# The Mimesis Effect: The Effect of Roles on Player Choice in Interactive Narrative Role-Playing Games

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## ABSTRACT

We present a study that investigates the heretofore unexplored relationship between a player's sense of her narrative role in an interactive narrative role-playing game and the options she selects when faced with choice structures during gameplay. By manipulating a player's knowledge over her role, and examining in-game options she preferred in choice structures, we discovered what we term the *Mimesis Effect*: when players were explicitly given a role, we found a significant relationship between their role and their in-game actions; participants role-play even if not instructed to, exhibiting a preference for actions consistent with their role. Further, when players were not explicitly given a role, participants still role-played – they were consistent with an implicit role – but did not agree on which role to implicitly be consistent with. We discuss our findings and broader implications of our work to both game development and games research.

### Author Keywords

Mimesis Effect; Roles; Player Choice; Interactive Narrative; Role-Playing; RPGs; Games; Role-Playing Games; Player Actions; Computer Games; Narrative Role

### ACM Classification Keywords

J.4. Social and Behavioral Sciences: Psychology; K.8.0. Personal Computing: General — Games; H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

## INTRODUCTION

Interactive narratives are a type of interactive experience in which users influence a dramatic storyline through actions by assuming the role of a character in a fictional world [31]. One of the key challenges of interactive narrative design [1] is achieving a balance between the story's coherence and the user's sense of *dramatic agency* – the satisfying power to take meaningful action and see the results of our decisions and choices [27]. The commercial state-of-the-art approach to this challenge is to author interactive narrative content for each of the user's actions that has a meaningful impact on the story's progress. However, the amount of interactive narrative content that must be authored to support this level of agency is exponential in the amount of ways the player can direct the development of the unfolding narrative [5]. For compelling experiences, this authoring becomes expensive and complex, requiring a significant amount of time to ensure that a high-quality experience is delivered [4, 26]. One approach to ameliorate the authorial combinatorics problem of interactive narratives is to understand and catalogue how players engage with interactive narrative artifacts. Through this understanding, designers could focus on incorporating game elements that will ever become relevant during interactive narrative play.

While character roles are tacitly assumed to affect a player's interactive narrative experience with respect to their in-game actions, no work exists to experimentally unpack this relationship. In this paper, we present a study aimed at distilling the relationship between a player's sense of her narrative role to the actions she selects when faced with *choice structures* during interactive narrative play. The experiment compares the gameplay of participants who engaged with an interactive narrative role-playing game (RPG) across three conditions. In the *no explicit role condition*, the participant's role was not made explicit, but rather was left unspecified. In the *assigned condition*, the participant was made explicitly aware of the role she was playing inside the interactive narrative world. In the *chosen condition*, the participant made a choice of what role she wanted to play. Importantly, in all conditions, every opportunity for interaction that was afforded to the participant allowed her to select an action that was either consistent or inconsistent with respect to a specific role.

We discovered what we term the *Mimesis Effect*. In conditions where the player was explicitly aware of her role, we found a significant relationship between the participant's role and her corresponding in-game actions; participants do in fact role-play, exhibiting a preference for in-game actions that are consistent with their role. Further, in the *no explicit role condition*, we found that participants were implicitly role-playing (acting in ways consistent with our fixed roles), but in aggregate they did not role-play as the same role. We also found that the *Mimesis Effect* was slightly stronger when players selected a role to play out as opposed to when they were assigned a particular role.


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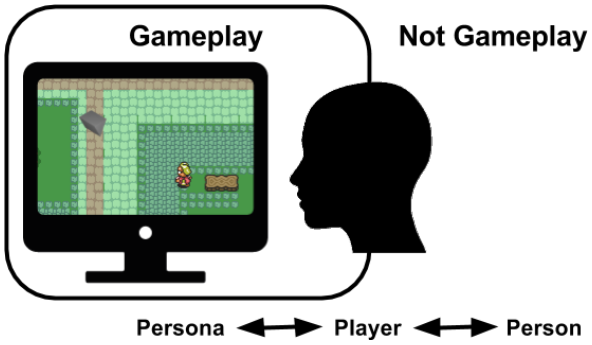


**Figure 1. Waskul and Lust's [36] *persona-player-person* boundaries. Prior work has studied actions as a function of a participant's *person* and *player* selves, but to our knowledge no work has studied actions as a function of their *persona*, which is what we analyze here.**

## RELATED AND PRIOR WORK

As defined by Mawhorter *et al.* [25], a *choice structure* consists of three things: a) the *framing*, which is the presentation of content prior to making the choice that influences how a player interprets it, b) the *options*, which are the discrete interface elements that lead to c) the *outcomes*, content that is presented after an individual option is chosen. Our work attempts to understand the relationship between the *framing* players experience with respect to in-game roles, and the *options* they select during the course of gameplay. A choice structure's framing context (which includes a player's narrative role) in conjunction with the presentation of specific options for action will have an effect on their eventual choice [34]. We were interested in discerning the individual effect of narrative role on choice, and controlled for other potential factors as discussed in the **STUDY DESIGN** Section.

Experimentally evaluating choices that participants make in interactive narrative role-playing games is a complicated task. Game participants construct and navigate symbolic boundaries between themselves and gameplay, often lying in the liminal spaces of the *persona-player-person* boundaries [36], illustrated in Figure 1. A participant in an interactive narrative role-playing game is at the same time: a) a *person*, with her own identity, beliefs, desires, intentions, and so on, b) a *player*, who is part of a social group and embedded in the culture and conventions of gaming, and c) a *persona*, a narrative "self" that exists in the interactive narrative's world.

Prior work in the study of the determinants of choice structures has primarily focused on the dimensions of *person* and *player*. With respect to the *person* dimension, existing work has looked at gameplay as a function of wanting to appeal socially [32], personal preference over game content [42], the psychology of players [12, 38, 41], among others. With respect to the *player* dimension, existing work has looked at gameplay as a function of the player's play style [33], the player's cohort [6, 14], the player's reasoning over in-game motivational affordances [24], among others. Our work is concerned with understanding an interactive narrative role-playing game's participant with respect to her (narrative-centric) *persona*. To our knowledge, no study has evaluated the effect of a player's sense of her narrative role on the options she selects in choice structures in an interactive narrative role-playing game. This is striking, since *there is tacit agreement that roles affect players during gameplay* [35, 37]; our work elucidates *how*.

