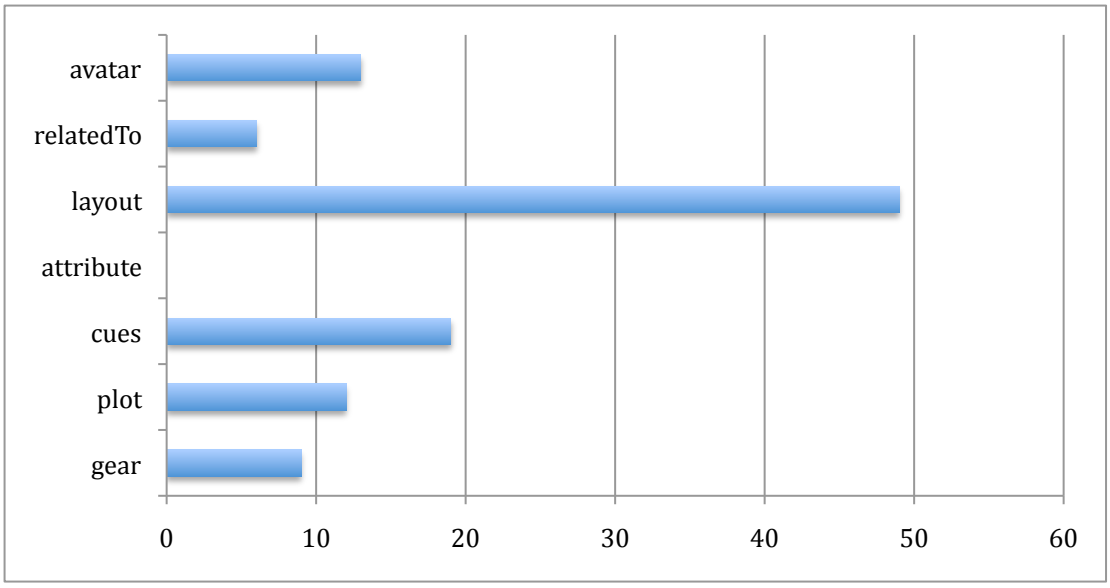


Figure 3: In-game units by number of articles mentioning.

**External Gaming Information**

In this category, the culture surrounding games was not very often discussed, which surprised me. *Hack* was not mentioned in any of the 98 articles, and sexuality was only mentioned in one. Violence, both ascribed to games and within games, was slightly more common, but would not warrant much attention in an overall organization of videogame resources. In 9 papers where violence was discussed, both ascribed violence and in-game violence were mentioned. Popularity was another minor occurrence in coding. Stereotypes were only mentioned in one article.

*Technology*, on the other hand, was an important theme, and was coded in 38 of 98 articles. Hardware such as controllers and peripherals would be important items to document in videogame collections, as would software, coding, and programs. In fact, technology was by a wide margin the most commonly mentioned unit of measurement of

the units surrounding games and gaming. However, technology is another code that is very broad. For example, all of the following were coded as *technology*: 1. *Wii-remote (or Wii-mote)*, 2. *About 29 years ago, computer games were simple little lights moving around a television screen and trying to bewitch the player.*, and 3. *It was released in 1984 on floppy-disk*.

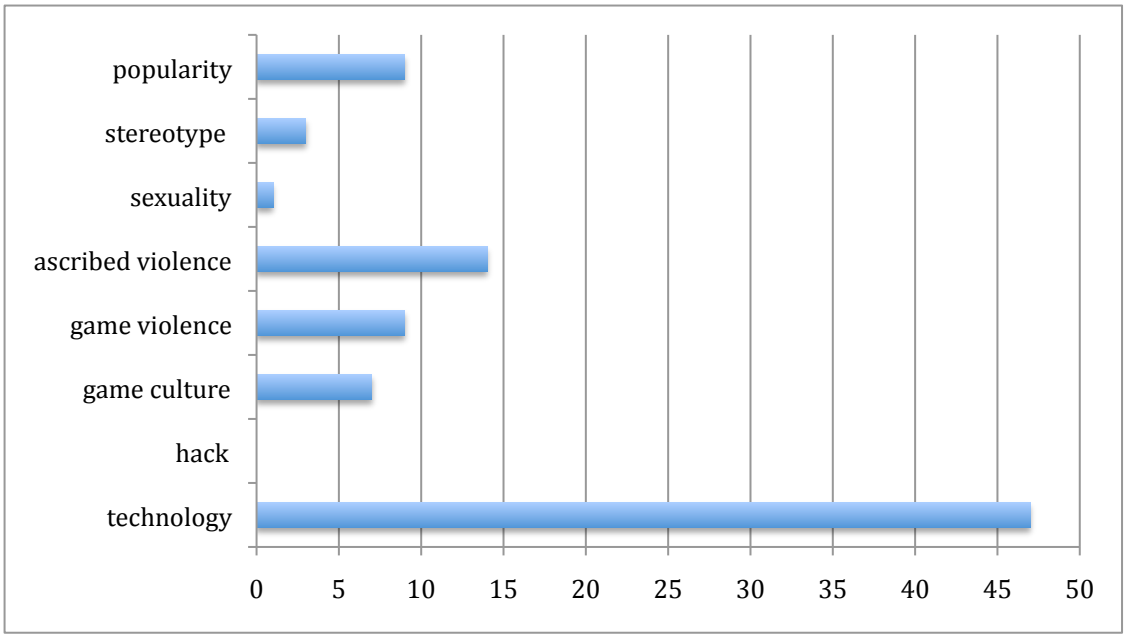


Figure 4: Game-related units by number of articles mentioning.

**Characteristics of Videogame Publications**

As part of the coding, I also recorded the date, first author's affiliation by university or other institution, and the discipline of both the journal and the article as themes. The list I developed in the coding schema for academic disciplines was not

exhaustive, but it served to limit the number of subjective disciplines that could be applied.

