Where does this fit?
A Comparative Study of the Graphical Portrayal of Keys as a system in Survival-horror Games

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Abstract

Puzzles have always been a central part of games. One of the simplest manifestations of a puzzle in games is an obstruction that prevents the player from progressing and an object that removes the obstruction. The system of unlocking new areas with keys is used in order to provide interesting level design and help build narrative in games. This examination intends to provide knowledge and insight into how this type of system is commonly portrayed visually and thus provide a basis for designers to build upon when creating similar challenges, providing a greater awareness of the design norms that are commonly applied. In the majority of the cases that have been examined during this study, text-based information is used to convey the majority of the essential information given to the players regarding the relationship of the key and the lock. In many cases the graphics serve only to highlight important features of the objects and help the player to quickly tell the different items apart in the inventory.

Keywords: Visual representation, items, game design, key puzzles, survival-horror games.
Abstract

Pussel har altid varit en central del av spel. En av de enklaste sät som pussel mainfesterar sig på i spel är en blockering som förhindrar spelaren från att ta sig vidare och ett föremål som tar bort blockeringen. Systemet med att öppna nya områden med nycklar används för att skapa intresanta banor och som ett hjälpmedel för att bygga narrativ i spel. Den här undersökningen avser att ge kunskap och insikt i hur denna typ av system normalt portretras visualt och igenom det, ge insikt som kan användas när spelutvecklare skapar liknade utmaningar. Detta ger en bettare medvetenhet om de design-normer som normalt används. I majoriteten av de fall som undersökt under studien, används text-baserad information för att förmedla majoriteten av den esentiella informationen given till spelaren angående relationen mellan nyckeln och låset. I många fall används de visuella aspekterna enbart för att framhåva viktiga aspecter av föremålen och för att hjälpa spelaren att skilja på de olika föremålen i inventariet.

Nyceord: Visuel representation, items, speldesign, pussel, survival-horror spel.
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**Terminology**

Player: anyone who plays games.

System: a set of components that relate to each other while following specific rules and restrictions.

Single keys: single keys is the term that describes the simplest key-to-lock challenge, where one key corresponds to one lock.

Multiple keys: is the term used for any challenge that demands several keys to unlock one lock.

Themed keys: will be the term used for challenges that follow a pattern where the keys and locks are identical in nature aside from one varying feature that matches up with the corresponding item.

Visual aspects: refers to features that are included in the graphical presentation of an object, such as color and texture.
1 Introduction

Puzzles have always been a central part of games. Ever since Resident Evil (1996) set the standards for what has come to be the survival-horror genre, keys have been used as a tool to provide interesting level design.

Most games that contain elements of exploration also rely on keys of some fashion to unlock new levels and areas. This applies to games of many genres, both 2D and 3D and as Chad Kilgore writes:

“A common example of a causal system is a lock (actual or metaphorical) that prevents you from accessing an area of the game and all you have to do is to bring it the appropriate key. Quake uses gold and silver keys, each of which opens respective colored doors within a level.”

(Kilgore, C 2013)

These simple type of systems are found throughout many types of games and have been a fundamental part of level design since the 90's, being featured in both Resident Evil (1996) and The Legend of Zelda: Link's Awakening (1993).

This thesis analyse how they are portrayed graphically within games and also find similarities in how different games within the survival-horror genre solve similar problems when it comes to creating an understanding among players of the key’s intended use. The games Amnesia: the Dark Descent (2010), Silent Hill 2 (2001) and Fatal Frame 2: Crimson Butterfly (2003) are examined in the study.

In order to examine the systems this thesis looks at: What visual elements are employed in order to efficiently convey the relationship between the key and the keyhole within the games they are utilized?

From an industrial standpoint, this topic is relevant when applied to future design of this type of systems. Identifying patterns and similarities in the presentation of these challenges are useful when designing similar systems in the future.
2 Background

With the rapidly evolving graphics engines we see more and more effort being put into environmental design. When the game world becomes increasingly detailed, so do the challenges and puzzles that the player faces. Yet many of the challenges that are found in games of today are similar to the ones that players saw two decades ago. In *The Legend of Zelda: Link's Awakening* (1993) players where faced with such dilemmas as finding the Tail key to open up the Tail cave or the Bird Key to open the Eagle Tower.