## DEFINING INTERACTIVE NARRATIVE ROLES AND RPGS

A key challenge to our approach to understanding the impact of roles on player choice is coming up with a precise definition for the concept of *interactive narrative role* itself. Various disciplines in and around interactive storytelling have varying definitions and we do not necessarily care to settle the debate of what *is* and *is not* a role. However, to avoid making our claims vacuous, we discerned an operational definition of role upon which we anchor this study. Our definition draws from *narrative roles* as discussed within narratology.

### Narrative Roles

Prince [29] defines a *narrative role* as a "typical set of [narrative] *functions* performable by, and *attributes* attachable to, an entity." We focus on narrative functions since they are most closely linked to actions, and therefore choice. We were unable to find (neither in the HCI literature nor elsewhere) previously published work on narrative roles as we have defined them. The strength of our definition of role is that it is narratologically grounded; researchers who study narratives generally agree on what roles are conceptually, and these ideas guided our work, operationalization, and experimental design. This definition of narrative role is similar to that of HCI *personas*: "a pattern of user behaviors, goals and motives, compiled in a fictional description of a single individual" [3], which is a concept commonly used in the design of software systems. Narrative roles are different in that they are literary, and exist in fictional contexts with fictional behaviors, goals, and motives.

Propp [30] was the first to discuss narrative functions in his study of the Russian folktale when he identified two phenomena: a) the same story action can have different narrative functions in different story plots; *e.g.* "John killed Peter" may be considered a villainy in one story, or a heroic victory in another, and b) different story actions can have the same narrative functions in different story plots; *e.g.* "John killed Peter" and "The dragon kidnapped the child" may both be considered villainy. These examples assume "villainy" and "heroic victory" are themselves functions worth describing in some universal sense. However, a narrative function can be described more generally as a story action defined in terms of its significance for the course of action in which it appears [29]. Narratologists generally disagree on the number and type of narrative functions [20]. Without appealing to some fixed set of them, a narrative function could be extensionally regarded as a label that describes the relationship of an action to an action sequence in which it appears. If we consider narrative role to be in part defined by a *typical* set of narrative functions, then we can construe role as a *preference* for specific actions in action sequences. Transitively, a narrative role expresses a preference for action sequences themselves; given two action sequences, the one containing a higher proportion of preferred actions will itself be preferred.

### Interactive Narrative Role-Playing Games

Based on our definition that narrative roles express preferences over action sequences, we construe interactive narrative role-

playing games as a subset of interactive narratives (as defined by Riedl and Bulitko [31]) that afford opportunities for players to express multiple distinct preferences over in-game actions in action sequences. As noted by Yee [38], different role-playing games provide different affordances to express preferences over in-game actions, and these affordances affect how players engage with the in-game choice structures. Yee [40] also found that a player's personality traits characterizes her behavior in RPGs. Additionally, work on avatar customization, such as those by Ducheneaut [13] and Yee [39], shows that avatar identity affects player behavior. To avoid introducing spurious factors in our design caused by avatar appearance, we constrained avatar identity in our experiment as discussed in the **STUDY DESIGN** Section. Similarly, to control for extraneous variables, we did not provide affordances for players to express preferences via numerical attributes, instead opting for affording actions that are equally attractive in terms of mathematical utility. In our experiment, all game actions advance the story along the same causal progression toward the same conclusion; the difference is in the feedback received when a participant executes an action, which is unique for every action.

## STUDY DESIGN

Our work here construes roles as preference functions over actions in action sequences. In our context, *actions are constrained to mean options in choice structures*.[1] Given a set of choice structure options that are afforded in an interactive narrative role-playing game, roles are distinguished by the different preferences they express over those options. For a fixed set of available options, we would therefore expect the following hypotheses to be confirmed:

**H1: Choice Correspondence to Explicit Roles** – Given an explicitly communicated player role, game players will consistently (*ceteris paribus*) prefer specific choice structure options over others; namely those that they expect are dictated by *their role*.

**H2: Choice Correspondence to an Implicit Role** – In the absence of an explicitly communicated player role, game players will consistently (*ceteris paribus*) prefer specific choice structure options over others; namely those that they expect are dictated by *a role*.

**H3: No Preferred Role in Control Group** – In the absence of an explicitly communicated player role, game players will not consistently (*ceteris paribus* and relative to other players) prefer the same set of choice structure options over others; namely those sets of options that are mapped to particular roles.

In essence, we expected that an *explicit role serves as a tacit directive* to players in interactive narrative role-playing games; a player's sense of her narrative role is a way the game *scripts the interactor* [17] in the pursuit of actions that successfully complete the interactive narrative experience. We also expected that, in the absence of an explicit role, a player's personal preferences would guide the initial selection of actions, but that they would then remain consistent with prior choices, inspired by related work on consistency in decision-making from social psychology [8].

To test our hypotheses, we developed a custom interactive narrative role-playing game, and developed an experimental protocol around our custom game designed to evaluate how a player's awareness of narrative role affects her choice over choice structure options. Our study design involves two sequential phases. In the first phase, which we call the **VALIDATION PHASE**, we identified our assumptions regarding the design of our interactive narrative role-playing game (*i.e.*, our **GAME DESIGN REQUIREMENTS**), and carried out a survey to validate unwarranted assumptions (discussed in the **VALIDATION SURVEY** section). These assumptions reflect what we assume to be true about how players will engage with the choice structures in our game, which (if not controlled for) could represent potentially spurious factors in our experimental design. The validation phase directly affected our interactive narrative role-playing game's design, used for the second phase of our study, which we call the **EXPERIMENT PHASE**. Our hypotheses were directly evaluated in this latter phase, by operationalizing them in terms of the number and type of choice structure options that were selected by participants during gameplay.

