

# Seven-day Roguelike Entry

Mar 9-15, 2013

Version: Day 6

## DESIGN GUIDANCE

### **Design goal**

To create (or recreate) a Rogue-like experience while striving for both portability and player-centric design within seven days.

### **Design platform**

In order to reduce the complexity of the experiment and to allow the most iterations of player testing, the design platform must use physical objects that are readily available to the testers.

### **Design scope**

The game Rogue will be used as a starting point, in order to recreate as much of the Rogue experience as possible. The individual game design elements of Rogue, however, are not required and will be excluded unless a specific design element contributes to the new design. Other games in the “Roguelike” genre are not part of the design scope, nor is the definition of “Roguelike” a governing framework. A popular game using physical objects should be used as a starting point for the physical design elements.

## TASK LIST

### 1 Inspect physical game model

*prereq: none*

- 1.1 Choose a popular physical game to use as a model.
- 1.2 Deconstruct the physical game into design elements.

### 2 Inspect the game Rogue

*prereq: none*

- 2.1 Play the game Rogue to refresh memory on the experience.
- 2.2 Deconstruct the game Rogue into design elements.

### 3 Choose design elements

*prereq: 1 complete, 2 complete*

- 3.1 Compare design elements between the game Rogue and the popular physical game.
- 3.2 Strip away any elements of the physical game that are unnecessary or not useful.
- 3.3 Strip away any elements of the game Rogue that are unnecessary or not useful.
- 3.4 Compile design elements of both games into a set to be included in the design.

### 4 Design game elements

*prereq: 3 complete*

- 4.1 Describe game design.
- 4.2 List intended consequences.

### 5 Test game elements

*prereq: 4 started*

- 5.1 Test the basic mechanics.
- 5.2 Test the gameplay.
- 5.3 Test a complete game design.

### 6 Finalize game elements

*prereq: 4 complete, 5 complete*

- 6.1 Describe the setup.
- 6.2 Describe the gameplay.
- 6.3 Describe the end game conditions.

### 7 Create game documentation

- 7.1 Write game rules.

*prereq: 6 complete*

- 7.2 Write “story” to wrap game.

*prereq: none*

### 8 Test game documentation

*prereq: 7.1 started*

- 8.1 Test rules comprehension.

### 9 Finalize game documentation

*prereq: 8 complete*

- 9.1 Package up documentation into a single PDF document.
- 9.2 Create a quick-start rules PDF document.

### 10 Publish game!

*prereq: 9 complete*

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# (1) INSPECT PHYSICAL GAME MODEL

prereq: none

## (1.1) Choose a popular physical game to use as a model.

The most popular physical game I can think of that should yield useful game design elements is the Klondike version of the card game, solitaire. It is massively popular and has high replay value, while still requiring someone to know the rules first. With millions of people having suffered through the rules to reach proficiency at the game, this is a good sign that the game is well-designed in terms of both rules and gameplay.

## (1.2) Deconstruct the physical game into design elements.

### Terms

First, I want to define the components of the Klondike play area to establish terms for reference. There are four main components (Figure 1.2):

- Play stacks
- Goal stacks
- Draw deck
- Discard stack

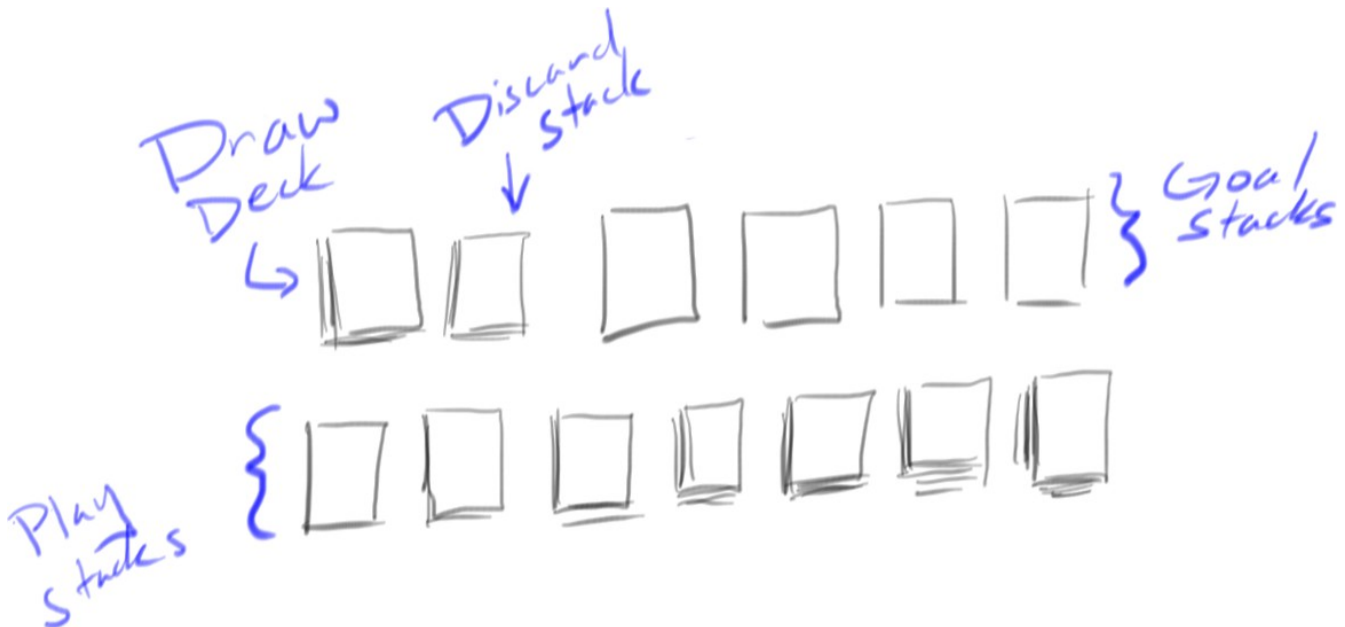


Figure 1.2: Components of Klondike solitaire

### Basic game rules

The game begins with a deck of 52 standard playing cards that are shuffled. The determination of when the deck is considered shuffled changes based on the host of the game. Theoretically, a uniformly random distribution of the cards in the deck is ideal but not considered necessary.

The phase of the game is setup. The host of the game (usually also the player) creates seven horizontal piles of cards with a number of cards in the pile equal to the numbered placement of the piles counting left to right (pile 1 has one card, pile 2 has two cards, ..., pile 7 has seven cards). The top card of each pile faces up, and all other cards face down. The remaining 24 cards in the deck are placed to the side facing down as the draw deck.

Play begins once setup is complete. The player's goal is to assemble the entire deck of cards into four goal stacks. These goal stacks can contain cards of only one suit and must be assembled in order of one (ace) to 13 (king). To reach this goal, the player must move cards facing up so the cards facing down underneath can be turned to face up.

Cards that face up can be moved with the following restrictions:

- A card must be played into either a play stack or a goal stack.
- A card may be played on a goal stack provided the card is the same suit as other cards in the goal stack and is the next card in the sequence 1 to 13.
- A card may be played on top of another card in a play stack provided the card is opposite in color from the card currently on top of the play stack and is the next card in the sequence 13 to 1.
- A 13 (king) may be played into a play stack that contains no cards.

As an alternative to moving cards between play stacks, the player move cards from the draw deck and place them facing up in the discard stack. The card on top of the discard stack can be played onto a play stack or goal stack with the same restrictions as playing a card from a play stack.

The game ends when one of the following conditions are true:

- The player decides to forfeit (counts as a loss).
- No moves are available to the player, and the goal stacks are incomplete (counts as a loss).
- The goal stacks are complete (counts as a win).

## **Variations**

The primary variations in the game center around the draw deck and scoring, and both are used to increase the difficulty and/or complexity of the game.

Regarding the draw deck, the host of the game decides how many cards may be drawn from the draw deck at one time. The easiest variation allows cards to be drawn from the draw deck one at a time. The more difficult variation requires three cards to be drawn at a time, effectively reducing the likelihood that any specific card from the draw deck will be playable without first playing other cards.

The host can also place restrictions on the number of times the discard stack can be turned upside down and transferred to the draw deck. The easier variation allows the discard stack to be transferred this way indefinitely, while the more common "difficult" style allows the discard stack to be transferred only three times. Some hosts may reduce this number as far as zero.

Regarding scoring, the host of the game can decide to place a score value on certain actions in the game. Some hosts will start the score at zero and award points for cards that are placed in the goal stacks and for cards that are turned from facing down to face up. As time elapses, points may be detracted from the score, encouraging faster play. As an additional variation, the points may carry over between games, creating a meta game. With the meta game, the host will often detract points for every game started as a cost to motivate players to squeeze every round for maximum points.

### **Elements of the game's design**

The game is designed to be single-player, and in order to increase replay value, introduces both complexity and difficulty. Patterns are designed into the game using the patterns already inherent in the cards' markings. This allows the pattern to be used in multiple ways without confusing the player. For example, moves between play stacks require descending order and alternating color, while moves from the discard pile or play stacks to the goal stacks require ascending order and matching suit. The difficulty of the game is in the amount of imperfect information created by both the shuffling and in the hiding of all but seven of the cards' values from the player. Until the player makes a move, the player does not have full understanding of the consequences.

The setup instructions are somewhat complex, but again the use of patterns helps the player handle the complexity. The locations of the goal stacks, draw deck, and discard stack are not usually explicitly declared spaces, since the arrangement does not impact play. The play stacks vary in the number of cards each contains, but the variance is determined by a counting sequence from one to seven. By introducing the idea of putting the play stacks in order from left to right according to the number of cards in each stack, the setup is reduced to only counting and then remembering to turn the card on top of each play stack to face up.

The game is designed in a way that does not prevent cheating. The design assumes that a player wishes to experience the challenge and does not prevent the player from making illegal moves, renegeing on a move, or blatantly modifying the game to allow a win.

### **Elements of the gameplay**

The game is experienced in two distinct phases: setup and play. The setup phase is performed by the host, and the play is performed by the player. When the host is also the player, this means the time spent in the setup phase should be balanced somehow with the time spent in the play phase. The game of Klondike solitaire is popular enough that we can treat it as a baseline for the balance between setup and play times. To get an idea of what these values are, two tests were sent out (Tests #1,2) to test the time spent setting up and the time spent to play a single game. We found that it can take around 4-8 minutes to set up five games, meaning setting up a single game takes somewhere around 1-2 minutes. We have to be a bit vague on the spread of times, since we gathered the times to the nearest minute, which creates a 1 minute variance on each end of the duration. We also found it can take around 2-10 minutes to set up and play a game, with most responses indicating that they felt the time to set up was not long.

The game is also pretty brutal in terms of win:loss ratios. None of the test responses indicated a win, and from experience, I personally have a win:loss ratio of around 7:100 using some of the more difficult variants.

During play, the game's random setup determines what moves are available, and the player determines which moves to make. The player's decisions have a significant impact on the whether or not a winnable situation is converted into a win, but most game setups do not appear to present winnable situations.

The rules for a move are complicated, but the rules can be consolidated down to just a few patterns. Once a player is familiar with the patterns, the player can quickly move to thinking in meta terms about the game and building a strategy over time. The cards themselves are part of the pattern, and the player performs comparisons with other cards rather than recalling specifics about the cards in question.

## (2) INSPECT THE GAME ROGUE

*prereq: none*

### (2.1) Play the game Rogue to refresh memory on the experience.

It turns out to be slightly difficult to track down a working copy of Rogue for Windows. The links from within the rgrd wiki pointed to a dead "official" site, and I had to surf around for a while to find what I was looking for. I booted up the game and tried it out as a refresher.

Pain. Now I remember why I didn't get into Rogue until iRogue and uMoria came out for the Palm OS. Navigating with the old HJKL always gave me troubles. The cost of a wrong move in Rogue can be quite high, and tying that cost to a set of navigation keys that do not spatially correspond to the move is just taxing mentally. I can't seem to find a number-pad driven copy of Rogue that doesn't also add other complexity and features to the game, so I'm going to have to partly go from memory. This is unfortunate but will have to suffice.

