Authoring Conversational Narratives in Games with the Chimeria Platform

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ABSTRACT
Conversations between characters are important aspects of many videogames. However, most such conversational interactions in videogames are quite limited in how they take into account the identities of those characters. Conversation in videogames typically varies, if at all, based only on one aspect of the character such as a non-player character (NPC) referring to the character by race, class, or a gendered pronoun. In this paper, we present an approach to developing conversational narratives that addresses such limitations. Toward this end, we present the Chimeria platform, which uses a cognitive science-grounded model of social category membership to customize how conversational narratives unfold. We also present a playable interactive conversational scenario called "Chimeria:Gatekeeper" authored using the Chimeria Platform. This scenario demonstrates how the system considers multiple aspects of a character's identity and degree of membership with, and between, social group categories in generating conversational dialog between a player character (PC) and an NPC. Using this scenario we illustrate how our approach allows the construction of conversational narratives that convey social identity phenomena such as stigma and discrimination.

Categories and Subject Descriptors
I.2.1 [**Artificial Intelligence**]: Applications and Expert Systems—*games*; K.8.0 [**Software Engineering**]: General—*games*

General Terms
Design, Experimentation, Theory

Keywords
Game design, Social simulation, Role-playing games, Conversational narratives

1. INTRODUCTION
Computational representations of social categories are found in a wide range of digital media works. For example, within computer role playing games (RPGs), racial categorization is often used to define statistical bonuses or decrements to abilities, to constrain the visual appearance of a player character (PC), and to trigger different canned reactions in conversations with non-player characters (NPCs). In social media, users join groups based on items that they like or use privacy setting to group each other into categories such as "work colleagues" or "family members." However, current systems are unable to model many dynamic interactions where identity representation shifts over the course of conversation, or to model intersectional identities based upon multiple traits. Thus, scripted social interactions in such systems are quite limited, lacking the nuance found in real-world conversations.

Our Chimeria platform attempts to address these limitations and to create more nuanced social categorization models in digital media such as videogames and social networks in two primary ways: (1) by modeling the underlying structure of many social categorization phenomena with our Chimeria engine; and (2) by enabling users to build their own creative applications about social categorization on top of the engine, using our API. The underlying engine allows for the movement of individuals within, between, and across social categories (such as from novice to expert or from marginalized to central). It also allows for members to be more central to a group than others, to assimilate or naturalize in relation to a hegemonic group, and to claim membership in multiple groups. In modeling these scenarios, we draw on specific concepts culled from sociolinguistics, cognitive science, and sociology of classification. They include: category gradience, category dynamics, multiple memberships,

inter-category relationships, and prototypes (described fully in the theoretical framework below).

In this paper, we present an interdisciplinary theoretical framework for social categorization and outline the ways that we draw upon this framework in creating Chimeria's categorization engine. We also focus on a sample game application built on top of the Chimeria engine (Chimeria:Gatekeeper). Although the potential applications of the Chimeria engine are numerous, we use this sample application to demonstrate the ways that the Chimeria engine can model more expressive and socially nuanced conversations between players and NPCs in games. Because the Chimeria engine is able to be more responsive to the specificities and dynamism of a player's identity, we demonstrate that it is able to model more expressive conversations, especially in contrast to existing conversation modeling in RPGs (as described in the Motivation section below).

The rest of the paper is structured as follows. An account of our motivation for this work in presented Section 2. We describe our theoretical framework in Section 3, followed by an overview of the Chimeria Platform in Section 4. The technical implementation of the Chimeria Platform is in Section 5. We present *Chimeria:Gatekeeper* as a case study application in Section 6 with user-testing results in Section 7. We conclude with a reflective summary in Section 8.

2. MOTIVATION
As an illustration of the aims and capabilities of the Chimeria platform, please consider the following scenario in an RPG: your player character stands outside a keep and wants to enter. Your PC is an elf and the gatekeeper is a halfling, and elves are stigmatized within halfling territory, being stereotyped as lofty and arrogant poets. However, perhaps your PC does not fit within existing cultural norms of how an elf should talk, dress, or look. While some elves are tall and prone to flaunting their fine clothing, your particular elf PC is shorter, prone to slouching, and modest in dress. Your elf could even have even been raised in a halfling village (or have had a halfling grandparent) and not be immediately identifiable as halfling or elf, but chooses to identify strongly as an elf. Because of your PC's less prototypical identity, the halfling guard is unsure of how to respond to the PC. Over the course of the conversation he begins sizing the PC up and responding differently as the conversation progresses, building a mental model of just how "halfling-like" this mysterious traveler actually is. The guard's perception of this traveler and his degree of "halfling-ness" changes over time in response to the PC's utterances and actions. With this, you have the choice of trying to emphasize that the PC is halfling-like in order to gain access to the keep or to emphasize the PC's "elfness", whatever consequences that may bring.