### Target Population and Sampling

Our study design aimed to evaluate how a player's sense of narrative role affects her choice, by manipulating the player's knowledge over her role, and examining what in-game actions she preferred to do. The target population for this study was *interactive narrative role-playing game players at least 18 years of age*. As mentioned, the study had two sequential phases; the **VALIDATION PHASE** was conducted first and was used to inform and construct the materials used for the second phase, the **EXPERIMENT PHASE**. In order for results from the first to be applicable to the second, we used the same sampling frame. However, to avoid introducing biases, we stratified the sampling frame to distinguish and separate the sampling for each phase. Participants were recruited using a combination of convenience and snowball sampling.

For the **VALIDATION PHASE**, we recruited from the entertainment social network and news site Reddit. Our validation sample consisted of 231 subjects between the ages 15 and 60 ($M = 26.07$, $SD = 6.89$) where 77.73% were males. Our advertisement for recruitment targeted native English speakers, but we did not ask participants to self-assess their command of the English language. Of those recruited, 79.6% reported having played table-top role playing games, with more than half (52.6%) reporting that they play table-top role playing games frequently. Only 2.2% reported never having played computer or console role-playing games.

For the **EXPERIMENT PHASE**, we recruited from the Computer Science student body at the first author's institution, through social media, and through mailing lists. Our experiment sample consisted of 210 subjects between the ages 18 and 38 ($M = 21.02$, $SD = 3.4$) where 80% were males. Of those recruited, 56.67% reported having played table-top role playing games. 96.67% reported having played computer or

[1] Thus, choices are a specialized kind of action; a choice is an action in a choice structure context. Other types of actions could be analyzed (*e.g.* movement), but that is beyond the scope of this work.

console role-playing games, with more than half (70.48%) reporting that they play computer or console role playing games frequently. Of our sample, 85.71% were native English speakers with only 1.91% reporting having a limited English working proficiency.

## VALIDATION PHASE

In this phase, we identified requirements that our experiment's interactive narrative role-playing game had to satisfy. These requirements, which served as game design constraints, represented experiment factors we needed to control for to help guarantee that players engaged with the choice structures in our custom game as we expected. The last two of these three requirements were design decisions that needed validation in order to be satisfied. In this section, we discuss the requirements, the rationale for them, as well as the validation to satisfy the second and third requirements.

### Game Design Requirements

Our three requirements were developed to guarantee three things about how experiment participants would engage with the choice structures we developed in our game: a) that experiment participants would in fact treat our game as such (*i.e.*, our game satisfied external validity), b) that the roles we provided controlled for player biases *vis-à-vis* role, and c) that the actions we afforded in the game were easily recognizable as belonging to a role without having to telegraph the association to experiment participants during gameplay.

#### *Requirement #1: External Validity of Game Experience*

The game's design had to be elaborate enough to be treated as an interactive narrative role-playing game by experimental participants, but remain tractable to produce for our experiment. Satisfying this requirement controlled for the effect of choice outcomes in the gameplay experience.

Recent work [23] has demonstrated a shift in people's motivations when they are presented activities in a game-based framing, and we wanted to ensure that experiment responses were not inhibited due to the experience not feeling like a game. For Murray [27], the key qualities of interactive narratives are *navigable space*, *encyclopedic capacity*, *procedurality*, and *participation*. Our game affords all these except *encyclopedic capacity*, due to the relatively small scope demanded by a highly-controlled experimental environment. Of the remaining qualities, *participation* is the quality most closely linked to player action. Ensuring that a player's sense of participation in our environment is undiminished requires the maintenance of her sense of *dramatic agency* – the satisfying power to take meaningful action and see the results of decisions and choices [27]. However, the amount of interactive narrative content that must be authored to support dramatic agency is exponential in the amount of ways the player can direct the development of the unfolding narrative [5]. To keep the authorial burden tractable for our study, while providing an interactive narrative experience that would be treated as such by experimental participants, we leveraged the *illusion of agency* as studied by Fendt *et al.* [16]. Their work attempted to discern a player's sense of dramatic agency on the basis of the feedback player's received through a choice structure's outcomes in an interactive narrative (a text-based choose-your-own-adventure). Fendt *et al.*concluded that simply acknowledging (in their case, through textual feedback) a player's choice after she selected a particular option is enough to create the illusion of agency, even if her choice has no other effect on the progression of the interactive narrative.

We did not seek to validate this requirement in our experimental design, since we were building on well-established work [7, 16]. However, we did add distinct feedback for every action. Because we afforded a graphical navigable space in our game, the feedback we provided was visual rather than textual, but otherwise the principle of the illusion of agency was applied in the same manner.

#### *Requirement #2: Controlling for Player Role Biases*

Due to the nature of role-playing games, roles are very fluid in terms of their behaviors and composition [10, 36]. We wanted to experimentally test whether a player's awareness of her role had a meaningful effect in terms of her action selection when faced with a choice structure, independent of which role was being examined. If some roles express distinct but similar preferences over action sequences, or if the roles carry with them a tacit association with a particular gender or behavior alignment,[2] spurious correlations may be introduced into the analysis. This would affect the choice structure's *framing*, since the framing context would be wider than just the player's sense of her narrative role with respect to narrative structure (it would include for example, gender expectations or behavioral alignment expectations). We therefore needed to select roles that had negligible overlap in terms of their characteristics, such that they were recognizably distinct, and for which there existed no *a priori* association with a gender or behavior alignment.