### (2.2) Deconstruct the game Rogue into design elements.

#### **Elements of the game's design**

The game is designed to be single-player, and in order to increase the replay value, introduces a large amount of imperfect information. Layouts are built by piecing together rooms by an algorithm that uses a nonsensical (pseudo-random) seed. I think it is important to note that the algorithm is not truly random (no truly random number generator has ever been created), because without a truly random seed, a better understanding is required of how the nonsensical seed influences content. In Rogue, a series of rooms are preset and placed in a bin as part of the game's design. The algorithm then selects rooms by choosing rooms that fit into the available space and allow connections between room doors. Paths are then drawn between rooms to create the connections. With a very finite number of rooms and placements available, the probability of seeing an identical layout over time is actually quite high. However, due to the way computerized random number generators work, the probability of seeing identical layouts in sequence is very low.

The items in the game are generally dropped from a monster, found lying on the ground, or found in chests, and these items are also algorithmically produced. Items with advanced properties have their properties hidden until revealed through use or through using a specific item that itself must be found and identified through use.

The monsters in the game are from a preset pool, with a letter assigned to each race of monster. In some cases, a small letter represents a younger, and presumably weaker, version of the monster



compared to the capital letter. Monsters are placed on the layout using an algorithm that decides placement according to the layout available and decides monster type based on the associated difficulty of the layout.

The layouts are linked together in a sequential fashion, with each next layout in the sequence having an increased difficulty when compared to the previous layout in the sequence. Players are encouraged to continue moving through the sequence by requiring the occasional use of a food resource. In order get more, players must explore more content.

As the associated difficulty increases, weaker monsters become less likely to be selected by the monster placement algorithm and stronger monsters become more likely. At the end, there is supposedly a final item that must be obtained and then transported back to the original layout of the game, but after playing for several months, I had never seen it.

The increasing difficulty of each level, the lack of information, and the need to push forward all combines into a game that is very unlikely to produce a winnable situation.

Player and monster entities movements are identical, allowing movement in the eight major compass directions unless a boundary or other entity occupies the adjacent space in the direction selected. In the case of a boundary, a movement in that direction is ignored by the game. In the case of another entity, an attack is initiated in which the entity moving strikes first and the second entity will attempt an attack only if the first attack is survived. Monster entities will generally move automatically towards the player entity during every turn of the game.

As the player defeats enemies, a number of experience points are awarded to the player. At increasing intervals, the player will gain a level. Each increasing level confers bonuses to the player's performance, including the amount of damage allowed before death, the likelihood of an attack to succeed, and other number increases. These bonuses influence the math of the game in a mostly invisible way, since even the damage a monster can inflict upon a successful attack is not revealed to the player.

Items are broken into categories of food, equipment, potions, and scrolls. The food items must be consumed regularly to allow the game to continue, similar to the "insert coin" mechanic of coin-operated arcade games. The food appears to have no purpose other than a way to hasten the player defeat. Equipment has a category associated with each piece of equipment that prevents multiple pieces of equipment with the same category from being equipped by the player, making these categories a resource that must be balanced. Potions can be consumed by the player to confer an effect that may be positive or negative, but once consumed, all future instances of the item will be identified. Scrolls allow magic spells to be cast, often from a distance, to cause effects on other entities, including items. The scrolls do not usually directly harm the player, but the effect of the scroll can drastically alter how winnable a situation is.

### **Elements of the gameplay**

The game is played using the keyboard keys, with each key press initiating an action. The game progresses only when the player initiates an action, and the player must then try to piece together what happened during the space of the action. Monster entities' movements must be observed and noted through inference, since no actual movement is displayed. The player must note that a monster entity was in one location before and is in a new location now. When multiple entities of the same monster type are present, this task becomes supposition. The player must maintain a high level of awareness

any time monster entities are within view.

In general, the player is constantly prevented from knowing information that may cause failure of the game. Every step of the way, the player is attempting to learn more about the game without losing. Learning more will not create a winnable situation, but not learning more will prevent a winnable situation. The player must constantly balance the need for more information with the cost that learning the information might present. If the player is to become proficient, the player must memorize all monster entities' behaviors and properties, memorize all the possible items' properties and effects, and memorize the rules (both hidden and obvious) of the game itself.

One benefit of the high amount of hidden information is the ability for the player to be delighted with a discovery. The items are algorithmically produced to appear in an unpredictable way, so many of one item may appear with very few or none of another item appearing. The ability to delight the player is left up to the interaction of all of the algorithms, so theoretically, some players will be delighted often while others may never be delighted. On the other hand, the player can also be dismayed. The game has the potential to create extremes, but neither extreme is limited nor guaranteed. Any particular game may produce only middle-of-the-road results.

Rogue is a game of repetition. The game must be played repeatedly in order to learn enough about the game to reach proficiency. Simply playing, though, is not enough, since patterns and pools must be observed, noted, and memorized. The player must then learn to put that memorized information to use.

The physical act of playing the game is also one of repetition. To move one space, the player presses a key on the keyboard once. To move ten spaces, the player presses a key on the keyboard ten times. A majority of the game is played using movement actions. During uninteresting tasks, like trekking back to a set of stairs on a level, the number of movements can be the same as those during a very exciting fight.

### **(3) CHOOSE DESIGN ELEMENTS**

*prereq: 1 complete, 2 complete*

#### **(3.1) Compare design elements between the game Rogue and the popular physical game.**

##### **Use of imperfect information**

Both games make use of imperfect information. The imperfect information in both is determined by both physically hiding information and assigning placement of a known pool of entities into an unknown arrangement.

In Rogue, this is done using algorithms and a computerized random number generator and whether or not the player entity is in a position to reveal information.

In Klondike solitaire, this is done through shuffling and whether or not a card is turned to face up or face down.

##### **Consequences of a turn**

Both games have known and unknown consequences to each turn, but Rogue hides more of the consequences from the player even after the turn.

In Rogue, the unknown consequences of a turn must be inferred by observing and noting the change in the game state. Sometimes, the change in game state cannot be observed, and this information remains hidden. The impact on whether or not the situation is winnable remains permanently hidden until near the very end of the game.

In Klondike solitaire, the some unknown consequences are revealed immediately after the turn by turning a new card to face up. The amount of impact revealed concerning whether or not the situation is winnable, though, depends on the number of cards already revealed.

### **Selecting an action**

The games separate on the nature of selecting an action to take.

In Rogue, movement is the most common action to take, but using items presents another layer to consider. The type of movement chosen would depend on whether the player is in combat or out of combat, whether the player is exploring or fleeing, and whether the player is free or confined. The decision to use an item then depends on whether the player is in combat or out of combat, whether the item might be used for combat or utility, and whether or not the player can afford to use the item (in terms of the possible unknown effects). The action taken must be balanced against all of the other reasonable actions that are available.

In Klondike solitaire, there are really only three types of actions: moving a card to a play stack, moving a card to the goal stack, or revealing cards from the draw deck. Different rules apply to each type of action, but much of the complexity in the rules can largely be described in patterns. The decision to select a specific action is reduced, because few actions are available at any one time. The probability that any specific action is available is low, turning the availability of actions into the primary resource of the game. While the final goal is to arrange the cards into specific sequences in the goal stacks, the immediate goal is to increase the number of available actions.

### **Evoking emotions in the player**

The games both have the possibility to evoke emotions, but to different degrees.

In Rogue, the wide variety of possible situations presents very few "good" events. The rarity of these events and the possible extreme nature (such as finding an incredible weapon) combine to delight the player. Similarly, the game can present situations that are suddenly awful (such as repeatedly missing attacks and being whittled down by a weak monster entity). The suddenness seems to be key in evoking the emotional response, as well as the rarity. In other words, the emotional response is tied to surprise.

In Klondike solitaire, the variety of situations is far fewer. There are instances when the number of available moves is high, pleasing the player, and there are instances when the number of available moves is dangerously low, displeasing the player. Every once in a while, a situation with only one available move can produce an "unlocking" card that completely changes the game from a possibly losing scenario into a possibly winning scenario. In order for this to occur, the player must be far enough into the game to have built up a good number of sequences on the play stacks. With these sequences available, usually a specific card is required to allow the play stacks to be disassembled and reassembled onto the goal stacks. This situation is usually results in a loss for the player, because the needed card is likely hidden in one of the play stacks' unrevealed cards. The likelihood of the last

move producing the needed card is low, so if that needed card is revealed and "unlocks" the rest of the stacks, then the player is delighted. With the "unlocking" card revealed, the game is usually resolved into a win for the player rather quickly. The delight presented by the "unlocking" card seems to be tied to winning the game.

### **Reaching player proficiency**

The games both require experience through repetition in order to become proficient at the game, but the cognitive demand concerning minutiae is very different.

In Rogue, repetition is required to learn what strategies are effective in various situations. However, in order to identify these strategies and their underpinnings that determine success, the player has to memorize a large amount of small details concerning how the player's attributes, the player's items, the player's available actions, the individual monster entities' attributes, and the layouts. This places an extreme cognitive demand on players, because a mountain of information must be recalled in order to begin piecing together higher-order strategies beyond the immediate moment. Recall is the most demanding cognitive memory task, and Rogue requires it constantly. The high recall requirement forces players to learn the rules for a long time before learning the game is possible.

In Klondike solitaire, repetition is required to begin observing the effect of various strategies. The high amount of imperfect information means much of the consequences of any given action are unknown when starting a game. As the game progresses, more information is revealed, but whether or not the player's strategy would be similarly effective in a different game is unclear. Fortunately, because the rules of the game can be compressed into patterns, the player does not have to process the individual attributes of a card. Instead, every card is compared against other cards. Comparison is a much less demanding task than recall, so players are able to quickly move from learning the rules to learning the game.

### **Time requirements**

The games differ greatly in the amount of time required to play a single game.

In Rogue, a single game can be as short as a minute or can last for hours. The setup time to start a new game is nil, since the computer asks no questions and simply starts a game immediately. A long game gathers meaning as the player progresses, because the progress completely resets to zero at the end of the game. The longer the game lasts, the closer the player is to victory. This also means that as a player becomes more proficient, the value of the earlier progress in the game loses value as the farther progress becomes the new upper limit. The feeling of progress is quite pronounced when a player reaches a new farthest point.

In Klondike solitaire, the setup must be performed first. When the player is also the host of the game and is performing the setup by hand, the setup can take around 1-2 minutes to perform, and the game can take around 2-8 minutes to both set up and play (see Test #1,2). The low time requirement allows a game to be played during small amounts of available time. The progress is somewhat vague for a good part of the game, and an impending feeling of loss is not pronounced. Only when the player is close to a win does a feeling of progress suddenly kick in.

## **Abstraction**

Both games are quite abstract but in different ways.

In Rogue, you have a story that binds the game together. The player entity is an adventurer who is seeking a rare item at the bottom of a dungeon. Actions have an associated word and are triggered, usually, by an associated letter. The visuals present rooms and corridors. For items and entities, though, the abstraction is extreme. An ASCII symbol is used to represent any item or entity, and every item or entity is the same size. The movement of entities considers all grid spaces in the eight major compass directions to be equidistant, even though the diagonal distances are physically 40% farther away. In many ways, the game is similar to a board game, even though the game is played on a computer. The story is necessary for Rogue to work, because without a higher level of abstraction to tie game elements together, many mechanics (like hunger) would be extremely difficult for the player to understand. The story also helps alleviate some of the memorization in a small way. For instance, players can use the knowledge that ants are small and dragons are huge to remember that "a" in the game is fairly weak and easy to kill while "D" is extremely strong and very difficult to kill.

In Klondike solitaire, the entire game is an algorithmically generated problem. There are four sets of sequential cards numbered 1 (ace) through 13 (king), with each set distinguished by one of two colors and one of four suits. Once the cards are arranged, the goal is to take the jumbled arrangement and order it into four sequences of 1 to 13 that match by suit. The rules all have to do with the arrangement or the sequences. Any story would simply be decoration and would not amplify the game itself.

