Imagination, Computation, and Self-Expression
Situated Character and Avatar Mediated Identity

ABSTRACT

The ability to construct imaginative, computational self-representations such as characters in games and avatars in virtual worlds and social media can impact people’s self-perception in the real world and provide proxies for people to engage in communities as players, learners, and doers. It is clear, however, that some users view characters and avatars instrumentally to accomplish virtual tasks, whereas others see them as virtual selves for playful identity construction and performance. Open questions about design of character/avatar construction tools include better understanding the trade-offs between accommodating representation of aspects of users real selves vs. enabling extraordinary fantastic characters – and how enabling either plays a role in the users’ situated contexts, including the creation of coherent life stories, narratives of personal experience, and narratives of personal identity. This paper provides theory and pilot evidence as steps toward answering these questions. Our evidence was elicited using grounded theory techniques on data collected in a three-year design-based research study into fostering at-risk students’ science, technology, engineering, and mathematics (STEM) learning using virtual world technologies. We propose a three-axis model of user stances in relationship to their avatars. Using insights from the cognitive science theory of conceptual blending in order to characterize users’ perspectives of their avatars as imaginative integrations of their real and virtual selves, we present a set of case studies illustrating users’ stances in terms of our three axes. The upshot is that students in the study tended to fall into one of three categories: (1) viewing their avatars as necessarily reflections of their real world identities, (2) viewing their avatars as mere proxies for building artifacts in the world, and (3) viewing avatars as characters external to themselves for engaging in a play of identity performance and presentation. Group (1) found the affordances of the virtual world tools they used to be inadequate, hence serving the needs of this group may require alternative design solutions in light of real world values, activities, and behaviors.

1. INTRODUCTION

The importance of enabling robust user representations in digital media seems clear. A mobile phone account features an associated profile describing billing related information, but also allowing for the upload of a photo or other self-representation. A social networking account allows for indications of preferences, friendships, and histories such as educational or employment backgrounds. Games allow users to manipulate characters in fictional worlds, and often allow a great degree of customization at both visual and game mechanical levels. There must be social, psychological, economic, cultural, and aesthetic factors at play that are worthy of scrutiny given the wide, cross-platform distribution of user representations. This might suggest that enabling empowering, self-expressive representations would be a social boon. Yet, there exists a countercurrent to this observation. Namely, that these digital representations are peripheral to our real world identity experiences. Those holding this view go further. In response to an interview where the first author argued for developing games that are more sensitive to the diversity of players’ social and cultural identities and more broadly that:

Much more is at stake than just fun and games. Prejudice, bias, stereotyping, and stigma are built not only into many games, but other forms of identity representations in social networks, virtual worlds, and more. These have real world effects on how we see ourselves and each other... even in social networking software, we create profiles that ostensibly represent our real selves, but they are limited by many of the same constraints as characters in games.

Responses included grateful expressions of understanding, and follow-up articulations of the role of privilege in allowing some to feel comfortable with the status quo, but there was also a large measure of

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vitriol in the user comments. Many users simultane-
ously adopted a highly racially-oriented interpretation
of Harrell’s argument (despite Harrell’s orientation
toward a wide range of phenomena including gender,
body type, style, fashion, body language, along with
race and more) at the same time as arguing that race
should not matter in games. This sentiment accompa-
nied apologia for the current state of popular gaming.
All of these viewpoints can be exemplified by the fol-
lowing excerpts from the user comments:

» Making a race issue out of fantasy games is a
tenuous argument. If you can’t [empathize] with
an Elf because he’s a white Elf, then maybe you’re
the racist. Why assume that black hominids in a game have
any connection to black humans in reality?

» About less intelligence in Oblivion. That is because
the Redguards are a strong muscular/physical race.
In the oblivion world this is about the opposite of
magic. And the intelligence stat is a measure on
how good you are at magic. So it’s not a form of
racism; it’s how the game works.

It’s a losing battle for game designers to try to an-
ticipate a hundred different body types. Be thankful
that you get to [choose] what your character looks
like to begin with…

» This guy seems like That Guy. For the non-role-
players in the audience, “That Guy” is a tabletop
roleplaying term. He’s the guy who mostly just
exists to derail the party, who seems to care way
too much about what his character is wearing,
who views every attempt to move things along as
Slowing His Creativity – a crime which can barely be
encompassed by mere words.