In this scenario, the PC exists at the margins and intersections of multiple social groups. It is at the margins of the elf group and in the intersection between the elf and halfling groups. Furthermore, race is not seen as a more definitive category of social group membership than other attributes such as style of speech, clothing, and appearance. The PC encounters a more central member of a more accepted category. However, the notion of a group's acceptance vs. its stigmatization is not universal, it is only because the characters are currently in a predominantly halfling area. The NPC, as a member of the more accepted category builds up an internal model of the PC based only upon what it perceives and its own worldview, which changes over time

based on the PC's behavior. Another NPC might have a different worldview (with a less prejudiced view of elves) and build up a different model based on seeing the PC speak, dress, and otherwise behave in a different way at a different time. While this model of social categorization is played out as a conversation between a gatekeeper and a traveler, one could also imagine other narrative scenarios and even non-game applications where the same range of identity-related concerns could be modeled and applied – for example developing a model of user's music related identity based on genre preferences over time. With the Chimeria platform, this is exactly our aim - to model such complex and nuanced identity phenomenon in our engine and then to allow users to create their own works about identity and categorization in any domain using the engine as support.

Now contrast the capabilities of this scenario against the way that conversations typically play out in RPGs. Traditionally, players can guide the dialogue uttered by the PC in such conversations through selecting from a variety of dialog options, which are each assigned to different forks in a conversation represented data-structurally as trees (known as conversation or dialogue trees). Many RPGs customize social interactions by creating dialogue that responds to social categories, such as race, gender, or occupation. To convey how current conventional games implement such effects, and how conversational models can be improved, we conducted a survey of several commercially and critically successfully games with significant RPG elements as of 2014 – *The Elder Scrolls V: Skyrim, Mass Effect 3*, and *Diablo III*[1]. Each of these games is representative of a different sub-genre of RPG. *Skyrim* is an open-world RPG in which players have a wide range of freedom in deciding which quests they will pursue and in what order. Mass Effect is an action-adventure RPG, where a player selects traits for a single character, who is a central component of the plot. *Diablo III* is an action RPG focused on robust combat and object acquisition in catacombs-like scenarios (colloquially known as a "dungeon-crawler"). We observed how these games model and use identity characteristics, termed **modeled character features**, to impact PC and NPC interactions. We evaluated how their implementations of character identities were used to drive conversational social interactions, available player actions, and story progression. Our observations are summarized in the chart in Figure 1, outlining a common set of limitations in such games that we have addressed in the Chimeria Platform. Our aim is similar to those of other researchers using virtual environments and games to empirically study, model, and convey social identity related phenomena, such as the game *Prom Week*, *The Restaurant Game* and experiments of the Virtual Human Interaction lab (VHL) [2, 14, 15]. "Prom Week" is an especially important precursor as we also model aspects of sociologist Erving Goffman's theories of stigma and impression management.

2.1 Common Methods for Narrative Variation
Socially nuanced conversations that take into account real-world identity phenomena have not yet been extensively modeled within these games. In the popular games we examined, we identified a set of common methods for providing variation based on player identity character in conversation

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[1] *Skyrim, Mass Effect II*, and *Diablo III* were the highest-rated RPGs on Metacritic.com, a rankings aggregator for games. These games and their franchises are also among the best-selling RPGs: *Skyrim* has sold over 20 million units [1], *Mass Effect 3* has sold over 3.2 million units [4], and *Diablo III* has sold over 15 million units [19].

Game	Modeled Character Features	Methods Used for Varying Conversation or Story Progression Based on Character Features (Grayed-out cell indicates method is not used)				Summary of Identified Limitations
		TXT-SUB	DLG-TRS	ACT-AVL	STR-PRG	
The Elder Scrolls V: Skyrim	Gender	✔				• Only a subet of modeled character features are used.
	Race		✔	✔		
	Skill Attributes					• Intersections between character features are not considered.
	Visual Apppearance					
Mass Effect 3	Gender	✔			✔	• World views by NPCs are shared and singular.
	Morality		✔	✔	✔	
	Class					• Availability of actions for players are based only on one chosen feature.
	Skill Attributes					
	Character Profile					• Social structures between characters are immutable and predetermined by designers.
Diablo 3	Gender	✔				
	Class	✔	✔			
	Skill Attributes					

Methods Key: TXT-SUB: Text substitution, DLG-TRS: Dialog trees, ACT-AVL: Action Availability, STR-PRG: Story progression.

Figure 1: Chart evaluating how identity models affect conversations and story progression in videogames.

and to progress stories (e.g., see Figure 2). One method was **text substitution** (`TXT_SUB`). Text-substitution here refers to the use of pre-authored text templates with one or more words capable of being replaced depending on a specific character feature (e.g., gender or race) and the context of use. For instance in *Skyrim* a word referring to the race of the character, such as "Nord" might be replaced with a word referring to another race such as "Breton" when the PC is addressed. Similar textual changes are often made to comments made in passing by NPCs to the PC when they are not engaged in conversation. Another method of conversation variation used is the replacement of entire clauses (rather than single words) in **dialogue trees** (`DLG_TRS`), yet this form of text-replacement is also often dependent upon only a single feature of the PC. A third variation method used is conversation **action availability** (`ACT_AVL`), which refers to using specific modeled character features as a means of selecting which choices and actions are available to the PC. Finally, **story progression** (`STR_PRG`) may be affected by specific character features. For example, in *Skyrim*, availability of a particular quest can be decided based on a player's character race. Playing as the "Orsimer" race allows a PC immediate access into a restricted area, whereas playing as a different race requires the completion of a prior task.