The *journal* unit was used in 55 of the articles for the publication venue or conference. The sample included articles published in venues from computer science, psychology, journalism, and RTF. Health related journals were among the most common. See Table 3 for a full list of journals.

| **Journal Title** | **General Discipline** |
|---|---|
| ACM Computers in Entertainment | Computer Science |
| ACM Trans. Multimedia Comput. Commun. | Computer Science |
| Computer-Aided Design 36 | Computer Science |
| IEEE Computer Society | Computer Science |
| IEEE International Conference Multisensor Fusion and Integration for Intelligent Systems | Computer Science |
| IEEE International Conference on Digital Games | Computer Science |
| IEEE Transactions on Consumer Electronics | Computer Science |
| IEEE Transactions on Evolutionary Computation | Computer Science |
| International Conference on Cyberworlds | Computer Science |
| International Conference Visualisation | Computer Science |
| Mechademia | Computer Science |
| Proceedings of the 34th Hawaii International Conference on System Sciences | Computer Science |
| Simulation & Gaming | Computer Science |
| Symposium on Computational Intelligence and Games | Computer Science |
| Econometrica | Economics |
| Computers & Education | Education |
| Computers & Education | Education |
| Educational Perspectives | Education |
| International Society of the Learning Sciences, Inc | Education |
| Journal of Adolescence | Education |

| | |
|---|---|
| Learning and Motivation | Education |
| Learning, Media and Technology | Education |
| The Journal of American Culture | Literature |
| Applied Psychophysiology and Biofeedback | Medicine |
| Applied Psychophysiology and Biofeedback | Medicine |
| Behavioral and Brain Functions | Medicine |
| BMC Neuroscience | Medicine |
| BMC Public Health | Medicine |
| Clinical Practice and Epidemiology | Medicine |
| Human Brain Mapping | Medicine |
| International Journal of Pediatrics | Medicine |
| Journal of Adolescent Health | Medicine |
| Nutrition and Physical Activity | Medicine |
| PLoS ONE | Medicine |
| Seizure | Medicine |
| Statistics in Medicine | Medicine |
| The American Journal of Cardiology | Medicine |
| The Journal of Neuroscience | Medicine |
| Vision Research | Medicine |
| Australian Journal of Psychology | Psychology |
| Computers in Human Behavior | Psychology |
| Cyberpsychology and Behavior | Psychology |
| Developmental Psychology | Psychology |
| Human Behavior | Psychology |
| Int J Ment Health Addiction | Psychology |
| International Journal of Behavior | Psychology |
| International Journal of Psychophysiology | Psychology |
| Journal of the Experimental Analysis of Behavior | Psychology |
| Media Psychology | Psychology |
| Psychological Science | Psychology |
| Cinema Journal | Radio Television & Film |
| Technology and Culture | Radio Television & Film |
| Television & New Media | Radio Television & Film |
| The Velvet Light Trap | Radio Television & Film |
| Wildlife | Wildlife |

Table 3: Journal titles and general disciplines in 55 articles.

Some articles recorded affiliations of authors while others did not. For example, seven of eight articles in the pilot study recorded affiliation by university, and there was no pattern. That is, the authors of articles appear to come from a diverse range of backgrounds. Usually the authors came from universities, and less frequently they came from the private sector. This likely corresponds to scholarly articles about a variety of research subjects. Departments by recorded affiliation included psychology, computer science, and RTF (Radio, Television, and Film). The wide range of departmental affiliations does not inform libraries on the only scholars that videogame resources should cater to. Instead, it establishes that videogame research can occur in almost any field and that digital libraries should encourage this inter-disciplinary approach. When analyzing the departments that were recorded in the articles, computer science and psychology emerged as the most common affiliations for authors by department.

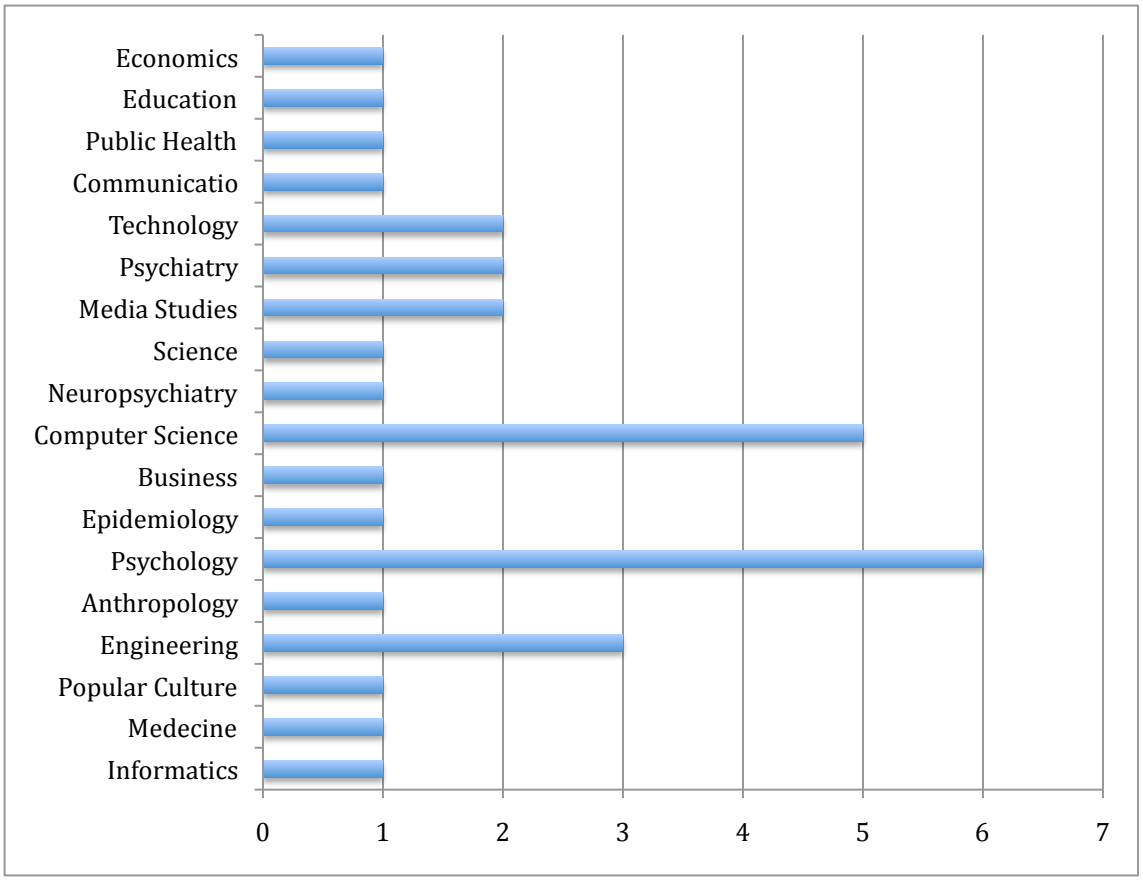


Figure 5: Departments that authors recorded as their affiliation.

The themes of the articles themselves were also wide-ranging. The themes of the articles centered on gender studies, medicine, and computer science. Article themes also included RTF, sociology, and videogames themselves.