### **(3.2) Strip away any elements of the physical game that are unnecessary or not useful.**

#### **Leverage common knowledge**

One of the things that makes Klondike solitaire learnable is its use of a common knowledge. The order of cards, separating them into suits and colors, and turning cards to face up or down are all things known by any card player (and the vast majority of the Western population plays cards to some extent).

#### **Require minimal recall**

Klondike solitaire requires only a few rules to be recalled during actual play and uses pattern recognition for the majority of actions. This allows the player to focus on the game rather than the rules.

#### **Use physical items as game objects**

This was pre-determined, but the decision was confirmed after deconstructing both games. Physical items make the game much more portable (port it anywhere!) and remove the extra layer of human-computer interfacing. Physical items require much less explanation and do not require the controls to be abstracted.

#### **Minimize repetition**

Klondike solitaire has actions that are mostly distinct from one another, and the game has no

requirements for and offers no rewards for repeating similar actions. Simplicity is very appealing.

### **Keep the game setup and play time short**

While games like Arkham Horror do exist and are popular, fatigue tends to set in with a lot of players when a game requires much time. Klondike solitaire is probably a good benchmark for how to make a good short game.

### **Minimize the number of actions available**

The limited number of actions is one of the reasons Klondike solitaire is so easy to play. Even if you aren't very proficient at the game, the next action to take is possible to identify.

## **(3.3) Strip away any elements of the game Rogue that are unnecessary or not useful.**

### **Elevate the feeling of progress**

Rogue does a great job helping you feel like you are progressing. Even though individual actions may not be linear, there is a distinctly linear feel built into the way the player entity progresses through the game.

### **Use a story to introduce more abstract mechanics**

Part of the appeal of Rogue is the idea of being an adventurer in a dungeon, and it allows for more abstract mechanics to be introduced. The abstract mechanics will be key in making a physical game feel more like a Rogue experience.

### **Use more than one source of imperfect information**

Rogue has multiple algorithms generating information independently, and this creates a more complex and interesting variety of scenarios. If the variety is higher, the replay value should go up as well.

### **Incorporate the player entity**

Rogue focuses all of the actions around a single entity. This provides a way for the player to identify with the game as well as allowing concepts like movement.

### **Incorporate the concept of items**

Rogue's items are a way to allow the player entity to change at different points in the game. The discovery of a rare, superior item is also a way to surprise the player

### **(3.4) Compile design elements of both games into a set to be included in the design.**

#### **Use physical items as game objects**

Physical objects will help reduce the barrier between the player and the game.

#### **Leverage common knowledge**

The rules for the game should try to use the physical items in a way that is already common to those items. Dice, cards, and coins all have common uses for creating unpredictable variation and may be good building blocks for the game. Common patterns should be used wherever possible. Ideally, even the physical actions taken by the player should be related to the game action being taken.

#### **Require minimal recall**

The rules should be require patterns wherever possible and minimize the amount of recall required. If recall is required for rare situations, a reference sheet may be necessary.

#### **Elevate the feeling of progress**

Each action should in some way contribute to the player's feeling of progress towards winning the game.

#### **Minimize repetition**

Each action should be meaningful to prevent repetitive actions that do not contribute to the player's feeling of progress.

#### **Keep the game setup and play time short**

This is a solitaire game, and in general, people have much more attention for social games than solitaire games. Keeping the game short will make the game more flexible in terms of finding an audience.

#### **Minimize the number of actions available**

Reduce the number of possibilities on any given turn, so the player can focus on higher-level strategy instead of trying to evaluate many options.

#### **Incorporate the player entity**

The player entity adds a focal point for the available actions and allows players to identify with the game.

#### **Use a story to introduce more abstract mechanics**

Abstract mechanics will help make the game distinct from Klondike solitaire and other solitaire card games. The story will be necessary to introduce mechanics that are separate from the rest of the rules without confusing the player. The story will also be helpful in the establishment of a player entity.

### **Use more than one source of imperfect information**

Multiple sources of imperfect information can create many more variations through interaction than that of a single source. The variety should increase the replay value and the likelihood of surprising the player.

### **Incorporate the concept of items**

An inventory system isn't necessary, but the idea of having something that by holding changes your character can add a lot of variety and flavor, as well as allowing the player to be delighted at finding a rare, superior item. We want to be able to delight the player.

## **(4) DESIGN GAME ELEMENTS**

*prereq: 3 complete*

### **(4.1) Describe game design.**

#### **Basic mechanics**

A bridge of cards is built in two rows of six. The bridge is taller on the ends and gets thinner as it reaches towards the middle, so the stacks on the ends will have the most cards. The middle stacks will have the fewest cards, and the remaining stacks will have some number in between. These cards are the bricks. The bricks are laid down with three cards in the end slots, two cards in the next slots, and one card in the middle slots.

The remaining cards comprise the deck of awakening and are placed to the side, leaving space big enough for a card between the deck of awakening and the bottom row.

The first card of the deck of awakening is revealed and placed next to the bottom row between the draw deck and bridge to start the lower stack. The bottom row is now permanently associated with the color of the card next to it, and the top row is associated with the opposing color. The first time a card with the opposing color is placed into the stacks, it will be placed next to the top row to start the upper stack.

Every time a card is put into the stacks, a die is rolled. The stack that the card was placed into, based on the card's color, determines the row. The number rolled on the die determines the brick, counting left to right.

For the first card, the lower stack is always chosen. The die is rolled to indicate which brick the troll will stand on to start the game. The troll marker is placed on the brick to start the game.

For subsequent cards played into the stacks, the die is rolled to indicate which dormant (face down) brick will awaken (turn face up).

#### **Gameplay rules**



Every turn is broken into the following steps:

1. Bricks awaken.
2. The troll takes two actions.
3. Awakened bricks attempt to flee.

Every turn, a card must be played into the stacks. If a card is not played into the stacks during play, then a card is drawn from the deck of awakening and played into the stacks. A die is rolled to determine which brick is awakened.

- The troll takes two actions. Actions are separated into: movement, stomping on an awakened brick, picking up an awakened brick, using a brick as a tool, or laying down a dormant brick.
- Movement - The troll can move one step to the left or right, up or down (no diagonals). The only restriction is that the troll cannot step on the same brick twice in the same turn.
- Stomping on an awakened brick - If the troll is standing on top of an awakened brick, the troll can stomp on the brick to knock it unconscious. The brick becomes dormant.
- Picking up an awakened brick - The troll can pick up any awakened brick that is not a heart (trolls can't have a heart... troll tradition). The card is placed on top of the troll in the awakened (face up) state.
- Using a brick as a tool - The troll can use differently shaped bricks as different tools. After being used, the card is set aside for use in the brick awakening phase.
  - Diamond-shaped bricks can be thrown left or right, up or down to knock an awakened unconscious. The brick hit is the first awakened brick in the direction thrown (no lobbing the brick over another awakened brick. Diamond-shaped bricks can also be throw off the bridge to hit no awakened bricks.
  - Spade-shaped bricks can be used to flip an awakened brick next to the troll up into the troll's hands as a dormant brick. Alternatively, spade-shaped bricks can be used to awaken a dormant brick next to the troll.
  - Club-shaped bricks can be used to beat an awakened brick next to the troll into unconsciousness.
  - THE CLUB (ace of clubs). If the troll happens to pick up a really big club that is perfectly shaped for clubbing and suitably hard not to break, the troll can use it as a normal club-shaped brick but the card will not be set aside after use. Instead, the troll can use it indefinitely. No other cards can be picked up by the troll for the duration of the game, but who would want to?
- Laying down a dormant brick - If the troll is carrying a dormant brick (after using a spade-shaped brick), the troll can lay that dormant brick down into any spot where the brick will be touching at least two other bricks.

After the troll takes two actions (the troll must take both), all awakened bricks attempt to flee. Awakened bricks that the troll is standing or carrying cannot move. All other bricks move one step to the left or right, moving towards the closest end of the bridge not blocked by the troll. Any bricks that move off the bridge are set aside for use in the brick awakening phase. All dormant bricks that are not

the ends must be supported by touching at least two other bricks. Awakened bricks do not not require support (they float). If an awakened brick moves and leaves a dormant brick (or stack of bricks) without support, all of the unsupported bricks fall off the bridge and are set aside for use in the brick awakening phase. All awakened bricks move before assessing whether or not dormant bricks are supported.

During the brick awakening phase, all cards that were set aside during play are played into the stacks one at a time. For each card played into the stacks, a die is rolled and bricks are awakened, with two exceptions:

- If the die roll indicates a slot that is empty, the next brick closest to one of the ends is awakened, instead.
- If the brick to be awakened is already awakened, that brick gets a jolt of wakefulness and immediately flies straight up into the air and away. That card is set aside for use in the brick awakening phase. If the troll is standing on the brick when it flies away, the troll flies away, too!

### **End game conditions**

The troll gets a satisfactory win if the deck of awakening is depleted, all the bricks left on the bridge are dormant, and the bridge is still standing. The troll gets a perfect win if all slots on the bridge have at least one brick.

The troll loses if:

- The bridge collapses from breaking the connection between the two ends of the bridge.
- The bridge collapses from losing both end slots at one end of the bridge.
- The troll is standing on an awakened brick that flies away.
- The troll is standing on a dormant brick that falls off the bridge.

On loss, the player's score is the number of cards left in the awakening deck. Lower is better.

### **Non-destructive variations**

The bridge can be rotated or mirrored with no consequences. Counting left to right, right to left, top to bottom, or bottom to top does not make any difference.

The locations of the stacks can be placed on either end of the bridge but must be placed on the ends to indicate rows for brick awakening.

The troll game piece can be any object that allows the brick being stood on to be clearly indicated, and allows a card to be balanced on top to indicate carrying a brick.

Bricks used or having successfully fled can be held in the hand, instead of being set aside.

### **Destructive variations**

Difficulty can be adjusted up or down by adding more bricks to the bridge. The most difficult legal

variation places 3 cards on the end slots, one card in the middle slots, and two cards in the remaining slots. This makes 27 the minimum number of awakenings that must be endured and makes the bridge more likely to collapse. Adding more cards to the end slots makes the game slightly easier. Adding one card to every slot makes the game much easier (15 minimum awakenings), and makes the bridge harder to collapse. Adding two cards to every slot puts the game into tutorial mode (3 minimum awakenings), which is hard to lose.

One card could be given to the troll from the awakening deck at the beginning of the game. This may make things harder or easier, depending on the situation.

The aces of diamonds could also be considered infinitely reusable like THE CLUB (ace of clubs). This lowers the value of either ace, and acquiring the ace of diamonds would make the game significantly easier than acquiring THE CLUB.

THE CLUB could be given to the troll at the start to both make the game easier and to simplify the rules by making it impossible to pick up other cards.

Purely for fun, the ace of diamonds could be made infinitely reusable and given to the troll along with THE CLUB at the start. The challenge of the game would decrease significantly, but it can be fun to play with toys that are otherwise unavailable to the player during a normal game.

## **(4.2) List intended consequences.**

### **Game time is balanced between difficulties**

The gameplay is fairly quick, with a balance built in to compensate for difficulty. With higher difficulty, the deck of awakening is larger, but the bridge has fewer cards. More cards in the deck of awakening means more possible turns, but fewer cards in the bridge presents more opportunities to lose the game earlier. With lower difficulties, the bridge has more cards, but the deck of awakening is smaller. More cards in the bridge means fewer ways to lose early, but fewer cards in the deck of awakening means fewer possible turns. The ratio isn't fixed, since lower difficulties will have less variation in the number of turns taken. Still, the balance prevents rare circumstances from creating a drawn-out game.

### **Setup is quick and does not require much free recall**

The setup of the game is fairly quick, including the assignment of color to the bridge rows. The setup mostly comprises of building the bridge, which uses an understandable metaphor to assign the number of bricks. The number of bricks is also a sequence, so the player does not have to remember much. With the knowledge of the bridge metaphor (more on the ends, less in the middle), the player only has to remember the numbers 3 (cards in the first slot) and 6 (slots). As a result, 3, 2, 1, 1, 2, 3 is the only sequence possible and does not have to be memorized. Any difficulty adjustment is done on top of this sequence.