These comments expressing a type of solipsistic
instrumentalism and racial anxiety exhibited by sug-
gest that fantastic storyworlds bear no reflection of
real world values and play no role in determining real
world values, arguing that game mechanical needs
excuse reductive and demeaning ideas of race and
ethnicity (ostensibly Norwegian and black charac-
ters with less default intelligence and more default
strength), and discounting Harrell’s critical concerns
as superficial. Yet, they suggest that several ques-
tions representative of a popular skepticism regarding
diversifying digital representations that may be worth
considering:

1. Is enabling creative user self-representation while
minimizing disempowering social identity phenom-
ena a desirable aim?
2. What is at stake and why are these concerns im-
portant in the real world, outside of play and social
networking experiences?
3. Are these goals technically and artistically feasible?

The answer to the first question seems clear. Avatars,
player characters, profiles, and accounts are intrinsic
to all societies using digital media. Empowering users
in such is then a fundamentally humanistic goal; such
media should not be trivialized and must be addressed
on par with other forms of mass media.

Regarding the second question, it is important to
recall that experiences in virtual worlds are real
experiences. They are mediated via computational
technologies, yet exist in real time, connect real
people, and comprise real personal experiences. The
negative psychological impacts of demeaning repre-
sentations related to issues of social categories that
are often marginalized, excluded, and/or underval-
ued have been well documented. However, such
representations impact real world agency as well. The
ability to see oneself in different roles that may or
may not be close to one’s individual experiences is
noted in the learning sciences as crucial to becoming
a learner and doer of those fields that are keystones
in enabling social and economic advancement. Hence,
as an exemplar of exactly what is at stake, this article
uses the contest of the classroom as it’s centerpiece
for exploring the nature of computational user self-
representation, offering a preliminary characterization
of the nature of those representations based upon
empirical results and critical observations. The upshot
is that the implications from observing classroom
experiences regarding the use of avatars in a virtual
world for learning reveal aspects of the aesthetics and
politics of computational identity in a way useful for
artists, game/technology designers, and socio-cultural
theorists/scientists.

Finally, regarding the third question, the theoreti-
cal framework of this paper lays out a conceptual
underpinning for better understanding the technical
basis for such representations across platforms as a
stepping stone toward suggesting how to develop
new computational identity platforms that avoid
reifying disempowering identity phenomena in their
infrastructures (as do many current technologies).

2. THEORETICAL BACKGROUND

In this paper, we use the Air Project’s cognitively
grounded theoretical model of computational identity
construction as the basis for an empirical study
examining the students’ enactment of their identities.
Cognitive categorization is a basic mental operation
necessary for understanding the world, and is based in
hurts, embodied and cultural experience and imagi-
nation. The model we use considers how identity
phenomena such as stereotypes, paragons, group
representatives, and other arise from what are called
“prototype effects.” Such effects are evaluated in light
of the how the computational identity systems are
built and the affordances they enable. A more detailed
account of the elements of this theoretical framework
follows.

2.1 Shared Technical Underpinnings of Computa-
tional 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.

Figure 1 (below) describes, at a high level, the com-
ponents that comprise the majority of widely used
computational identity technologies. Fundamental
to implementing computational identity applications,
the six components in Figure 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.

Figure 1. Shared Technical Underpinnings of Computational Identity Applications.

Understanding the applications and limitations of the
technical means by which users stage their identities
across digital media forms can enable customizability
and cross-community communication facility in social
identity systems.

2.2 The Air Model of Cognitively Grounded Compu-
tational Identity

Our approach begins with the basic cognitive building
blocks of identity (discussed in a subsection below)
upon which social identity categories are built. Cogni-
tive scientists have proposed that human conceptual
categories form “idealized cognitive models” (ICMs)
upon which categories of objects in the world are built. These models can explain how users project
their identities into their avatars.
The AIR model is useful for identifying where schisms exist between a technical structure and a real world 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).

1. Input Spaces (the conceptual spaces to be combined)
2. Cross-space mappings (links between analogous elements in different input spaces)
3. The Generic Space (a conceptual space mapped to both of the input spaces that describes shared structure between the input spaces)
4. The Blended Space (the space in which elements from the input spaces are integrated)

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tions, and, if not, provide insights into assessing which self-representation construction affordances would be better.