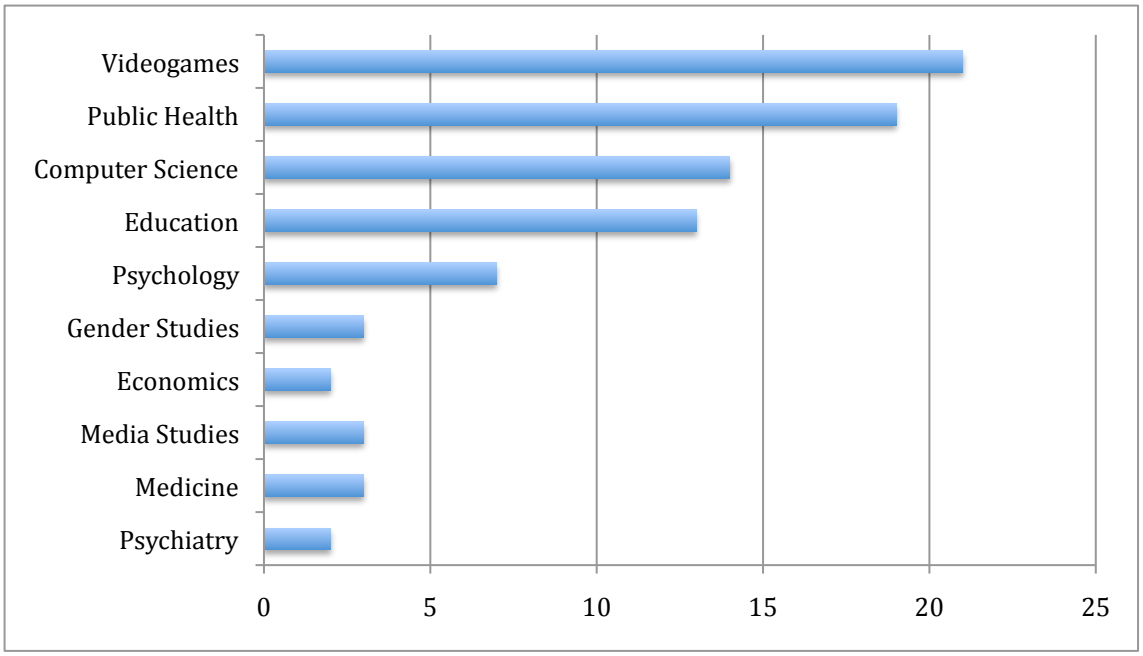


Figure 6: Themes of articles appearing two or more times.

**Data by Year**

This section charts the overall articles in the sample by year. Date information was not available in the downloaded version of every article in the sample. I extracted the date from the reference list (see Appendix A). Dates by year were present and coded for 76 out of 98 articles. The published years in the sample ranged from 1982 to 2010.

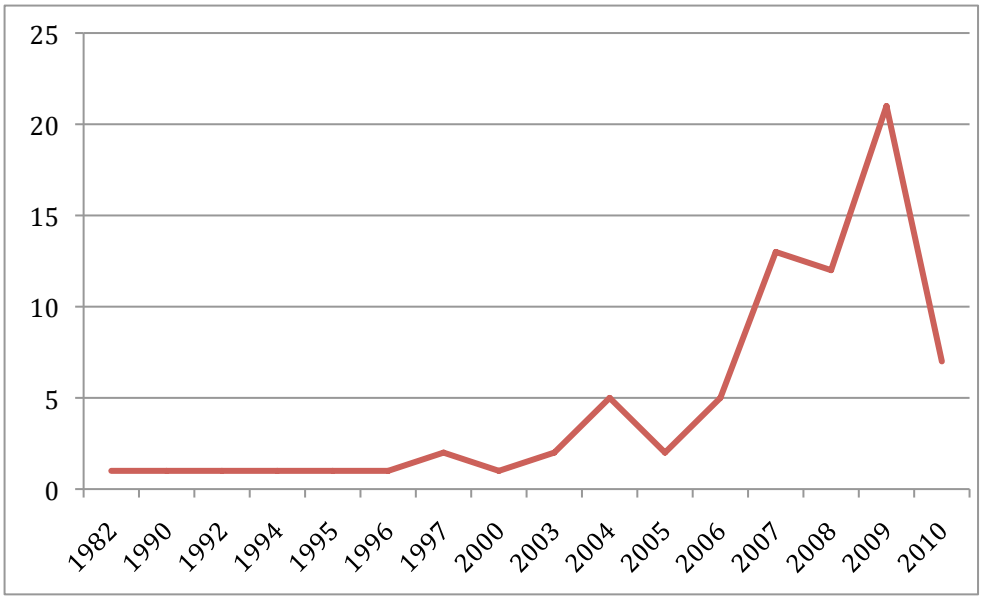


Figure 7: The number of sampled videogame articles charted by year published.

The spread of articles begins with one article published in years prior to 1996 and begins to climb especially after 2000. The sharp drop from 2009 to 2010 is probably due to this study being conducted in the middle of 2010, which is before the full range of publications has gone to press and before articles have had a chance to be stored in databases.

There may be a pattern between years published and themes written about. The two articles published in the earliest years were both on physiology, and the next oldest articles featured computer science. However, the sample size for this type of analysis is too small to indicate with any certainty that early articles focused on physiology and computer science. One sampled article from 2000 was an article on wildlife and hunting

games, a fact that I don't believe indicates anything about the state of videogame research at the time.

## Structure and Metadata Examples

This paper does not recommend a specific metadata element set to use, or a standard for organization of collections. Instead I suggest groundwork for types of metadata that may be useful for digital libraries, vocabulary, and material types that may be of interest for videogame scholars, likely users of videogame resources online. Existing metadata standards would be best for formatting in order to encourage interoperability. Possibilities include METS[7] for digital objects, PREMIS[8] for preservation metadata, Dublin Core[9] for descriptive metadata, MODS[10] for bibliographic metadata, or VRA core[11] for visual resources. This paper also does not suggest design themes. For a structural look and feel, institutions creating websites sometimes have their own brand or image to use in a website, or sometimes use software such as OMEKA or ContentDM.

This section is meant to serve as an example of how this research could be applied. It is not meant to instruct digital libraries in a rigid way as every institution and collection will differ in mission and practice.

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[7] Metadata Encoding & Transmission Standard, http://www.loc.gov/standards/mets/.
[8] http://www.loc.gov/standards/premis/
[9] The Dublin Core Metadata Element Set, http://www.dublincore.org/documents/dces/.
[10] Metadata Object Description Schema (MODS), http://www.loc.gov/standards/mods/.
[11] VRA Core 4.0, http://www.vraweb.org/projects/vracore4/.

**Metadata**

In this section I will demonstrate how the findings from the content analysis can be used when creating The types of metadata and structure considered for this study are descriptive in nature, so I will focus on Dublin Core as a simple, extensible, and interoperable metadata schema that can fit into the descriptive section of METS. The fifteen core elements and three additional qualified elements (QDC) of Dublin Core are:

1. Title
2. Creator
3. Subject
4. Description
5. Publisher
6. Contributor
7. Date
8. Type
9. Format
10. Identifier
11. Source
12. Language
13. Relation
14. Coverage
15. Rights
16. Audience (QDC only)
17. Provenance (QDC only)
18. RightsHolder (QDC only)

The importance of title, the first element, is supported in this study by the frequent mention of game titles in articles. This element can also refer to other types of titles, for example, the title of a musical track. But my research suggests that a consistent qualified title element, for example "title.game," would be useful for each item in a collection.