Are today’s games following this distinctive mould because of the easy and effective way it communicates a relationship to the player, or is it simply easier for game developers to stick to the beaten path of design choices? Perhaps it is for the sake of making sure that long time players are met with familiarity that these simple puzzles have made it into games for such a long period of time.

For today’s game developers it is interesting to examine how puzzles are used in contemporary games. To look into the evolution of graphical assets have benefited or crippled the players’ understanding of the message.
3 Previous works within the subject area

3.1 Keys in level design.

Keys and locks as a system are mentioned and defined by several sources, however to the author’s knowledge no previous studies have been conducted on the visual representation of keys in games.

Ernest Adams mentions “finding keys to locked doors” as one of the basic challenges that is commonly present in games. Adams describes these types of challenges as puzzles with two components: an obstruction that prevents the player from progressing in the game and an object that removes the obstruction. (Adams, E. 2012 p.559) This definition of key-to-lock challenges describes the system in its simplest form. Identifying these two components in each of the challenges will be fundamental to the study.

Chad Kilgore describes keys as a manifestation of “Mathematical-Logical Challenges”. Kilgore describes key-to-lock challenges as a manifestation of a casual system (a system where the result, or output, depends on the past and present input of actions, value or information) and as such, a “mental” challenge that reacquires the player to use a specific key in order to access a specific area within the game. This is, simply phrased, a cause-and-effect system. Kilgore also points out that a key and a lock do not necessarily have to be portrayed with literally a key and a lock. (Kilgore, C. 2013 p.2) As Kilgore's definition of the system is flexible enough to include not only one key or one lock per challenge, it will be useful when examine key-to-lock systems with multiple components.

Kevin Oxland also describes problem-solving puzzles and points out that many challenges of this nature are derived from the system of keys and locks. “Puzzles often provide the game with temporary boundaries that can be pushed down by the player by solving the puzzle. Most puzzles are a correlation for a key and a locked door.” (Oxland, K. 2004 p.106)

3.2 Gestalt theory

Many studies have been made on gestalt theory and the perception of shape and color. Most commonly these studies apply to graphical design but can be applied to any graphical assets.

Rudolf Arnheim defines several aspects of gestalt theory including shape, form, space and color with the primary intention to define what these visual aspects represent and communicate to the viewer. (Arnheim, R. 1954) Studies on visual perception are very important when it comes to understanding how objects are perceived by the player. Shape, form and color especially are important in establishing the physical properties of an object. As Arnheim focuses on the perception and interpretation of visual aspects his theories will be central in the analysis of the key and lock components.

Chris Solarski examines how composition techniques, that are normally used in traditional art, are used in games in order to guide the player through a game level (or map) by highlighting the goal of the level trough visual aid. Solarski also describes how shape, line and volume affects the players perception of objects and how said visual aspects can be used to invoke desired feelings among the players based on their previous experiences with these aspects.
This practical example of the use of composition techniques and gestalt theory in games provides insight in how they affect how the player perceives the game world and the objects that are found within it. Solarski's application of gestalt theory in functioning game design gives knowledge of how these principles are used to guide the player by creating a visual language that can be easily understood (at least at a subconscious level).

### 3.3 Color theory

In several color psychology studies Anders Hård, Rikard Kuller, Lars Svik and Åke Svedmyr, examine the meaning of color and how color is perceived by humans on an intellectual and emotional level. The studies examine, among other things, how colors are used in environments and in product packaging, and how they affect a person's experience of the environments and products. (Hård, A et al. 1995) Understanding how different colors affect how the player interprets and experiences objects helps when analyzing how the appearance affects the understanding of the object's intended range of use.

John Fiorito and Craig Stitt explains how color was applied to the level design of Spyro the Dragon (1998) in order to evoke emotion in the players and to create “landmarks” within the game. Fiorito and Stitt also describe how color was used in order to create items that would be immediately recognized by the players in the games environment. (Fiorito, J, Stitt, C 2000) This insight in how color was used in order to enhance specific features in Spyro the Dragon gives a practical example of how color theory affects game play.