3.1 Participants
The 13 student participants in this study were all members of an urban California alternative high school classroom. The students were 15-19 years old, the ethnic make-up was predominantly African-American, and there was a near-equal gender distribution. All students at this school qualified for federal free lunch programs, and over half of the students in the study classroom had Individual Education Plans (IEP), because they are categorized as Special Education students.

3.2 Procedure
The intervention began with students creating logins and avatars. In choosing login-names, each participant was asked to compose a first name, yet 734 required them to select a last name from a pre-compiled list. In choosing a visual representation for themselves, users were limited to a dozen basic images (see Figure 3), which they could subsequently modify through dedicated interface features for altering skin color, adding tattoos, changing their facial features and hair, “putting on” makeup and accessories, etc.

3.3 Data Collected
Our raw data consists of digital movies of students’ collaborative work, screen-capture movies that archive every keystroke and mouse click made by each student over the entire intervention; personal journal logs each student kept throughout the study; movies of day-by-day individual semi-clinical interviews with a subset of focal students selected on the basis of real-time events that occurred in the classroom; rich field notes we amassed and co-edited on our laboratory wiki; videotaped design-team debrief/plan sessions; and participant-generated mixed-media artifacts, i.e., worksheets, modeling constructions, and computer screenshots (see Figures 4a, 4b, 4c, and 4d, below).

3.4 Data Analysis
Analysis was comprised of a series of steps using situated discourse analysis, conceptual blending theory techniques from grounded theory, and microgenetic analysis, and drew on conceptual blending theory. This process is elaborated below as a series of steps.

Step 1. Selection of data: We selected data segments relevant to virtual identity construction. For example, one data segment was a video clip of a group discussion at the end of the first day of the project that included rich exchange between the principal teachers, researchers, and students regarding students’ initial experiences of constructing virtual identities as externalized through avatars. An example of segment not included is a video of a student debugging code they wrote to generate a jukebox since this would not be considered pertinent to virtual identity construction utilizing an avatar (though not the focus here, certainly the role of artifact construction and use will play a role in our study of identity creation at a later date). Additionally, still images complemented the video data.

Step 2. Transcription: Raw video data was transcribed.

Step 3. Chunking raw data: Using situated discourse analysis, we segmented this transcription into utterances as determined by turn taking. Thus, the words an individual verbalized continuously without interruption or change of speaker would be considered an utterance.

Step 4. Finding patterns and meanings among utterances: We then adapted techniques from grounded theory and looked at the utterances for codes, or patterns, occurring between the utterances. Grounded theory techniques are useful here because they reveal qualitative patterns within data without a-priori hypothesizing about outcomes. Grounded theory analysis consists of four steps as described below:

1. Grounded theory involves four steps: (1) identifying codes that act as anchors to all key data points to be gathered; (2) grouping the codes into concepts; (3) grouping concepts into similar family theories; (4) theory development based on previous steps, that is a collection of explanations that describe the subject of the research. For purposes of our analysis here, we focused on steps 1 and 2. Using two coders, through discussion and two iterations of coding we achieved 100% inter-rater reliability.

2. Step 5. After identifying the codes and concepts we used microgenetic analysis, drawing on cognitive linguistics as a tool, to analyze the utterances deemed meaningful.

For our coding scheme, we found indices of students’ views of their own, and others’, avatars in relation to real world users. First, we noted every reference to avatars (normative or idiomatic vocabulary notwithstanding) and highlighted them in the transcript. We then noted if the utterance indicated a blend of the user’s real self and the avatar as a virtual self (e.g., when referring to an avatar “look at my hair” and the contrasting “look at my dude’s hair” are each indicative of different types of blends – the first an integrated projected identity and the latter an external character).

