Computational and Cognitive Infrastructures of Stigma: Empowering Identity in Social Computing and Gaming

D. Fox Harrell
Digital Media Program | School of Literature, Communication, and Culture
Georgia Institute of Technology
fox.harrell@lcc.gatech.edu

ABSTRACT

Computing technologies such as games, social networking sites, and virtual environments often reproduce forms of social stigma encountered in everyday real life, as well as introducing new forms of stigma. When users represent themselves via avatars, characters, and profiles, norms for behavior and group affiliations are established that may introduce prejudices, stereotypes, and associated social ills found in the real world. To empower users against these effects, this paper presents technologies designed to: (1) provide dynamic means of identity representation while avoiding stigmatizing norms, and (2) provide for critical reflection on stigmatizing identity infrastructures found in other systems. The theory and technologies developed with these aims are encapsulated under the rubric of the Advanced Identity Representation (AIR) Project that has been initiated in the Imagination, Computation, and Expression Laboratory (ICE Lab; D. Fox Harrell, Director) at the Georgia Institute of Technology. This work has a basis in the cognitive science foundations of categorization and metaphor-based bias, and sociology of science accounts of social classification infrastructures. Using this theoretical framework, this paper provides a model to reveal a set of inadequacies of many current identity infrastructures in social computing and gaming systems for supporting the needs of people in marginalized categories. As results, several social networking systems and games developed in the ICE Lab to empower users in creating computational identities and/or critiquing the phenomenon of stigma in these applications are presented.

Author Keywords

Stigma, social identity, cognitive categorization, social classification, empowerment, gaming, social networking

ACM Classification Keywords

J.5 ARTS AND HUMANITIES; **K.4.2 Social Issues**

General Terms

Design, Theory

C&C'09, October 26–30, 2009, Berkeley, California, USA.

INTRODUCTION

We have long since passed by the myth that racism, gender discrimination, and community conflicts are things of the past in online environments in which men can take up the roles of women, underrepresented ethnic minorities can create avatars with Caucasian skin tones, and any animated character's physical appearance can be completely reconfigured with a mouse-click. Despite new possibilities for identity representation introduced by gaming and social networking, issues of race and gender and less politicized forms of identity are alive and well in these realms. Popular current games such as the *Elder Scrolls IV: Oblivion* and *World of Warcraft* computationally implement and amplify many disempowering existing social identity constructions, in *Oblivion* females of some races are ten points more intelligent than their male counterparts, and individuals of the ostensibly French "race" (Bretons) are twenty points more intelligent than their Norwegian (Nords) counterparts, regardless of gender. [1, 2] On the Facebook social networking website, women's right to post photographs that include even incidental breastfeeding of infants has been hotly debated. While anecdotal, these mainstream examples illustrate the prevalence of the problem.

In the real world, humans have the ability to creatively present themselves in a fluidly nuanced and dynamic way, seamlessly varying gesture patterns, discourse structures, posture, fashion, and more, often with an astounding sensitivity for context. Humans are also often quite aware of the perceived appropriateness of particular ways to present one's self in different situations, as well as social avenues that may be closed off or accessed only with more difficulty due to externally defined social prejudices and biases. The perceived negative difference between diverse individuals and socially defined, desirable and privileged norms is called stigma.

Arguments over comparative social impacts of self-empowerment versus empowerment via removing socially imposed barriers comprise debates existing from time immemorial. This paper proposes several modest ways in which cognitive science and computing can contribute to both the empowerment of individuals and the understanding of disempowering social infrastructures, particularly regarding social networking and gaming. The Advanced Identity Representation (AIR) Project seeks to enable more creative and empowering forms of social identity representation in computing applications. Toward

this end, this paper introduces both new theory and new technologies. It is structured as follows: presented first is a motivating account of converging research on computational identity and a summarizing list of ways in which current technologies are inadequate in the face of the creativity with which humans present themselves outside of digital media. This account is then followed by a novel interdisciplinary theoretical framework, which has been developed under the rubric of the AIR Project. [3] This framework provides a basis for developing an approach to computational identity relevant across various types of social computing systems. The analyses here are centrally based on accounts of categorization from cognitive science and social classification infrastructures from sociology of science. Building upon these accounts, an overview of the phenomenon of stigmatized identity as raised in sociology is provided that may be useful for orienting readers unacquainted with this literature.

Analyses are presented of a game developed in the ICE Lab called *Chameleonia*, and two social networking projects developed in the ICE Lab called *DefineMe* and *IdentityShare* (the latter is an M.S. student's thesis project) as providing new infrastructures to critique stigma and to provide more dynamic and empowering modes for users to represent themselves and form communities. [3] Finally, a concluding section provides reflection on the paper's argument, describes a framework for evaluation, and highlights future challenges.

PROBLEMS WITH CURRENT TECHNOLOGIES

In recent years there has been a convergence of research from a range of disciplines addressing the problem of identity in virtual worlds, games, social networking, and related technologies. This works combines to reveal a set of challenges, problems, and new phenomena of computational identity. Work in anthropology and psychology has investigated new "intersubjective relationships" between humans and machines developing as computing infiltrates everyday life, including machines as proxies for our identities. [4, 5] Ethnographers have explored topics ranging from individual users' deployments of multiple avatars, including construction of gender and race, to interpersonal intimacy. [6, 7] Sociology and communication research has studied bias empirically using virtual environments as test beds. [8-10] The problematics of genomics and digital cultural sharing have also been explored. [11, 12] Racial and ethnic representations across web applications, menu-driven identities, and users' negotiations of such complex emergent phenomena, have created new types of peripheral membership or passing in ethnic groups. [13-15] Real world commerce and virtual economies of Massively-Multiplayer Online (MMO) games and how they transform notions of fun, free commerce, affiliation, and power are studied in [16-18]. Networked publics in applications like MySpace, Facebook, LiveJournal, Xanga, and YouTube (often accessed through mobile devices) have been revealed to have "architectural differences between unmediated and mediated publics [that] affect sociality, identity and culture." [19, 20] In the humanities, interdisciplinary research blending feminist theory, biological sciences, anthropology and more have addressed gender and race using the metaphor of the cyborg and accounts of cybernetics. [21-23] In the emerging field of game studies scholars explore how game mechanics produce the experience of identity play, while others cite cultural analyses of real world issues of identity, ethics, stigma, and power, exploring how they are reproduced in games and the potential of games to effect real world change[24-35]. In computing research, human-centered computing and computer-supported cooperative work (CSCW) approaches have been applied to how social arrangements and meanings giving structure to operators of networked information systems, users of virtual environments, and game players. [36-39]

