Learning Resilience in the Face of Bias: Online Gaming, Protective Communities and Interest-Driven Digital Learning

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Abstract: Online digital gaming environments have been proposed as an important form of computer-supported collaborative learning, but these environments have been shown to marginalize some learners, most notably women or girls, as well as ethnic or racial minorities. Furthermore, game-based competencies and identities have been shown to be important for digitally-mediated learning activities and trajectories in computer science and technology. In this paper we look at how supportive communities can improve resilience by mitigating stereotype threat, and thereby helping to protect vulnerable groups from the negative effects of implicit and explicit bias in gaming culture and game-based learning activities. Our findings demonstrate that a female-supportive gaming community can foster equitable gaming identification and self-concept, and we propose that similar models can be used with other marginalized groups (i.e., ethnic/racial minorities).

Keywords: online gaming, digital games, gender, race, ethnicity, stereotype threat, social identity theory, communities of practice, informal learning, interest-driven learning, 21st century learning

Introduction

Gaming has often been cited as inequitable in its social practices, particularly for females. In an era where informal learning spaces and communities are increasingly contributing to meaningful skill development, domain identification and learning trajectories, understanding the ways these spaces can be inclusive to certain learners and marginalizing to others becomes increasingly important in meeting equity goals. This paper builds off of previous work that explores the interrelationship between social experiences in online gaming and its effects on the investment, self-perceptions of domain competency (i.e., gaming ability), and the social practices of gamers, across gender (Richard, 2013a; Richard & Hoadley, 2013). Specifically, we focus on the role that online gaming communities play as a form of computer-supportive collaborative learning.

We begin by focusing on the mitigating and mediating negative social practices in online spaces, and how supportive communities can be protective for vulnerable players (namely, female and ethnic minority players). We first examine how gaming activities can support learning, as well as marginalize certain sociocultural identities. We then explore the relationship amongst community perceived support, gaming identification and gaming self-concept to see how identity supportive participation structures can play a role in fostering resiliency against stereotype threat for marginalized groups (i.e., whether female-supportive communities can level the playing field for women). Finally, we discuss the findings in light of creating inclusive and equitable spaces for computer supported collaborative learning.

Gaming communities as spaces of learning and practice

Literature continues to demonstrate that digital, mediated and online spaces offer opportunities for learning and developing interest-driven competencies, and emerging and necessary 21st century literacies (e.g., Gee, 2004; Halverson, 2012; Hayes & Duncan, 2012; Ito, et. al, 2010; Jenkins, Clinton, Purushotma, Robinson & Weigel, 2006; Kafai, Peppler & Chapman, 2009; Squire, 2011; Thomas & Brown, 2011). Much has been written about how "affinity" spaces can not only be models for education through interest-driven learning within authentic contexts, but can also serve as learning environments themselves where applied and authentic expertise forms through learning with others (e.g., Gee, 2004; Hayes & Duncan, 2012). Increasingly, online multiplayer game environments are being used as exemplary models of authentic learning communities from which motivation can be fostered (e.g., Dickey, 2007), and collaborative and constructivist learning has been documented (e.g., Squire, 2011; Steinkuehler, 2004; Steinkuehler & Duncan, 2008; Voulgari & Komis, 2010).

Capitalizing on gaming communities as learning spaces raises questions about who can benefit from such spaces. Access across gender, in particular, is an area of concern that has been raised over the past 30 years (e.g., Bryce & Rutter, 2003; Kiesler, Sproull & Eccles, 1985; Yee, 2008). Researchers have, on the one hand, looked to the motivation games produce as a potential technique to engage learners. But, on the other hand, researchers have also noted the wide disparity of who is present in these game-based affinity spaces as they currently exist. In the next section, we explore the issue of gender and access to gaming.

Games, gender and marginalization

Early work that sought to understand why women or girls were not playing and participating as much or in the same way as men or boys thought game themes were male-oriented, and felt that females wanted less difficult games or more whimsical themes (e.g., Morlock, Yando & Nigolean, 1985; Wilder, Mackie & Cooper, 1985). Related work proposed that females and males have different learning styles and prefer certain design elements, a popular concept shared by many game designers (e.g., Braithwaite & Shreiber, 2009; Ray, 2004; Schell, 2009). Later work examined more culturally constructed models of gender in the context of gaming (e.g., girls have been taught to like certain games) citing the influence of culture, access and experience (e.g., Carr, 2005; Dickey, 2006; Taylor, 2008).