Because of the popularity and influence of the tabletop role-playing game *Dungeons & Dragons* [10], we chose to use it as the basis for narrative roles in our game. *Dungeons & Dragons* (D&D) is set in a fantasy genre, which commonly uses supernatural phenomena as a primary plot element. While D&D invites players to extensively customize their in-game persona, the player must first select one role from a finite set of character roles in the game to use as a baseline for that persona [19]. D&D supports many roles to choose from; for the purposes of our experiment, we needed to select roles that shared little overlap in the kinds of choice structure options they would take, and in the kinds of attributes associated to them. This is so there was a clear distinction between the afforded roles, and so that a player could make the distinction with as little effort as possible. We arbitrarily selected three distinguishing attributes for characters: strong, magical, and stealthy. These attributes led to the following three roles for our study: *Fighter*, *Mage*, and *Rogue*, which are related to each other as illustrated on the triad in Figure 2. The in-game descriptions of these roles were designed as schematized paragraphs, exactly three sentences long. The first and third sentence of each paragraph was taken from that role's description as written in the D&D Player's Handbook

[2]Behavior alignment in this case refers to whether the roles were considered to be intrinsically *good* or *evil*.

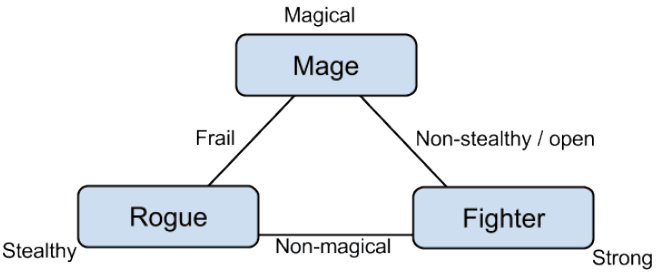


**Figure 2. Our triad of role-attribute mappings. We selected three attributes and identified three corresponding roles we felt best represented the attributes. Nodes represent role-attribute mappings, and edges are attributes shared between the connected role-attribute mappings. The edge opposite a node is the antonymic attribute to the node's role-attribute.**

(4th Edition) [19, p. 15]. The second sentence was designed to make clear the relation of that role in the triad in Figure 2. These descriptions make clear the relations in the triad, as well as to refer to types of actions that those roles *typically*, but not *necessarily* take. Each description was as follows:

**Fighter** – "Fighters are experts in armed combat, relying on muscle, training, and pure grit to see them through. While they are not stealthy or magical, they are strong. They typically mix it up in close combat, protect their companions, and hack enemies into submission while their attacks rain down fruitlessly on their heavily armed bodies."

**Mage** – "Masters of potent arcane powers, mages disdain physical conflict in favor of awesome magic. While they are not strong or stealthy, they are magical. They typically hurl balls of fire that incinerates their enemies, cast spells that change the battlefield, or research arcane rituals that can alter time and space."

**Rogue** – "Thieves, scoundrels, dungeon-delvers, jacks-of-all-trades – rogues have a reputation for larceny and trickery. While they are not strong or magical, they are stealthy. They typically slip into and out of the shadows on a whim, tumble across the field of battle with little fear of enemy reprisal, and appear from nowhere to plant a blade in their foe's back."

To validate that our choice of role attributes, role descriptions, and role gender and behavioral alignment biases for our game would be perceived as intended by participants of the **EXPERIMENT PHASE** of our study, we conducted a survey that is discussed in the **VALIDATION SURVEY** Section.

#### *Requirement #3: Actions are Recognizably Role-Specific*

The actions (*i.e.* choice structure options) that we afford during gameplay must be easily recognizable as belonging to a role without having to telegraph the association to experiment participants during gameplay. We did not want to overtly signal to the player the association of in-game options to roles, to avoid implying (through the game's interface) that the game expected them to select a particular option (especially in the experiment conditions where the participant is explicitly made aware of her role). We wanted the player to select whatever option "felt natural" for her throughout the narrative's development, without instructing her to role-play.

Because actions could be interpreted differently by different people, we needed to ensure that, even without narrative context, game players identify our action choices as typical of the specific roles that were afforded in our game. Like for our selection of interactive narrative roles, we identified a set of candidate actions based on D&D. Our candidate actions were inspired by the actions that the D&D Player's Handbook (4th Edition) [19, p. 176] identified as afforded to our selected roles. To validate that our action choices would be perceived by participants of the **EXPERIMENT PHASE** as typical of the roles we designed them to match, we conducted a survey that is discussed in the **VALIDATION SURVEY** Section.

### Validation Survey

We conducted an online survey in order to validate the design decisions that were taken to satisfy requirements #2 and #3 for our game's choice structures with respect to their framing of our three roles: Fighter, Mage, and Rogue. For the *validation of role attributes*, we asked survey participants to check from the list of three afforded roles which ones satisfied the presented role attributes (strong, magical, stealthy) as well as the antonymic attributes (frail, non-magical, non-stealthy). For the *validation of role descriptions*, we took each role's three sentence description and for each sentence asked survey participants to name the role that best matched the sentence. For the *validation of gender and behavioral alignment perception*, we asked survey participants to identify what gender and behavioral alignment they considered each role to be mostly associated with. For the *validation of actions*, we asked participants to select the role that is most likely to execute the action (which will be presented in the experiment as a choice structure option). Of the 231 participants that completed this survey, we used the Fleiss' Kappa [18] statistic to evaluate inter-rater agreement for the 192 that answered all of the questions. We obtained a value of $\kappa = 0.801$ – an almost perfect agreement per Landis and Koch [22]. The survey randomized the presentation of all questions. We discuss our results for each portion of the survey below.

#### *Validation of Role-Attribute Mappings*

Participants were asked to identify, of the three roles, which one(s) were associated to each of the attributes individually (strong, magical, stealthy, frail, non-magical, non-stealthy). Participants could select multiple roles for each attribute, if they felt that attribute was applicable to multiple roles. This section was designed to validate that our role-attribute mappings would be perceived as identified in Figure 2. In general, participants agreed with our role-attribute triad, identifying that: a) Fighters are generally strong (99.1%), non-stealthy (94.7%), and non-magical (97.3%), b) Mages are generally frail (97.8%), non-stealthy (59.7%), and magical (100%), and c) Rogues are generally not strong (30.8% considered it frail, but only 19.2% considered it strong), stealthy (98.7%), and non-magical (69.3%).