2.2 Common Limitations

We have outlined how current methods make use of character features in order to represent player identity as well as to drive variation in game conversation and plot progression. However, these approaches are limited in several ways (summarized in Figure 1). Most conversations in such games do not dynamically progress based on the NPC's impression of the PC's identity during the interaction, nor take into account multiple features of PC identity (a phenomenon known in the humanities as "intersectionality" in identity).

3. THEORETICAL FRAMEWORK

The Chimeria Platform was developed as a part of the NSF-funded Advanced Identity Representation (AIR) Project discussed in [8]. Here, we highlight Chimeria's ability to computationally represent multiple kinds of categorization phenomena as described in sociolinguistics, cognitive linguistics, and the sociology of classification. Here, we present a brief summary of some of the key theories we draw upon.

3.1 Conversational Narrative

In [6, 7], it is argued that in many forms of everyday communication, narrative provides a deep and satisfying sense of involvement. Additionally, sociolinguists William Labov [11]
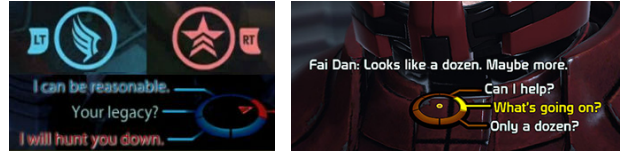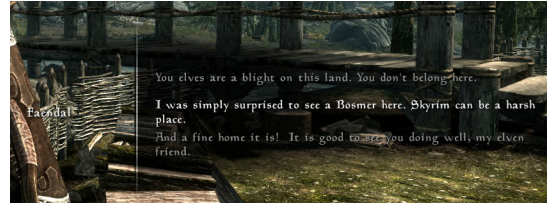

Figure 2: In *Skyrim*, NPC conversations often take into account a single feature of a PC's identity in order to customize conversation via text replacement (above). Dialog trees in *Mass Effect 3* are based on the "Morality" or "Personality" features (below).

and later Charlotte Linde [13] have conducted well-known and extensive empirical studies of narratives of personal experience and life stories respectively, both of which are conveyed to others under natural conditions. We generate conversational narratives in *Chimeria:Gatekeeper* according to a schema based on the above formalization of Labov's insights. Narratives in *Chimeria:Gatekeeper* are structured after Labov's narrative theory, both in the ordering of clauses and the structure of the clauses themselves. We also draw upon a schema inspired by Livia Polanyi's model of narratives in conversational storytelling. In particular, we model what Polanyi defines as "story sequences [16], in which "multiple members contribute individual stories" toward the construction of a single, overarching narrative. In this paper, references to "narrative" refer to Polanyi's model of conversational narrative. The term "narrative generation" refers to the automatic artificial intelligence (AI) generation of these conversational narratives. We adhere to Polanyi's proposed constraints in *Chimeria:Gatekeeper*, allowing these constraints to inform the computational models used in our conversational narrative generation system.

3.2 Cognitive Categorization

We describe several cognitive models related to cognitive categorization, which are used in *Chimeria*.

3.2.1 Category Gradience

The notion of category gradience implemented in Chimeria is based upon cognitive scientist George Lakoff's work in

cognitive categorization [12], a challenge to what can now be considered to be incorrect classical or "folk" approaches that consider category membership to be defined by a fixed set of characteristics. Instead, Lakoff's notion of centrality gradience recognizes that some members are typically deemed "better examples" of a category than others, what psychologist Eleanor Rosch has called "prototypes" [18]. Centrality gradience describes how "members which are clearly within the category boundaries may still be more or less central".

3.2.2 Category Dynamics and Classification

Category dynamics refers to the idea that changes to category membership can occur over time. Within the sociology of science, Geoffrey Bowker and Susan Leigh Star [3] have argued that classification systems entail a process of regularization that occurs across different contexts. Communicating across contexts with different classification systems can create tensions that lead to prejudice and discrimination. Significantly, by computationally modeling these category membership phenomena, applications built with Chimeria can express changes of category over time (e.g., naturalization). Bowker and Star have defined the concepts fundamental to understanding these processes as follows: **Membership** is the experience of encountering and interacting with objects within certain social groups, and increasingly engaging in naturalized relationships with them. **Naturalization** is the deepening familiarity of such interactions within a given social group. **Marginalization** is a result of enforced naturalization occurring in which members of a marginal category exist outside of social groups, or are less prototypical members of communities. It is also characterized by exclusion from a social group or an individual having multiple memberships and having to switch between the objects, interactions and protocols specific to each social group.