If gaming is to be used as a context for promoting learning (whether technology-oriented learning or more self-directed learning as with affinity spaces), we certainly should consider both the differences of learners across different sociocultural experiences, along with overarching cultural assumptions. But, these issues may not be the most important factor in determining who has equitable access to these learning spaces. As asserted by Lave and Wenger (1991), learning in communities of practice is contingent on power relations. Similarly, related research (e.g., Goode, 2010; Margolis & Fisher, 2002) has documented the role that differential gendered expectations and support around computing – including playful experimentation fostered through gaming (Cassell & Jenkins, 1998; Kiesler, Sproull & Eccles, 1985) - from early ages and beyond contribute to the gender gap in computing and technology. This bears the question of whether women and girls are able to develop identities of learning within the power dynamics of gaming culture.

A long line of research on gender and games demonstrates that females often don't have the same efficacy as males when it comes to digital games and game culture. However, newer research is finding that gender differences in abilities and perceived abilities were often diminished once females had the opportunity to train and engage in gaming (e.g., Feng, Spence & Pratt, 2007; Jensen & deCastell, 2011). Furthermore, research highlights that the ways games and game marketing portray the social context around gender and ethnicity can have measurable, negative effects on players' sense of who belongs in gaming and virtual environments, which often precludes women and girls (e.g., Behm-Morawitz & Mastro, 2009) and racial or ethnic minorities (Dill & Burgess, 2012). Similarly, lack of diversity and representation can have similar effects on efficacy for marginalized gamers (e.g., Lee & Park, 2011). Research also demonstrates that females and racial/ethnic minorities are likely to have lowered domain self-concept when presented negative stereotypes or marginalized representations of their respective groups, which is often the case (e.g., Behm-Morawitz & Mastro, 2009; Williams, Martins, Consalvo & Ivory, 2009). For example, Williams, et. al. (2009) found that male characters and White characters, respectively, each made up over 85% of primary characters, and many game types did not have any representational diversity.

Furthermore, most play spaces, in the home or in public gaming environments (e.g., the arcade or gaming conventions), are often structured around gender dynamics, such that males were given more agency to demonstrate their abilities and authority (e.g., Bryce & Rutter, 2003; Kiesler, Sproull & Eccles, 1985). Online spaces are similarly mediated by male experience (Yee, 2008), which forces some females to hide their gender when playing online. However, this is increasingly difficult with the rise of voice-based gaming communication (Richard, 2013b; Gray, 2012) and profile stalking, the act of looking up ones' online identity (Richard, 2014). Recent work has found that females as well as ethnic/racial minorities are often victims of harassment (Gray, 2012; Richard, 2013c; Richard, 2014) and females are three times more likely to experience harassment when using voice-based chat online regardless of skill (Kuznekoff & Rose, 2013). All of these factors show support that online gaming may negatively affect the amount of investment and self-concept female and ethnic minority players have with gaming, as well as their ability to engage equitably in online social play.

Mechanisms of marginalization

Both stereotype threat (Steele & Aronson, 1995; Steele, 1997) and social identity theory (Tajfel & Turner, 1986; Eccles, 2005) address how identities form in relation to sociocultural experiences, which can support or inhibit identification with certain fields, domains and aspirations. Stereotype threat, in the short term, can cause stress for individuals stereotyped to underachieve in a domain, which limits their working memory and inhibits their performance when triggered. It can be triggered overtly (e.g., through harassment) or ambiguously (e.g., male-oriented themes or advertising). Over time, stereotype threat and unsupportive learning climates can lead to domain disidentification (Steele, 1997; Picho & Stephens, 2012). For example, groups frequently stereotyped with underperformance in math or science will eventually disidentify with that area, and choose not to engage in relevant learning and performance activities (Hill, Corbett & St. Rose, 2010; Steele, 1997; Spencer & Aronson, 2002). In studies where stereotype threat was measured in computer and technology environments, researchers found that females were more likely to attribute failure to their own technical inabilities than males in general

and females not in a stereotype threatening situation (Koch, Muller & Sieverding, 2008). Researchers have found that marginalized gamers are more likely to not identify with gaming, and efforts for targeted representation don't rectify this issue (Shaw, 2012). For most marginalized gamers, the exclusivity of game culture seems to be a greater barrier (Richard, 2013b; Shaw, 2012).