Creator, the second element, could be interpreted as the game creator, but could also be the developer, producer, or company. The company unit coded in this study was

identified much more frequently than any of these others. Items in a videogame collection could contain a number of variations on creator, qualified Dublin Core also provides contributor as an attribute for the creator element.

The subject element should be filled with keywords that will often be taken from a controlled vocabulary. Genre and technology are prudent candidates for this category. Genre includes the type of game material is related to, which may include book-style genres such as fantasy or adventure as well as play-style genres such as shooter or role-playing. Technology includes information about hardware and software related to games, game playing, and game development. Technology subject keywords will include game engines, game platforms, and game peripherals. In the controlled vocabulary section of this paper I discuss controlled vocabularies in more depth.

Description is an element that can include a wide assortment of game-related information that may be from an analysis of research or from a practical perspective on what scholars will need to know about an item in the collection. This information includes plot, type of material in the collection, and game environment information. A word frequency count across documents revealed that games, computer, and video occurred frequently across the sample, so a refined keyword extraction approach would be needed to tag documents accurately.

Publisher is an element meant to be used for the provider of the resource, so will vary based on the database or institution holding the game related materials. Contributor can be any person or entity that contributes to an item. This element will likely be useful in cases where the creator element has been filled in with the company, but a game

developer or creator still needs to be recorded. This element may be repeated many times for a variety of contributors will be involved in games and game-related materials.

The date element will also be repeated. Dates for videogame materials will include publication date of the material and publication date of any game that the material is related to. Coverage might include year ranges during which a game was under development or could include places or companies involved in a game. Relation metadata will be metadata about other items in the collection related to the item as well as books, movies, and literature based on games or vice versa. Audience, if used, may be an element with metadata about scholars or journals that may be interested in videogames, such as those outlined in the research presented here.

The elements of identifier, type, format, provenance, and language are not covered by this content analysis; they will be decided based on the resource. The rights and rightsHolder elements also will be decided depending on the resource but will likely be more complicated than type, format, and language. The source element is meant to be used when the item is a derivative.

**Structure**

Browsing online resources is facilitated by a usable and sensible structure on any website. The structure and vocabulary used in a digital library will contribute to browsability and an overall look and feel of a website. Game genres and game titles were both coded in over 40 articles. Organization by either could be a familiar way for scholars

to browse a site. As digital resources can be organized in multiple ways, there is no reason to choose between the two.

It may be beneficial to use a controlled vocabulary for "genre" as users, scholars, videogame players, and information professionals can all have their own ideas of what a genre is. Table 4 contains the list that I developed from the first two pilot studies. The list will likely change over time and should not be considered a complete list of every videogame genre. I took the examples from popular gaming sites: IGN[12], Gamespot[13], and EA Games[14]. A single game might fit under more than one genre. For example a game could be a role-playing game and a fantasy game, or a tower defense game and a strategy game.

| **Genre Name** | **Other terms** | **Examples** |
|---|---|---|
| Action | | Grand Theft Auto |
| Adventure | | Sonic |
| Arcade | | Ms. Pac Man |
| Dating | | SimGirls |
| Dungeon | DnD | Planescape Torment |
| Education | Learning game | JumpStart, Oregon Trail |
| Fantasy | | Final Fantasy |
| Fighting | | Tekken |
| First/third person shooter | FPS, shooter, run and gun | Halo, DOOM |
| Horror | | Castlevania |
| Kids | Children, family | Littlest Pet Shop |
| Multi-Player Online | MUD, MMO | World of Warcraft |

[12] http://www.ign.com/
[13] http://www.gamespot.com
[14] http://www.ea.com/genre/

| | | |
|---|---|---|
| Music | Rhythm game | Guitar Hero |
| Party | Social | Trivia, card games |
| Pinball | | Pinbrawl |
| Platform | Platformer | Mario |
| Puzzle | | Tetris, LIMBO |
| Racing | Vehicle sim, driving | Crazy Taxi |
| Retro | Classic | Donkey Kong |
| Role Playing | RPG | Baldur's Gate |
| Simulation | Virtual reality | The Sims |
| Sports | | NHL Slapshot |
| Strategy | Real-time strategy | Chess, Starcraft |
| Tactical | | Counter-Strike |
| Tower Defense | | Rampart |
| Visual Novel | | Air, School Days |

Table 4: Videogame genres.

Some game titles appeared often (more than twice): Pong, Mario titles, Grand Theft Auto, Warcraft titles, Space Invaders, and DOOM. For each title count I combined series titles so that, for example, Grand Theft Auto I and IV were both counted the same.