#### *Validation of Role Descriptions*

Participants were presented with each of the three sentence role descriptions we developed, one sentence at a time. For each sentence, the participant was asked to provide the name of the role that best matched the sentence. In general, participants correctly identified the role that matched the description for each individual sentence. The three sentences in the Fighter

| Choice | Fighter | Mage | Rogue |
|---|---|---|---|
| 1 | Battleaxe (99.6%) | Staff (99.6%) | Set of Daggers (97.8%) |
| 2 | Shake Tree (78.5%) | Levitate (98.7%) | Acrobatic Climb (97.4%) |
| 3 | Charge! (98.2%) | Sleep Spell (96.9%) | Hide (96.9%) |
| 4 | Smash (99.1%) | Disintegrate (96%) | Acrobatic Jump (96.9%) |
| 5 | Intimidate (92.1%) | Mind Control (98.2%) | Bluff (90.4%) |
| 6 | Brute Strike (98.7%) | Arcane Missile (95.6%) | Silent Strike (98.7%) |
| 7 | Fierce Blow (98.2%) | Frostbolt (99.1%) | Finesse Strike (81.2%) |
| 8 | Share war stories (98.7%) | Cast party tricks (83.8%) | Tell him what he wanted to hear (90.8%) |
| 9 | Crushing Blow (97.8%) | Fireball (98.7%) | Sneak Attack (98.7%) |
| 10 | Endure (92.1%) | Ice Shield (98.2%) | Dodge (93.4%) |
| 11 | Skullcrusher (97.8%) | Blizzard (98.7%) | Poison (91.7%) |
| 12 | Bearhug (97.8%) | Freeze (98.7%) | Trap (91.7%) |

**Table 1. Choice point options in the order they were presented in the game. The value in parentheses indicates the level of agreement of the assignment of a particular choice option to its particular role.**

description were attributed to the Fighter role by 98.3%, 96.5%, and 92.6% of the respondents, respectively. The three sentences in the Mage description were attributed to the Mage role by 100%, 99.6%, and 98.7% of the respondents, respectively. The three sentences in the Rogue description were attributed to the Rogue role by 99.1%, 98.7%, and 99.1% of the respondents, respectively.

*Validation of Role Gender and Behavioral Alignment*

Participants were asked to identify, for each role, an association to a particular behavioral alignment (good, evil, neutral, or none). Fighters were mostly considered to have a neutral or no alignment (79.5%), with 20.4% considering them good and 0% considering them evil. Mages were also mostly considered to have a neutral or no alignment (89.5%), with 9.6% considering them good and 0.9% considering them evil. Similarly, Rogues were mostly considered to have a neutral or no alignment (84.7%), with 0.4% considering them good and 14.8% considering them evil. Participants were also asked to identify an association of roles to genders (male, female, others, or none). Regarding alignment to specific genders (male, female, or others), Fighters were regarded as male by 44.3% of the respondents, and female by 0.4%. Mages were regarded as male by 8.3% of the respondents, and female by 3.1%. Similarly, Rogues were regarded as male by 10.4% of the respondents, and female by 6.1%.

*Validation of Action Choices*

Participants were asked to select, for each individual action, the role most likely to execute that action. The results for the ratings are summarized in Table 1. This table presents for each choice structure (row in the table, 12 total), the choice structure option that corresponds to the particular role (column in the table, three per choice structure), and the percentage of survey participants that agreed that the cell was a match for the column. As shown on this table, our game only included actions that were individually agreed upon by at least 78.5% of participants, with the average agreement being much higher.

## EXPERIMENT PHASE

Taken together, the results of the VALIDATION PHASE indicated that participants held no significant biases with respect to the roles we used in our interactive narrative role-playing game, and that the actions we afforded in our game were recognizable as representative of the respective roles we designed them to be. Given these favorable results, we felt justified in assuming that players will engage with our in-game choice structures primarily guided by their sense of narrative role. We therefore deployed an experiment to discover the heretofore unexplored relationship between a player's sense of her narrative role to the options she selects when faced with choice structures during interactive narrative play. The remainder of this section outlines our approach.

| Role Type | Role | Participants |
|---|---|---|
| Assigned role | Fighter | 26 |
| | Mage | 27 |
| | Rogue | 25 |
| Chosen role | Fighter | 25 |
| | Mage | 34 |
| | Rogue | 32 |
| No role | | 41 |

**Table 2. Distribution of participants across experiment conditions.**

### Method

Our study used a $3 \times 2$ factorial design plus a control group. One factor has three levels for the roles in the game (Fighter, Mage, or Rogue). The other factor differentiates conditions where participants chose their role to play (*i.e. chosen condition*), from conditions where participants were randomly assigned a role to play (*i.e. assigned condition*). We introduced these factors to see if there was a meaningful difference when the explicit role was adopted voluntarily versus when it was assigned by the game itself. Both the *chosen* and *assigned* conditions constituted a broader factor in the experiment, namely conditions of the experiment where the participant's role was *explicit*, compared to our control condition in which the participant's role was left unspecified. In our control group, participants were neither assigned a particular role nor given the ability to choose one explicitly. The game itself was identical for all participants. Table 2 contains the distribution of the 210 participants across conditions.

We had two independent variables in our experiment: *player awareness of role* and *player's role*; if the player is not explicitly aware of a role they're playing, the value of the

**Figure 3. The player's avatar, which was modeled after Perlin's *Polly* [28] to avoid the *Proteus Effect* [39] – the phenomenon that users conform to expected behaviors associated with an avatar's appearance.**

second independent variable is undefined, as is the case for the control group. The player's awareness of role is either *explicit* (for the chosen/assigned factors), or *not explicit* (for the control group). The player's role (applicable only for the explicit conditions) is either Fighter, Mage, or Rogue. We had one dependent variable in our experiment: *selected player options* (*i.e.* actions) at every choice structure. Every participant in our experiment encountered the 12 choice structures that appear in Table 1; every participant contributes 12 data points for the experiment. We are assuming all choice structures are equal in terms of relevance to the player's option selection. Given our three hypotheses, we expected to see the following trends in terms of our dependent variable as a function of manipulations to our independent variables:

**H1: Choice Correspondence to Explicit Roles** – For participants explicitly aware of their role, we expected a high count of actions associated to the participant's explicit role, and a low count of actions associated to other roles.