### **Game story helps explain abstract mechanics**

The tying of suit shapes and names into their function serves as another way the player doesn't have to use free recall to remember the rules of the game. Hearts? A troll can't have a heart. Spades? Shovels

for flipping over things. Clubs? Used to bash things with. Diamonds? Rocks for throwing. The story of the troll and the bridge allows us to introduce some more mechanics that would otherwise be cumbersome to remember. We are adding a hook for memory to move the player cognitively away from free recall and towards the use of memory jogs.

### **Raw mechanics don't require much recall and are sufficiently "random"**

By using the additional cards in the deck of awakening to determine the row, we keep from having to use another item (like a coin or another die), and the player does not have to remember which row corresponds to which value. The determination is done through pattern matching (red goes with red, black goes with black). The row determination is also sufficiently unpredictable to approximate randomness, since the game state starts with 51 of 52 cards in a hidden state. The interesting bit is that the row selected for awakening will always have a slight bias towards the row that contains more cards. This is good, because we need cards from both rows to be awakened in order to threaten the structural integrity of the bridge. With the hardest difficulty, we would have to subdue a minimum of 21 bricks without using bricks as items to increase the awakenings, and that would only be possible with a perfect set of awakenings or by finding THE CLUB early. This makes the game theoretically beatable on the hardest setting, but I have yet to get such a win myself.

### **A really easy game is unlikely**

A perfectly easy game would require either only die rolls within one step of the troll's position. This is extremely unlikely.

$$\text{Pr(same row)} \approx \text{Pr(other row)} \approx 1 / 2$$

$$\text{Pr(die roll within position +/- 1)} \approx 3/6 \text{ (favorable estimation)}$$

$$\text{Pr(die roll of position)} = 1/6$$

$$\text{Minimum\_Awakenings} = 27$$

$$\text{Pr(die roll within one step)} =$$

$$\text{Pr(same row)} * \text{Pr(die roll within position +/- 1)} + \text{Pr(other row)} * \text{Pr(die roll of position)}$$

$$\text{Pr(total)} = \text{Pr(die roll within one step)} ^ \text{Minimum\_Awakenings}$$

$$\text{Pr(total)} \approx (1/2 * 3/6 + 1/2 * 1/6) ^ 27 \approx 1.3 / 10 \text{ trillion}$$

The only other perfectly easy game would require early discovery of THE CLUB and only die rolls within two steps of the troll's position, which should be even less likely due to the rarity of THE CLUB. The low likelihood of a perfectly easy game is good, because a perfectly easy game has almost no replay value as a solitaire game unless the goal of the player is something other than winning (such as games where the goal is social or narrative).

### **Repetition is discouraged in the design**

The game is very difficult, even on easier settings. The player must learn to consider each move, or the game is almost impossible to win. This keeps the player engaged with each move and helps prevent the need for repetitive actions.

### **A rare "artifact" can show up to delight the player**

The existence of THE CLUB is there to delight the player when it is attainable. The probability of the ace of clubs being in the bridge is about 46%, but the probability of the ace of clubs being in the bridge, being on the top, being awakened, and being awakened within range of the troll, is much, much lower:

$$\text{Pr(in bridge)} = 24 / 52$$

$$\text{Pr(on top of row)} = 6 / 12$$

$$\text{Pr(row chosen)} \approx 1 / 2$$

$$\text{Pr(in range of troll starting position)} = 104 / 144$$

$$\text{Pr(total)} = \text{Product(all probabilities)} \approx 1.39\% \text{ chance}$$

The probability that the troll will actually be able to get THE CLUB fluctuates based on the gameplay and the scenario. Every scenario that the troll could potentially acquire the club would add slightly to the total probability, but there are many scenarios in which the club would appear but be unattainable. For instance, if the troll cannot immediately reach THE CLUB, THE CLUB's position could be awakened again, causing the THE CLUB to fly away. THE CLUB could also be in a position that must be preserved in order to keep the bridge from collapsing, or a more pressing concern could require immediate action elsewhere. As slots in the bridge are emptied, travel also takes more time between certain spaces, lowering the probability of THE CLUB appearing within reach. The troll's hands must also be empty to pick up THE CLUB. All things considered, the probability of actually getting the club during play is probably only marginally better than 1.39%.

### **Specialized "item" uses can delight the player in the right circumstances**

The specialized uses of different bricks are also there to delight the player when the exact need for that use has just arisen. Getting a diamond-shaped brick is a huge relief, for instance, when the last brick holding together the bridge has awakened out of reach.

### **Specific "enemy" occurrences can dismay the player**

Awakened heart-shaped bricks are specifically in the game to dismay the player. Heart-shaped bricks, because they cannot be picked up, require either standing on the brick (risk loss from double awakening if stomping isn't an immediate option) or require use of a brick as an item (adds an awakening).

### **Power is fun but has a cost**

The use of bricks as items is fun, and the fun has a cost. Every brick used this way causes an extra awakening, so the player must consider both the known consequences of not using the brick and the unknown consequences of using the brick. There are many circumstances where an awakened brick

must be subdued in order to preserve the bridge's original structure, so the player is sometimes forced to make the decision to use a brick. Personally, this is my most frequent failing, because I love using bricks as items.

### **Boring actions have a cost and are less likely to be possible**

The "best" way to subdue a brick is by stomping, which does not cause an extra awakening. However, stomping must be done on top of the brick, so an extra action is consumed when compared to picking up a brick. Stomping is the most boring action, so the game's design discourages stomping from being repeatedly possible. A boring win is boring.

### **Player must constantly balance positioning**

The ends of the bridge are the most tactically dangerous, because they put a high number of slots out of reach within a single turn. The ends have the most bricks, so they are the most stable. Being farthest away, though, awakenings that happen on the end are very difficult to subdue before the brick successfully flees, and if both ends on one side are lost, the bridge collapses. This causes a constant tension in the player. Staying near the middle can protect the thinner area of the bridge and gives access to a wider range of movement options. Staying near the ends allows the player to protect against bricks fleeing at that end but puts the other end out of reach.

### **Players must keep moving**

The rule that the same brick cannot be stepped on twice in a turn forces players to keep moving. As the bridge starts to fall apart, this can force the player to make some difficult gambles. The gamble is mostly determined by the rules and the randomness of the game, but the player still gets to feel in control of the specifics of the gamble.

### **Movement rules extend the metaphorical playing space**

Being able to move only two steps in one turn makes the physically small bridge (six cards long) feel much bigger in game terms (three turns to cross). The feeling of chasing is preserved, even though the fleeing bricks only move one step per turn. The bricks move more slowly, but a card that awakens three steps away will take two turns to reach.

### **Progress towards a win is always visible**

The deck of awakening serves as a constant countdown to the end of the game. Whenever the player prevents other cards from being added to the stack, the player gets one step closer to the end of the game. Essentially, the deck of awakening can be viewed as the number of levels needed to pass in order to win. Counting the number of cards left in the deck of awakening provides a score that allows a player to get a sense of personal progress and to keep the player focused on the fact that whittling down the deck of awakening is the key to winning.

## Limited options encourage the player to think strategically

The number of options available to the player at any one time are very few. The player has a limited number of variations in total, and only some of the variations are available on any turn, depending on the troll's location, the state of the bridge, and what the troll is carrying. This limitation focuses the player on choosing the optimal choice from what is possible, rather than having to recall every possible combination of actions. Pushing the focus towards making optimal choices also pushes the player towards strategizing for future moves. Theoretically, as we push the player to think about the game at a higher level of abstraction, the proficiency of the player should increase. Designing this into the game helps relieve a player's need for outside assistance in becoming more proficient.

## (5) TEST GAME ELEMENTS

*prereq: 4 started*

### (5.1) Test the basic mechanics.

The basic mechanics of setting up the game, rolling a die, and flipping cards over is fairly abstract, so we need some outside eyes on the process. To this end, I sent out a test to see if some others could understand the concept and perform the steps (Test #4). Testing at this phase was extremely important, because if the basic mechanics are too arcane, the rest of the gameplay will be completely inaccessible to players. Luckily, my group of testers includes people who are used to learning games. Learning games is an abstract activity that requires effort, and if someone isn't willing to learn new games at all, then that person as a tester would be very likely to criticize even well-written rules. I needed testers who were not afraid of rules. Interestingly enough, though, none of the testers are familiar with the Roguelike genre or the game Rogue. In my case, this is actually a boon, because I don't want to have to justify why certain carry-overs from the genre are or are not being included in the design.

The testers that got back to me on this test reported success with understanding the rules. Two testers both reported a specific exception that was left out of the instructions (on purpose), which indicates the mechanics are probably forming up well in the testers' minds.

### (5.2) Test the gameplay.

Next, we need to see if someone else can understand the basic rules of play. This is a bit more complicated, so I had to create a visual walkthrough of the gameplay by taking pictures of steps in a simulated game. I sent the walkthrough to the testers as part of the testing instructions (Test #5) in an attempt to avoid testing the form of written rules, which aren't written, yet. In experimental design, the mantra is "remove from your test that which you are not testing."

The good news is that the testers responded positively to the gameplay. Responses indicated that they were a little unsure about the rules, but that's okay, since we weren't testing those. This gives us a green light to move on to testing a complete game design.

### (5.3) Test a complete game design.

Internal testing is a good place to start when attempting to emulate an "expert" player. As the designer, you know all of the game design, and you can use yourself as a benchmark. I played somewhere between 15 and 20 complete games and was able to play without having to focus on the mechanics of

the game. I lost repeatedly, but that is part of the design. The main proof here is that if someone has a thorough understanding of the current design, it is possible to play the game without having to stop to remember the rules. This proof is very important, because if I as the designer have trouble juggling the rules in my head during play, then it is likely no one else will be able to, either. In writing the rules later, I can try to map out part of how I am categorizing the rules in my head, rather than listing the rules in a purely abstract way. The rules will likely look quite different from my game design document, and that is a good thing if it helps the players understand.

Now, I need to know if the game can be described to someone else, and if that person can successfully play the game. Areas where testers struggle will indicate either a need to develop a better way of explaining a mechanic or else a need to streamline or remove the mechanic. This feedback will be very useful in writing the rules, because we want the rules to be concise. Spend too much time explaining something already understood, and the player will feel the need to start searching for the relevant info. Spend too little time explaining something difficult to understand, and the player may require additional information before being able to play the game unassisted. I wrote up a basic explanation of the game and sent out instructions to the testers (Test #6). The explanation this time is starting to border on writing the game rules, but I'm still taking up a lot of space with visuals and demonstrations that would be bloat in the final documentation. It's a fine line to walk.

The physical playtest happened with optimal results. My two playtesters really got into the game, playing 10+ rounds (without prompting), and both showed a lot of interest. It turns out the game is a blast when watching someone else play. The three of us played rounds simultaneously, all attempting to get a win. I managed my first win ever (yay!) with an early THE CLUB appearance, and one of the other playtesters won with a single-row strategy. The other playtester resorted to adding one brick to each bridge slot in order to experience a win. One playtester said "I really like this game. I can see myself playing this on my own time. I think [my wife] would like to play this, too!" What feedback!

I asked the tester who mentioned his wife to teach the game to his wife and let me know how it went. This is what he wrote:

"[My wife] played three times, and she was able to play just fine on her own for the last [time], and pretty [well for] the second too. She lost all of them, best was 13. She said she likes it a lot and its a fun game to play on her own. The only thing she doesn't like about it is not winning. She did say she would play it more."