Taken together, this work reveals both the limitations of current infrastructure for representing the dynamic contingency of real life identity experiences, the robust ways in which users induce nuanced experiences from such architectures, and points to the need for new technical models and infrastructure for identity representation that takes into account both what users actually do in practice and how they are often stigmatized regardless of the affordances of identity computing technologies or innovative user practices. Indeed, current infrastructures for computational identity representation are limited in significant ways. They enable users to present themselves through social networking profiles, offering the information about themselves that they want others to know, though often forced to fit it into predetermined data-structures and interfaces. They create avatars to participate in communities in virtual environments, though the way they customize our identities is often purely tool-based, not based on what users actually do in these environments. In light of the research above, there are common limitations that disempower users in social computing and gaming applications. Some of these include the following.

Online Social Networking

Social networking systems exhibit characteristics such as:

- User categories are predefined (e.g., birth date, gender, or relationship status)
- Social data structures are hierarchically organized (e.g., tiers such as forum moderators, members, and guests),
- Simplistic models of community membership are used (e.g., opt-in/opt-out friendship or group affiliation models),
- Identity is only individually defined (e.g., creating a profile webpage with no facility for input from others),
- There is no facility to mediate between communities (e.g., sites where groups can post messages to members, but not to other related groups), and
- Their uses are informational rather than imaginative (e.g., users update each other about everyday life or network for professional reasons, but sites for collaborative creative endeavors are more rare).

Gaming and Virtual Worlds

Computer and video games often exhibit the following characteristics:

• Attributes are reduced to numerical statistics (e.g., values for hit points, intelligence, etc. in role-playing games),
• Social categories are reduced to graphical models and skins plus numerical statistics (e.g., avatars in most computer role-playing games and virtual worlds), and
• Character changes and narrative progress in many popular genres of computer and video gaming are often driven primarily by: combat, spatial exploration, and object acquisition (e.g., in most massively multiplayer online role-playing games and many action adventure games).

Implications of Current Problems

The lists are not meant to be exhaustive or mutually exclusive. Rather they are meant to support the argument that stigmatizing and socially constrictive phenomena can be implicitly hardcoded into social computing systems. In order to address these phenomena, engineers need to design infrastructures in a manner cognizant of the social phenomena that they intend to support or disenable. It is possible to develop more dynamic, robust, and creative technologies to expand the expressive potential of identity computing systems and to tailor them to particular communities of users, while avoiding the side-effect of disempowering stigmatized and marginalized groups and individuals. Addressing these problems can provide greater customizability, make for more salient experiences, and invent new forms of expression and identity.

THEORETICAL FRAMEWORK

Shared Technical Underpinnings of Computational Identity

The approach to computational identity articulated here is relevant across multiple forms of digital media. Various computational identity applications such as social networking sites, avatar creation systems for virtual worlds, and games are implemented using a limited and often overlapping set of techniques. **Fig. 1** (below) describes, at a high level, the components that comprise the majority of widely used computational identity technologies [40]. Fundamental to implementing computational identity applications, the six components in **Fig. 1** that commonly form the basis for avatar/character/profile construction can enable dynamic and contingent models of social identity in digital environments as described in [41].

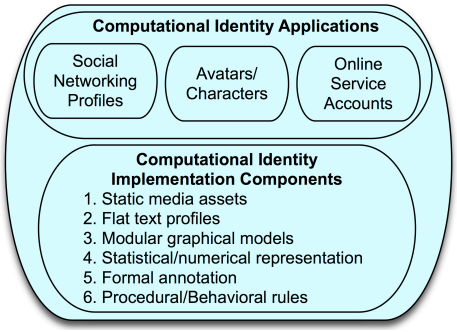

Fig. 1: Shared Technical Underpinnings of Computational Identity Applications

Understanding the reciprocities and overlaps between the technical means by which users stage their identities across digital media forms can enable more powerful customizability and cross-community communication facility in social identity systems.

In the software engineering of such systems, the reliance of computer scientists on intuitive understandings of identity, rather than nuanced theories that view identity as enacted, contextual, imaginative, and infrastructural, has resulted in software that at best ignores opportunities for empowerment, and at worst results in perpetuating longstanding social ills of discrimination and disenfranchisement. We can do better. By looking outside of the field of computing itself, there exists rich information and identity construction strategies developed by individuals who have had to navigate the shifts, convolutions, and problems of social identity and/or have dedicated careers to studying them.