**H2: Choice Correspondence to an Implicit Role** – For participants in the control condition, we expected that each participant would select a significant number of actions that were consistent with *one* role, regardless of which. Each participant should produce a high count of actions associated to one role, and a low count of actions associated to other roles.

**H3: No Preferred Role in Control Group** – For participants in the control condition, we expected that, in aggregate (*i.e.* across all participants in that condition), the total counts for actions associated to each of the roles would be relatively even, and neither high nor low.

### *Apparatus*

The game was developed using the Impact.js[3] JavaScript game engine, and was hosted online. The game requires keyboard input exclusively, and was designed to reflect a control scheme that is typical of computer-based games. Keys 'W', 'A', 'S', and 'D' (alternatively, the arrow keys) moved the character up, left, down, and right, respectively. The 'E' key was a context-sensitive action button that enabled players to interact with non-player characters (NPCs) they were proximal to, and the 'Spacebar' key advanced dialog. The game interface alerted when each key was available to be pressed in the player's context (*e.g.* "Press 'E' to talk", "Hit space to continue"), as demonstrated in Figure 5.

### *Stimuli*

Our game[4] is a one-player interactive narrative role-playing game; see Figure 8 for a synopsis of the game's plot. To avoid the *Proteus Effect* [39] – the phenomenon that users conform to expected behaviors and attitudes associated with an avatar's appearance – the playable character's avatar was modeled after Perlin's *Polly* [28], a gender-neutral anthropomorphic geometric shape. Figure 3 shows a portion of the sprite sheet we used to animate the player's avatar motion. The game used a 2-dimensional top-down view with oblique projection as shown in Figure 4. The camera follows the player's movement so that her character's avatar is always centered on the screen. Carried items, such as the player's weapon, were displayed in an inventory box on the bottom-right corner of the game screen. The inventory box was always visible during gameplay.

**Figure 4. Screenshot of a sample in-game level environment.**


**Figure 5. Screenshot of a sample in-game dialog box.**

As the story unfolds, players face a series of 12 choice structures with consistent ordering across all participants. In each choice structure, the player must select one out of three options, with each option corresponding to one of the three afforded roles (Fighter, Mage, or Rogue). All choice structures, along with their associated options, and mappings between options and roles are listed in Table 1. Importantly, participants are not explicitly informed of the mapping between choice structure options and roles. Instead, the game interface only presents the names of the options, as illustrated in Figure 6. The order in which the three actions were presented at each choice point was randomized using the unbiased *Fisher-Yates* shuffle algorithm [15] at the time the choice point was activated. Regardless of role alignment, each action in every choice point always succeeded and resulted in the same narrative progression in the game. Players were unaware of alternate narrative progressions because they were forbidden

[3] http://impactjs.com/

[4] The reader is encouraged to play along! The game is available here: http://go.ncsu.edu/ixd-demo-rpg


**Figure 6. Screenshot of a sample in-game action selection screen.**

**Figure 7. Screenshot of a sample in-game cutscene.**

to play the game more than once. To provide a sense that the choice had a meaningful impact in the story, a static image cutscene was presented for three seconds immediately after every choice with an illustration of the selected action being performed. This acknowledgment of choice was shown by Fendt *et al.* [16] to be enough to preserve player agency; an important characteristic of meaningful play experiences [23]. An example cutscene is shown in Figure 7. To give the narrative context for these choice structures, we provide a synopsis of the game's plot in Figure 8; the numbers preceding some of the sentences in the synopsis correspond to the choice structures that the player encountered to resolve the plot point described by the sentence.

### *Procedure*

Participants engaged with the experiment via the Internet. After obtaining informed consent, participants completed a demographic information survey. Participants were then randomly assigned to one of the experimental conditions. Next, participants were presented with a description of the fantasy setting of the game. This description was presented to all experimental conditions, and included the three role descriptions as written in the **GAME DESIGN REQUIREMENTS** Section. However, these descriptions were framed as "*characters* that could be encountered in the world" (emphasis added). Participants in the *chosen* and *assigned* conditions were then associated to a specific role.

*In the beginning, the player encounters a kingdom Green Guard, who informs the player that the* Crown of Power *has gone missing; without it, the kingdom cannot crown a new king to replace the old king who passed away.* **(1)** *The guard gives the player a coupon for a weapon at the local shop and tells the player to meet him at the castle.* **(2)** *Along the way, the player encounters a denizen who is attempting to rescue her cat from atop a tree.* **(3)** *After rescuing the cat, the player encounters a set of bandits who are blocking the path.* **(4)** *When the bandits are dealt with, the player encounters a large tree-stump that blocks the way.* **(5)** *Having dealt with the tree-stump, the player arrives at the castle, and is interrogated by guards – they question the task the Green Guard entrusted upon you. With the guards managed, the player enters the castle and meets the king's councilor, who urges to find the missing crown, since he does not desire to be the land's steward. The player meets the Green Guard, who indicates that the crown is being guarded by a dragon, and that the player should seek the dragon slayer to help. The dragon slayer reveals that an enchanted weapon is needed to defeat the dragon.* **(6, 7)** *To enchant the weapon, the player must defeat a manticore and bring the beast's heart to a witch who requires it as an ingredient for an enchantment spell.* **(8)** *The witch tests the player's character, and then proceeds to enchant the weapon.* **(9, 10, 11)** *Armed with an enchanted weapon, the player travels to face the dragon. Upon slaying the dragon, the player recovers the crown of power. However, on the way back to the castle, the player encounters the king's councilor who reveals that he gave the crown to the dragon, in order to be the land's steward for perpetuity.* **(12)** *The councilor attempts to make an escape, which is foiled by the player. In the epilogue, the newly anointed king names the player the new councilor for the kingdom and the game ends.*