3.3 Sociology of Stigma

The Chimeria Engine and the scenario *Chimeria:Gatekeeper* were informed by sociologist Erving Goffman's work on social stigma [5]. Goffman's hypothesis describes how stigma is constructed and maintained through social interaction and always associated with one or more attributes that are deemed socially **"discrediting"** – perceived failings, shortcomings, or handicaps that a social group deems as undesirable within a particular social context. Goffman describes three types of stigma, differences of: (1) the physical body, (2) individual character, and (3) 'tribal' classes of 'race, nation, and religion.' He describes each of these categories as deviance from 'those who do not depart negatively from the particular expectations at issue', whom he calls the 'normals.' Yet, in practice, a society may hold norms that are largely unattainable for any of its members. Goffman introduces **impression management** in describing strategies for how the stigmatized (what Goffman calls the 'discredited') might enter into 'mixed contact' with normals. Impression management involves a degree of self-surveillance and control where everyday actions and behaviors are scrutinized for how they might reveal a personal stigma. Because these stigmas are typically hidden or invisible, the stigmatized may develop a feeling of danger or anxiety that she or he will be "found out" by a normal. Goffman identified a number of impression management strategies used by stigmatized individuals, which we have summarized in Table 1.

4. CHIMERIA PLATFORM OVERVIEW

The *Chimeria* platform supports authoring conversational narratives of group membership in any social identity domain using a data-driven approach with these components:
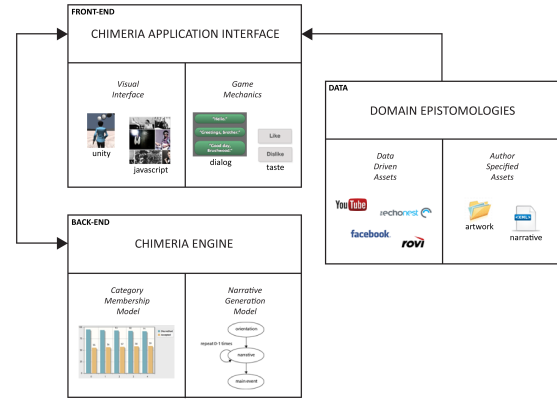

Figure 3: Chimeria Platform Architecture

Chimeria Engine: A mathematical model of users' degrees of membership across multiple categories. It provides the functionality to calculate, modify, and simulate changes to category memberships and serves as the logical processing component for identity used by applications built with Chimeria. The engine models users' category memberships as gradient values in relation to the membership values of more central members. This enables more representational nuance than binary statuses of member/nonmember. We describe the Chimeria Engine's implementation for conversational narrative generation in the next section.

Chimeria Application Interface: A visual interface for user interaction and for experiencing the conversational narratives related to the category membership changes driven by the Chimeria Engine. The *Chimeria:Gatekeeper* Application Interface aims to resemble a familiar RPG scenario, for example, involving a player engaging with an NPC gatekeeper in order to gain access to a keep. However, the interface could also take multiple other forms (e.g., the *Chimeria:Music-Social-Network* interface as reported on in [10], a text-only interface, or a 3D virtual environment)[2,3]. The specific interaction mechanics are also defined here (e.g., conversational dialogue rules). The separation between back-end (the Chimeria Engine) and front-end (Chimeria-Application) provides the flexibility to easily "re-skin" any given implementation with a new visual interface.

Domain Epistomologies: We use the term "epistemology" to refer to an ontology that describes cultural knowledge and beliefs [9]. Hence, domain epistemologies in Chimeria refer to the knowledge representations describing the categories being modeled. The data utilized by the Chimeria platform to present these categories to users include both author specified assets (e.g., artwork, narrative) and data-driven assets (e.g., an API call to YouTube to query for a video).

5. CHIMERIA ENGINE

The Chimeria Engine implements an AI-based system grounded in cognitive science theories of categorization, which implements an algorithmic model of users' degrees of membership in multiple categories. Furthermore, the Chimeria Engine is responsible for the generation of non-linear, socio-linguistic based conversational narratives to be experienced by users. The distinct separation between the Chimeria Application Interface and the Chimeria Engine confers the flexibility of

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[2]Chimeria:Music-Social-Network: `http://groups.csail.mit.edu/icelab/chimeria/`

[3]Additionally, we implemented a small demo showing the applicability of Chimeria to a 3D game interface using Unity.

Substrategy	Definition	Example	Degree of Passing
Covering	Diverting overt attention from the stigma.	Changing one's name or avoiding clothes associated with one's heritage.	Intentional passing
Disidentifiers	Positive signs used to throw doubt on the validity of a virtual identity.	An illiterate person wearing glasses.	Intentional passing
Status/prestige symbols; "points"	Behavioral or visual signs that make claims to prestige or normalcy.	Clear diction or insignia.	Intentional passing
Slipping	Fugitive signs that discredit tacit claims to privilege	One's true accent slipping through a facade.	Accidental non- or partial-passing
Relationship distance management	Selectively reveal stigma to some groups.	Only tell your good friends that you're gay, reveal nothing to others.	Intentional partial-passing
Voluntarily disclosure of stigma	Impression management to tension management	Wearing an insignia associated with a stigmatized group or acting as an advocate for the community.	Intentional non-passing

Table 1: Goffman's Strategies for Impression Management from Stigmatization

using wholly different domains and visualizations (e.g., the social networking interface of *Chimeria:Music* and the role-playing game interface of *Chimeria:Gatekeeper*) while using the same underlying membership model and conversational narrative generation structure. The components of the Chimeria Engine are described in more detail below.