This is a complete affirmation of my efforts (despite the fact that all the good comments were after at least a half-pint of tasty beer). There was one modification that needed to be made: the rule about unsupported bricks needs to be removed. The occurrence happens so rarely that players have difficulty recognizing its trigger, so it just needs to be removed. The rules concerning escaping bricks also needs to be adjusted to make the recognition of an escaped brick more conforming and less reliant on a rarely occurring pattern. This will be adjusted by defining the "banks of the river," which the bridge stands on. Brick much reach the banks to escape, which delays certain awakening events, but does not remove them. At the same time, this makes all escapes follow the exact same rule.

## (6) FINALIZE GAME ELEMENTS

*prereq: 4 complete, 5 complete*



## (6.1) Describe the setup.

The bridge is built by placing two rows of six stacks. The stacks contain 3, 2, 1, 1, 2, 3 cards, left to right. After both rows are created, the rest of the cards become the deck of awakening. The top card of the deck of awakening is turned face up and placed next to the bottom row in the lower stack. The color of this first card establishes the color of the lower stack. The two ends of the brick sit on the river bank.

The deck of awakening is placed to the side, and a die is rolled. The die indicates the position of the brick indicated, counting left to right. The troll token is placed on this brick.

## (6.2) Describe the gameplay.

The gameplay is separated into three phases:

1. Bricks awaken.
2. The troll takes two actions.
3. Awakened bricks attempt to flee.

During the brick awakening phase, any cards set aside during a previous turn are placed into the upper or lower stack (depending on the color) one at a time. For each card placed into the stacks, one awakening occurs. The color of the card placed determines which row (upper or lower), and the die is rolled to determine which brick (counting right to left) will awaken. The brick that is awakened is turned to face up. If no cards were set aside during the previous turn, a card is drawn from the deck of awakening and placed into the stacks.

If the position indicated is empty, the next slot closest to a river bank.

If the position indicated is occupied by an awakened brick, the brick jumps straight into the air and flies away. The card is immediately set aside for use in the next brick awakening phase.

The troll can take two actions. There are five available actions:

1. Move one step – The troll can move one step up, down, left or right. The troll must always be standing on a brick. The troll cannot step on the same brick twice in one turn.
2. Stomp a brick – If the troll is standing on top of an awakened brick, the troll can stomp on it to make it dormant (turn face down).
3. Pick up a brick – If the troll is next to an awakened brick (up, down, left, or right) and the brick is not a heart, the troll can pick up the awakened brick. The card is placed on top of the troll token for later use.
4. Use a carried brick – If the troll is carrying a brick, the troll can use the brick. The use is dependent on the suit. After use, the used card is set aside for use in the next brick awakening phase.
  1. Diamonds – A diamond can be thrown up, down, left, or right to hit the first awakened brick in that direction.
  2. Clubs – If the troll is next to (not on top of) an awakened brick, the troll can use a club to beat the brick into submission (make it dormant).
  3. THE CLUB – The ace of clubs can be used like a normal club, but it is not set aside after

use. Instead, it can be used repeatedly, and the troll cannot drop it or pick up any other card for the rest of the game.

4. Spades – If the troll is next to an awakened brick, the troll can use a spade as a shovel to flip the awakened brick up into the troll's hands as a dormant brick (turn it face down and place it on top of the troll token). The now dormant brick can be laid down later.
5. Lay down a brick – If the troll is carrying a brick, the troll can lay down the brick into a bridge position next to the current position of the troll (up, down, left, or right).

After the troll takes two actions, all awakened bricks attempt to flee. Bricks that the troll is standing on top of or is carrying cannot move. All other awakened bricks move one step left or right towards the closest river bank not blocked by the troll. If a card moves off the last bridge position and onto the river bank, that brick has successfully fled, and the card is set aside for use in the next brick awakening phase.

After all awakened bricks have moved, the bridge is evaluated to see if it still stands. The sides of the bricks must touch to create a connection between both river banks, or the bridge collapses. Also, if all the bricks on one side of the river bank (positions 1 or 6) are empty, the bridge collapses.

### (6.3) Describe the end game conditions.

**The game ends in a win if:**

- The deck of awakening is empty, all bricks on the bridge are dormant, and the bridge still stands. A perfect win has no empty bridge positions.

**The game ends in a loss if:**

- The bridge collapses.
- The troll is standing on a brick that jumps up and flies away (double-awakening).

## (7) CREATE GAME DOCUMENTATION

### (7.1) Write game rules.

*prereq: 6 complete*

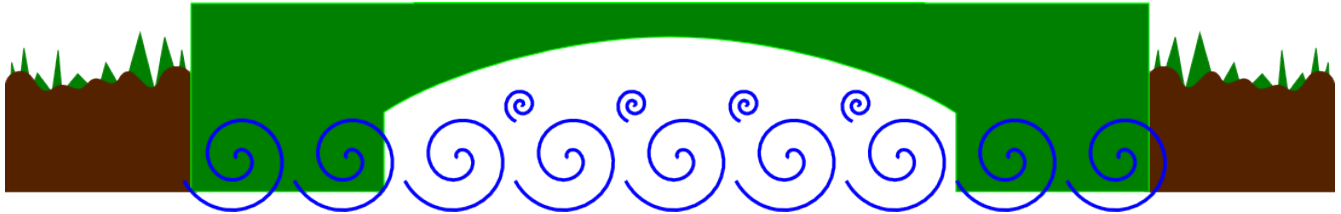
# Angry Troll versus Magic Bridge

## Materials required:

- 52-card deck of playing cards (Ace – King with suits of clubs, diamonds, spades, and hearts)
- One six-sided die (standard 1-6 die)
- An object to represent the troll (a shot glass works well)

## Building the Magic Bridge and placing the Angry Troll:

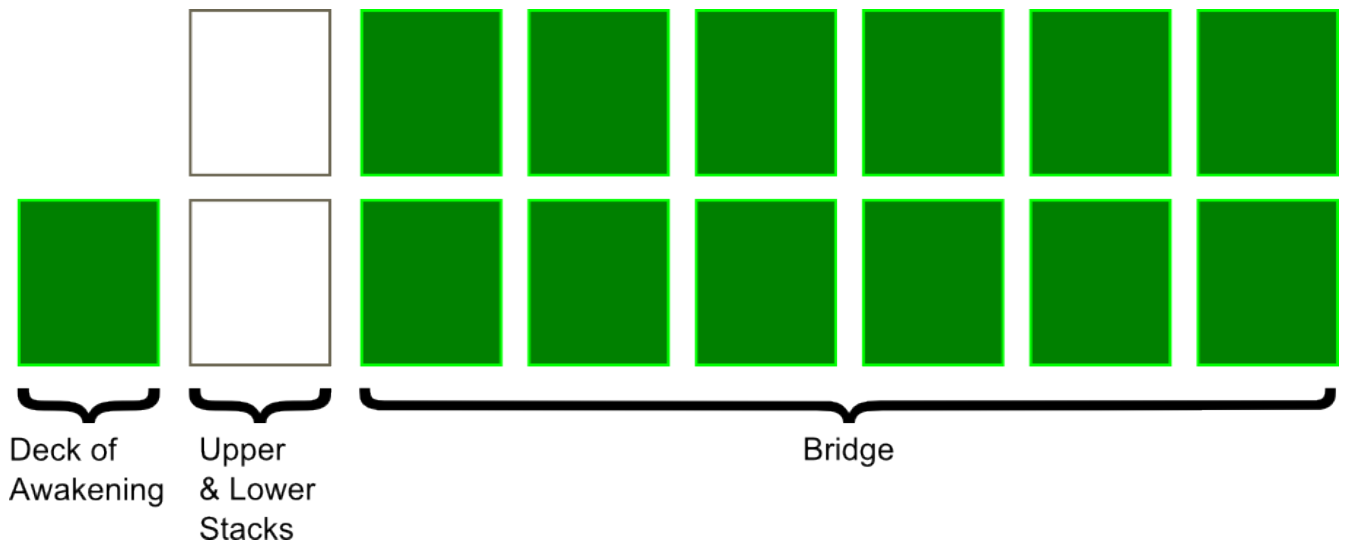
The bridge stands over a river, with a river bank on either side.



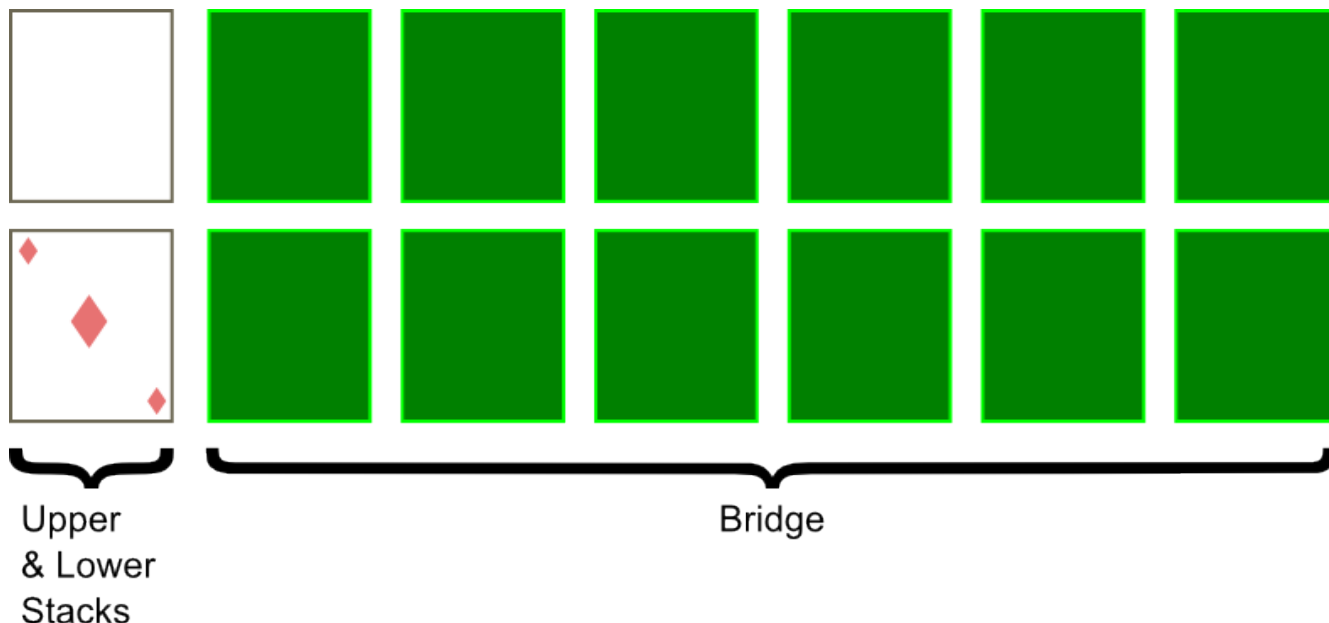
With cards as bricks, a row of a bridge is built with 3, 2, 1, 1, 2, and 3 cards in a row.



Two rows of bricks create a full bridge. The rest of the cards are set aside as the deck of awakening.