In other words, when we see studies that highlight female distaste and eventual disidentification with computer and technology careers and interest-driven trajectories (e.g., Anderson, Lankshear, Timms & Courtney, 2008), we may be witnessing the byproduct of both culturally constructed dissonance and stereotype threat disidentification. Essentially, these kinds of studies highlight the interrelationship between context and identification with competencies and associated careers. In short, it may be that there is gender inequity in online games due first to sociocultural practices (i.e., male-oriented design, and differential female support to play), and then the harassment and marginalization that results due to the incongruence between social identities and expectations in the play space, which can both invoke stereotype threat. This, then, causes females to disidentify and either leave the domain or to face difficult compromises such as self-misrepresentation (pretending to be male), disidentification with their marginalized stereotype (disidentifying as female), or simply enduring mistreatment. In fact, Richard (2013a) found that stereotype threat vulnerability is indeed higher for females and ethnic/racial minorities in digital gaming.

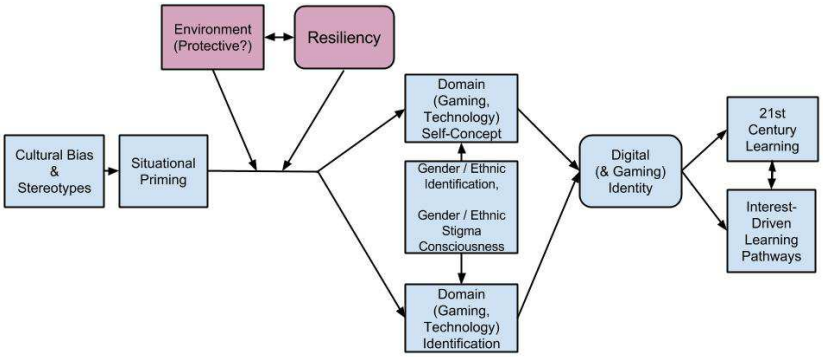

Figure 1. Logic Model of how environmental factors affect identification, self-concept and interest-driven learning trajectories, as well as the role of protective environments and resiliency in mitigating those outcomes.

Supportive spaces and fostering resiliency

Not all individuals will be subjected to or similarly vulnerable to stressors (like stereotype threat) or positive influences. However, researchers caution that, even though most individuals exhibit strong resiliency against all odds, positive role models and environments are especially important in mitigating negative stressors and resulting negative outcomes for vulnerable groups (Benard, 2004). Protective environments have been found to have "particular importance when adversity levels are high" (Werner, 2013, p.99). Positive educational climates and teachers have been found especially helpful because they serve as sources of support and role models for learners, sometimes in place of other caring structures or individuals (Benard, 1993).

Protective processes have been seen to "counteract the harmful effect of stressors (such as educators providing normative coping strategies for students during school transitions...)" and protective enhancing processes strengthen an individual's capacity to manage stressors on their own (Reyes, Elias, Parker & Rosenblatt, 2013, p. 351). Since protective environments and interventions can only extend so far, aiding individuals in developing their own coping strategies has been seen as especially useful for long-term outcomes beyond the supportive structure or intervention (Werner, 2013).

To summarize, interest-driven and informal learning operates within sociocultural context, which can shape the kinds of learning trajectories individuals will eventually invest and partake in, as outlined in figure 1. One successful approach to leveling the playing and learning field is to train people to be resilient and provide both safe havens and skills that allow individuals to resist the negative effects of stressors.

Supportive community as a model of interest-driven learning and resiliency

In this study, we further explore a longstanding explicitly female-supportive (yet co-ed) gaming community, named PMS Clan. Our work (Richard, 2014; Richard, 2013a; Richard & Hoadley, 2013) underscored the level of investment required by this community. While skill is not a requirement to join, many members train with highly skilled players who compete in tournaments, and can go on to compete in tournaments, or just play with

the community in low-stakes online matches during practices. Telling of its success with this model, female members of this community are some of the most visible females in the professional gaming circuit. As further discussed in Richard (2014), community structures reinforced learning as central to the community, through its highly regulated practices and emphasis on bettering skills and mastery. Members must practice and play with the community at least four hours a week.