5.1 Social Category Modeling

In modeling categories, we have developed and implemented a notion of **abstract** (e.g., accepted and discredited) and **concrete** (e.g., elves and halflings) categories. This division offers the affordance of assigning concrete categories to abstract ones differently at run-time to encompass multiple worldviews. For example, in the simple case of an elf and halfling category as described in the introduction, the elves may be accepted in one instance and discredited in another. *Chimeria* supports any number of abstract and concrete categories, actors (e.g., PCs and NPCs), and features (attribute types such as height). To computationally model category gradience, *Chimeria* computes a **closeness value** corresponding to the degree to which an actor deviates from a prototypical member of a category. A prototypical member is defined via a set of features. The closeness value for a given actor and category is calculated as a function of the overlapping attributes in each feature. For discrete features (e.g., weapon skills), the number of overlapping attributes determines closeness. For a continuous feature (e.g., height or speaking ability), the numeric similarity determines closeness. A normalization factor is used to bound the final membership value within the range of 0 to 1, representing non-membership and a perfect match with a group's prototypical member respectively.[4] The variance of the closeness value thus models centrality gradience. The degree of membership fluctuates throughout a narrative by the actions and choices made by the user. Attributes are added/removed (discrete features) or modified numerically (continuous features), which creates a fluctuating degree of membership and naturalization trajectory for the user.

5.2 Narrative Generation

Chimeria first initializes the identity **actors** and **categories** for a given domain. For example, for setting the user's initial identity category, *Chimeria:Music-Social-Network* uses a set of Facebook music "likes" to determine themes, moods, and genres associated with categories from an external database, while *Chimeria:Gatekeeper* uses author-specified attributes. A narrative experience then begins progressing over time and generating structured clauses using a formal schema

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[4]The closeness value formula used in Chimeria:Music-Social-Network is (m:moods, t:themes, u:user, c:category) [10]:

$$\frac{1}{W}\left\{ w_m \times \left(\frac{m(u)\cap m(c)}{m(c)}\right) + w_t \times \left(\frac{t(u)\cap t(c)}{t(c)}\right)\right\} \quad W = \frac{1}{w_m + w_t}$$
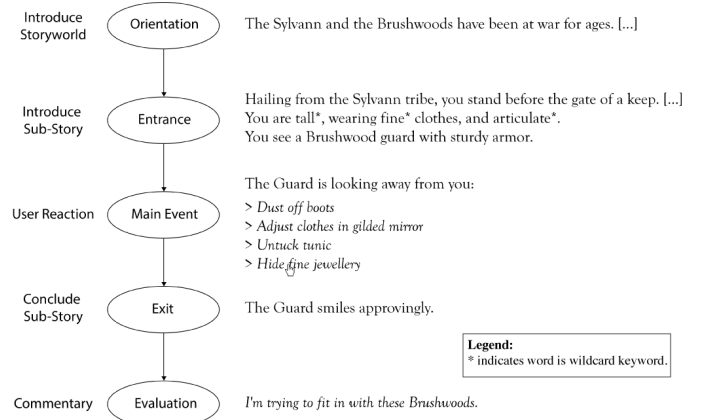

Figure 4: Simplified Narrative Structure

based on Labov's narrative of personal experience [11]. The purely structural aspects of this theory can be formalized as a grammar, instances of which correspond to the legal structures for narratives. Narrative generation is implemented according to a narrative structure specified by a simplified version of a finite state machine called the Linear Event Structure Machine (or probabilistic bounded stack transition machine) defined in [6, 7]. It operates upon a narrative specified here using extended Backus Naur Form (EBNF):

```
<Linear Event Structure Machine> ::=
  "<narrative>" <clauses> "</narrative>"
<clauses> ::= <clause> {<clauses>}
<clause> ::=
  "<narrative-element> <type>"
    <name> <number-pair>
  "</type> </narrative element>"
<name> ::= an atomic clause name
<number-pair> ::=
  "<min>" <minimum-number> "</min>"
  "<max>" <maximum-number> "</max>"
<minimum-number> ::= a positive integer
<maximum-number> ::= a positive integer
```

The linear event structure machine consists of a set of `<clause>` elements, and its functioning can be understood its components. Each consists of a name, pair of integers, subclause name, exit-to clause name, and a read-flag. A clause is to be interpreted as follows: Its *name* is a symbol used for referring to the clause type and can be anything, not necessarily referring to specific clause types from various linguistic or narrative theories. The *number-pair* consists of an integer indicating the minimum and maximum number of repetitions of the clause. Figure 4 illustrates a simplified conversational narrative structure. Conversational narrative structures are instantiated by a database of narrative templates called content-clauses that are filled in with text content and *wildcards*. Wildcards are text elements that possess identity specifiers determined at run-time. Consider the (continuous) feature "clothing":

```
<feature name="Clothing" type="range" wildcard="c">
```

```xml
<feature-range-labels>
  <label min='0' max='20'>ragged</label>
  <label min='20' max='40'>worn</label>
  <label min='40' max='60'>ordinary</label>
  <label min='60' max='80'>fine</label>
  <label min='80' max='100'>exquisite</label>
</feature-range-labels>
</feature>
```