We anticipated finding blending phenomenon such as the above, yet we did not presuppose this in our coding scheme. The analysis of utterances to reveal students stances toward their avatars occurred by grouping like utterances and characterizing as input spaces to the blend. Given this, we assessed if the utterance referred to a conceptual blend and identified prospective input spaces, generic space, and frames from which the input spaces seem to have been drawn from. Though a subjective process, each such attribution was inferred directly from data, i.e., we only speculated based on student utterances-in-context, not from our own opinions about students’ unarticulated thoughts.
In especially illustrative examples, we took particular care to notice vital relations (cross space mappings revealing analogous structures in the input space), compression (reduction of abstract concepts to human scale in the blended space), and types of conceptual integration networks in order to assist in explicating the phenomenon at hand. For example, the “identity” vital relation indicates that the student and the avatar are integrated in the blend space. Cases where a category of person (e.g., “black” or “Mexican”) is rendered human scale through a particular avatar appearance comprise a type of compression of category to a paragon (a metonymic icm). Finally, cases where both the real and virtual selves are being integrated in the blend seem to be drawn from the same frame (frames are broad, commonly understood knowledge of a particular domain, e.g., the notion of a community) comprise “single-scope” blends, whereas cases where they seem to be drawn from quite different frames (e.g., the real self is drawn from the community frame and the virtual self is drawn from the computational tool frame) comprise “double-scope” blends.

The advantage of utilizing conceptual blending theory to perform this analysis is that it provides a careful terminology and structure to account for the ways that specific elements of the real and virtual selves are integrated in a projected self. It also provides a uniform means to account for cases where the “projected self” consists of an avatar used as a tool to accomplish tasks rather than as self-representation. Regardless of the status of conceptual blends as cognitive phenomenon directly resulting from particular neural structures (an open and controversial question), the relative precision of the conceptual blending construct for characterizing different types of integration and the elements thereof has proven useful. Specific insights gained using this framework are discussed in the next section, most importantly, including a three-axis model of stances that students take toward their avatars.

4. RESULTS

Through analysis as described above, we found there to be three distinct dimensions of students’ stances toward the construction and use of avatar-based identities. The three dimensions are named below (and depicted in Figure 5, below):

1. Everyday vs. Extraordinary graphical appearance: Avatar appearance can range from the everyday to the extraordinary or fantastic. Students tend toward preferring one or the other extreme, though a preference for anthropomorphic avatars was observed (likely due to the platform). This dimension is context-sensitive since one student’s perception of what everyday appears to be can be quite different from another student. In fact, “engineer” was more extraordinary to some of the students than “gangster.”

2. Mirror (1st Person) vs. Character (3rd person) ontological status: Student perception of avatars ranged from virtual representations of their real selves to perceiving them as characters external to themselves operating, or to be operated, within the virtual world.

3. Instrumental/Playful use: Students’ uses of avatars ranged from their instrumental deployment as tools to accomplish tasks and proxies for them to act in the virtual environment to accomplish tasks construed as computational to deployment game-like personae as a means for engaging in imaginative identity play.

Recall from the Methods Section that the project goals were framed for students as open-ended. Following a Freirian critical pedagogy perspective in which students’ own generative themes were elicited, students were shown various avatars and activities and invited to propose their own ideas to investigate within the virtual world. Thus, while we are aware that the project’s framing including the researchers’ and educator’s own ways of referring to avatars, the activities completed, peer register, and the project’s goals of enabling student to see themselves as learners and doers of STEM material, could have primed the students’ stances toward their avatars to fall at particular locations along the above axes, we believe any possible priming was minimized. While one of the main goals of the initial study was to help foster within students a sense of themselves as STEM learners and practitioners, we did not explicate this to students, thus this motivation did not impact students’ view of their virtual identities.

Below, we interrogate three students’ views of avatars as a means of exploring the three dimensions and to ground later discussion of the schism that exists between computational identity platform affordances and students’ desires for avatar construction. The first two provide less detailed accounts, but are used to describe the means by which we discovered the three dimensions of stances that students take toward avatars. The cases are also used to characterize particular stances encountered in multiple students’ based on the combination of their positions along each of these axes. The upshot is that a subset of students that we call Mirror Players seemed to see avatars as primarily performative, avatars for them are reflections of the students real selves used for identity play and intended to be faithful to the students’ real world categories. Unfortunately, these students seemed the most likely to eject themselves from the study because of dissatisfaction with the affordances of avatars to enable the type of customization that they desired. Alternatively, such students put in extra effort in order to realize avatars that they only construed as “adequate” (e.g., Figure 6, image on right side, below).