However, participating in the community is also a tale of resiliency. As a central component of the community's mission, and a regular part of practice activities when playing in the community together online against random opponents, members are taught to cope with the kinds of regular and negative behavior they are subjected to. As part of membership, individuals not only are required to be respectful and supportive of marginalized groups (females, ethnic minorities and LGBTQI players) but are also taught to be good sports in the face of adversity, and use their fellow members as sources of venting and support after matches (see, Richard, 2014). In this sense, the community serves a protective process and protective-enhancing process.

Method

In past studies, we found (Richard & Hoadley, 2013) that members of this female-supportive community exhibited higher gaming identification and self-concept than members of other communities. Female and male members in the female-supportive community were equal in their gaming identification (in other communities, gaming identification was significantly higher for males than females). Here, we seek to further understand the relationship between communities, and their structures on members' identification and sense of ability. Specifically, what is the role of member perceived support, and community structures, and which is the best predictor? The research questions explore herein are: What is the relationship between community perceived support, gaming self-concept and gaming identification? If the possible effect of community is controlled for, can community perceived support predict gaming self-concept and gaming identification?

Measures

The survey was one part of a larger, mixed-methods study (with surveys, interviews and ethnographic participant observation) on gaming experience, online communities, and learning-relevant outcomes conducted primarily between 2009-2012 (Richard, 2013a). The two measures reported here were derived from the Perceived community support questionnaire (PCSQ) (Herrero & Gracia, 2007) and the Social Identities and Attitudes Scale (SIAS) (Picho & Brown, 2011). The PCSQ is made up of three scales, which assess three aspects of community support. Community integration measures sense of belongingness and identification to a community, community participation measures how much one is involved in social activities in the community, and community organization measures the degree of support a respondent perceives. Items were measured on a 5-point Likert scale from (1) strongly disagree to (5) strongly agree. Only two measures from the SIAS are analyzed in this study: domain (gaming) identification and self-concept. Both of these measures were used in past studies to assess the role of communities in shaping identification and self-concept, across gender. The PCSQ was revised slightly to reflect gaming communities instead of general community organizations, and to account for some wording that didn't make sense in translation from Spanish. The original scale demonstrated good internal consistency for the overall scale ($\alpha > .85$) and its subscales ($\alpha > .75$). Reliability analysis was run for the revised PCSQ, which demonstrated high internal consistency for the overall scale ($\alpha = .92$) and its subscales for community integration ($\alpha = .76$), community participation ($\alpha = .86$) and community organization ($\alpha = .84$).

Participants and context

Participants were self-identified game players, 18 or older (due to human subjects constraints), who responded to calls for participation, widely disseminated across several gaming communities, including the female-supportive one, and some social networks associated with the researchers' institution, located in the Northeastern United States.

Data analysis

The Pearson product-moment correlation coefficient was used to evaluate the relationship between perceived community support, gaming self-concept and gaming identification for female-supportive community (FSC) as compared to other communities, since the FSC demonstrated higher levels of gaming self-concept and identification in general over other communities in previous analyses (Richard & Hoadley, 2013). Preliminary analysis were performed to ensure that there weren't violations of the underlying assumptions of normality, linearity and homoscedasticity. Results demonstrate that for individuals in communities other than female-

supportive one, the PCSQ has a significant positive relationship with gaming identification (r = .33, n = 39, p = .04); the subscale community participation has a significant positive relationship with gaming identification (r = .33, n = 39, p = .04) and gaming self-concept (r = .34, n = 39, p = .04); and the subscale community organization has a significant positive relationship with gaming identification (r = .36, n = 39,p = .02). There were no significant relationships between the PCSQ or its subscales in the FSC. Table 1 contains the Pearson product-moment correlations, divided by community membership, across gaming identification, gaming self-concept, the PCSQ and its subscales.