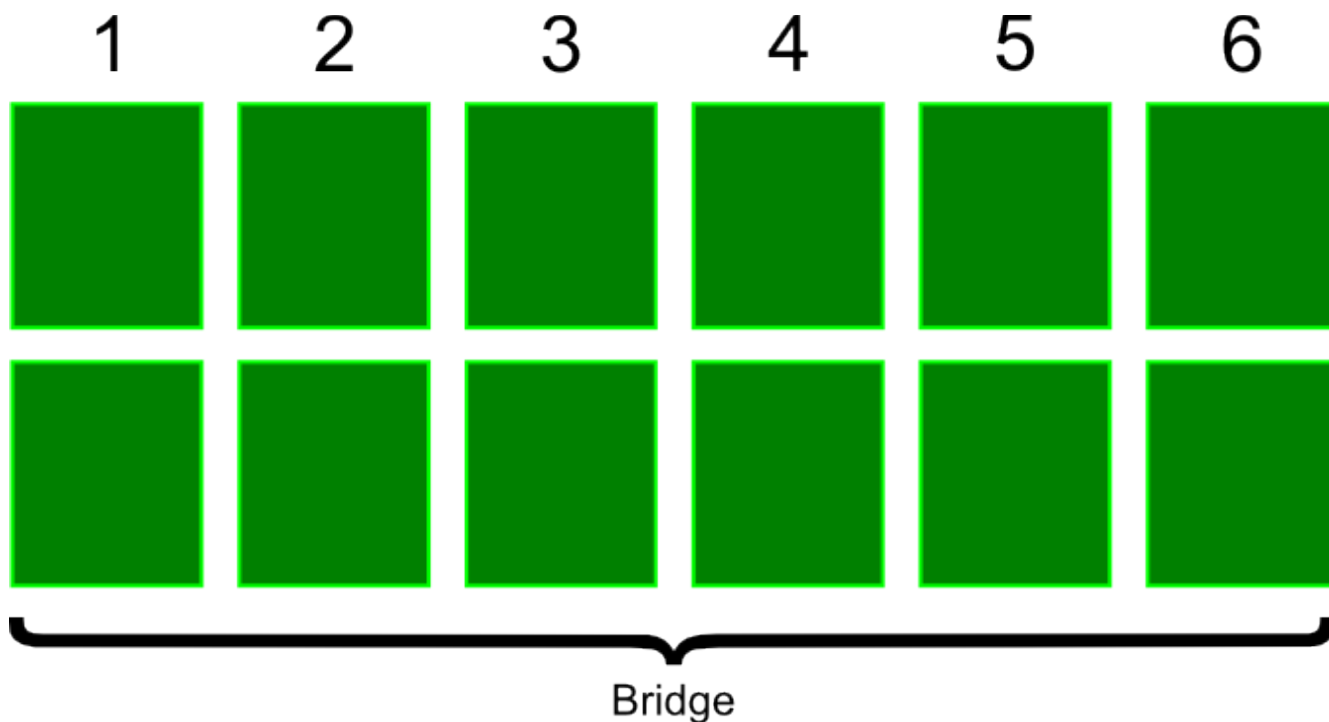


Before the first turn, a card is drawn from the deck of awakening and placed face up in the lower stack.



Only cards that match this first card's color can be played in the lower stack. Cards of the opposite color will be played into the upper stack. The stack a card is played into indicates which row is being used.

Each position of the bridge corresponds to a number on the die.



The die is rolled and the troll is placed into the row indicated by the card played into a stack (always the lower row for the first turn) and is placed into the position indicated by the number on the die.

## **The goal(s)**

### **The Angry Troll's goal:**

The troll wants to beat the bridge into submission, so it doesn't have to find a new bridge to live under.

### **The Magic Bridge's goal:**

The Magic Bridge wants to leave and be a bridge somewhere else.

### **Your goal:**

Help the troll have at least some semblance of a bridge to live under tomorrow.

## Playing a turn

Each turn has three phases:

1. Brick awakening phase.
2. Troll action phase.
3. Brick flight phase.

### **Brick awakening phase:**

Any cards set aside during the previous turn are played into the stacks one at a time. The card is always played into the stack that matches the color of the card, so that the lower stack contains all cards of one color, and the upper stack contains all cards of the opposite color. If no cards were set aside during the previous turn (such as on the first turn), a card is drawn from the deck of awakening and played into the stacks.

Each card is played into the stacks one at a time, and a die is rolled after each card. The brick in the row (determined by the stack played into) and in the position (determined by the die roll) will awaken. The card is turned from face down to face up. If the card was already face up, the card “flies away” and is immediately set aside for use in the next brick awakening phase.

### **Troll action phase:**

Every turn, the troll must take two actions. Actions can be movement, stomping, picking up a brick, using a brick, or laying down a brick.

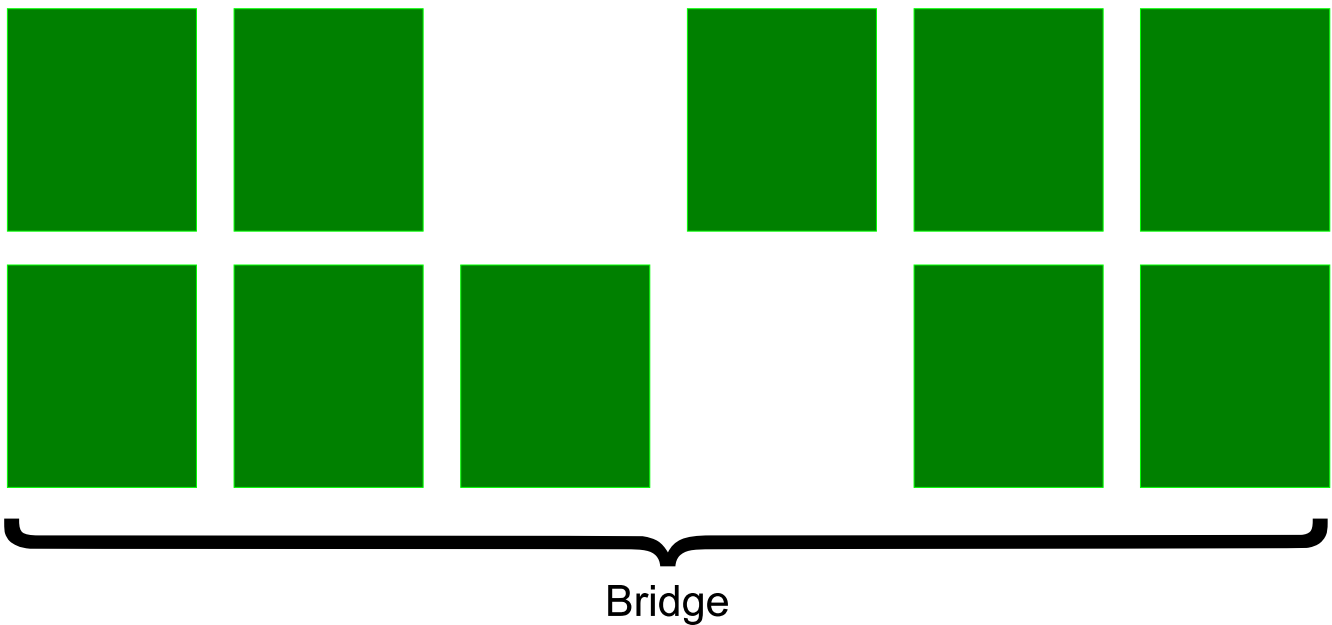
- **Movement** – The troll can spend one action to move one space up, down, left, or right. The troll must always be standing on a brick and cannot move onto the same brick twice in one turn.
- **Stomping** – If the troll is standing on an awakened brick, the troll can spend one action to stomp on the brick to make it dormant. Flip the card from face up to face down.
- **Picking up a brick** – If the troll is next to (not standing on) an awakened brick, the troll can spend one action pick up the brick for use later. Place the card on top of the troll token. The troll cannot pick up bricks that are hearts, because a troll cannot have a heart. It's a troll tradition. The troll can carry only one brick at a time.
- **Use a brick** – If the troll is carrying an awakened brick, the troll can spend one action to use it. The use depends on the suit of the awakened card. After use, the card is set aside for use in the brick awakening phase.
  - **Clubs** – If the troll is next to an awakened brick, the troll can use a club as a close-ranged weapon to beat the awakened brick and make it dormant. Flip the target brick's card from face up to face down.
  - **Diamonds** – The troll can throw a diamond up, down, left, or right as a throwing weapon to hit the first awakened brick in that direction to make it dormant. Flip the target brick's card from face up to face down.
  - **Spade** – If the troll is next to an awakened brick, the troll can use a spade as a shovel to flip the awakened brick up into the troll's hands as a dormant brick. Flip the target brick's card from face up to face down and place it on top of the troll token.
- **Laying down a brick** – If the troll is carrying a dormant brick (after using a spade), the troll can lay down the brick in a spot up, down, left, or right of the troll's current position. The brick must be laid down in one of the original bridge's positions.

**Brick flight phase:**

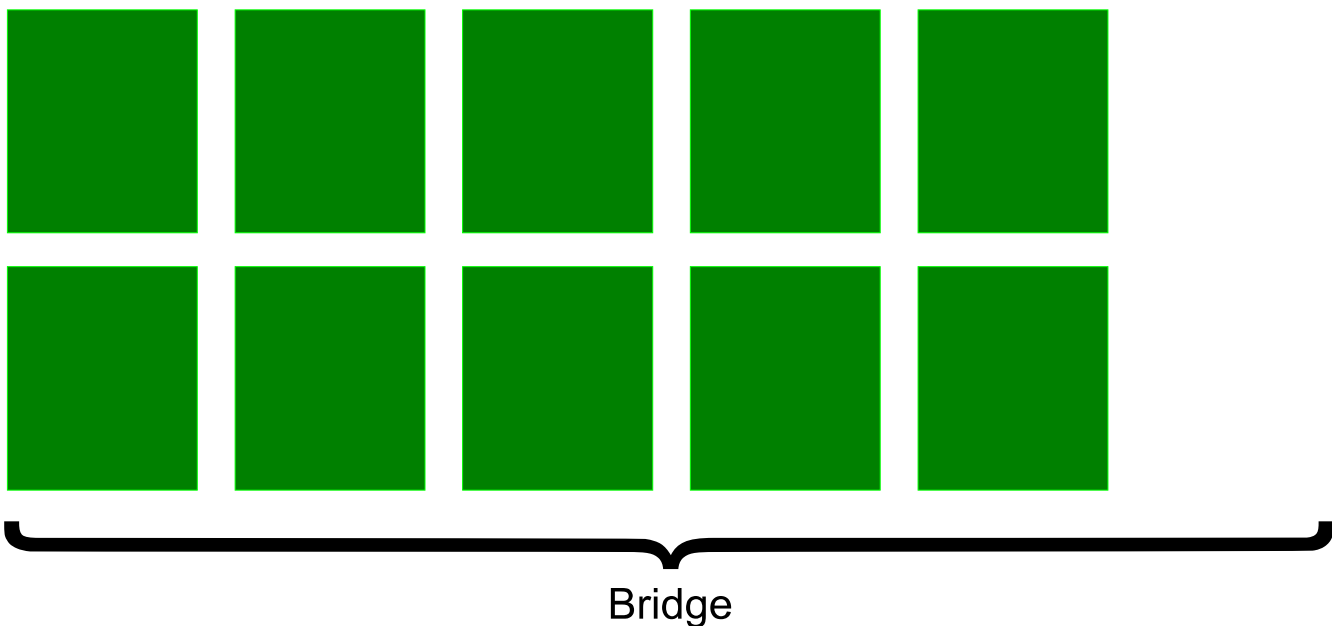
Each awakened brick attempts to flee. Bricks that the troll is standing on or carrying cannot flee. Bricks that can flee move one space left or right towards the closest bank not blocked by the troll. Any bricks that move beyond the bridge's original positions (1 – 6) and onto the river bank are set aside for use in the brick awakening phase.

After all awakened bricks attempt to flee, the bricks must be evaluated to see if the bridge collapses. Bricks must be touching sides to create a bridge between the two banks of the river.

If the bridge is not connected, the bridge collapses.



If the bridge does not have bricks at either end touching the river bank (positions 1 or 6), the bridge collapses.





## Winning

### **The troll wins if:**

...the deck of awakening is empty, all bricks on the bridge are dormant, and the bridge is still standing.  
The win is “perfect” if there are no gaps in the bridge.