### 3.4 Semiotics

Winfried Nöth describes the different uses of both verbal and nonverbal communication from a historical and practical perspective. Semiotics, such as symbols, icons, metaphors, semantics and semiotics are some of the topics that are covered. (Nöth, W. 1990 p.) Since semiotics are heavily integrated in game design it is of essence to understand the roles that they fill in visual communication. Icons and symbols specifically are commonly found in games, decorating items and objects. Nöth's description of the use of semiotics will be useful when analyzing these visual aspects.
4 Purpose

The primary purpose of this thesis is to examine how survival-horror games use visual and text-based elements to convey the functional use of items that allows the player to access new levels or areas by pairing them up with a lock. This examination intends to provide knowledge and insight into how this type of system is commonly portrayed and thus provide a basis for designers to build upon when creating similar challenges, providing a greater awareness of the design norms that are commonly applied.

The thesis will be conducted as a comparative study, examining how keys and locks are represented visually in three different systems, in three games from the survival-horror genre.

The aim of the thesis is to answer the following two questions:

How do games use shape, color and texture in order to convey a relationship between a key and a keyhole within the context of the game?

Are players provided with clues, such as textual description of the key? And if so, are the text-based clues the primary source of information given to the players?
5 Method and materials

This thesis is a comparative examination of three survival-horror games. It looks at items that are used to progress game-play by opening up new levels or areas within the game.

The challenges that will be analyzed are simple key-to-lock challenges where the key is represented by a literal key within the game, and more complex keys to lock challenges where the key is represented with a different type of object than a key. For example a needle intended as a lock pick, where the correlation between lock and key is not immediately obvious. These challenges will be broken into sub categories depending on how many key and lock components are featured in the system.

In order to draw conclusions regarding the game’s use of visual elements, the thesis compares what visual elements are used to establish a context in the different cases. It will look at what factors most efficiently communicate the desired context and draw conclusions regarding the connection between visual keys and player experience using deductive reasoning and hermeneutic interpretation.

5.1 Limitations of the study

The study does not look at challenges where keys are constructed of multiple elements due to the complex nature of these challenges. Once the key is assembled together it might be of interest to the study. Challenges with multiple keys will be analyzed if they do not contain additional puzzle elements. The study does not take into account whether the doors look a certain way because of specific level design purposes.

5.2 Games

The thesis examines games from the survival-horror genre and compares how different games apply visual keys to challenges that are similar in nature. With the games: Amnesia: the Dark Descent (2010), Silent Hill 2 (2001) and Fatal Frame 2: Crimson Butterfly (2003) as examples. The thesis looks at 3D games exclusively, and will look at games with relatively realistic graphics since they have a greater level of detail that will provide a greater base for the analysis than games with more abstract graphics. It is also of importance to the study that the games also feature inventories where items can be viewed for closer examination.

The games that are examined are chosen based on their inclusion of exploration elements and non-linear level design. The three games have (to the authors knowledge) a very good reputation among players and are considered “classic horror games” by the gaming community. This is supported by the games high community ratings on the IGN (Imagine Games Network) website, ranging from 8.2 to 8.9 (out of ten).

5.3 Method of examination

In order to examine how the game presents the challenges to the player, each challenge will be examined. Firstly through looking at what visual aspects the key and the lock are made up of; and secondly to what extent the game provides textual information.

The keys have been divided up according to what type of challenge they are presented as within their own game. Examples from each game that has a challenge that fit within this
category are then listed below. I determine whether each separate visual element is present in the design of the lock and key. If it is present in both they will be compared to identify potential similarities and differences.

Separate from the visual aspects I examine what text-based information is given to the player. This includes how the key and lock are described as separate objects and how the relationship of the two is explained, by giving the player a description or clue regarding the nature of the corresponding item. I determine to what extent the challenges are explained through the text and if the different components of the system are described. Most importantly, it will be examined whether the challenge can be solved entirely through the textual information.