A wildcard specifying the clothing value (`c`) of an actor or a category (`A`) would be `*cA`. Given a clothing value (e.g., `25`), the wildcard is converted to the appropriate text descriptor (e.g., `worn`). Conditional **tests** constrain occurrences of each clause: *Category membership tests* specify the gradient membership threshold required within a social group (e.g., central, peripheral, or non-membership within a category). *Naturalization membership tests* specify the trajectories of social group membership across all required groups (e.g., increasing, decreasing or fluctuating membership). *Feature tests* specify the attributes required for features (e.g., at least fine clothing and of tall height.) **Main event clauses** are capable of handling user responses. Each response includes text content (which may include wildcards), and *fallouts*, which consist of resultant effects from actor responses. A `fallouts` can directly modify a specific attribute or enact a more global change across all features with a specified intensity. The following is an example of such a clause type:

```xml
<main-event-clause>
    <id>300</id>
    <image>guard_stare.png</image>
    <feature-test>
        <test feature="Ability">You,stealing</test>
    </feature-test>
    <category-membership-test>
        <test min="50" max="80">Accepted</test>
    </category-membership-test>
    <naturalization-trajectory-test>
        <test naturalization="fluctuating">Accepted</test>
    </naturalization-trajectory-test>
    <content>The *rG Guard stares at you.</content>
    <actions>
        <action args="0">
            <text>Do nothing</text>
        </action>
        <action args="1">
            <text>Straighten up</text>
            <fallout>Height,+10</fallout>
        </action>
        <action args="2">
            <text>Slouch</text>
            <fallout>Height,-10</fallout>
        </action>
    </actions>
</main-event-clause>
```

Here, `id` is a unique identifier, `image` is the graphic to be displayed, `feature-test` requires that the user (defined as "You" in this narrative) has the "stealing" ability, `category-membership-test` requires the user to be within the range of [50−80] in the *Accepted* (abstract) category, `naturalization-trajectory-test` requires that the user's membership be "fluctuating" in the *Accepted* (abstract) category, `content` specifies the text of the clause (`*rG` wildcard dynamically retrieves the Guard's "Race" feature), `actions` specify possible user choices, and `fallout` the consequences of each choice (here affecting the user's "Height"). More complex `fallout` specifications allow for category-relative consequences (e.g., `Accepted,Height,+10` shifts the user's "Height" feature closer to the *Accepted* category by intensity 10), global category-relative consequences (e.g., `Accepted,+10` shifts all user feature values closer to the *Accepted* category by intensity 10), and local attribute-specific consequences (e.g., `Weapon,Axe` adds the attribute "Axe" to the user's "Weapon" feature). We prioritized scalability in our implementation for the *Chimeria Platform* to maximize authorial influence by handling any number of user choices, choice consequences, and con-

ditional tests for a given clause.

6. A CASE STUDY APPLICATION: CHIMERIA:GATEKEEPER

To demonstrate the capabilities of the Chimeria Platform for use in game development, we created a sample application using the engine called *Chimeria:Gatekeeper*. *Chimeria:Gatekeeper* models an extremely common RPG scenario that was sketched earlier in this paper – a player trying to get past an NPC guard in order to gain access to the inside of a castle keep. However, within this sample application, we demonstrate the power of the *Chimeria Engine* for enhancing this scenario by modeling more complex, adaptive, and nuanced conversations between PCs and NPCs.
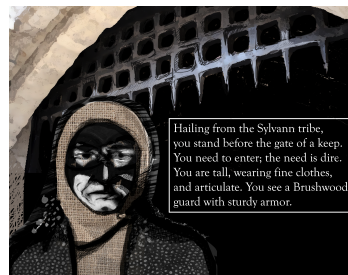

Hailing from the Sylvann tribe, you stand before the gate of a keep. You need to enter; the need is dire. You are tall, wearing fine clothes, and articulate. You see a Brushwood guard with sturdy armor.

Figure 5: Chimeria:Gatekeeper Sample Screenshot

The scenario is designed as follows (see Figure 7 for a sample run[5]). Drawing on Goffman's theories of stigma, the PC is initialized to the 'discredited' category and the NPC to the 'accepted' category. The accepted category is instantiated with a concrete category that is prototypically defined as the *Brushwoods* race – short, plain-spoken, and wearers of rough spun clothing. The discredited category has been instantiated with a concrete category that is prototypically defined as the *Sylvanns* race – tall, well-spoken, and wearers of fine clothing. To gain access to the inside of the keep, the player has to convince the guard that she or he is among the accepted category, in effect "passing" as a member of the concrete category has been instantiated as "Accepted" [17]. Various behavioral choices within the conversation (e.g., slouching to adopt the posture of a prototypical Brushwood or displaying fine Sylvann clothing) incrementally shift the NPCs model of the PCs membership with respect to the discredited and accepted categories, either bringing the player closer to gaining access to the keep or to being rejected. However, rather than simply encouraging players to "pass" as part of the accepted category in order to "win," the game uses clauses representing the internal thoughts of the PC to emphasize trade-offs between gaining utilitarian access to the keep and the loss of self-identity that can occur in trying to pass.[6] These internal thoughts, along with clauses representing the guard's approval or disapproval, provide the player with feedback regarding how the system is processing their chosen actions.