Table 1: Correlations, divided by community membership

	Female Supportive (FSC)						Other communities					
Measure	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
Gaming Identification	-	.42***	0.22	0.13	0.23	0.18	-	.76 ***	.33*	0.17	.32*	.36*
Gaming Self-Concept		-	0.002	-0.04	0.05	-0.04		-	.32*	0.26	.34*	0.17
PCSQ			-	.88***	.89***	.81***			-	.83***	.93***	.88***
Community Integration				-	.63***	.75***				-	.62***	.70***
Community Participation					-	.51***					-	.71***
Community Organization						-						-

* $p < .05$, ** $p < .01$, *** $p < .001$ (2-tailed)

The correlations demonstrated that perceived community support, as measured with the PCSQ, has a significant positive relationship with gaming identification, particularly for members of communities other than the female supportive one. Further, the subscale community participation and gaming self-concept had a significant positive relationship for members of communities other than the FSC. However, there appeared to be no significant relationship between perceived community support and gaming identification or self-concept for members of the female-supportive community. As a result, we found it important to investigate whether community perceived support predicted gaming identification or self-concept over and above community membership.

A hierarchical linear regression was first run on gaming identification (table 2), which previously demonstrated the strongest positive relationship with the PCSQ and its subscales, with community membership (FSC or other community) put in the model first, followed by the subscales of the PCSQ. Using Cohen's (1998) criteria, the table of correlations show that gaming identification has a medium positive correlation with the female-supportive community membership (r = .42, n = 103, p <.0001). The table of correlations further showed that community participation and community organization had small positive correlations with gaming identification, r = .26, n = 103, p <.01, and r = .27, n = 103, p <.01, respectively. There wasn't a significant correlation between community integration and gaming identification, r = .04, n = 103, p <.35.

Community membership was entered in step 1 and explained 17.7% of the variance in gaming identification, F (1, 101) = 21.68, p < .0001. After entering the subscales of the PCSQ into the model in step 2, the total variance explained by the model increased to 26.6%, F (3, 98) = 8.86, p <.0001. Examining the change in the model, it is evident that the addition of the PCSQ subscales explained an additional 8.9% of the variance, R square change = .89, F change (3, 98) = 3.95, p= .01 (see table 2). However, in the final model, only community membership was statistically significant (*beta* = .36, p < .0001), though community participation (*beta* = .22, p= .057), and community organization (*beta* = .24, p = .07) were reaching significance. Based on the results, we can conclude that perceived community support doesn't statistically significantly contribute to gaming identification after controlling for the influence of community. In other words, community membership contributes more significantly to gaming identification than perceived community support within the community does.

A hierarchical linear regression was then run using the same process on gaming self-concept (see table 2), by first entering community membership in step 1 followed by the subscales of perceived community support. The table of correlations show, once again, that gaming self-concept has a small positive correlation with female-supportive community membership (r = .27, n = 103, p <.01). It also further shows that community participation has a small yet positive correlation with gaming self-concept (r = .17, n = 103, p = .04). FSC membership was first entered into the model in step 1 and explained 7.4% of the variance in gaming self-concept, F (1, 101) = 8.01, p < .01. After entering the subscales of the PCSQ into the model in step 2, the variance explained increased to 10.2%. However, while the model as a whole is significant, F (3, 98) = 2.8, p = .03, the change in R square is not, indicating that the subscales of the PCSQ do not explain the additional

variance in gaming self-concept, R square change = .03, F change (3, 98) = 1.03, p = .38. In other words, the subscales of the PCSQ do not add significantly to gaming self-concept, after controlling for gaming community membership. Gaming community membership remains the stronger predictor of gaming self-concept, though the entire model only explains a small amount of the variance.

Table 2: Left: Linear model of predictors of gaming identification, with 95% confidence intervals in parenthesis. Right: Linear model of predictors of gaming self-concept, with 95% confidence intervals in parenthesis.

	b	*SE B*	β	*p*
Step 1				
Constant	4.94 (4.67, 5.22)	0.139		p <.001
Community Membership (FSC or other)	0.82 (.47, 1.17)	0.18	0.42	p <.001
Step 2				
Constant	3.53 (2.45, 4.62)	0.55		p <.001
Community Membership (FSC or other)	0.7 (.33, 1.06)	0.18	0.36	p <.001
Community Integration	-0.24 (-.61, .117)	0.18	-0.19	p = .18
Community Participation	0.29 (-.01, .59)	0.15	0.22	p= .057
Community Organization	0.32 (-.026, .67)	0.18	0.24	p= .069