5.4 Visual aspects to be examined

The study uses three of the seven elements of art as explained by Leo Sandberg as a basis for analyzing the system. More specifically, the elements of form, color and texture will be used for describing and analyzing the visual properties of the objects. These specific elements will be included because they are often the most pronounced properties of 3-dimensional assets. Space, value and line (most often used in 2D graphics) are of varying interest when applied to 3D graphics and are not studied in favor of keeping the study focused. Shape will be applied when relevant but will mostly be used to help describe form. (Sandberg, L 2009)

5.4.1 Form and shape

Form refers to the 3-dimensional aspect of an object. While shape describes the silhouette of an object, form give the viewer additional information about the structure of the object. While shape communicates the roundness of a circle, form communicates the structure of a sphere. (Sandberg, L 2009 p.44,48) Arnheim defines form as an extension of shape and speculates that form and shape are what conveys the majority of information regarding an object’s function to the beholder.

“Most practically, shape serves, first of all to inform us about the nature of things through their natural appearance.” [...] “In addition form always goes beyond the practical function of things by finding in their shape the visual qualities of roundness or sharpness, strength or frailty, harmony or discord. It thereby reads them symbolically as images of the human condition. In fact, these purely visual qualities of appearance are the most powerful of all. It is they that reach us most directly and deeply. (Arnheim, R. 1954 p.96,97)

Chris Solarski makes a similar statement about how shape is perceived by the viewer.

“Picture the above three wooden objects -- the sphere, cube, and star -- placed on a table. Now imagine shaking that table. The round sphere would begin rolling around -- demonstrating its dynamic properties -- while the cube would stay in place. Now imagine somebody throwing the sphere and star towards you for you to catch. You'd instinctively hesitate to catch the star, even if you knew it wouldn't harm you, based on your learned response to sharp objects, in contrast to soft and round shapes.” (Solarski, C. 2015)

Solarski states that already from an early age humans develop a sense of “feeling” associated with shape, and that it is with this “feeling” that we perceive all objects around us through sight.
5.4.2 Color

Color refers to hue (hue is color in its “purest” form, the colors that are found on the color wheel such as yellow, red, blue or any mix or variation), temperature (the “warmness”, that often refers to the red range of the color spectrum or “coldness” that often indicates the blue range of the color spectrum) and saturation (the intensity of the color). (Sandberg, L 2009 p.88)

5.4.3 Texture

Texture in this study refers to texture in the sense of the surface quality of an object (such as rust) that help the viewer understand what kind of material the object are constructed from. (Sandberg, L 2009 p.108,109) It will not be referring to texture in the sense of brightness, transparency or color, as sometimes is the case when speaking of textures in the context of 3D graphics.

5.4.4 Symbols and Icons

The study will look at semiotics, specifically Icons and Symbols as defined by John Fiske and Winfreid Nöth because of their regular presence in the design of keys. Symbols and Icons will be studied as one unit since they both hold representative value. Nöth describes the iconic definition of a symbol as a replacement of the object which it represents and Fiske makes a similar definition. (Nöth, W. 1990 p.117)

“In an icon the sign resembles its object in some way: it looks or sounds like it. […] In a symbol there is no connection or resemblance between sign and object: a symbol communicates only because people agree that it shall stand for what it does.” (Fiske, J. 2011)

5.4.4 Textual information

The study examines what type of text-based information is given to the player as they interact with the system; such as if direct or indirect descriptions of the visual nature of the objects are given, or if clues regarding the items relationship to the corresponding door or key is described. When interacting with doors this will be of particular interest if a description or clue is given to the player regarding the visual characteristics of the key.
6 Results
The results of the study are listed below.

6.1. Single keys
In this challenge the task of the player is to match up one key with one lock. The keys in these challenges are meant to unlock one simple lock.

6.1.1 Amnesia: The Dark Descent
In *Amnesia: The Dark Descent* keys in general holds a rather plain appearance. The key unlocking the wine cellar and the key unlocking the machine room are identical in form, color and texture. Being gray with a metal texture, the only thing that separates these two keys is the text that is displayed alongside the key in the player's inventory, as well as how the keys are verbally referred to within the game.

Fig 1, Wine cellar key, Screenshot, *Amnesia: the dark descent* (Frictional games, 2010)
Source: Jessica Andersson 2015.04.02

Fig 2, Machine room key, Screenshot, *Amnesia: the dark descent* (Frictional games, 2010)
Source: Jessica Andersson 2015.04.02
The doors that the keys belong to, however, have different designs. The wine cellar door is rather unremarkable in its appearance and is not marked by any symbols that would indicate what sort of room the door leads to. The color and texture of the door suggest that it is constructed out of dark wood and metal. Only the textual information describes the room that lies beyond the door.