The AIR Model of Cognitively Grounded Computational Identity

The AIR Project approach begins with the basic cognitive building blocks of identity (discussed in a subsection below) upon which all social identity categories are built. Cognitive scientists have proposed that human conceptual categories form "idealized cognitive models" (ICMs) upon which categories of objects in the world are built [42]. These ICMs are akin to what are known as ontologies in database research and artificial intelligence (AI) research. Yet, most user categorization is not done using AI knowledge representation techniques. Technical infrastructures implement and reify (often incorrect) stigmatizing identity classification models. [38, 43] Cognitive science theory is presented below to provide more robust models. These models can explain how users project their identities into their computational surrogates/proxies. [41]

However, it can also be noted that social infrastructures of classification can serve to reify many different models of identity, only some of which capture the dynamic, constructive, and performed or enacted models encountered in everyday experience. Furthermore, some classification infrastructures serve to reinforce social-ills of discrimination and prejudice. The notion of allowing users to enact their own identities and membership within communities is an important one to allow for users to feel empowered in social computing systems and games.

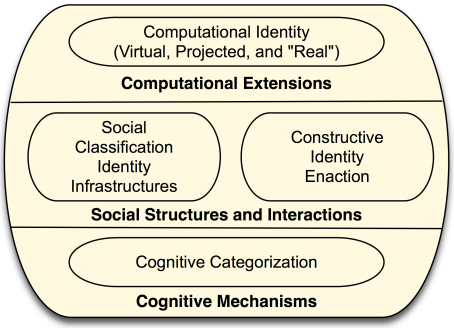

Fig. 2: The AIR Model of Cognitively Grounded Computational Identity

Identity customization and experiences of transformative identity in social computing systems rely upon the ability for system authors to explicitly model the effects of social classification infrastructures such as: viewing oneself differently than others do, performing actions usually attributed to a community outside of one's own, or changing identity based upon learning how to accomplish new tasks or to use new tools. Users may then project themselves into their dynamic computational selves: whether as avatars that change appearance depending upon the skill level of the user as determined by data in a social networking profile, or as characters in a game that gain experience and change from communicating with diverse sets of other characters rather than common mechanisms of combat and acquiring more powerful weapons.

The AIR model is useful for identifying where schisms exist between a technical structure and a real world idealized cognitive model as encoded in a classification data-structure. A researcher can then construct new structures, using techniques such as suggested by the AIR Project systems, that more closely align these structures and models in order to construct the hybrid of computationally afforded identities and real world identities that James Gee calls the "projected identity" as shown in the cognitively grounded AIR model (e.g., a player taking on the role of a priest in a computer role-playing game and trying to be helpful and supportive to her or his friends). [41] The key here is that our understanding of both computational structures and the ways that users interpret them is based in imaginative cognitive processes such as categorization. The focus on categorization and classification arises because these phenomena are often reified in infrastructure and are thus amenable to computational modeling. Hence, we shall see that forms of stigma introduced by problematic categorization and classification models can be addressed computationally.

Cognitive Categorization

The approach to identity here is influenced by the prototype theory of the psychologist Eleanor Rosch, and especially work in categorization by the cognitive scientist George Lakoff. [42] George Lakoff's work in this area over two decades ago is well known and influential, yet it is a thread that has been underdeveloped with respect to issues of social identity construction (an exciting exception being the work of the linguist Otto Santa Ana on conceptual metaphor-based bias in [44]). Furthermore, this theory has not been significantly applied to cases of identity representation in digital media.

Traditional theories or objectivist views of categorization hold that categories are defined by the common objective properties of their members. These traditional views are characterized by ideas such as that meaning is based on truth and reference (relationships between symbols and things in the world), differences between physical objects are defined by common essential properties, there is a single correct way of understanding what is and is not true, and all people think by using the same conceptual systems.

The AIR Project draws on, in contrast to traditional and "folk" theories of categorization, more recent empirically-based theory [42] which asserts that categorization is a matter of both human experience and imagination. Lakoff asserts that meaning is based upon human experience, consisting of: embodied perception of the world, experience of motor activity, and shared cultural knowledge, and that meaning is constructed by imagination, including: mapping concepts to one another as in metaphor and metonymy, and dynamically constructing mental imagery. This view of categorization draws on the growing corpus of research from psychology, computer science, neuroscience, anthropology, and more to reveal a convergence of evidence disputing the traditional theory.

Important for the purposes here, Lakoff describes a metaphor- and metonymy-based account of how imaginative extensions of "prototype effects" result in several phenomena of social identity categorization that have proven useful for the AIR Project [42]:

- Representatives (prototypes): "best example" members of categories,
- Stereotypes: normal, but often misleading, category expectations: (e.g., gender stereotypical categories define normative expectations for language use)
- Ideals: culturally valued categories even if not typically encountered (e.g., note the difference between an ideal and stereotype – Ideal husband: good provider, faithful, strong, respected, attractive, Stereotypical husband: bumbling, dull, beer-bellied),
- Paragons: defining categories in terms of individual members who represent either an ideal or its opposite (e.g., "he is no Turing when it comes to computing," "it's the Taj Mahal of apartments!"), and
- Salient Examples: memorable examples used to understand/create categories (e.g., after experiencing an earthquake in California someone may never wish to travel there, even from a place with a higher incidence of natural disaster).

Since the AIR Project technology involves techniques to formalize and implement idealized cognitive models (such as Lakoff's) as computational data-structures, identity phenomena such as described above become amenable to algorithmic manipulation and experimentation. The AIR Project entails computationally modeling such phenomena that define normative expectations and stigma (stereotypes, ideals, salient examples, etc.) within computational identity applications and enabling the possibility for critique and experimentation with identity models that enable users to move beyond disempowering expectations.