**Figure 8. Plot synopsis for our game. Numbers preceding some of the plot points correspond to choices the player encountered to resolve that plot point, enumerated in Table 1.**

In the *chosen* condition, participants were presented with an additional screen that prompted them as follows: "In this game you will have one of the following *roles*. Please read the descriptions carefully and choose the *role* you would like to have" (emphasis added). In the *assigned* condition, participants were shown an additional screen that indicated the following: "In this game you will have the following *role*. Please read the description carefully" (emphasis added). All role descriptions were presented in random order. Participants in all conditions were then tasked to play a tutorial level to familiarize themselves with the game, which required them to move their avatar in all directions, advance dialogs, make choices, interact with NPCs, and understand the inventory system. After completing the tutorial level, the actual game began. Participants were required to complete the game in order to proceed. After completing the game, participants completed the interest/enjoyment sub-scale of the Intrinsic Motivation Inventory (IMI) [11].

## ANALYSIS AND RESULTS

To assess external validity with respect to the participants' engagement throughout our experiment, we looked at our sample's IMI scores across conditions. The mean score across the sub-scale for all conditions fell close to the middle point of the 7-point Likert scale. Specifically, the overall scores were [$M = 4.3$, $SD = 1.6$], [$M = 4.4$, $SD = 1.6$], [$M = 3.8$, $SD = 1.8$], [$M = 3.4$, $SD = 1.8$], [$M = 3.4$, $SD = 1.8$], [$M = 4.2$, $SD = 1.7$], [$M = 3.4$, $SD = 1.8$] for questions 1-7, respectively. This means that our participants on average did not express strong feelings regarding their enjoyment of the study (full results are omitted due to space limitations).

### H1: Choice Correspondence to Explicit Roles

To test our hypothesis that, given an explicitly communicated player role, game players will prefer actions that they

| Explicit Role | Fighter Actions | Mage Actions | Rogue Actions |
|---|---|---|---|
| **Fighter** | 402 (65.7%) | 76 (12.4%) | 134 (21.9%) |
| **Mage** | 71 (9.7%) | 557 (76.1%) | 104 (14.2%) |
| **Rogue** | 84 (12.3%) | 123 (18.0%) | 477 (69.7%) |
| **No Role** | 108 (22.0%) | 188 (38.2%) | 196 (39.8%) |

**Table 3. Number of actions chosen by participants with explicit roles that corresponded to each of the roles. In parentheses, the proportion of each value for each player role (row). Players were significantly consistent with their explicit roles ($\chi^2$ = 1286.3, $p < 0.0001$, $\phi_c = 0.563$).**

| Explicit Role | Consistent | Inconsistent |
|---|---|---|
| **Chosen** | 822 (75.3%) | 270 (24.7%) |
| **Assigned** | 614 (65.6%) | 322 (34.4%) |

**Table 4. Number of actions chosen by participants with explicit roles based on whether their role was chosen or assigned. In parentheses, the proportion of each value for each condition (row). We found a statistically significant (but small) increase in consistency when players chose their role ($\chi^2$ = 22.365, $p < 0.0001$, $\phi_c = 0.106$).**

expect are dictated by their assigned or chosen role (**H1**), we calculated the number of actions each participant chose corresponding to each of the three roles, and then grouped them by the participant's explicit role. As expected, participants chose more actions that align with their game roles than actions from the other roles, as shown in Table 3. To evaluate the significance of these results we conducted a Chi-square test with Yates' continuity correction which revealed that the choices made by participants (excluding our control group) were significantly consistent with their explicit role (assigned or chosen) ($\chi^2(df = 4, N = 210 * 12)$ = 1286.3, $p < 0.0001$, $\phi_c = 0.563$).

We also calculated the percentages of actions that participants chose that corresponded to each role in each of the explicit roles, and compared them to choices made by participants in our control group. We found that not only is the percentage of actions aligned with participants' roles higher than in the control group, but the percentages of actions that are not aligned with participants' roles are lower than those in the control group. Together with the prior Chi-square analysis, this result strongly confirms **H1**.

We further explored if there was any significant difference between participants in the *assigned condition* versus participants in the *chosen condition*. As shown in Table 4, participants that were allowed to choose their role were more consistent with that role than participants that were assigned a role to play out. We conducted a Chi-square test with Yates' continuity correction, which revealed that this increase in consistency was statistically significant ($\chi^2(df = 1, N = 210 * 12)$ = 22.365, $p < 0.0001$), but was not practically significant due to the small effect size ($\phi_c = 0.106$).

### H2: Choice Correspondence to an Implicit Role

To test our hypothesis that, in the absence of an explicitly communicated player role, game players will consistently prefer specific actions that they expect are dictated by a role (**H2**), we ran a k-means clustering with $k = 3$ on all actions that each participant chose, to determine if participants without an explicit role could be grouped into three categories based on their action choices. We found that the three clusters nicely capture these three dimensions of data with $betweenSS/totalSS = 0.797$.

| Cluster | Participants | Fighter Actions | Mage Actions | Rogue Actions |
|---|---|---|---|---|
| **1** | 15 | 17 | 22 | 141 |
| **2** | 14 | 10 | 140 | 18 |
| **3** | 12 | 81 | 26 | 37 |

**Table 5. Number of participants assigned to each cluster and the total number of actions chosen corresponding to each role by cluster. Participants in our control group were significantly consistent with an implicit role ($\chi^2$ = 356.19, $p < 0.0001$, $\phi_c = 0.602$), and had no significant preference for any particular one ($\chi^2$ = 0.34146, $p = 0.843$).**

The next step was to determine if these clusters corresponded to the three roles that we defined. For this, we added the number of actions chosen by participants in each cluster by the roles to which those actions were mapped. The results, shown in Table 5, indicate that there is indeed an alignment between clusters and roles with participants in clusters 1, 2, and 3 choosing more Rogues, Mages, and Fighters actions, respectively. A Chi-square test with Yates' continuity correction on the number of actions by cluster revealed that choices made by participants were significantly consistent with an implicit role ($\chi^2(df = 4, N = 41 * 12)$ = 356.19, $p < 0.0001$, $\phi_c = 0.602$), strongly confirming **H2**.