We charted the potential "outcomes" for players engaging with *Chimeria:Gatekeeper* based on Goffman's theories of impression management. While trying to **intentionally pass** in order to gain access to the keep is perhaps the

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[5]We intentionally made the writing very self-explanatory and straightforward with the idea that it could be embellished with greater literary style later after we were certain that the system functioned as desired.

[6]Chimeria-Gatekeeper: `http://groups.csail.mit.edu/icelab/chimeria-gatekeeper/conv.html`

content	category-membership-tests	naturatlization-trajectory-tests	conclusion-polarity-test	Theme	Thematic Polarity	Description
"Thankfully, I was able to convince the guard to let me in."	Accepted [60,100]	Accepted [increasing]	Positive	Intentional Passing	Positive	Acceptance
"Well, I got in, though I had to pretend to be something I'm not."	Accepted [60,100]	Accepted [increasing]	Positive	Intentional Passing	Negative	Denial of self
"Somehow I talked my way in."	Accepted [55,100]	Accepted [fluctuating]	Positive	Inadvertant Passing	Positive	Unintentional social power
"The guard let me in somehow, *rU-plural seem unwelcome here."	Accepted [55,100]	Accepted [fluctuating]	Positive	Inadvertant Passing	Negative	Separation from stigmatized
"The guard learned something today about *rU-plural and he let me in."	Discredited [50,100]	Accepted [decreasing]	Positive	Voluntary Disclosure	Positive	Change society
"The guard let me in, but seemed more dazzled by my race than anything."	Discredited [50,100]	Accepted [decreasing]	Positive	Voluntary Disclosure	Negative	Stigma Allure or Exoticism
"I'm an *rU, and I won't change myself or pretend to be something I'm not. I'll find another way inside or go somewhere better."	Discredited [50,100]	Accepted [decreasing]	Negative	Voluntary Disclosure	Positive	Non-denial of Self
"It seems like once the guard realized I am an *rU, he was never going to let me in."	Discredited [50,100]	Accepted [decreasing]	Negative	Voluntary Disclosure	Negative	Failure to Access
"I wasn't sure if I wanted to try to fit in or to be myself. He'd never let an *rU in here. Maybe I don't want to go inside after all...but it would be nice...I don't know."	Accepted [0,55]	Accepted [fluctuating]	Slipping	Slipping	Negative	Failure to Access

Figure 6: A summary of coda clauses from *Chimeria:Gatekeeper*, each corresponding to Goffman's theory on stigma impression management and defined using the *Chimeria Engine's* social group categorization model.

The Sylvann and the Brushwoods have been at war for ages. The Sylvann, known as a tall people on average, are sometimes judged from afar to be lovers of finery and elaborate poetry. The Brushwoods, known as small people on average, are sometimes judged from afar to be fond of earthy homespun fabrics and good hearth tales.

· · ·

Hailing from the Sylvann tribe, you stand before the gate of a keep. You need to enter; the need is dire. You are tall, wearing fine clothes, and articulate. You see a Brushwood guard with sturdy armor.

· · ·

The Guard before you looks preoccupied.

The Guard is looking away from you:

| Dust off boots | Adjust clothes in gilded mirror | Untuck tunic | Hide fine jewellery |

· · ·

The Guard smiles approvingly.

I'm trying to fit in with these Brushwoods.

· · ·

A Guard stands before you, ready to size you up.

· · ·

The Guard stares at you:

| Do nothing | Straighten up | Slouch |

Legend:

| | boxes indicates possible user actions |

☞ hand icon indicates selected action

· · ·

The Guard approves.

I'm trying to fit in with these Brushwoods.

· · ·

The Guard before you has a wary expression.

· · ·

The Guard asks you a question: "We don't see many, um, ...new...folk around these parts. You travel far to get here?" (It seems that he was about to say "many Sylvann."):

| "Tis not far from home." | "Oh, yes good man, this is a strange land to me." |
| "New? I'm from just around the way." | "I'm from a little ways off indeed." |

· · ·

The Guard frowns disapprovingly.

· · ·

I think he'll still let me in, though maybe I didn't give him the response he was looking for.

· · ·

The Guard before you looks curious.

· · ·

The Guard looks expectantly at you:

| "Seasu re a' lle." (Sylvann for "Pleasant day to you.") | "Some weather we're havin' today." |
| "Good day!" | "I hope you are faring well, a star shines on the hour of our meeting." |

· · ·

The Guard smiles approvingly.