Fig 3, Wine Cellar Door, Screenshot, *Amnesia: the dark descent* (Frictional games, 2010)  
Source: Jessica Andersson 2015.04.02

Aside from the textual information, that also describes the nature of the door, this is not the case with the machine room door. This door is decorated with a cog wheel, a symbol commonly associated with machinery. The color and texture of the door suggests that it is constructed out of metal. As the doors that the player has encountered so far have been “constructed” out of wood and metal and as doors constructed entirely out of metal are not commonly found in castles (the setting of the game) the machine room door suggests that the room beyond might house items that are industrial in nature.

Fig 4, Machine room door, Screenshot, *Amnesia: the dark descent* (Frictional games, 2010)  
Source: Jessica Andersson 2015.04.02
As the color of the keys are lighter and the texture is less pronounced than that of the doors it might be safe to assume that most players would find the keys to bear little resemblance to its counterparts. The keys, when examined in the inventory, are described to have a tag marking them as the “wine cellar key” and the “machine room key”. Because of the disconnect in the visual appearance, this is the only reliable information given to the player that describes its relationship to the door.

An example of a different type of key that is used in *Amnesia: The Dark Descent* is the hollow needle. This key is described as a “strong surgical needle” and it has a long slender form with one pointed end that leads into a hollow base. The needle is white in color with a light texture that suggests it has a smooth surface. Based on the color and texture the needle it could potentially be made from bone, porcelain, ivory or any similar material.

![Fig 5, Hollow needle, Screenshot, Amnesia: the dark descent (Frictional games, 2010)](source: Jessica Andersson 2015.04.10)

The door where the player is required to use the key is identical to the wine cellar door (See Fig.3). As the door is (as previously mentioned) constructed of wood and metal, it has no direct visual connection to the hollow needle. The text that the player encounters while interacting with the door states “It’s locked with a simple lock”. The text does not directly mention the needle or that the lock can be picked, but implies that the lock might be breakable or frail through the use of the word “simple”, as no other lock the player have encountered at this point has been referred to in this manner. Based on this information the player must make the logical connection between the two.

### 6.1.1.2 Silent Hill 2

The apartment gate key in *Silent hill 2* is gray with rusty a metal texture that matches the gate. The apartment gate key's shape is slender with a knob-like “handle”, indicating that it might fit in a lock that has a small keyhole. Attached to the key is a note that explains the key's use. The gate is however not marked as the “apartment gate” but instead bears a “no trespassing” sign. With this vital piece of information not included in the visual design of the gate, the player would most likely not be able to make the connection between the key and the lock without the additional textual information. Had the gate been marked visually as the apartment gate the player would have been given all the necessary information to how the system worked without the additional text.
The “clock key” is long and thin in its form. It has a yellow color and lightly corroded texture that makes it appear to be made of a metal with properties similar to brass or gold. The textual information describes it to have “a small clock” at the end of the key. The clock that the key belongs to is an old grandfather clock with dark colored wood and metal parts resembling that of the key in color and texture. The “clock key” bears the resemblance of an ordinary clock key in the sense that it is long and thin with small teeth (the protruding parts furthest down on the shaft).
6.2 Themed keys

Some keys exist as separate parts in a bigger system of keys. These systems divide the keys into categories where each individual key has the same basic function (to unlock a single lock).
6.2.1 Fatal Frame 2: Crimson Butterfly

In Fatal frame 2: Crimson butterfly, many of the locks follow (among others) an herbal and a geometrical theme with keys and locks that are identical except for the symbols that are portrayed on them. The keys in Fatal frame 2: Crimson butterfly all have a dark gray or brown color and a texture that the textual information defines as wood. The locks have a similar gray or brown color and the texture closely resembles that of the key, but in this case the lock appears to be constructed out of metal. What theme the keys follow in Fatal frame 2: Crimson butterfly depends on what house or area the door that they wish to open is located. In the first area the player enters in the game the keys follow a herbal theme, such as we see in the Rose and Ginger keys. In another area the keys follow a geometrical theme, that we see in the Diamond stack and Diamond link keys.