4.1 Case Studies

4.1.1 Case One: Mirror Player DS

DS is an example of a student who (1) wanted his avatar to have an everyday appearance and (2) tended toward preferring his avatar to mirror his real self. At the end of class discussion on the first day of the project DS proclaimed that the project was “stupid.” It was only when his classmates revealed that DS’s avatar had “female features” with “long eyelashes” that DS acknowledged his real source of displeasure arose from his inability to construct his avatar as he would have liked. Excerpts below are transcription of portions of this conversation, exemplifying DS as a mirror player. The numbers in the analysis indicate which of the three axes the statement is pertinent to.

Below in Figures 6a and 6b, we see on the left the avatar that he constructed by the end of the first day when the discussion took place. On the right we see his avatar after he was able to get it to an acceptable, but not ideal look (although this view allows us to only see his character from the back, note the broad shouldered physique, bald head, and attempt at what the student described as flames flaring from the torso). The identity play resulted in a largely everyday avatar, but with some fantastic features suiting DS’s masculine ideal.

![Figure 5](image_url)

**Figure 5.** Three dimensions related to user perception and use of virtual identity.
A transcript excerpt pertinent to DS.

(1) KJ and DS's descriptions collude to communally define norms for appropriate everyday categories, or ideals. 
(2) SK, a female student, refers to the state of being female. 
(2) KJ, his dude, had female features. 
(2) SK, a female student, refers to the state of being female. Speculatively, her mocking tone and use of the term "being" suggests that feminine qualities of the avatar input space is being integrated/identified with user's real self input space, indicating a mirror stance.

4.1 Case Two: Character User SQ

SQ is an example of a student who (1) exhibited a moderate preference for his avatar to fall within an everyday category, (2) exhibited a strong perception of the avatar as unrelated to his real self, and (3) viewed his avatar as a tool to accomplish his goal of building a skyscraper in the virtual world.

In an interview conducted with SQ, he was asked why some people care about their avatar appearance and others do not. Below is a transcription of portions of that interview that exemplify SQ's categorization as a Character User.

4.1.2 Case Two: Character User SQ

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In an interview conducted with SQ, he was asked why some people care about their avatar appearance and others do not. Below is a transcription of portions of that interview that exemplify SQ's categorization as a Character User.

4.1.3 Case Three: Character Player CGT

CGT is an example of a student who (1) exhibited a slight preference for her avatar to fall within an everyday category, but also made an extraordinary avatar (a purple skin-toned human superhero), (2) viewed her character as representing her real self and thus puts in many hours of care into crafting her avatar characters, and (3) viewed her character as a means for identity play. She did, however, also engage in instrumental uses. For example, she wanted to plant a garden and led a beautification project on the island and used her avatar as a means to explore potential for constructive play with flowers, plants, and trees.

Table 1. A transcript excerpt pertinent to DS.
Table 2. A transcript excerpt pertinent to SQ.

<table>
<thead>
<tr>
<th>Transcription</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI: [first 30 minutes of this interview were spent talking about SQ’s family and school history followed by an inquiry into his experience with the project]…So do you care what your avatar looks like?</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>SQ: No I don’t really care, I don’t really care.</td>
<td>(3) This is a clear and direct message that SQ has an instrumental view of avatar identity, or at least is not invested in identity play.</td>
</tr>
<tr>
<td>PI: Why?</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>SQ: Cause it’s just like an animated dude. Ahh man that’s what we got to pick out of but I wasn’t like man I ain’t going to be tripping. So I picked the dude and</td>
<td>(2) SQ clearly does not see the avatar as a direct reflection of himself, rather he views it as a character separate from himself.</td>
</tr>
<tr>
<td>PI: you didn’t want to be a woman?</td>
<td>(3) Merely “picking” the character indicates a minimal degree of constructive play.</td>
</tr>
<tr>
<td>SQ: It’s true though.</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>PI: Some people care a lot about what their character looks like.</td>
<td>(1) Based on the rapport the PI had built with SQ, she asked laughingly if he had wanted to pick a woman avatar, knowing that for him this was not in his image that constituted his “everyday.”</td>
</tr>
<tr>
<td>SQ: Yeah. Yeah.</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>PI: So why do you think some people care so much and some people are like whatever like it’s just some “animated dude”?</td>
<td>(1) Jokingly, SQ admits he wanted his character to be “manly,” thus more closely aligned with his male identity.</td>
</tr>
<tr>
<td>SQ: Just wanna, I wanna build something nice. I wanna build something I really don’t care what he look like. You should look at my avatar, he wearing a frock. Cause I was tryin’ to dress him, I was tryin’ to dress him and I messed up on him and then I just left him like that. He’s wearing a dress. And I was working with him you know?</td>
<td>(3) SQ affirms his instrumental view of his avatar.</td>
</tr>
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Table 3. A transcript excerpt pertinent to DS.