Sociology of Classification Infrastructures

The approach to computational identity infrastructure design in the AIR Project is influenced by accounts of classification systems from the sociology of science. In [43], Geoffrey Bowker and Susan Leigh Star make the case

that classification systems are necessary for information exchange and communication. They assert that classifying systems allow humans to regularize information from one context to another. Social challenges regarding classification systems arise from cases where tension exists between contexts. In such cases, communication between communities with different classification systems causes disempowering social-ills such as prejudice, discrimination, and their "often attendant violence." [43]

Toward accounting for the interaction between individuals' social identities and classification in different communities, Bowker and Star call attention to the concepts of membership and naturalization. Membership is the experience of encountering objects and interactions native to particular communities and increasingly engaging in naturalized relationships with them. Naturalization refers to deepening familiarity with use and enactment involving such objects and interactions. The problem with enforced naturalization is that it always creates problems of marginalization. "Marginal persons" are those who either exist outside of communities or are less prototypical members of communities. Marginalization can occur through exclusion or through multiple memberships in communities where an individual must switch frequently between interaction and object use protocols within each community, often with varying degrees of success. Typically, when discussing marginalization it refers to exclusion or difference from normative behaviors (stigma) and/or dominant, privileged, and/or hegemonic communities. The concept of category markedness indicates that, unlike normative categories, marginal categories are linguistically demarcated. Identity torque is where self-classification of individuals differs from how broader society classifies them.

Important tools for bridging between communities are "boundary objects," defined by Bowker and Star as objects that "inhabit several communities and also satisfy the informational requirements of each." An example of a boundary object would be a website that serves both students and faculty members. For Bowker and Star, boundary objects act as a means of resolving tensions between communities without forcing one to adopt the other's norms and practices. The shared architectures of some of the systems developed under the AIR Project implement what Bowker and Star term "boundary infrastructures." These are defined as "stable regimes managing multiple boundary objects, allowing the necessary information to be accessed by multiple communities." While it is common to imagine that classification systems are objective entities, in subscribing to Lakoff's observations above regarding the traditional view of classification it becomes clear that such is not the case. Indeed, Bowker and Star assert that [43]:

> Classifications are made of standards, and these standards are developed through a complex and difficult process heavily influenced by social, political, economical factors. Classifications are not equal to standards, they are boundary objects among different communities, or better, they are boundary infrastructures.

As opposed to computational identity applications that are based on standard, static classification systems, the dynamically configurable, imaginatively grounded identities of the AIR Project are boundary objects that can customize user information and preferences for particular communities. The power of such models lies in the possibilities they enable for cross-community communication, which is of course necessary in order to challenge the discrimination that occurs at the margins, and lack of diversity inherent in the center.

Sociology of Stigma

Stigma often occurs in identities at the margins. An important perspective of identity can be found in Erving Goffman's *Presentation of the Self in Everyday Life*. [45] This work provides a basis for Goffman's later work on how stigma is constructed through social interaction and construction. Though his work was not empirical in the sense favored by much of contemporary sociology, his concepts have been widely influential. In [46], Goffman grossly describes three types of stigma. These are differences of: (1) the physical body, (2) individual character, or (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*." For Goffman, these hypothetical *normals* are definitional of social norms, some of which may be achievable by a majority of individuals, yet many of which are unavailable to individuals because they are due to unchangeable characteristics such as skin tone. Yet, in practice, a society may hold norms that are largely unattainable for any of its members. In fact, and provocatively, during his time period in the United States he asserted that [46]:

> …in an important sense there is only one complete and unblushing male in America: a young, married, white, urban, northern, heterosexual Protestant father of college education, fully employed, of good complexion, weight and height, and a recent record in sports.

In short, most everyone is stigmatized in some regards, and those who are not will soon be with the passage of time.

He also crucially noted that even those stigmatized by social norms may subscribe to these same norms, inducing self-hatred and other pathologies. Indeed, African American scholars as far back as W.E.B. Du Bois have noted the phenomenon of "double-consciousness," in which African Americans are dually aware of their own community and self-determined values that recognize their basic humanity, and the broader stigmatizing social values. [47] This idea will be taken up more rigorously below in the discussion of classification infrastructures.

This paper postulates the idea that many experiences of stigma largely rests in our cognitive ability to map

characteristics of the second type of stigma, that of character, moral value, will, belief, and passion [46], onto physical characteristics and the attendant categorization of those characteristics into socially recognized races, nationalities, and other so-called tribal classes (which may be described using theories of conceptual metaphor and blending). Secondarily, these mappings are reinforced and reified in social classification infrastructures, including computational infrastructures.

AIR PROJECT SYSTEMS

Below are a set of examples of recent systems developed as case study AIR Project applications to analyze social stigma and empower users navigating social classification structures and affordances for community formation. Though the problem of designing technologies to dynamic and socially situated user representations while avoiding stigmatizing structures is quite broad, the approach here suggests incremental advances predicated on understanding the imaginative creativity that people in real life use to navigate marginal social categories and to create new infrastructures to enable in software the strategies that cognitive scientists and social theorists have articulated in work on classification and categorization. The initial AIR Project systems fall into two categories: (1) systems to enable critical reflection on disempowering social identity phenomena such as torque and inadequate classifications structures based on identifications with discrete attributes (such as racial labeling on admissions forms), and (2) systems that empower users by providing alternatives to such disempowering structures.

What is sought here is to understand infrastructurally how stigma persists in computational self-representations. Many scholars underestimate the role of stigma as it persists in social computing applications and games, after all users are not limited to our real world categories, etc. Yet, it makes a difference who uses it, people stigmatize virtual bodies and it also is disempowering to have to play using a representation explicit chosen to be different than your real self in order to eliminate stigma.

Chameleonia: Shadow Play – A Critical Identity Game

Chameleonia: Shadow Play is a prototype critical identity politics game in which an avatar and its shadow (performed and socially-constructed selves) dynamically transform, along with the cinematic presentation of the scene, based on player selected gestures and the current location.