![Diamond stack lock](Fig 10, Diamond stack lock, Screenshot, Fatal frame 2: Crimson butterfly (Tecmo, 2003)
Source: Jessica Andersson 2015.04.21)

![Diamond stack key](Fig 11, Diamond stack key, Screenshot, Fatal frame 2: Crimson butterfly (Tecmo, 2003)
Source: Jessica Andersson 2015.04.21)

6.2.2 Silent Hill 2

In Silent Hill 2, inside the apartment building exist many rooms that the player can enter and each room is marked with the apartment's number on the door. Each key that belongs to this system is identical in appearance but marked with the number of the apartment that it unlocks.
The same principle is used in the “Lakeside hotel” that the player enters later in the game. Each key is identical in color and texture to the other keys within their system aside from the number-tags that are both present in the visual design and in the descriptive text. The keys resemble regular “house keys” in their form which fits with the apartment theme, but this would not give the player much information regarding the key's role within the system without the label. Due to the generic appearance of the keys, they could belong to any house or apartment building unless otherwise specified.

6.3 Multiple keys

In systems that demand several keys to unlock one lock the keys often are portrayed similarly.

6.3.1 Fatal Frame 2: Crimson Butterfly

In Fatal frame 2: Crimson butterfly two keys are needed to unlock a prison cell. Both keys are identical except for the symbols that decorate the handle, which are inverted. The keys are described in the text as the Light key and the Shadow key. The locks that belong to these keys share the same rusted metal color and texture as the keys. Each lock has a symbol that matches one of the keys.
Another instance in *Fatal Frame 2* where two keys are used are the Twin keys. These keys are identical in shape but with one of them being a mirrored version of the other, creating one shape when lined up with each other. The keys are each decorated with the symbol of a person. These symbols match the engraving on each side of the lock. The color and texture roughly matches that of the lock, though the text describes the key as “a small wooden block” and the lock appears to be “constructed” to appear metal. The game also provides textual information on the basic shape that the key possesses by describing it as a “block”. The twin keys share many of the visual properties with the lock. The color, texture and symbols are very similar in nature. Even if the shape of the key had not been described when the player encountered the lock, they would most likely be able to understand the connection based on the visual information if they had examined it closely.
6.3.2 Silent Hill 2

In Silent Hill 2 the player will find three coins titled the “snake coin”, the “old man coin” and the “prisoner coin”. These coins are adorned with symbols that match their description with colors ranging from gold to silver. The slots that these coins fit into are located on a table. These are described as “a line of five 1-inch round depressions”. There are more depressions than there are coins and to figure out which coin goes where the player needs to solve a riddle (or word puzzle) where the coins are referred to textually by their name or with analogies of their names.
The same system is used in a similar challenge where the player is to place three music boxes with motifs from the fairy tales Cinderella, Snow White and The Little Mermaid on a music playing machine. The base of the music boxes has a red or brown color and a rusty texture that suggests the base is constructed out of metal or tin. The ornamentation on the boxes is pale in color and could potentially be made out of porcelain or enamel. This contrasts with the red color and wooden texture of the machine. The brass-like clockwork details on the machine does not appear to match the metal of the music boxes in ether color or texture. The tree indents in the machine matches the rectangular shape of the base of the boxes. In this case each slots is marked with a text-based description of the motif that belongs to them.
Fig 20, Music machine, Screenshot, *Silent hill 2* (Konami, 2001) Source: Jessica Andersson 2015.05.23
7 Analysis

Although key-to-lock challenges rely most heavily on text based information to explain the relationship within the system, graphics are also used to guide the player. In *Amnesia, the Dark Descent* the door to the engine room is decorated with a cogwheel, a symbol commonly associated with machinery. In *Silent Hill 2* apartment number 202 are marked with just these numbers above the door, as well as on the map, giving the players additional visual clues about how and where the keys are intended to be used.

In the majority of the cases that have been examined, text-based information is used to convey the majority of the essential information. In most cases the graphics serve as a secondary source of information only. The player is unlikely to disregard the text-based information unless they have a good reason for doing so. Bernd Kreimeier emphasizes that the players need to understand the function of an item or object.