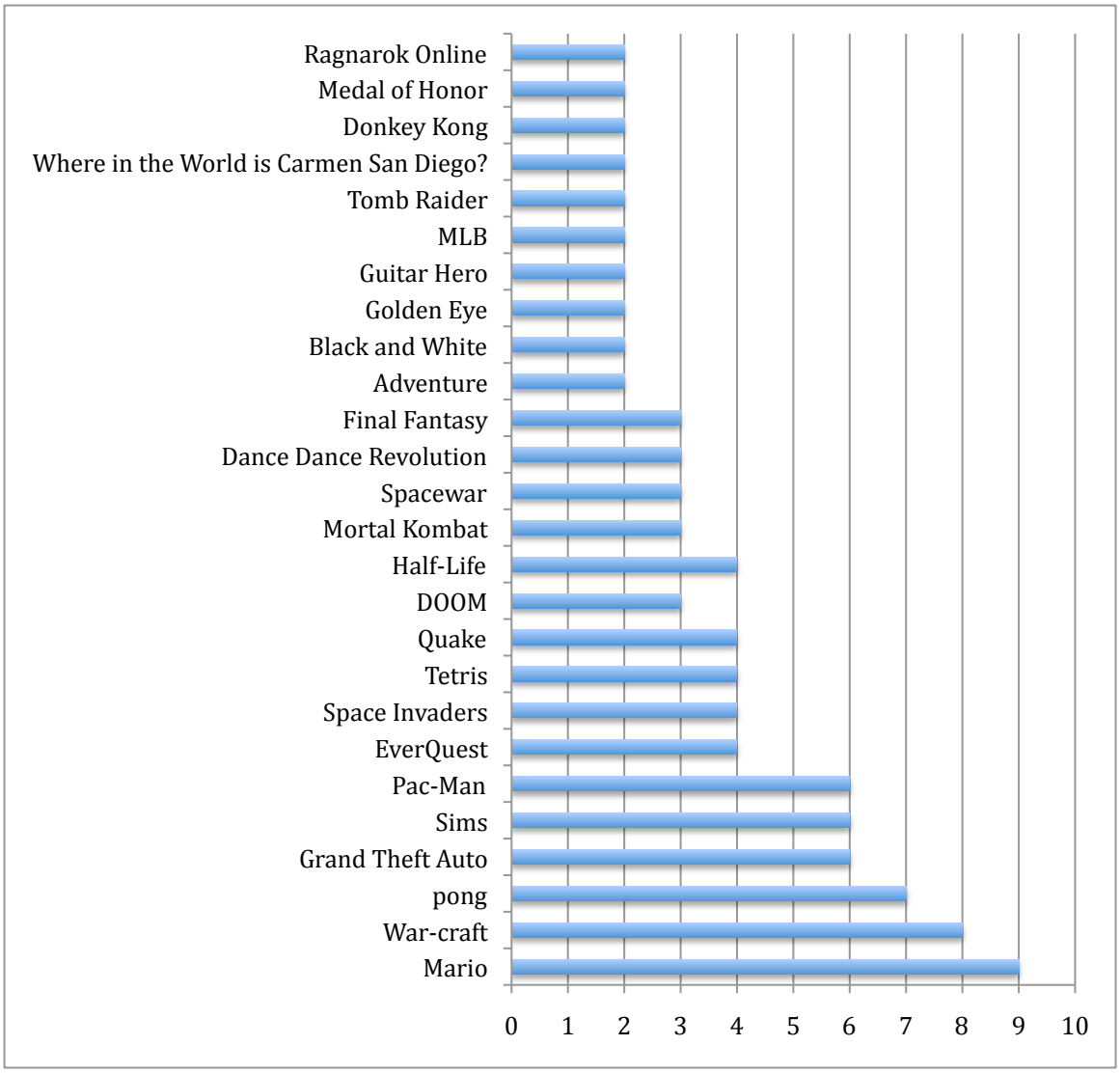


Figure 8: Titles that were mentioned in two or more articles.

## DISCUSSION

### Limitations

The publication years may have been skewed due to the ranking algorithm of the databases used for the initial search. In addition, the databases I chose might not reflect

the spread of videogame related research. Although I attempted to choose a range of databases that carried journals across disciplines, it is still possible that the academic disciplines covered in these databases was not true to the distribution of scholarly, peer-reviewed videogame articles in existence. My search may have returned more articles from certain types of journals, or in an unforeseen abundance of one subject area. In short, the search was limited to the set of journals carried by the databases searched, and may not have included all possible videogame articles.

Because the initial pool of over 1000 searched articles was not culled for matching the criteria as thoroughly as the 98 final sample articles was, that list may not have represented the total pool as faithfully as it might have otherwise. However, this method ensured that the sample articles represented scholarly work in the field of videogames. The articles represent a cross-section of videogame research in a variety of fields. Themes coded for journals and articles were subjective to the coder applying them.

**Future Work**

The results gathered thus far are preliminary. More articles need to be coded to solidify these initial results that provide only the groundwork for structuring and organizing videogame materials. In addition, during the analysis, I identified the following characteristics that will make good candidates for measurement in future studies:

- Whether a paper investigates current games or creates a game purely for the research.

- Whether research is focused on videogames or uses them to measure something else.
- Whether authors use "non-video-gamers" versus "video gamers" terminology.
- Whether a paper mentions the entertainment value of games.
- Whether papers mention "addiction" or amount of time spent playing videogames.
- Whether authors use game packaging to conduct research.
- Whether studies are focused on health or obesity.
- Whether papers mention minor or major game objectives such as tasks or achievements.
- Whether authors mention algorithms to create a game; or math, random numbers, calculations needed to play a game better, or to control the game environment.
- Whether authors write about immersion in videogames.
- Whether gambling in videogame literature is considered a type or genre of videogame.
- Whether videogame articles mention artificial intelligence.
- Whether videogames are spoken of as learning tools.
- Whether authors use game dates or series information

In addition, the technology unit of measurement should be narrowed down to codes that are specific to hardware devices and software programs.

Using the initial pool of 1367 articles compared by journal and year only might show an interesting spread of theme over time, or memes in research rather than the small sample presented here. A larger sample size may also show results more reliably, or it may only return more of the same. Larger sampling can have diminishing returns. Krippendorff showed in a study that 12 newspaper samples from one year showed the same results as 18, 24, and 48 samples from that year (1980, 69). Future samples should not include a search by the keywords "video AND computer AND games." After deleting articles that did not fit the sample criteria I believe those keywords to have introduced the most errors.

## CONCLUSION

Content analysis does not prove effect, but it serves to provide an overview of themes and is a good tool for identifying information needs and topics in a field. Archives and libraries should explore this method and its feasibility for formulating a structure and metadata schema for videogame libraries and collections. Metadata elements designed from these results or other analyses could conform to Dublin Core in METS as a simple solution, but it is possible to adapt to situational needs using themes as a guideline. It is important to focus on the patrons since usability is the most important concern for users (Hedstrom et al. 185).

I coded the units related to in-game information in articles to answer the question: what game environment information is cited within scholarly videogame articles? Game titles and genres were the clearest examples of often-used manifest game data.

Descriptive metadata about games also includes the layout or game environment and character information.

I coded elements surrounding the game environment to answer the question: what information surrounding games is common in scholarly videogame articles? Technology is the most commonly discussed theme; hardware such as systems or controllers is discussed more frequently than engines or software. Other themes include cultural topics like gender and violence ascribed to gaming.

I coded the journals articles were published in, the affiliations of the authors, and the themes of the articles to answer the question: who are the scholars researching videogames and what disciplines do they come from or write in? My findings show that some common disciplines of journals and authors are psychology, computer science, and education. Article themes range from health related topics such as mental health and obesity, to technology development topics such as design and development, to videogames themselves. However the most important finding is that videogame research is conducted in a wide range of fields and as the interest in videogame research and number of articles about videogames grows, the range of disciplines and affiliations is also likely to grow.

In his 2010 presidential address to SAA, Frank Boles implored archivists to select, "If you accept the challenge of selection, if you face the fear we all have in saying 'yes,' or, worse, saying 'no,' then you will perform the noble service our profession educates us to do and calls on us to perform." Who better to inform our decisions about

when to say “yes,” or, worse, “no,” than the past and present users of our collections; and who better to help us make those collections usable with structure and metadata?

Analyzing the corpus of videogame scholars’ work provides clues into what the body of literature contains. Beginning from the work that the potential users of a digital library produce and combining the results with standardized metadata schemas offers a way to build a structure and organization for a robust digital library of videogame materials.