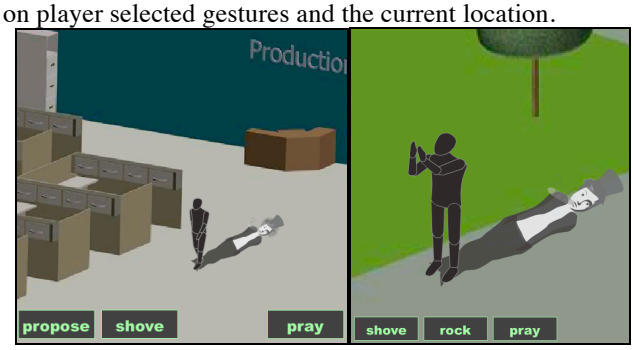

Fig. 3: Screenshots of *Chameleonia: Shadow Play*

This game is meant to suggest naturalization phenomena such as articulated by the work of Bowker and Star as described above. One of the major ways in which humans naturalize within communities is by appropriately displaying contextually appropriate gestures. A continuously walking player character transforms dynamically in response to both gesture and context (e.g., suburban, corporate, park, or urban scenes) while the character's shadow transforms differently in parallel. The player character represents the dramatized self in this case, while the shadow represents the socially constructed self. The difference between the two illustrates the concept of torqued identity.

DefineMe: A Critical Identity Construction Social Networking Application

DefineMe, the first version of which is subtitled *Chimera*, implements aspects of Lakoff's metonymic idealized cognitive models for categorization to allow users to co-construct their own and others' avatars as boundary objects. [42] The premise behind *DefineMe* is to allow users to define each others' avatars using both commonplace and abstract metaphors. Users can append metadata to other peoples' profiles to drive dynamic generation of avatar images. The initial content domain consists of animal metaphors that can be mixed-and-matched algorithmically. Animal types are potent entrenched metaphors for human personality. [48] (e.g., sneaky weasels or docile sheep), however this animal metaphor-based version is only an initial experiment. The model extends to more directly social categories such as scenes, fashions, or movements.

The *DefineMe* database is designed to be lightweight, dynamic, and extensible, while implementing categorical relationships between members. When comparing profiles, *DefineMe* is designed to match lexical items and logical relations directly. In the future it can be developed to compare the structures of profiles following insights from the analogical structure-mapping engine (SME) developed by Ken Forbus et. al. [49, 50]

Fig. 4: A screenshot of *DefineMe – Chimera*

The *DefineMe – Chimera* application reported on here focuses on creating metaphorical projections as described above. The *DefineMe* database relies on tags to create additional descriptors for each category or member. For instance, one user could describe a friend as a 'lion'

because she 'is' 'strong' (the tag). Another user could add an additional tag, stating that she is a 'lion' because she 'tends to be' 'carnivorous.' These tags can comprise vertical parent-child links (e.g., a 'lion' is-an 'animal') or horizontal implicit links (e.g., in another user's profile a 'lion' is-an 'Ethiopian symbol,' yet the system may still create a category linked by the concept 'lion'). The initial content domain consists of animal types (constructing chimeras) because they are potent entrenched metaphors for human personality [48], however the model extends to more everyday social categories such as scenes or fashions. The system implements identity torque when the avatars differ from users' self-conceptions.

Following the work of Eleanor Rosch cited in [42], the tagging system could also be used to define aspects of categories themselves. For instance, a 'robin' tag can be added to the category, 'birds,' to define the prototype of that category. In this way, members can belong to multiple groups, but individuals can represent the prototypical members of groups. Furthermore, the system could use an individual as a prototype stand-in for a category. For instance, rather than just labeling a friend as a lion, one could state that your friend, Emily, is like your friend Bobby because she is brave. The system would then take all of Bobby's attributes and apply them to Emily's avatar, mixing animal types further.

IdentityShare: A Critical Identity Construction Social Networking Application

IdentityShare, a social networking site for "non-friends," Daniel Upton's MS thesis project in Digital Media with Dr. Carl DiSalvo as his co-chair, is also developed under the umbrella of the AIR project. [3]

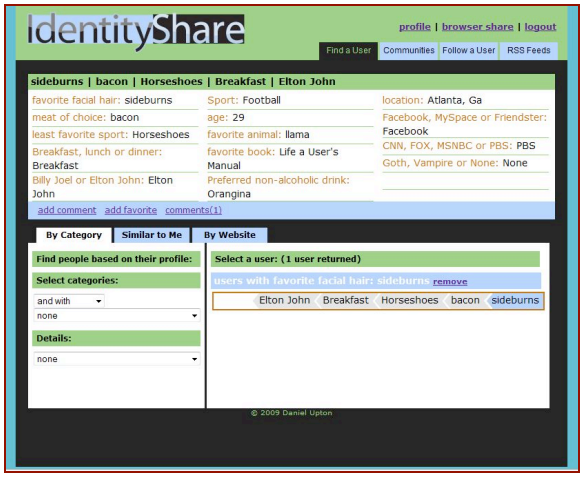

Fig. 5: A screenshot of the *IdentityShare* interface

IdentityShare is implemented utilizing the same database is the same as in *DefineMe*. The system allows for social networking by providing users with facilities to construct profiles, follow and comment upon other users, and perform game-like tasks that encourage users to consider exploring both like and different profiles of others. *Identity Share* offers a novel means of self-representation based upon open-ended categories and tags. Standard profile models that typically include normative categories such as name, age, gender, location, and race are replaced with a customizable list that exists as a database, growing as more categories are added. Database consistency is maintained by giving users type-ahead functionality when adding custom categories and by presenting existing categories in order from most common to least common. Users can select which categories are most important to them by indicating that they are primary using checkboxes.