<table>
<thead>
<tr>
<th>Transcription</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>KJ: I’m thinking it could be cool if you just had some body set up like a male, you feel me a Mexican. PI: Without long eyelashes. KJ: A Mexican male and a black male. Set up.</td>
<td>(1, 2, 3) KJ states what his everyday categories are, that he sees these avatar constructions as a reflection of his real world self. He indicates no inclination toward an instrumental view of the avatar.</td>
</tr>
<tr>
<td>Teacher_Inuyasha: Hello, are we missing out on someone here?</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>KJ: just, just, just, just like you feel me, a little sample then you could mess with it, like you could make a default body.</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>Teacher_Inuyasha: But wouldn’t you want to create, what if you’re a black male but your character, you want to be a Mexican…girl?</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>KJ: I don’t want to be a girl.</td>
<td>(1, 2) KJ reveals what his everyday category does not include, the female gender. KJ is seeing the projected identity as a mirror reflection of his own characteristics.</td>
</tr>
<tr>
<td>SK: You wanna be around a bunch of boys?</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>OJ: I’m not sayin’ that you shouldn’t, I’m just sayin’</td>
<td>(2) Here we see KJ being challenged by his classmates to consider the possibility of his avatar construction not reflecting his real world identity.</td>
</tr>
<tr>
<td>SK: Yeah. It’s not real. OJ: I’m not saying that you shouldn’t</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>SQ: It’s true though.</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>SK: yeah cause hers [referring to Res_KB] was an alien, tattoo, Mohawk and green skin.</td>
<td><img src="https://example.com/analysis.png" alt="Analysis" /></td>
</tr>
<tr>
<td>Res_KB: So like some of the options that we had, the original, some of the original default skins, all the skins are tintable to some degree but some don’t really tint enough to look like an African-American skin.</td>
<td>(1) A member of the research staff. Researcher KB, makes an assumption regarding what she perceives are KJ’s everyday categories. In this statement we see that she makes an assumption that when KJ says “a black male” that in part he is talking about a skin tone that is dark enough to represent an African American person.</td>
</tr>
<tr>
<td>KJ: No, not even that. I’m just saying, just something I could just start with…one that looks um, uh, hmmm…you know solid, male or female.</td>
<td>(1) However, we see KJ correct Researcher KB, proclaiming that his everyday category is not necessarily about skin tone per se, but rather a different set of characteristics that he describes only as “solid.” The below analysis picks up on this notion of “solid.”</td>
</tr>
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Table 3. A transcript excerpt pertinent to DS.
4.14 Case Four: Mirror Player Detail, The Meaning of Being Solid
After helping his classmate \( \alpha \) describe concerns of an overly feminine avatar, \( \kappa \) and the class continued discussing their experience with the project. The transcript below provides remaining relevant portions of conversation so as to prepare the reader for an analysis of a comment \( \kappa \)'s makes about wanting his character to be “solid.”

When \( \kappa \) describes the state of being “solid,” clearly he does not mean something so simplistic as being provided with an avatar of appropriate skin tone. He could mean that in addition to physical appearance, the avatar should be able to present body language, gestures, facial expressions, fashions, discourse styles, and other attributes that would allow it to be a certain gender because he or she possesses certain physical characteristics, or to be a certain gender because of possessing certain innate qualities of behavior. There are two major challenges to essentialism, however.

First, the second recognizes the limitations of understanding of the subject that characterizes a single axis of identity as discrete and taking priority in representing the self – as if being Asian-American, for example, were entirely separable from being a woman. The second recognizes the problem that some members of a group may end up to “impose their vision of the group’s identity onto all its members.” In contrast, that identities are social constructs, can be performed, are created by social institutions, etc., we can see that the \( \kappa \) requires the system to allow for construction of social identities independent of objective qualities.