# Appendices

**APPENDIX A: ARTICLES AND JOURNALS INCLUDED IN THE SAMPLE.**


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## APPENDIX B: CODEBOOK.

This codebook is divided into four sections containing units of measurement that will be coded in 2010 for a content analysis of scholarly articles about video games. The units of measurement in the first section are manifest units that will overwhelmingly be explicitly stated in the text, such as titles and characters. The second section contains units regarding game environments that are latent and will require a minor amount of interpretation by coders. Part three also contains latent units; in part three the measurement units to be coded related to the culture and environment surrounding game playing. The final section contains both manifest units and latent units regarding the metadata of the articles themselves and their themes.

Some general guidelines follow.

More than one unit of measurement may be found within one semantic sentence. In several examples below it will be seen that two units or more are present.

It is not necessary to code pictures, images, figures, references, charts or graphs; only code titles, abstracts and text.

Some articles may not have any codes beyond THEME; that is acceptable. As long as the article includes a mention of video games in at least one sentence it should be included in the final sample. All codes should be considered as related to video games. General mention of movie ratings or other non-game ratings should not be considered for example.

Two codes may apply to the same words, but be cautious when applying two codes to the exact same words.

--For example, in the sentence, "The alien protagonist was from *Ratchet and Clank*," *Ratchet and Clank* is an instance of a title, and no instance of a character should be recorded. In the sentence, "Mario and Luigi are both playable characters in *Mario Kart*." The first instance of Mario, and that of Luigi, are each coded as separate instances of characters, and *Mario Kart* is recorded as an instance of a title, but the Mario in *Mario Kart* should not be recorded as an instance of a character.

Distinct codes: In cases where a new instance of a countable unit is mentioned in a paper, a new code should be recorded, but if the same element is repeated, no new code should be applied.

-- Only TITLE, CHARACTER, and GENRE are countable.

--So if Mario is mentioned repeatedly, only one instance of CHARACTER should be recorded, but when LUIGI is mentioned, a second code should be applied.

Examples have the portions to be coded highlighted in grey. In order to narrow down the codes, only use adjectives if it would change the meaning of the unit to leave it out. "Sexually suggestive" means something different than "suggestive," but "distinctive cartoon look" is the same as saying "cartoon look."

**OVERVIEW OF ALL CODES**

PART ONE: Game environment characteristics

TITLE (countable)

SYSTEM

ENGINE

CHARACTER (countable)

AVATAR

GENRE (countable)

CREATOR

COMPANY

RATING

GEAR

PLOT

CUES

ATTRIBUTE

LAYOUT

RELATEDTO

PART THREE: Cultural and societal characteristics of gaming

TECHNOLOGY

HACK

G.CULTURE

G.VIOLENCE

A.VIOLENCE

SEXUALITY

STEREOTYPE

POPULARITY

PART FOUR: Characteristics of videogame publications

AFFILIATION

JOURNAL

DATE

THEME

--

PART ONE: This section contains codes that are relatively simple and refer to easily spotted video game information. Typically, the units of measurement from this section will be written out explicitly in the articles, or refer to information implicit to the game and internal characteristics of the game.

--

**Code:** TITLE

**Brief Definition:** The title of a game. (countable)

**Full Definition:** The title of a video game that is mentioned in an article either in part or in full. Titles may be mentioned in reference to other games or aspects of the game in question.

**When to Use:** Apply this code whenever the title of a game is mentioned anywhere in an article. Titles may be set off from text by italics or other defining characteristics.

**When not to Use:** Do not apply this code when an eponymous character is referred to, such as "Mario." (See CHARACTER.)

**Example:** "The alien protagonist was from *Ratchet and Clank*."

--

**Code:** SYSTEM

**Brief Definition:** The name of a video game platform or system. SYSTEM is always hardware that a game relies on.

**Full Definition:** A video game platform or system refers to the hardware that works with software to allow a specific game to be played. There are five main types of platforms: console, computer, hand-held, coin-operated, and online games. Platforms can be general terms such as, "pc" or specific brand names such as "Playstation."

**When to Use:** Apply this code whenever a platform or system is mentioned anywhere in an article. Each platform should have it's own code, so in a list of four platforms, each one would get defined separately. Apply this code also if it refers to the types of platforms that certain video game players prefer. Apply this code whenever a platform or system is mentioned explicitly anywhere in an article. Each platform or system should be defined separately.

**When not to Use:** Do not apply this code when platforms are referred to latently but not named.

**Example:** "Street Fighter started out as an arcade game." "This game was designed for the Xbox 360."

"Arcade" is a SYSTEM when referring to the hardware or coin-operated machines, otherwise code as GENRE.

**--**

**Code:** ENGINE

**Brief Definition:** ENGINE is only software, any that a game is designed on and relies on for play.

**Full Definition:** A video game engine is a software system designed for creating and developing video games. Typically the engine provides functionality such as 2D or 3D graphics, collision detection and scene graphs.

**When to Use:** Apply this code when an engine is mentioned by name. Each engine should be defined and coded separately.

**When not to Use:** Do not apply this code when engines are discussed generally or theoretically.

**Example:** "Irrlicht's cross-platform and open nature attracts a wide variety of programmers."

**--**

**Code:** CHARACTER

**Brief Definition:** Characters are people and creatures. (countable)

**Full Definition:** Characters are people and creatures that can be playable or controlled by AI in a game or series of games.

**When to Use:** Apply this code when an article mentions a character by name or by clear reference. The character might be specific to a particular game or game series. Every character listed or mentioned should be coded as an instance of CHARACTER, including when the same character is mentioned several times within an article.

**When not to Use:** Do not apply this code when the concept of characters is mentioned generally but no particular characters are referred to. **Example:** "Players can choose Mario or Luigi."

--

**Code:** AVATAR

**Brief Definition:** Expression of a player's avatar that does not fit under CHARACTER as a manifest named unit.

**Full Definition:** Avatars are the expression of the player's self that are not countable.

**When to Use:** Apply this code when an article mentions avatars.

**When not to Use:** Do not apply this code when a character is named (see CHARACTER).

**Example:** Mii's are avatars.

--

**Code:** GENRE

**Brief Definition:** The category of a game, from the list below, otherwise code as LAYOUT.

**Full Definition:** Genre list is below (genres can be added if agreed on by the coders).

Action

Adventure

Arcade

Education (sometimes “learning games”)

Dating

Dungeons and Dragons

Fantasy

Fighting game (eg: Mortal Kombat, Boxing)

First or third person shooters (sometimes “shooter”)

Horror

Role-playing

Multi-player online games (sometimes “MUD”)

Music games

Party games (eg: trivia, card-games)

Pinball games

Platform or Platformer

Puzzle games

Racing  (sometimes “vehicle simulation”)

Retro (sometimes “emulator”)

Simulations

Sports

Strategy (eg: chess, war games, real-time strategy)

Tactical

Tower defense

Visual novel

**When to Use:** Apply this code whenever an article mentions a game genre. Some genres have common abbreviations; these should be coded as genre mentions as well. Some common abbreviations follow.