Note. R^2 = .177 for Step 1; ΔR^2 = .089 for Step 2 (p = .01)

	b	*SE B*	β	*p*
Step 1				
Constant	5.46 (5.21, 5.70)	0.123		p <.001
Community Membership (FSC or other)	0.44 (.134, .754)	0.16	0.27	p <. 01
Step 2				
Constant	4.86 (3.86, 5.87)	0.505		p <.001
Community Membership (FSC or other)	0.43 (.093, .766)	0.17	0.264	p = .01
Community Integration	-0.024 (-.358, .310)	0.17	-0.02	p = .89
Community Participation	0.213 (-.064, .491)	0.14	0.194	p = .13
Community Organization	-0.03 (-.352, .292)	0.16	-0.03	p = .86

Note. R^2 = .074 for Step 1; ΔR^2 = .028 for Step 2 (p = .38)

Discussion

The statistical results indicate that the holistic measure of perceived community support has a significant positive relationship with gaming identification and the subscale of community participation had a significant positive relationship with gaming self-concept, if, and only if, one were in communities other than the female supportive community. There was not a significant relationship between perceived community support or any of its separate sub-scales with gaming identification or self-concept for individuals in the female supportive community. However, membership in the female supportive community positively predicts higher gaming identification and self-concept than does perceived community support. In other words, while members of the female supportive community may not perceive it as supportive, membership in the community contributes over and above general support. One interpretation for these results is that the community provides structures other than perceived support that help with fostering resiliency and increasing identification and efficacy. One possibility is the presence of role-models that defy stereotypes of female inability in gaming spaces (since the community contains multiple highly ranked and professional female gamers); another possibility is that its tactics for providing a structured way to deal with harassment online while playing with the community, which involves reporting and muting negative players, while maintaining sportsmanship (Author, 2014), could be scaffolding and modeling a healthier way to deal with threat. As a result, players could have positive structures to help build investment, confidence, identity and ability.

Conclusion, limitations and future directions

The emergence of learning through affinity spaces holds much promise. The voluntary nature and authenticity of such spaces has led many to observe profound learning taking place that would be challenging to provide in formal learning contexts, and the degree of personal identification and identity development with affinity spaces like gaming cultures may lead to this learning being more impactful for the participants than learning which was driven by others' interests. However, the dark side of affinity spaces is that they may be marginalizing to certain groups. While prior research has focused on the way that designed elements of such spaces may marginalize or

fail to attract women and girls (and may also have tried to identify ways to design segregated spaces for women and girls), these approaches treat marginalization as a byproduct of the differences in the marginalized groups. In short, they treat inequity as a woman's problem, rather than a culture problem. Still, cultures can be changed, in part through leadership and the presence of diverse role models. Minority role models have to come from somewhere; often the most resilient among marginalized groups are the ones who can succeed. This work demonstrates that one important technique for changing cultures that perpetuate inequity is to create learning sub-communities that help protect the marginalized and train for resilience. While this paper has focused on the role this distinct female-supportive community has played in supporting the resilience of female players, we also have anecdotal evidence that the same community provides support for other marginalized groups, including ethnic, racial, and sexual minorities (see, Richard, 2013a). This suggests that resilience-oriented communities can be protective of many groups, and that such protective communities may in fact be able to contribute to culture change more generally towards tolerance and/or achievement in the face of adversity.

In CSCL and the learning sciences, the need for facilitation and the importance of cultural assumptions in equitable participation in collaborative learning have been well documented for many years (for example, Hsi & Hoadley, 1997; Hoadley, 2002; Lee & Hoadley, 2006). However, responses to these needs has been primarily to focus on improving the designed environment and/or overlaying tools. This work shows that treating resilience as an important learning outcome, and the intentional creation of protective communities, is another viable technique. While this study only looked at female-supportive communities, it offers implications for identity-supportive communities across sociocultural experiences. Richard (2013a) has found that ethnic/racial minorities, in particular, are similarly vulnerable to stereotype threat in gaming. A future direction of this work would be to explore its efficacy for members of other marginalized groups, such as ethnic/racial and sexual minorities. Moreover, further research is needed on how such communities accomplish their protective role, how this role may or may not extend beyond the practice fields in which the communities function, and how to dissect what aspects of equity, or inequity, may be attributed to designed environments vs. the cultures that spring up in those environments.

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