By allowing for primary selection of categories, the system implements centrality phenomena from the cognitive linguistics theories of categorization above, i.e., "the idea that some members of a category may be 'better examples' of that category than others," to a users profile. [42] This means that a user's profile, as a collection of categories that define a user, is no longer viewed as just a set of static characteristics that are true about this user, but rather as a complex set of characteristics where some may be "truer" or more definitional to the user's self-conception. To take this even further, a future implementation of *IdentityShare* could offer a ranking system for each category, thereby not only providing centrality, but a centrality gradience, "the idea that members (or sub-categories) which are clearly within the category boundaries may still be more or less central." [42] This offers a new dynamic to social network profiling that does not currently exist on the popular social networking sites.

CONCLUSION

Moving beyond utopian views that celebrate computational identity technologies as eradicating the phenomena of stigma merely by allowing users to create graphical avatars, this paper has looked at the ways that identity politics of race, gender, ethnicity, as well as more general issues of marginalization, community exclusion, and naïve classification, persist in the use and implementation of current systems.

Computational identity representation technologies, including games, social networking sites, and virtual worlds, allow both (1) uniquely computational modes of self-presentation (e.g., uploading personal information into a database that is later presented through an online profile or creating a graphical avatar) and (2) extensions of real world facilities to engage in discourse practices, self-dramatization, and community creation that also exist offline (e.g., voice chatting or videoconferencing). In light of this duality, the AIR Project theories and technologies described above serve two goals, (1) critical reflection on, and (2) user-empowerment over, stigma.

Creative Critical Reflection on Stigma

Some of the works that ICE Lab has created are cultural products intended to aid users in understanding social phenomena of stigma. These are subjective projects for users to interpret, in a sense creative artworks, rather than empirical experiments for conceptual change (although the latter is a future goal). In particular, projects such as

DefineMe, and *Chameleonia* are intended to reveal the limitations of discrete/folk classification infrastructures, the socially constructed nature of the self, and phenomena of torqued identity/double consciousness that arise in stigmatized individuals and communities. To assess more carefully how this critique functions, this subsection describes design considerations in implementing the two social networking applications described above.

When social stakes are low, many people are inclined to reveal their adherence to stigmatizing norms and to project those norms onto others. Indeed, in a project such as *DefineMe – Chimera* the potential for using the system to ridicule and ostracize is quite apparent. Yet, these potentially disempowering uses are not seen as drawbacks of the systems. The system is considered to be a culturally situated critical intervention, rather than a usability oriented productive application. In bringing to light more nuanced and imaginative stigma phenomena, such as potential ostracism, prejudicial exoticizing of other people, or unflattering labeling, it also provides the potential to disempower such phenomena through dialogic engagement. The system can be considered to be a provocative cultural intervention situated in an environment increasingly encroached upon by hegemonically enforced, often corporately determined, norms regarding of user identity. As such, a system like *DefineMe* succeeds only to the degree that it engages users as an evocative tool to inspire critical thought, and is construed as adequate for capturing personalities using archetypical avatars or conjure the sensation of experiencing the web through another's eyes. Beyond this, however, the systems are prototypes that suggest directions that could enhance the expressive and empowering potentials of productive, utilitarian, or commercial systems such as computer games and popular social networking sites with features such as self-definition of categories and deployment of imaginative metaphor.

Despite the provocative and critical interventionist stance taken, the systems are engineered to mitigate against abuse, and certainly distress of users is not a goal. Looking at the two systems consecutively, mitigating factors designed into the systems are as follows:

DefineMe: Chimera Design Factors

1) Users are only allowed to tag their Facebook "friends" who have added the application.
2) Users can access a limited database of animal types.
3) Users must "opt-in" to receive a generated avatar.
4) Users can "opt-out" at any time.
5) Users' database entries can be edited by moderators.
6) Users have access to only a limited format for tagging each other.
7) Users can delete entries on their profiles that others have created.

Together, these factors strongly help to avoid the system's potential to be applied in an overly negative manner. It is a contract between friends to sign up for potential compliments, teasing, and both self and social insights. Ultimately, *DefineMe – Chimera* is intended to present users with a controlled experience of torqued identity. The fractured identity of a monstrous chimerical representation is then, an accurate reflection of the limitations of applying modular and discrete classifications to a real world biography.

Creative Empowerment of Users Against Stigma

Aside from the sort of critical reflection that artworks provide, there are practical results of the AIR Project technologies. These can be summarized as follows: (1) insurgent metaphors are instantiated. Insurgent metaphors, as defined by Otto Santa Ana in his work in critical discourse analysis, are conceptual metaphors explicitly designed to replace social metaphors that induce stigmatizing bias. [44] The AIR Project systems also allow for (2) dynamic construction of user categories based on empirical results in how humans actually categorize in the world, with features such as centrality gradience and prototype based grouping as occur in *DefineMe*. AIR technologies also (3) provide new modes of community formation as in the involuntary communities that Upton's *IdentityShare* enables. Finally, the AIR Project systems provide for (4) user-defined and user performance based support for identity/naturalization. For example, the user's self in *IdentityShare* is primarily presented through database fields that users' themselves determine and through the performed action of surfing the internet.

As done with *DefineMe – Chimera* above, the following assesses more carefully how these empowering affordances function, the below elaborates discussion of *IdentityShare* also first articulated in [3].

Regarding *Identity Share*, empowering design functions implemented include the following:

Identity Share Design Functions

1) Users can create their own self-classifications.
2) Users can select which classifications are important to them in defining communities (that others do not have to explicitly opt in to).
3) Users can avoid or utilize normative categories such as gender or occupation.
4) Users can allow or disallow the system's tracking of their web visitation paths at will.
5) Users' real world identities are kept anonymous.
6) Users' perceived affordances to communicate with one another are highly restricted.
7) Users have full control to delete any of their data in the system.