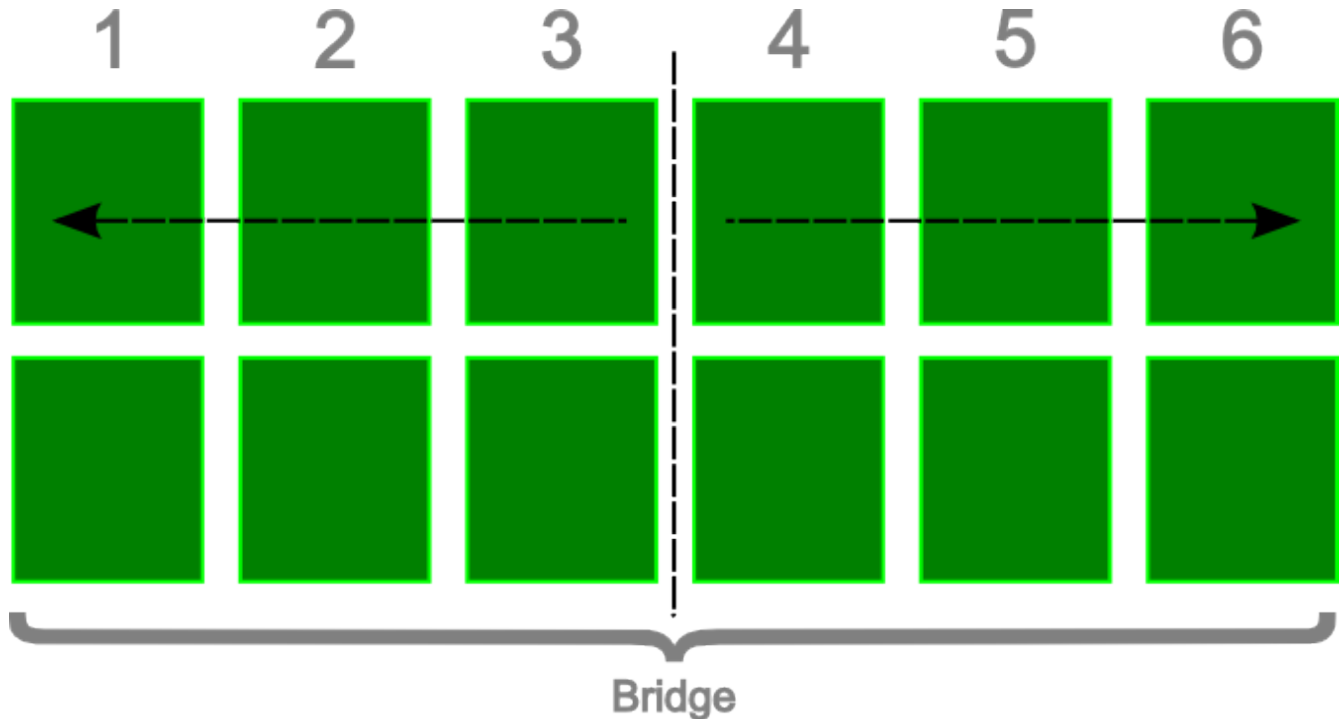
### **The bridge wins if:**

...the bridge collapses or if the troll is standing on an awakened brick that gets a second awakening and flies away (Hey, if the brick flies way, so does the troll standing on it!).  
Your score for the game is the number of cards left in the deck of awakening.

## Exceptions to the rules

### No brick there...

During the brick awakening phase, if the card and die roll indicate an empty location, the next brick closest to a bank is awakened instead. If no bricks are in that direction, the next card in the opposite direction is awakened. If no bricks exist in that row, no brick is awakened, and the troll action phase and the brick flight phase still happen.



### The deck of awakening is empty...

Hooray! You're really close to winning! You still have to continue playing the game until all bricks on the bridge are dormant. If you have a turn where no cards are set aside for the brick awakening phase, you skip the brick awakening phase and still have the troll action phase and brick flight phase. Good luck!

### THE CLUB (ace of clubs)

The ace of clubs is a special variant of a club. **THE CLUB** can be used like a normal club, but **THE CLUB** is not set aside for the brick awakening phase. Instead, **THE CLUB** can be used repeatedly, and no other brick can be picked up by the troll for the rest of the game.

## (7.2) Write “story” to wrap game.

*prereq: none*

I have started playing around with the idea of an angry troll who lives under a magic bridge. He's a troll, he must live under a bridge, but this magic bridge moves. The troll doesn't want to move, so he has to climb out from underneath the bridge and beat it senseless to keep it in place. Trolls aren't particular about the bridges they live under, so it's okay if the bridge is pretty beaten up when the troll is done. It does still have to be a bridge, though. I'm not sure why, but this seems to be an important part for trolls.

I could write up a bunch of this to suit my own fancy, but I would like to make sure the story suits others. A test was sent out (Test #3) to get some others' ideas about how a troll might feel or act. To get the ball rolling, the troll from the Three Billy Goats Gruff was chosen. I assume after being battered down, stomped flat, and thrown into a river, the troll from that story should be suitably angry for my purposes.

I wrote a quick little song that I imagine the troll singing to him-/her-self while trying to act big and tough. The song has acted as a nice locator point for the attitude of the troll.

### **I'm a troll**

Got a head on my shoulders  
I've got shoulders on my back  
I'm not shaking any hands  
I'm just handing out slaps  
I'm a troll  
I'm a troll

I've got stones in my stomach  
I've got stones in my spine  
I've got a pre-ci-sion watch  
So I can thump you on time  
I'm a troll  
I'm a troll

Gonna chew you up slowly  
'Till you're chewed up flat  
It doesn't matter if you're tasty  
I'm not picky like that  
I'm a troll  
I'm a troll

Bash  
Flat  
Stomp  
Splat  
Grump

Thump  
Eat  
Smack  
Chew  
Spit  
Tear  
Rip  
Boom  
Crash  
Troll  
Smash  
I'm a troll  
I'm a troll

## The story

Near an old Norwegian village, a troll climbed up from his bridge to make a quick and easy snack of a small goat that was foolishly attempting to cross the bridge alone. Unfortunately, the tables were turned when the small goat, its medium-sized brother, and their large brother teamed up.

A frightening troll, big and tough,  
Treated those on his bridge rather rough;  
But a big billy goat  
Dumped that troll in the moat  
In a manner both gruesome and gruff.

The troll managed to eventually crawl out of the river in order to seek out a new abode. Trolls must live under a bridge by decree of fairy tale narrative, so the troll trudged down the river to the next bridge. Fairies floated by singing little taunts to the troll.

“HELP! I have been beaten by the largest billy goat in the world with the sharpest horns and the roughest toes! Please help me find my way home so that I can cry on my mother's shoulder. I have sailed down a stream to a large lake and was taken down a river and into the big ocean. I am stranded on an island. Please send help!”

“Mr Troll should not have been so mean! If he had made friends with the goats, they could've shared meals and played together. I hope he learned his lesson and the next bridge he came to as he floated down the river that he decided to stay under, he would make friends and learn to eat grass!”

The troll grimaced a troll grimace (barely distinguishable from a troll smile), and attempted to ignore the fairies' laughter. “I have a bridge, so I'm still a troll. They will fear me if they try to cross! I'll eat them all up. See if I don't!”

Unbeknownst to the troll, however, was the fact that he had taken up lodgings under no ordinary

bridge. No, this new bridge was the legendary Magic Bridge. Each night, the bridge's bricks would awaken and migrate to a new river or stream. There, the awakened bricks would form a new bridge to delight tired travelers the next day by providing a crossing where previously none had been. What a wonderful Magic Bridge it was!

In the evening, the troll settled down for bed. No sooner had dreams begun to come (dreams of tasty goats with no horns) than the sound of bricks stirring reached the troll's ears. The troll could hear their little brick voices softly whispering, "It's time... it's time to move."

"Not on my watch!" the troll roared, see a repeat of its recent eviction playing out in the mind. The troll leaped up onto the bridge ready to beat into submission any brick that dared to move an inch! Thus begins our story.

## **(8) TEST GAME DOCUMENTATION**

*prereq: 7.1 started*

### **(8.1) Test rules comprehension.**

Test #7

## **(9) FINALIZE GAME DOCUMENTATION**

*prereq: 8 complete*

### **(9.1) Package up documentation into a single PDF document.**

### **(9.2) Create a quick-start rules PDF document.**

## **(10) PUBLISH GAME!**

*prereq: 9 complete*

# APPENDIX

## Test #1

### Email sent

#### Tester criteria:

- Testers must know how to set up a game of Klondike solitaire (aka Windows solitaire with seven stacks of cards, and a draw deck).

#### Materials required:

- 52-card deck of playing cards (no jokers or other “extra” cards)
- A digital clock or watch

**Time required:** no more than 15 minutes

**Instructions:** (Use your own discretion to interpret the instructions, but don't try to purposefully misinterpret. Vague or ambiguous directions are likely written that way on purpose.)

- Get out the deck of cards and place them in a single stack with all cards facing down.
- Write down the time, to the nearest minute.
- Repeat five times:
  1. Shuffle the deck seven times.
  2. Set up for a game of Klondike solitaire.
  3. Pick up all the cards and place them in a single stack
- Write down the time, to the nearest minute.

**Results:** (fill the following form out and reply to this email)

Start time:

End time:

## Results received

Start time: 2:28

End time: 2:35

Start time: 7:07 PM

End time: 7:12 PM

Start time: 7:22 pm

End time: 7:31 pm

Start time: 8:58 PM

End time: 9:03 PM

Start time: 15:25

End time: 15:29

Start time: 2:12

End time: 2:19

Start time: 2:17

End time: 2:23

## Test #2

### Email sent

#### Tester criteria:

- Testers must know how to set up and play a game of Klondike solitaire (aka Windows solitaire with seven stacks of cards, and a draw deck).

#### Materials required:

- 52-card deck of playing cards (no jokers or other “extra” cards)
- A digital clock or watch

**Time required:** no more than 10 minutes

**Instructions:** (Use your own discretion to interpret the instructions, but don't try to purposefully misinterpret. Vague or ambiguous directions are likely written that way on purpose.)

- Get out the deck of cards and place them in a single stack with all cards facing down.
- Write down the time, to the nearest minute.
- Shuffle the deck to your satisfaction.
- Set up for a game of Klondike solitaire.
- Play a single game of Klondike solitaire.
- Write down the time, to the nearest minute.

**Results:** (fill the following form out and reply to this email)

Start time:

End time:

Which of the following most closely describes your game result:

- a. I won.
- b. I ran out of moves and lost.
- c. I gave up, because I couldn't win.

Which of the following most closely describes how you feel about the length of your game:

- a. It was a short game.
- b. It was a long game.
- c. I don't feel strongly about picking 'a' or 'b'.

Which of the following most closely describes how you feel about the length of time spent setting up the game:

- a. The setup is fast.
- b. The setup takes too long.
- c. Given the length of the game, the setup feels about right



## Results received

Start: 2:36

End: 2:39

- b. I ran out of moves and lost.
- a. It was a short game.
- c. Given the length of the game, the setup feels about right.

Start time:7:15 PM

End time:7:22 PM

- b. I ran out of moves and lost.
- b. It was a long game.
- a. The setup is fast.

Start time:7:37 pm

End time:7:43 pm

- b. I ran out of moves and lost.
- b. It was a long game.
- b. The setup takes too long.

Start time:9:05

End time:9:07

- b. I ran out of moves and lost.
- a. It was a short game.
- a. The setup is fast.

Start time: 15:30

End time: 15:36

- b. I ran out of moves and lost.
- a. It was a short game.
- a. The setup is fast.

Start time: 2:16

End time: 2:25

- b. I ran out of moves and lost.
- a. It was a short game.
- a. The setup is fast.

Start time: 2:25

End time: 2:32

b. I ran out of moves and lost.

c. I don't feel strongly about picking 'a' or 'b'.

a. The setup is fast.

## Test #3

### Email sent

#### Tester criteria:

- none

#### Materials required:

- Access to the story of the Three Billy Goats Gruff ([http://americanfolklore.net/folklore/2010/10/three\\_billy\\_goats\\_gruff.html](http://americanfolklore.net/folklore/2010/10/three_billy_goats_gruff.html)).

**Time required:** no more than 20 minutes

**Instructions:** (Use your own discretion to interpret the instructions, but don't try to purposefully misinterpret. Vague or ambiguous directions are likely written that way on purpose.)

- Read the story of the Three Billy Goats Gruff.
- Write a short piece (no more than one page) about the troll **AFTER** the story. The piece can be in any form: a limerick, a haiku, a description of therapy sessions attended, a letter written home to mother... anything you can think of.
- If the fancy takes you, you can write multiple pieces, but keep each piece short.