There are two major aspects of how this “solidity” could be enabled. First, the system would need to provide a set of affordances that could construct an avatar that fits within the appropriate category that comprises an ideal. Recalling the discussion of Lakoff’s metaphor category above, we could say that ideal category is highly situated within his own context. Hence, the Second Life’s updated dark skin-toned male default avatar (as in Res_KB suggestion) was insufficient as a paragon – its tight suit with a high waist double-breasted jacket and striped yellow necktie or hand-on-hip posturing brow-skin-toned avatar in Figures 9a and 9b may be far from \( \kappa \)'s urban notion of “solid.”

Secondly, he means that users should be able to perform as this paragon of “solidity.” Essentialist perspectives (those based on “the belief that an object has a certain quality by virtue of which it is what it is”) \( \kappa \) would consider someone to be of a certain race because he or she possesses certain physical characteristics, or to be a certain gender because of possessing certain innate qualities of behavior. There are two major challenges to essentialism, however.

First, the second recognizes the limitations of understanding of the subject that characterizes a single axis of identity as discrete and taking priority in representing the self – as if being Asian-American, for example, were entirely separable from being a woman. The second recognizes the problem that some members of a group may end up to “impose their vision of the group’s identity onto all its members.” In contrast, that identities are social constructs, can be performed, are created by social institutions, etc., we can see that the \( \kappa \) requires the system to allow for construction of social identities independent of objective qualities.

For example, \( \kappa \) requires a performative constructivist models that emphasizes enactment of social identities in the virtual world, e.g. allowing him to “perform” masculinity, and engage in the ongoing act of performing, e.g. “walking solidly.” There are many ways that this can occur. Some aspects should be built into the infrastructure, whereas users must enact others. At times the infrastructure should have preconstructed affordances (e.g., emotes), while at other times the facility should exist for users to build the appropriate appearance or behavior.

It is instructive at this point to revisit the shared computational underpinnings of computational identity mentioned in the theoretical framework above. Altering a graphical skin is relatively easy. Indeed, there is already a tradition of using infrastructure allowing this to perform identity. In \( \kappa \), it was noted that many feminist theorists agree that, in order to demonstrate agency, a person must resist the hegemonic patriarchal status quo. This form of oppositional agency has gradually been adopted by some users/artists/hackers of digital worlds. In 1999, Sonya Roberts released her Female Skin Pack Excerpts, a series of female texture maps for the original Quake avatars, because the game designers neglected to provide a female protagonist. The eerie composition of a female skin on a muscular male figure embodied a form of resistance to power. 3D graphical models are harder to change without robust tools for doing so that often end up constraint the set of possible results (e.g., the contrasting importance relationships between the ease of use and relative degree of customization in Sims 3 and Second Life). Scripting character behaviors is more challenging for novices still requiring both animation and even perhaps artificial intelligence (AI) programming skills.

All of this suggests that performing a “solid” way of being is not a simple technical problem, it is a problem that requires understanding the cognitive and social issues at hand, and assessing them in light of what can be implemented computationally (whether by users or system implementers). To truly enable \( \kappa \) to take the stance he desires regarding his projected self, a balance must be struck between his highly situated desires, the project goals, and the possibilities given the limitations of Second Life. Furthermore, if these aspects cannot be reconciled, it may be the case that new theory and technology is necessary.

5. CONCLUDING REMARKS AND FUTURE WORK

Through our analysis we discovered three dimensions to students view of their virtual identities, and characterized two observed stances that students took relative to their avatars. These axes and stances can help us understand how virtual identities impact their real world development of stem identities. Since this study, makers of Second Life have updated their generic avatar set to a new set of options such as the two examples seen in Figure 9.

In viewing these new generic avatars, we can expand our questions of virtual identity construction to include performativity, facial gestures, body movement and language, posture, etc. Thus, student view of virtual identities goes beyond the top-level view of avatar appearance to characteristics associated with performance and discourse style. Thus, we intend to continue by conducting further work that can expand our understanding of projected identities and the impact of virtual identities on real world identities at large, not restricted only to the classroom. Ultimately, we shall use this understanding to design effective computational environments for fostering empowerment and agency for anyone in the contemporary media condition who is forced to harness a legion of selves across platforms in order to buy, network, play, and learn.
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