These factors were developed over the course of iterative refinement of the project based on informal user feedback (mainly via open-ended interviews). The greatest challenge with the system is to allow for user-generated categories while also pruning sparsely used and idiosyncratic database elements. A second challenge regarding anonymity and privacy is addressed by careful controls such as articulated above, and by providing quite clear and prominent information on the nature of the site. Quite contrary to

being a site to allow people to "spy" on others, it is an "opt-in" site oriented toward users with a desire to share their personal styles, definitions, and web behaviors with one another. Finally, it is a system that is proposed as a balance between the limited and discrete, yet highly modular, data-structures provided by computing and the continuous and transient, yet not computationally amenable, identity phenomena as experienced in the real world.

Final Remarks and Future Work

Tackling issues of stigma is admittedly an incredibly ambitious goal. Situating this goal as closely related to computing and cognitive science research is also risky as both the issues and terminology are usually seen as the realms of the social sciences and the humanities. Yet, these are some of the most fundamentally divisive issues in societies across the globe. They are also woefully under-researched, even in human-centered computing fields such as computer-supported cooperative work or other user-centric areas of human-computer interaction. In addition, by invoking a broad interdisciplinary theoretical framework centered upon seminal works necessarily there is omission of many nuanced accounts of the social phenomenon of stigma.

Yet, given all of these challenges, this early work can still make a worthwhile contribution to the area of research in cognition and creativity. The central argument has been that phenomenon of stigma is actually implemented and reified in software, it is not only a social concern has been carefully formulated with sociological motivations grounded in well known results from cognitive science and provided a framework upon which more nuanced phenomena can be investigated. Lastly, future work will engage empirical research in sociology to develop effective strategies for changing attitudes regarding stigmas that are well known social-ills such as racism.

The author has proposed an evaluation framework for this research. The framework is based in a venerable methodology for qualitative research from sociology called "grounded theory techniques," [51, 52] augmented by contemporary theory from cognitive linguistics called "critical discourse analysis." [44] Grounded theory techniques will be useful here because they reveal qualitative patterns within data without a priori hypothesizing about outcomes. In the AIR Project, these patterns involve the nature of projected identities [41] for satisfying users' in-application needs and imaginative self-determinations of identities. Because projected identities are the results of conceptual metaphor (i.e., projection of the "source" space of self-conception onto the "target" space of a computational representation) [53, 54], methods to elicit, discover, and characterize metaphors from user-generated discourse are necessary. Conceptual metaphor-based critical discourse analysis has been applied for these purposes and has even been used to elucidate metaphors for racism and bias within a corpus, as well as the types of inferences that these metaphors enable. [44] The steps would be performed on a corpus of data elicited from users about their experiences in games/social networks initially through concurrent and retrospective verbal protocols, open-ended interviews, questionnaires, and transcripts of online experiences, so that the investigators can triangulate insights based on these multiple sources and schemas.

Finally, the name of the endeavor, Advanced Identity Representation, is grounded in a humility that the word "advanced" obscures. In the face of this grand challenge, advancing the current state of computing and cognitive science research into combating issues such as racism is a modest goal given the paucity of research in these fields explicitly engaging such a goal.

ACKNOWLEDGEMENTS

Brilliant implementation work has been performed by students in the ICE Lab. In particular, Daniel Shane Upton has been an inspired coder and thinker. Others who have made valuable contributions include Jichen Zhu, Ben Medler, Emily Cribb, Bryan Berry, Bobby Schweizer, Brett Holmes, Richard Shemaka, Jisun An, Ayoka Chenzira, Digdem Sezen, Tonguc Sezen, and Donna Sammander.

REFERENCES

1. Bethesda Oblivion [PC] 2006.
2. Blizzard World of Warcraft [PC] 2005.
3. Harrell, D. F., Upton, D., Medler, B. and Zhu, J. *Define Me: A Cognitive and Computational Approach to Critical Digital Identity Representation in Social Networking Applications*. Baltimore, MD, 2009.
4. Turkle, S. Whither Psychoanalysis in Computer Culture? *Psychoanalytic Psychology* 21, 1 2004), 16-30.
5. Turkle, S. *Life on the screen: Identity in the age of the internet*. Simon and Schuster, New York, 1995.
6. Geertz, C. *The Interpretation of Cultures*. Basic Books, New York, NY, 1973.
7. Jil. *Coming of Age in Second Life: An Anthropologist Explores the Virtually Human*. Princeton University Press, Princeton, NJ, 2008.
8. Bailenson, J. N., Iyengar, S., Yee, N. and Collins, N. Facial Similarity as a Voting Heuristic. *Public Opinion Quarterly* 2009 (in press).
9. Fox, J. A. and Bailenson, J. N. Virtual self-modeling: The effects of vicarious reinforcement and identification on exercise behaviors. *Media Psychology* 2009 (in press).
10. Bailenson, J. N., Yee, N., Blascovich, J., Beall, A. C., Lundblad, N. and Jin, M. The use of immersive virtual reality in the learning sciences: Digital transformations of teachers, students, and social context. *The Journal of the Learning Sciences*, 17 2008), 102-141.
11. Nelson, A. Bio Science: Genetic Ancestry Testing and the Pursuit of African Ancestry. *Social Studies of Science*, Special Issue--Race, Genetics, and Disease: Questions of Evidence, Questions of Consequence, 2008.
12. Nelson, A. and Tu, T. L. N. *Hidden Circuits: An Introduction*. New York University Press, NY, 2001.
13. Nakamura, L. *Cybertypes*. Routledge, New York, 2002.