### H3: No Preferred Role in Control Group

To test our hypothesis that, in the absence of an explicitly communicated player role, game players will not consistently (and relative to other players) prefer actions mapped to a particular role (**H3**), we looked at the number of participants that were assigned to each cluster, and therefore to an implicit role, expecting to find an even distribution. To determine how close the distribution across the three implicit roles matched an even distribution, we conducted a Chi-square goodness-of-fit test with Yates' continuity correction. Our test revealed no significant preference for any of the three roles among participants who were not given an explicit role ($\chi^2(df = 2, N = 41)$ = 0.34146, $p = 0.843$), consistent with **H3**.

## DISCUSSION

While we expected a player's narrative role to affect in-game choices, the size of this effect was larger than we anticipated. Considering Cohen's [9] interpretation of $\phi_c = 0.5$ as a large effect size, our values of 0.563 and 0.602 for **H1** and **H2**, respectively, indicate that players are *strongly consistent* with their roles, regardless of whether their role was explicit (assigned or chosen), or not. We call this effect the *Mimesis Effect* – the phenomenon that players act in ways that are guided by their sense of their narrative role; so named in reference to the theatrical process of creating/playing a dramatic role [29].

We detected the *Mimesis Effect* to be statistically stronger when participants chose their role as opposed to when they were assigned to it, however we found this effect to be small ($\phi_c = 0.106$) per Cohen. Although we did not control for player

preference over the roles afforded by our game, it is possible this difference could be due to players identifying more closely to the character they are portraying. We posit that the real effect can be larger than what we found in light of the possibility that some participants in the *assigned condition* may have been assigned to roles they would have chosen (effectively putting them in par with participants in the *chosen condition*).

When looking at our control group (who played the game without an explicit role), our results show that players are in fact consistent with a role. This is interesting, since it suggests that participants (consciously or not) fabricated a mental constraint on their gameplay, preferring choice structure options that fell within those constraints. Further, we showed these constraints aligned with the three roles we made explicit to participants in the *chosen* and *assigned* conditions, as demonstrated through our clustering analysis. In essence, participants binned themselves into our pre-defined roles, rather than a) choosing randomly, or b) conforming to a undefined blend of our roles, as defined through a mix of action selection. This suggests that a participant's mere *awareness* of distinct character types prompts her to select one, and role-play to it, making her behave as an exemplar of that character type. If true, it implies that participants in the control condition behave *as if* they were in the *chosen* condition; we would just not be privy to what role they selected until after the fact. However, because we do not know if these participants actually decided *a priori* to play a specific role, or if it emerged subconsciously during gameplay, these suggestions warrant further investigation.

We also found no evidence that the narrative of our game favored choices mapped to any particular role. While establishing this reinforces the internal validity of our study, the number of participants in our control group (41) may not have been enough to detect the expected small effect size between the distribution of participants with implicit roles and an even distribution. However, even with more participants, if the distribution grows proportionally, we do not expect a significant difference based on our current results.

Importantly, it is possible that the RPG genre carries with it the expectation that a player will remain consistent with her role, since many commercial role-playing games [2, *e.g.*] constrain players in ways that are costly (in terms of game mechanics) to pursue different roles. Participants in our study were explicitly aware that what they were playing was a role-playing game. An interesting avenue for future work is to avoid the role-playing game framing of gameplay, to see if the *Mimesis Effect* still holds in that context.

## CONCLUSIONS AND FUTURE WORK

There are several limitations to consider when interpreting our results. Firstly, there are many different types of role-playing games [21], and our findings here are specifically applicable to role-playing games that place an emphasis on a narrative trajectory to drive unfolding action. Secondly, all choice structures of our game are equally important from our study's perspective, since we do not control for the choice structure's story-level importance. This was by design, to avoid creating the sense that some types of actions were more useful than others. Thirdly, we do not account for choice structure ordering effects, nor do we include choice structures that do not allow participants to express an in-game roles (which would serve as distractor choices from our study's perspective). All these limitations point to avenues of future work, and while addressing them would increase the ecological validity of our findings, doing so would require a significantly more complex study design, and correspondingly larger sample. We expect that the *Mimesis Effect* will generalize well to multiple settings, but our goal here was to solidly lay its foundations so that future work could further explore its applicability to other domains. Limitations notwithstanding, our findings are impactful, and encourage further exploration of the *Mimesis Effect*, wherein a player's role in an interactive narrative significantly affects the options she selects in choice structures in an interactive narrative role-playing game, even when the role is implicitly assumed by the player. This effect, which has been tacitly assumed to be true in the literature, is thus empirically confirmed to a great degree in this paper, and is demonstrably true when the player's narrative role is made explicit to her, as well as when it is not.

We rigorously established internal and external validity requirements for our study design choices. While some conditions gave participants explicit roles, our study in no way prompted them to make choices aligned to those roles. Our results are strengthened by the fact that our game, as opposed to traditional RPGs, afforded actions that were equally useful for advancing the narrative's plot, not rewarding nor punishing players for choosing in any particular way. One broader implication of our study for games research is that it raises questions about the validity of previous studies on interactive narrative that fail to control for user role. This is particularly true for studies that target player choice as the object of study.

In addition to being meaningful from a games research perspective, our work here also has practical applications. In the realm of interactive storytelling, and RPGs in particular, preserving player agency through meaningful actionable choices is a widely pursued feature. However, as players are given a broader choice of actions, generating game content to support these actions becomes exponentially expensive and time-consuming [5]. If players' desired actions could be made to converge with a subset of all the possible actions that could be taken, a game will only need to provide support and content for that subset of actions without sacrificing player agency. Our results indicate that it is more likely for players to choose actions aligned to roles afforded by the game, which suggests that crafting content aligned with those roles can be used as a way to mitigate the authorial combinatorics problem of interactive narrative.

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