FPS: First Person Shooter.

RPG: Role Playing Game.

MMO: Massively Multi-player Online game.

**When not to Use:** Do not use if the author(s) did not mention the genre explicitly.

**Example:** "*Doom* is an FPS."

"Some games were commonly virtual simulations…"

**--**

**Code:** CREATOR

**Brief Definition:** The creator or designer of a game.

**Full Definition:** The creator or designer is the person who had the intellectual idea for the game, or the person or persons in charge of designing the game.

**When to Use:** Apply this code whenever an article references the creator(s) or designer(s) of a game(s) by name.

**When not to Use:** Do not apply this code unless the creator is referred to by first or last name and is clearly identifiable.

**Example:** "Alexey Pajitnov also designed a puzzle game called *Welltris*."

**--**

**Code:** COMPANY

**Brief Definition:** The development or production company that published a game or games.

**Full Definition:** A development or production company for video games employs the creators, designers, artists, and other team members for particular video games.

**When to Use:** Apply this code whenever an article references by name a particular company involved in production or development of games.

**When not to Use:**

**Example:** "Activision's *Guitar Hero* may assist in learning to play the guitar."

**--**

**Code:** RATING

**Brief Definition:** A letter rating assigned by the Entertainment Software Rating Board, or other gaming board.

**Full Definition:** Ratings are assigned to assist in the choice of an appropriate game for age or maturity. The board regulates maturity of content, privacy practices and advertizing.

**When to Use:** Apply this code whenever article references the rating (for example Ec, E, E10+, T, M, A, RP) of a game.

**When not to Use:** Do not apply this code when the article talks about concepts that might affect rating such as violence or mature content unless the specific rating is mentioned.

**Example:** "In 2005 the ESRB assigned a new rating of "Adult Only" to *GTA: San Andreas* and many stores pulled the game from shelves."

--

**Code:** GEAR

**Brief Definition:** Anything that enhances playable characters abilities. Gameplay objects inside the game environment

**Full Definition:** GEAR is armor, weapons, keys, or other items that enable a player to do more with their character. Players should be able to take gear with them; stationary objects are defined as CUES.

**When to Use:** Apply this code whenever the article mentions generally in game gear, including clothing, usable items, or Apply this code whenever an article references a particular weapon or other equipment used or present in a particular game or game series. Gear referenced should be inside the game environment.

**When not to Use:** Do not apply this code when the article is referring to items outside the game such as controllers or other hardware. (See TECHNOLOGY or SYSTEM.)

**Example:** General reference: "The player gets certain rewards, such as a new weapon." Specific reference: "In *Call of Duty 2*, the M1 Carbine was based on a gun developed in the late 1930s."

--

**Code:** PLOT

**Brief Definition:** The storyline of a game or game series, mention of story or plot.

**Full Definition:** The plot could be the storyline of the protagonist or a general story ascribed to the game environment.

**When to Use:** Apply this code whenever the article describes or discusses the plot or "the general course of a story including significant events that determine its course or significant patterns of events."

**When not to Use:**

**Example:** "The only real flaw in *Beyond Good and Evil* is the ending; it lacks closure."

--

**Code:** CUES

**Brief Definition:** Visual or audible cues indicate something about game play.

**Full Definition:** Cues can be anything that prompts a user to perform a certain action or warns a player about game events. If the character can take the item with them, it should be coded as GEAR

**When to Use:** Apply this code whenever an article discusses or describes visual or audible cues employed by games to convey information to the player such as health, limited time, status.

**When not to Use:** Do not apply this code if auditory or visual effects are discussed that do not cue anything in particular about game play such as environment music.

**Example:** "With a dialog tree the game provides players with several choices of lines they can select to say."

--

**Code:** ATTRIBUTE

**Brief Definition:** Appearance of characters, specific attributes of the character design look, otherwise code as LAYOUT.

**Full Definition:** The mention of how a character or characters look such as features, attire, or attractiveness.

**When to Use:** Apply this code whenever the article discusses the appearance of game characters such as dress, race, perceived race, and anatomical or bodily appearance.

**When not to Use:** If it is vague or unclear that the unit is referring to specific character attributes then default to using LAYOUT.

**Example: "**41% of pictured female characters contained sexually suggestive imagery."

--

**Code:** LAYOUT

**Brief Definition:** Spatial or visual characteristics of a game. A game environment.

**Full Definition:** The spatial characteristics of the game environment layout could be two or three dimensional among other more or less innovative spatial layouts. Visual characteristics caused by design and use of mechanics or designed to add a certain look and feel to the game.

**When to Use:** Apply this code whenever the article discusses or describes the employment of spatial layout of a game, that is, how the character and player relate

spatially to the video game environment such as 3-D, scrolling, linear, and non-linear layouts. Apply this code whenever an article discusses or describes general visual characteristics of game such as use of color, lightness/darkness, special effects, or resolution.

**When not to Use:** Do not apply this code when the article discusses character details such as hair color or features. Do not apply if the reference is specific to character ATTRIBUTE (physical attributes). Do not apply when the article refers to visual cues that indicate mechanics to a player (see CUES)

**Example:** "In some arcade-type games traveling off one side of the screen resulted in returning on the opposite side."

"*World of Warcraft* is known among role playing games to have a distinctive cartoon look."

--

**Code:** RELATEDTO

**Brief Definition:** A game that is based on or references a movie or book or vice versa.

**Full Definition:** A game being based on a novel or movie or referencing either in small aspects such as character names, or overall story basis.

**When to Use:** Apply this code whenever novel or movie to game comparisons are mention in an article, or if the article references movies or novels a particular game is based on or has been the basis for.

**When not to Use:**

**Example:** "The protagonist, Hopkins, shares many traits with Holden Caulfield from *Catcher in the Rye*."

**--**

**Code:** POV

**Brief Definition:** The narrative style of the game.

**Full Definition:** The point of view used in the storyline of the video game related to the narrative story telling style.

**When to Use:** Apply this code whenever the article discusses the point of view the game is played from, such as a first person, or third person point of view.

**When not to Use:** Do not use when the article is referring to the plot (see PLOT).

**Example:** "First person shooter games often test a player's reaction time and precision."

--

PART THREE: This section includes cultural artifacts and other social elements that are expressed in relationship to games and game playing.