“The player cannot take a meaningful decision to act (or not to act) if the result of a possible action can not be anticipated. A meaningful player decision is an informed decision: she has to be able to guess the result of her action before she ever takes it.” (Kreimeier, B. 2015)

Considering this, minor graphical differences in the design between the key and the lock are unlikely to cause players to question the key's intended use, when they have been given direct written instructions. Factors such as texture, shape language and color are unlikely to cause an uncertainty great enough for players to disregard these instructions. In theory the graphical aspect of the puzzle could be removed altogether without making the challenge impossible to complete.

If no sort of label or instructions are provided for the system that tie the components together, it is more likely that players will turn to the graphical clues in order to solve it. Such is the case in *Amnesia: the Dark Descent* when players are given the hollow needle and the locked door. In many cases games will hint at what type of object is required to complete the task, for example when asked to utilize “something heavy” players are most likely to turn to the first object fitting the description in their physical location within the game or inventory. In *Amnesia: the Dark Descent* this can mean a rock, a brick or even a decorative statue from the room. Though sometimes a vague description is also used when the game demands the utilization of a specific item. This type of logic based challenge gives the player all the components they need to solve the puzzle while relying the player for figuring out the relationships in the system that are presented to them. Adams describes this type of problem-solving in “formal logic puzzles”.

“A logic puzzle typically present the player with a collection of objects related in ways that are consistent but not directly obvious. To solve the puzzle, the player must put the objects into a specified configuration. The player manipulates the objects and receives feedback about their relationships, which eventually comes to understand by observation and deduction.” (Adams, E. 2012 p.264)

With games with multiple keys following a pattern, such as the herbal themed keys in *Fatal Frame 2: Crimson butterfly*, the keys and locks are often adorned with the same symbol, such as the rose key and the rose door. These locks are what might be the least dependent on textual information to convey the relationship between the lock and the key. Since the player is repeatedly required to pair up the keys and the locks they are taught the function of the
symbols within the system. After the first lock in this sequence have been paired up with its key, the player should in theory be able to fully rely on the symbols for solving the remaining challenges without getting additional information through the text.

When icons and symbols are incorporated in the visual design of the key it is to be assumed that the same icon will be incorporated into, or in other ways be referenced, by the responding lock, such as the rose key in *Fatal frame 2: Crimson butterfly* or the snake coin in *Silent Hill 2*.

8 Discussion

What appears to be the case throughout this study, is that textual information is the most frequently used way, among the games that have been studied, to convey information to the player. It appears that this is the most effective way of making the players understand their task. If the intention behind the challenge is to give the player all the information that they need to solve the puzzle simply by providing two labeled pieces to them, this might be the most straightforward way to do so. If this is the goal given by the game, the textual information alone will most likely be enough for the players to understand the system.

Though graphics might play a secondary role in this setup, close attention should still be paid by the designers so that the visual representation of neither the key or lock clashes with the textual information. If the text describes a rusty metal key while the key is visually represented as being made of shiny gold, it might cause confusion among the players if both a rusty metal and a gold lock is available. Even more so if the key are represented with an object that has no connection to a key, or other object that might seem useful for solving the task they are presented with.

In the case that the challenge calls for a less direct approach that forces the player to figure out the solution to the puzzle (to some extent) by themselves, it might be beneficial to rely less heavily on textual information. If such an approach is to be made, it needs to be done carefully with much consideration to how the visual clues are presented.

8.1 Single keys

As single keys exist as a unit to themselves without directly being connected to any other system, it might be the most important to establish a context here. As the lock could potentially exist anywhere in the game without regard to where the player found the key, it is vital that the game gives the player the information that they need in order to connect the two together. If the player does not recognize the lock when they see it they might become stuck for a lengthy period of time while they search for it. Since this disrupts the flow of the game and is generally frustrating from the viewpoint of the player, it is best to avoid unnecessary confusion if possible (unless this sort of frustration is desired by the creators of the game). Kreimeier makes a statement on how the representation of the object affects the player's understanding of its use.

“The design might be biased towards using mechanisms resembling real world objects, to minimize the need for explanations. A lack of uncertainty on the player's side makes the game more transparent, potentially removing the need for exploration and experimentation.”