14. Nakamura, L. *Digitizing Race: Virtual Cultures of the Internet*. University of Minnesota Press, Minneapolis, MN, 2008.
15. Nakamura, L. Race In/For Cyberspace: Identity Tourism and Racial Passing on the Internet. *Works and Days*, 13, 1-2 1996, 181-193.
16. Castronova, E. *Synthetic Worlds: The Business and Culture of Online Games*. University of Chicago Press, Chicago, IL, 2005.
17. Ducheneaut, N., Yee, N., Nickell, E. and Moore, R. J. *The Life and Death of Online Gaming Communities: A Look at Guilds in World of Warcraft*. Association for Computing Machinery (ACM), 2007.
18. Yee, N. The labor of fun: How video games blur the boundaries of work and play. *Games and Culture*, 1, 1 2006), 68-71.
19. boyd, d. *Taken Out of Context: American Teen Sociality in Networked Publics*. University of California, Berkeley, Berkeley, CA, 2008.
20. Taylor, T. L. *Play Between Worlds: Exploring Online Game Culture*. MIT Press, Cambridge, MA, 2006.
21. Haraway, D. J. *Simians, Cyborg, and Women: The Reinvention of Nature*. Routledge, Chapman and Hall, Inc., New York, 1991.
22. Eglash, R. *African Influences in Cybernetics*. Routledge, City, 1995.
23. Eglash, R. *African Fractals: Modern Computing and Indigenous Design*. Rutgers University Press, New Brunswick, NJ, 1999.
24. Leonard, D. J. Not a Hater, Just Keepin' It Real: The Importance of Race- and Gender-Based Game Studies. *Games and Culture*, 1, 1 2006, 83-88.
25. Everett, A. and Watkins, C. *The Power of Play: The Portrayal and Performance of Race in Video Games*. MIT Press, Cambridge, MA, 2008.
26. Leonard, D. J. High Tech Blackface -- Race, Sports Video Games and Becoming the Other. *Intelligent Agent*, 4, 4, 2007.
27. Chan, D. *Playing with Race: The Ethics of Racialized Representations in E-Games*, 2005.
28. Leonard, D. J. *Live in your World, Play in Ours': Race, Video Games, and Consuming the Other*, 2003.
29. Kolko, B. Representing Bodies in Virtual Space: The Rhetoric of Avatar Design. *The Information Society*, 15, 3 1999, 177-186.
30. Foster, T. *The Souls of Cyber-Folk: Performativity, Virtual Embodiment, and Racial Histories*. Indiana University Press, 1999.
31. Gonzalez., J. *The Appended Subject: Race and Identity as Digital Assemblage*. Routledge, 2000.
32. Höglund, J. Electronic Empire: Orientalism Revisited in the Military Shooter. *Game Studies*, 8, 1, 2008.
33. Book, B. Moving Beyond the Game: Social Virtual Worlds. In *Proceedings of the State of Play Reloaded,* New York Law School, 2004.
34. DiSalvo, B. J., Crowley, K. and Norwood, R. Learning in Context: Digital Games and Young Black Men. *Games and Culture*, 3, 2, 2008, 131 - 141.
35. Bogost, I. *Persuasive Games*. MIT Press, Cambridge, MA, 2007.
36. Muramatsu, J. and Ackerman, M. S. Computing, Social Activity, and Entertainment: A Field Study of a Game MUD. *Computer-Supported Cooperative Work*, 7 1998, 87-122.
37. Lutters, W. G. and Ackerman, M. S. Beyond Boundary Objects: Collaborative Reuse in Aircraft Technical Support. *Computer-Supported Cooperative Work*, 16, 2007, 341-372.
38. Goguen, J. *Towards a Social, Ethical Theory of Information*. Lawrence Erlbaum Associates, City, 1997.
39. Shneiderman, B. *Leonardo's Laptop: Human Needs and the New Computing Technologies*. MIT Press, Cambridge, MA, 2002.
40. Harrell, D. F. *Digital Metaphors for Phantom Selves: Computation, Mathematics, and Identity in Speculative and Fantastic Fiction and Gaming* City, 2008.
41. Gee, J. P. *What Video Games Have To Teach Us About Learning and Literacy*. Palgrave Macmillan, New York City, 2003.
42. Lakoff, G. *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind*. University of Chicago Press, Chicago, IL, 1987.
43. Bowker, G. C. and Star, S. L. *Sorting Things Out: Classification and Its Consequences*. MIT Press, Cambridge, MA, 1999.
44. Santa Ana, O. *Brown Tide Rising: Metaphors of Latinos in Contemporary American Public Discourse*. University of Texas Press, Austin, TX, 2002.
45. Goffman, E. *The Presentation of Self in Everyday Life*. Anchor Books, New York, 1959.
46. Goffman, E. *Stigma: Notes on the Management of Spoiled Identity*. Prentice Hall, Englewood Cliffs:NJ, 1963.
47. Du Bois, W. E. B. *The Souls of Black Folk*. A.C. McClurg & Co., Chicago, IL, 1903.
48. Turner, M. *The Literary Mind: The Origins of Thought and Language*. Oxford UP, New York; Oxford, 1996.
49. Forbus, K. D. *Exploring Analogy in the Large*. MIT Press, Cambridge, MA, 2001.
50. Gentner, D. Structure-mapping: A theoretical framework for analogy. *Cognitive Science*, 7, 2 1983, 155-170.
51. Strauss, A. *Qualitative Analysis for Social Scientists*. Cambridge University Press., Cambridge, U.K., 1987.
52. Glaser, B. *Basics of Grounded Theory Analysis*. Sociology Press, Mill Valley, CA, 1992.
53. Lakoff, G. and Johnson, M. *Metaphors We Live By*. University of Chicago Press, Chicago, IL, 1980.
54. Grady, J. E., Oakley, T. and Coulson, S. *Blending and Metaphor*. John Benjamins, 1999.