**Results:** (place your written piece below)

## Results received

Mr Troll should not have been so mean! If he had made friends with the goats, they could've shared meals and played together. I hope he learned his lesson and the next bridge he came to as he floated down the river that he decided to stay under, he would make friends and learn to eat grass!

A frightening troll, big and tough,  
Treated those on his bridge rather rough;  
But a big billy goat  
Dumped that troll in the moat  
In a manner both gruesome and gruff.

HELP! I have been beaten by the largest billy goat in the world with the sharpest horns and the roughest toes! Please help me find my way home so that I can cry on my mother's shoulder. I have sailed down a stream to a large lake and was taken down a river and into the big ocean. I am stranded on an island. Please send help!

## Test #4

### Email sent

#### Tester criteria:

- none

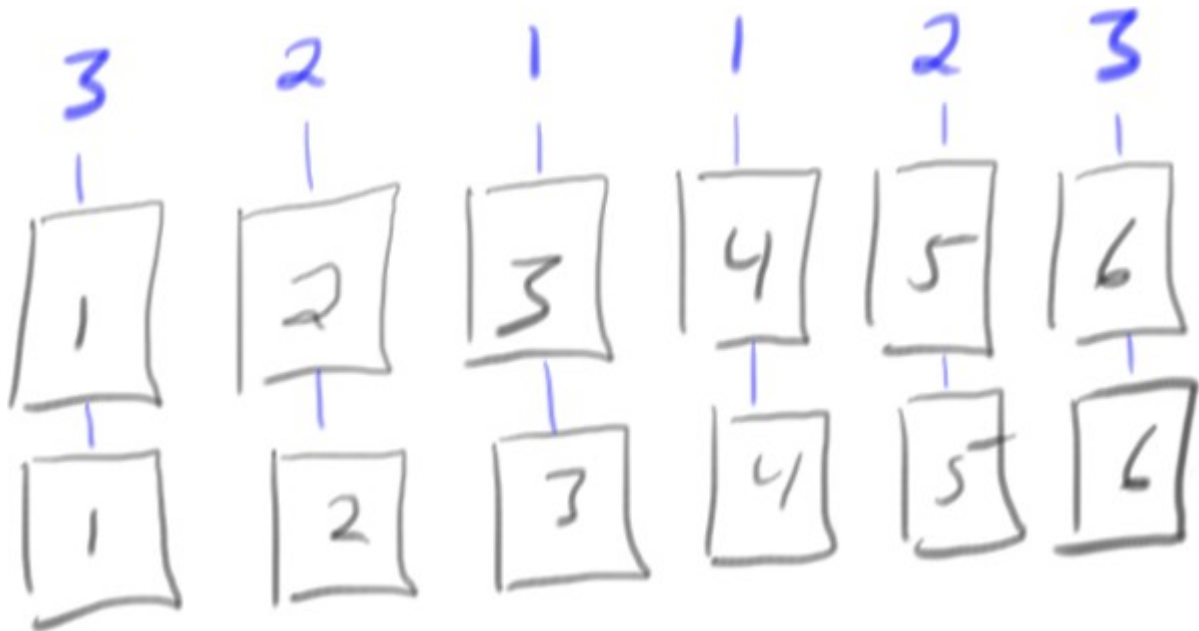
#### Materials required:

- 52-card deck of playing cards (no jokers or other “extra” cards)
- A six-sided die (standard die)

**Time required:** no more than 20 minutes

**Instructions:** (Use your own discretion to interpret the instructions, but don't try to purposefully misinterpret. Vague or ambiguous directions are likely written that way on purpose.)

- Get out the deck of cards and place them in a single stack face down.
- Shuffle the deck to your satisfaction.
- Create twelve stacks of cards in two rows of six. Place 3, 2, 1, 1, 2, 3 cards in the stacks right to left.



- Place the rest of the cards to the left of the stacks as a draw deck, leaving space for one stack in between (marked in blue).



- Turn the first card in the draw deck up and place it space 1, next to the bottom row.



- Roll the die and remove the top card from the stack on the bottom row that corresponds to the number on the die. For instance, if the die roll was 4, you would remove top card from the fourth stack on the bottom row.
- If the card removed is the same color as the card to the left of the bottom row, place it in the stack on top of the card. In the above case, if a red card was revealed, you would put the card on top of the red card in the bottom left. If the card is the opposite color, place that card in the space to the left of the top row.



- Repeat this ten times:

1. Turn over a card from the draw deck.
2. Place the card in the appropriate stack to the left of the rows. That is the row you will remove a card from.
3. Roll the die. That is the stack you will remove a card from.
4. Place the removed card face up on the appropriate stack color on the left.

**Results:** (fill the following form out and reply to this email)

How would you describe the instructions:

- a. They are simple.
- b. They are complicated.
- c. I don't feel strongly about choosing 'a' or 'b'.

How would you describe your understanding of the instructions:

- a. I understand them perfectly.
- b. It took some effort, but I eventually understood.
- c. I think I understand some of it, but I'm still confused.
- d. I don't understand them at all.

How would you describe the your ability to complete the instructions:

- a. I was able to complete them perfectly.
- b. I think I completed them correctly, but I'm not sure.
- c. I couldn't follow the instructions.

What was the most difficult part of these instructions?

## Results received

- c. I don't feel strongly about choosing 'a' or 'b'.
- b. It took some effort, but I eventually understood.
- a. I was able to complete them perfectly.

What to do if there are no more cards in a stack I'm supposed to take a card from. (My response was to just play on.)

- c. I don't feel strongly about choosing 'a' or 'b'.
- b. It took some effort, but I eventually understood.
- b. I think I completed them correctly, but I'm not sure.

I had empty spaces where I was supposed to take a card from on my last 2 turns and didn't know what to do.

- a. They are simple.
- a. I understand them perfectly.
- a. I was able to complete them perfectly.

The initial set up with the space to the left of the cards. It wasn't too difficult, though and the pictures in the e-mail made it clear.



## Test #5

### Email sent

#### Tester criteria:

- Must have access to a PDF reader.

#### Materials required:

- 52-card deck of playing cards (no jokers or other “extra” cards)
- A six-sided die (standard die)
- An object with a flat bottom and top that can be stood on top of a card (I chose a shot glass)

**Time required:** no more than 20 minutes

(instructions are in the attached PDF)

**Results:** (place your written piece below)

Count the cards in your draw deck, the face up piles at the left, and all of the face down piles of the bridge, and put them into the following table. The places correspond to the game setup.

-----							

How would you describe your understanding of the rules:

- a. I understand them perfectly.
- b. It took some effort, but I eventually understood.
- c. I think I understand some of it, but I’m still confused.
- d. I don’t understand them at all.

How would you describe the your ability to complete the instructions:

- a. I was able to complete them perfectly.
- b. I think I completed them correctly, but I’m not sure.
- c. I couldn’t follow the instructions.

Give a quick summary of what your game was like:

## Results received

-----	8	5	3	1	1	3	3
0	14	4	2	2	2	3	2

b. It took some effort, but I eventually understood.

b. I think I completed them correctly, but I'm not sure.

Very slow and unsure at first and constantly referring back to the pictures and text of your example game. It got to be more fun toward the end. I think my troll won.

-----							
0							

c. I think I understand some of it, but I'm still confused.

b. I think I completed them correctly, but I'm not sure.

The game play went pretty normal until I wasn't sure what to do when I had an empty space and no card to flip over. I was carrying a card to put in a hole so I put it in the hole during my turn. I also ran out of cards before 10 turns (I lost count of the turns so that I am guessing). I also wasn't sure what to do when I used a card and it went into the "discard" piles. After I rolled the die was I allowed to take my turn then? Still a little fuzzy on the rules.

-----	7	2	2	2	2	2	5
6	6	5	3	2	1	3	4

c. I think I understand some of it, but I'm still confused.

b. I think I completed them correctly, but I'm not sure.

I had a lot of spades and clubs come up and I was wishing for at least one diamond. The A of clubs foiled me again and ran off the board. At least of 4 out of my 10 turns were because of the magic bricks running off the board. I ended the game with only one magic brick facing up.

-----	4	4	3	2	2	3	5
4	9	3	3	0	2	3	5

b. It took some effort, but I eventually understood.

b. I think I completed them correctly, but I'm not sure.

I set up the game and played several turns but didn't think I was getting the whole picture. So, I re-read the instructions, started over and understood them better after the trial playing hand.

3 things I wrote down----The initial roll to place the troll then rolling again was missing in the abbreviated instructions so I had to go back and read that part again. -----I would like more specifics about what the different suits can do---how far can the diamond be thrown, what does he do with a heart, etc. -----This may have been in the instructions, but I wasn't sure what to do when I rolled a number (it happened with a 3) when I'm supposed to awaken a brick and there are no bricks in that spot.

## Test #6

### Email sent

#### Tester criteria:

- Must have access to a PDF reader.

#### Materials required:

- 52-card deck of playing cards (no jokers or other “extra” cards)
- A six-sided die (standard die)
- An object with a flat bottom and top that can be stood on top of a card (I chose a shot glass)

**Time required:** no more than 20 minutes

(instructions are in the attached PDF)

**Results:** (place your written piece below)

Count the cards in your draw deck, the face up piles at the left, and all of the face down piles of the bridge, and put them into the following table. The places correspond to the game setup.

-----							

How would you describe your understanding of the rules:

- a. I understand them perfectly.
- b. It took some effort, but I eventually understood.
- c. I think I understand some of it, but I’m still confused.
- d. I don’t understand them at all.

How would you describe the your ability to complete the instructions:

- a. I was able to complete them perfectly.
- b. I think I completed them correctly, but I’m not sure.
- c. I couldn’t follow the instructions.

**Give a quick summary of what your game was like:**

## Results received

-----	4	3	2	0	1	2	2
23	3	2	1	0	2	2	3

- b. It took some effort, but I eventually understood.
- b. I think I completed them correctly, but I'm not sure.

The set up is easy. What do I do with the cards that "fly"? The bridge fell before 10 moves. Remind me---if I roll a number and that card is already face up, does that card get set aside or does nothing new turn up?

-----	13	0	0	0	0	0	0
21	10	0	2	1	1	1	2

- c. I think I understand some of it, but I'm still confused.
- b. I think I completed them correctly, but I'm not sure.

I almost lost a few times but luckily I realized that stomping would save the game. As you can see, all of the cards on the "top" of my bridge disappeared so I wasn't sure what to do when I turned over a card from the draw deck that told me to roll the dice to flip a card in the top row. Also, I wasn't sure whether or not to count the card sitting on top of my shot glass on bottom row slot 2 so I didn't. This was not a lucky game!

-----	7	1	3	0	1	1	2
17	9	3	2	0	1	2	2

- a. I understand them perfectly.
- a. I was able to complete them perfectly.

Cards were awakening out of my troll's reach, so I lost fairly quickly when the bridge collapsed.

## Test #7

### Email sent

#### Tester criteria:

- Must have access to a PDF reader.

#### Materials required:

- 52-card deck of playing cards (no jokers or other “extra” cards)
- A six-sided die (standard die)
- An object with a flat bottom and top that can be stood on top of a card (I chose a shot glass)

**Time required:** no more than 20 minutes

#### Instructions:

- Read the attached rules document. (rules are in the attached PDF)
- Play one or more games of Angry Troll versus Magic Bridge.

**Results:** (place your written piece below)

How would you describe your understanding of the rules:

- a. I understand them perfectly.
- b. It took some effort, but I eventually understood.
- c. I think I understand some of it, but I’m still confused.
- d. I don’t understand them at all.

How would you describe the your ability to follow the rules:

- a. I was able to follow them perfectly.
- b. I think I followed them correctly, but I’m not sure.
- c. I couldn’t follow the rules.

How would you describe your experience playing the game? Was the game interesting or fun? Did you have any moments of tension? Tell what you are willing to tell:

Please provide feedback about the rules and how they were sufficient or deficient. If possible, offer improvements:

## Results received