(Kreimeier, B. 2015)

In order to make sure that the key and lock are perceived as two parts of one system it might be beneficial to rely more heavily on textual information as it seems to leave room for the
least misunderstanding. If it is undesirable to use textual information, giving the two components matching symbols might act as a suitable alternative.

The apartment gate key in *Silent Hill 2* follows a similar template as the keys in *Amnesia: the dark descent*. The difference from how Konami (the creators of *Silent Hill 2*) have chosen to portray this differentiates from how Frictional Games (the creators of *Amnesia: The Dark Descent*) have done, is that, in silent hill, the note attached to the key is included into the graphical design of the key with visible text (that is to some extent legible).

In cases such as in the clock key *Silent Hill 2* where this type of key have an established function outside of the game of unlocking or winding up clocks. It might be possible for the player to identify the corresponding components of the system if they have previous experience or general knowledge of the mechanics of clocks. If the player has not had the previous experience it might not be possible for them to complete the challenge without the textual information that was given. If the clock symbol that decorated the key had been shown more clearly in the visual design it might have been possible for the player to make the connection solely based on the visual clues.

It might not be desirable to communicate the context through color and texture alone unless unique color and textures are used. If all the doors within the game have some degree of rusted texture associated with them it would probably not be possible for the player to decide where a key belongs if its only defining feature is its rusty metal texture. If the game only had one rusty door it would not be entirely unrealistic to expect the player to make the connection, but giving additional information through textual descriptions might still be beneficial. In the case of color coded keys additional information would be vital for those who are colorblind.

### 8.2 Themed keys

Since themed keys does not exist by themselves but as part of a larger system it is much less likely that the player will misunderstand how the key should be used. However, since all the keys and locks are bound to follow the same “template” there is less freedom for the designer of such challenges as there is (commonly) only one property of the object that varies. As long as the keys fit thematically into the setting that they are to be used in the “base key” can be portrayed as anything. It would only be if the base key does not thematically match its environment or lack the common denominator with the lock (the room number in *Silent Hill 2* or the symbols in *Fatal frame 2: Crimson butterfly*) that the player might believe they belong somewhere else.

### 8.3 Multiple keys

The system of multiple keys is rather similar to themed keys, however there seems to be more variation in how the multiple key challenges are portrayed. As these challenges tend to take on a more puzzle like nature than the other challenges that are examined in this study, it seems they tend to rely more heavily on the player's abilities to make logical connections based on their own experiences. In both the case of the music box and the coins in *Silent Hill 2*, the first information hinting to the connection between the keys and the slot is the shape of the indents where the keys will fit. The player is then required to figure out the position of the keys with the help of the visual and textual information that are available.

Not all challenges of this type requires the player to be more active in figuring out the system. The light and shadow key in *Fatal frame 2: Crimson butterfly* does not require the player to
do more than pair up the key marked with the symbols of “light” and “shadow” with the lock bearing the same name and symbol.
9 Conclusions
When examining how games use shape, color and texture in order to convey a relationship between a key and a keyhole, there seems to be no one particular visual element that is always found to correspond between the key and the lock. In some cases no direct visual similarities are found at all. In most cases (aside from visual appeal) the basic understanding that the key is in fact a key seems to be the only purpose that the graphics serve within the context of the system.

In other cases the graphics serve to highlight the most important aspects of the textual information. In Fatal Frame 2: Crimson Butterfly the symbols that decorate the keys give a visual correlation to the lock and also serve to help the players distinguish between the different keys in the inventory.

It is when the game does not give direct text-based instructions on what type of key is required to solve the challenge that graphics are of the greatest essence to the player. In Amnesia: the Dark Descent the players are given no direction for how the hollow needle is used, they are simply required to judge the needles range of use based on its visual appearance.

When examining whether games provide clues, such as a textual description of the key to the player, and whether these text-based clues are the primary source of information given to the player, it is found that, in almost every case that has been examined, textual information is the primary source of information given to the players regarding the relationship of the key and the lock. Aside from the hollow needle in Amnesia: the Dark Descent where the text only provides vague clues regarding the nature of the key and its potential range of use, most other objects are described in a way that makes their role in the system immediately understandable to the player. In many cases the graphic serves only to highlight important features of the objects and help the player to quickly tell the different items apart in the inventory.
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