· · ·

I'm trying to fit in with these Brushwoods.

· · ·

Guard: "Welcome, I think you'll be at home here."

· · ·

"Well, I got in, though I had to pretend to be something I'm not."

Figure 7: Chimeria:Gatekeeper Sample Playthrough

most normative trajectory through the conversational narrative, we also consider other player decisions such as **voluntary disclosure** of stigma and **slipping** (trying to pass as a member of an accepted category, but failing to do so). In all cases, we try to emphasize the ambiguity (simultaneous positives and negatives) of each set of decisions, as well as the multiplicity of different outcomes that could arise from a single decision. For instance, when one voluntarily discloses her membership in a stigmatized category, there is the equal chance that the player might be rejected from the keep, gain access because of the NPCs attraction to her "exotic" category (a phenomenon called "stigma allure" by Goffman) or be let in because they have stayed true to themselves. In the latter two cases, both are successful outcomes in terms of gaining access access, yet the first is considered negative in the psychological experience of the PC while the second is considered positive. The modeling of passing and social categorization membership in *Chimeria:Gatekeeper* seeks to capture aspects of the stakes and power relationships often at play in real world social interactions.

7. EVALUATION

Here, we present results and findings from a preliminary user-study of *Chimeria:Gatekeeper*. Our aims were to receive user feedback about the effectiveness of the conversational experience and to evaluate the system's capabilities regarding identity-driven conversational interaction. We invited a total of 9 subjects for the preliminary study. All subjects were university students. The age range was between 18-24. 3 subjects were males, and six were females. Of the 9 subjects, three claimed to play computer games once a week or more frequently, 4 rarely or occasionally, and 2 indicated that they never play computer games. 8 of the subjects were observed locally, and one accessed the system remotely from a personal computer. Each subject interacted with the system and ran the scenario through three times before being directed to a survey form. Each session lasted approximately 30 minutes. The survey consisted of questions pertaining to demographic information (age, gender, occupation, gaming background), 21 5-point Likert scale questions about their experience in the conversational system, and 22 free text-entry questions about their experience with the system.

7.1 Results and Findings

Table 2 presents some survey responses which address the focus of this paper on computational approaches to identity-driven NPC interactions. Scores are computed numerically from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5). Other survey items referred to ease of use, comprehension, and demographic information. Players perceived that identity was central to the interaction, noting changes in their character's identity over the course of the interaction. While 7 respondents noted that their character seemed "very Sylvann" at the start of the conversation, only 2 indicated that their character seemed 'very Sylvann' at the end of the conversation. Similar changes also occurred in the question "How did the guard perceive your character's identity" at the beginning, middle, and end of the conversation. When asked if they would like to see this conversation in similar games, one subject responded "sure, it is interesting to see if you can take on the perspective of someone so different from your character."

Question	Avg Score
The identity of the player character seemed to impact the conversation	4.22
The identity of the guard seemed to impact the conversation	4.22
Compared to a typical game of the genre, the identities in this game impact the conversation	3.78
The impact of my responses was meaningful in the conversation	3.67
There were times when I acted to fit in with the guard intentionally and succeeded	4.22
I could determine that there were positive and negative trade-offs to the choices I made	3.89

Table 2: User Testing Summary

Subjects also identified factors contributing to their in-game identity. One subject replied "Wealth, posture, and where I came from." Two-thirds of participants felt that the identities of their character and the guard impacted the conversation when compared to a typical game in this genre. One subject noted "With each try at the game, I differed my answers, and every time, the guard reacted differently." Subjects expressed a desire for even more nuanced feedback from the guard and more variety in responses from the guard. Finally, when asked about what constitutes success, one player remarked "The main success is accomplishing the goal (getting in) but depending on how much the player wants to be 'true to themself,' success could also be how little they try to fit in." This was gratifying because it indicated awareness of our aim for the scenario to highlight trade-offs and ambiguity of impression management rather than simply success at passing as a member of an accepted category.

8. CONCLUSION

Social group membership is an important aspect of all societies. Thus, a robust and nuanced computational model is important for the everyday forms of conversational narrative that are crucial to player's experiences in many computer games. It potentially enables new forms of creative expression using games, especially those that aim to provide social commentary about identity. The Chimeria Platform implements a dynamic computational model of social group membership that provides support for authoring conversational narratives using that model. We implemented a scenario called *Chimeria:Gatekeeper* that provides social commentary integrated with game mechanics by modeling a form of racial profiling that is aligned with an in-game goal. This is a modest step toward our longer-term hope that computationally modeling issues such as naturalization, marginalization, and passing can contribute to scientific approaches to issues of social empowerment and diversity, most often served by research in the humanities, arts, and social sciences.

8.1 Future Work

We plan to develop a set of graphical user interface (GUI) tools to make authoring content more user-friendly to those unfamiliar with markup languages. Greater variation in dialog content can be achieved with additional authoring and extending wildcards usage. Implementing feature "weights" can be used to prioritize features in the membership model.

9. ACKNOWLEDGMENTS

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