--

**Code:** TECHNOLOGY

**Brief Definition:** Game related technology that does not fall under SYSTEM or ENGINE.

**Full Definition:** Technology could be any hardware or software used to design or improve a game. Examples include controllers, games stored on physical media, or software that is peripheral to the ENGINE.

**When to Use:** Apply this code whenever technology is mentioned for a game, whether as an innovation or a pattern. TECHNOLOGY could be controllers used, or general programming.

**When not to Use:** Do not apply this code when technology inside the game environment is mentioned. Do not apply this code for the same words that SYSTEM is applied.

**Example:** "A photo sensor in the gun detects the shift from dark to light based on the television screen, and the duck is "shot"."

Discussion of a computer or television in general would not be coded, but if a television set was referred to in reference to gaming on it, it would be coded.

--

**Code:** HACK

**Brief Definition:** Use of hardware or software tricks to bypass regular rules.

**Full Definition:** A hack could be a malicious or benign use of a short cut, a cheat, piracy, or trick to advance a character and/or game. Also use if any of the above are used in order to play for free.

**When to Use:** Apply this code whenever hacking or cheating is mentioned in an article.

**When not to Use:**

**Example:** "To protect against piracy, *Tempest* had an embedded security code that checked the placement of objects on the screen."

--

**Code:** G.CULTURE

**Brief Definition:** The article mentions gamer culture.

**Full Definition:** Video gaming culture is related to Internet culture and online gaming culture and includes stereotypes that are sometimes embraced by the gamers themselves. Cultural slang is also often used, sometimes referred to as "leetspeak."

**When to Use:** Apply this code whenever the title of a game is mentioned anywhere in an article. Titles may be set off from text by italics or other defining characteristics. Also apply when gaming culture slang is referenced.

**When not to Use:** Do not apply this code when the article is referring to a specific gamer, but not the culture in general.

**Example:** "A small sample revealed that 'girl gamers' possess an alternative style of play."

**--**

**Code:** G.VIOLENCE

**Brief Definition:** Violence described within game(s).

**Full Definition:** Violence could be violent behavior included in game play, including fighting and graphic violence.

**When to Use:** Apply this code whenever violence inside a game or game environment is mentioned in an article (see A.VIOLENCE).

**When not to Use:** Do not apply this code when the article refers to violent behavior that is ascribed to a game or game play.

**Example:** "The real-life violence and gore in arcade games of the early '90s caused a sensation."

--

**Code:** A.VIOLENCE

**Brief Definition:** Violence ascribed to game(s).

**Full Definition:** Violent behavior that is blamed on a particular game or game play in general.

**When to Use:** Apply this code whenever an article mentions cases of violent behavior being ascribed to game play, whether proven or otherwise.

**When not to Use:** Do not apply this code when in-game violence is mentioned (see A.VIOLENCE).

**Example:** "Games featuring violence committed by robots may adversely influence younger children."

**--**

**Code:** SEXUALITY

**Brief Definition:** Sexuality depicted in game.

**Full Definition:** Sexual themes, behavior or imagery in a game environment including explicit images or storyline references.

**When to Use:** Apply this code whenever an article mentions sexuality in a game. This code could also be applied to instances mentioning sexual orientation.

**When not to Use:** Do not apply when the article references gender of gamers or sexuality outside the game environment.

**Example:** "Less than 1% mentioned a male character's attractiveness."

--

**Code:** STEREOTYPE

**Brief Definition:** A stereotype by gender or other characteristic in game or related to gaming.

**Full Definition:** A standardized portrayal of a person or setting because of gender, race, or social group.

**When to Use:** Apply this code whenever an article mentions stereotyping in games or in the culture surrounding games. Use when the word "stereotype is present

**When not to Use:**

**Example:** "No previous study has found that a minority was more likely to be portrayed negatively."

--

**Code:** POPULARITY

**Brief Definition:** The number of consumers of a game.

**Full Definition:** Popularity of a game may be due to the game being well liked at any time in its existence, or simply due to good marketing.

**When to Use:** Apply this code when an article discusses the popularity of a game in sales or a game with a large fan base even if the game did not sell many copies.

**When not to Use:** Do not apply this code when an article mentions gamer culture (see G.CULTURE).

**Example:** "Neither of the sequels to *Donkey Kong* was as popular as the original."

--

PART FOUR: This section contains codes that relate to the style and affiliation of the article itself. The first units of measurement from this section can be found in the articles metadata, only the general theme or topic will need to be assessed after reading the entire article. Each of these units requires that the coder record the metadata from the article itself rather than simply using a preset code.

**Code:** AFFILIATION

**Brief Definition:** Author(s) affiliations by university or other institution.

**Full Definition:** The AFFILIATION should be the affiliation that the author provides for the article in question.

**When to Use:** If possible, apply this when provided by the author. Use the first author only.

**When not to Use:**

**Example:** "**Yi Mou,** *Cambridge, MA, USA*. **Wei Peng,** *Michigan State University, USA*."

--

**Code:** JOURNAL

**Brief Definition:** Journal type.

**Full Definition:** The discipline the journal is in. The ISI Web of Knowledge lists the following types or disciplines in the sciences, social sciences, and arts and humanities:

- Agriculture
- Anthropology
- Archaeology
- Architecture
- Art
- Astronomy
- Biology
- Chemistry
- Computer Science
- Education
- Gender Studies
- History
- Information Science & Library Science
- Law
- Linguistics
- Literature
- Mathematics
- Medicine
- Music
- Philosophy
- Physics
- Plant Sciences
- Political Science
- Psychiatry
- Psychology
- Radio, Television, & Film
- Religion
- Veterinary Science
- Videogames

**When to Use:** Apply this code for every article.

**When not to Use:**

**Example:** Most IEEE articles would be coded as Computer Science.

--

**Code:** DATE

**Brief Definition:** Date of publication.

**Full Definition:** The date the article was published, by month and year.

**When to Use:** Apply this code for every article.

**When not to Use:**

**Example:** June, 2009.

--

**Code:** THEME

**Brief Definition:** General theme or topic of paper.

**Full Definition:** The most prominent topic of the paper as defined after reading the entire article.

**When to Use:** Apply this code for every article. More than one theme may apply to a single article. Try to identify one or two major themes. Do not try to identify every subject addressed in the paper.

**When not to Use:**

**Example:** Examples of possible themes follow: "education," "gender-theory," "technology advancement," "history," or, "effects of gaming on health.

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# Vita

Ramona Lindley Broussard received her BA in Liberal Arts from The Evergreen State College. She is currently a student of information science at the University of Texas at Austin. She will be entering the doctoral program in that school in the fall of 2010. Ramona worked as a Graduate Research Assistant at the University of Texas's Harry Ransom Center from 2008-2010 where she collaborated on digital exhibitions and electronic records preservation. Her research is focused on investigating novel methods for accessing online information.

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This report was typed by the author.