Plugged in to the Community:
Social Motivators in Online Goal-Setting Groups

Moira Burke
Human-Computer Interaction Institute
Carnegie Mellon University
5000 Forbes Ave., Pittsburgh, PA 15213
moira@cmu.edu

Burr Settles
Machine Learning Department
Carnegie Mellon University
5000 Forbes Ave., Pittsburgh, PA 15213
bsettles@cs.cmu.edu

ABSTRACT

At personal goal-setting websites, people join others in committing to a challenging goal, such as losing ten pounds or writing a novel in a month. Despite the popularity of these online communities, we know little about whether or how they improve goal performance. Based on theories of goal-setting and group attachment, we examine the influence of two social factors in an online "songwriting challenge" community: early feedback evoking a shared social identity, and one-on-one collaborations with other members. Combining five years of longitudinal behavioral data with member surveys, we find that users who engage in these social features perform better on their goals than those who are non-social. Furthermore, these early social experiences are associated with strong community-centric behaviors in the long term, including donating money and providing feedback to others**.**

Keywords

Goal-setting, social facilitation, collaboration, feedback

INTRODUCTION

Hundreds of thousands of people join online communities to reach a personal goal. More than 200,000 members of NaNoWriMo, or National Novel Writing Month, attempted to create a complete novel in the 30 days of November 2010, and an astonishing 37,000 of them were successful[1]. Hundreds of knitters have participated in "knit-alongs" on Ravelry, concurrently knitting the same pattern and posting photos and questions along the way[2]. On StepGreen, users commit to simple environmental behavior changes and track their carbon footprint over time [15]. And more than five million people track their weight on Lose It!, many of whom connect their accounts to Facebook and Twitter to get motivational messages from their friends[3].

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[1] http://www.nanowrimo.org/eng/mediakit
[2] http://www.ravelry.com/groups/browse/alongs/knitting
[3] http://www.loseit.com/about.jsp

These kinds of sites, in which individuals attempt to meet their own personal goals in the virtual company of others, span the boundary between purely individualistic action and social collaboration. The Internet makes it easy to track milestones, compare one's progress to others, and post encouragements. Yet these sites differ from more commonly studied production communities such as Wikipedia or open-source software [cf. 12, 13], in that the goals are at the individual level, rather than the group level. While communities with group-level goals may suffer coordination [12] or motivation losses [11], individual goal-setting communities generally have independent tasks (e.g., "I will lose 10 pounds by June" or "I will turn the lights off every day before going to work"), and members' progress is not contingent on that of others. The sheer popularity of these sites suggests that many people desire a social context for their personal goal-setting, but we know little about whether and how these communities work.

The purpose of this paper is to examine features of goal-setting communities that influence member motivation and performance. In particular, we argue that interactions between members build social relationships that help individuals meet their goals and strengthen the community.

Based on theories of goal-setting and group attachment, we examine two social factors in a songwriting challenge community, February Album Writing Month, or FAWM[4]. Combining five years of longitudinal behavioral data with surveys of participants, we examine the effect of two social mechanisms—social identity feedback from others in the community, and pairwise collaborations—on member goal performance and more general pro-social behavior. Then, we explore demographic and domain-specific features of pairs that lead to more successful collaborations. The results inform both theory and site design, by identifying factors in which social contexts facilitate individual goal performance, and by highlighting levers site designers can adjust to improve member satisfaction and retention.

PERSONAL GOAL SETTING IN A SOCIAL CONTEXT

Goal-setting and its effects on motivation and performance are relatively well-understood psychological phenomena, with decades of empirical research [24]. Goals that are

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[4] http://fawm.org

specific and *challenging* lead to greater performance than "do your best" goals [14]. Therefore, a goal like "I will cut my shower time by two minutes" would reduce water use more than a goal like "I will use as little water as possible." Ambiguous goals lack an absolute referent, while specific, challenging goals focus attention on goal-relevant behaviors, energize individuals, and prolong their efforts. Furthermore, people perform better when they receive summary feedback about their progress so they can adjust their effort along the way [14].

The effects of goal-setting in a social context are more ambiguous, and depend on the nature of the task and the group. First, social facilitation theory suggests that people perform better in the presence of others [1]; cyclists race faster around other cyclists than when training alone or with a motorized pacer. However, the findings only hold for simple tasks; social settings often lead to *reduced* performance on creative or complex tasks such as writing poetry, often explained by evaluation apprehension or distraction [7]. Furthermore, when one's own success is dependent on the efforts of others, coordination adds overhead and people may lose motivation because the connection between their own effort and the likelihood of success becomes less direct [11]. Ducheneaut et al. found that World of Warcraft (WoW) players who avoid joining guilds consistently "level up" faster than those who spend time fighting in groups, because guilds require more coordination and are hindered by weaker members; thus many players prefer "soloable" characters for the majority of the game [6].

Under what circumstances do people perform complex tasks better in a group setting? Several theories provide motivational explanations based on audience effects, social comparison, and group cohesion. First, simply making a goal public increases commitment, in part because people do not want to appear inconsistent or irrational in front of others [9,21]. By telling people about your goal, you feel social pressure to stick to it. In one short-term study, Consolvo and colleagues found that users of a mobile physical activity monitor, Houston, were more likely to meet their goals when they shared their step counts with friends than when they kept information private [5].

Individual goal-performance sites like NaNoWriMo and FAWM can be either *coaction* groups, where individuals work (virtually) side-by-side but do not interact, or more cohesive communities, in which members interact and form relationships. In both cases, the presence of other people allows individuals to compare their progress, and seeing others achieve a goal increases self-efficacy, or confidence in one's ability to do the task, too [1]. Social comparison, either upward or downward, may spur competition [7], such as when households shown the natural gas bills of "more efficient neighbors" reduce their own gas usage [10]. Simply having an audience of spectators and potential companions makes some tasks more enjoyable; Ducheneaut found that WoW players, despite spending most of their game time "alone together" appreciated an audience and background chatter that they could choose to join or not, likening it to "playing pinball in a crowded arcade," [6].

GOAL SETTING AND GROUP ATTACHMENT

However, groups that facilitate social interactions beyond mere coaction may elicit greater cohesion, increasing members' attachment to each other and the group, and in turn, inspiring higher performance. Frequent social interaction leads to liking, especially when that interaction contains self-disclosure and reveals ways in which the members are similar [4]. For goal-setting sites centered around creative content, such as book- or songwriting, members may list biographical information and creative influences on their profiles, allowing them to find others with similar tastes or who live nearby. Weight-loss challenge groups are by their very nature highly personal, with members disclosing a desire to change their appearance and health. Furthermore, goal-setting sites have forums, in which members engage in both task-specific and off-topic conversation. Profiles, forums, comments, and other site communication channels allow members to get to know each other individually, strengthening interpersonal bonds, and in turn, their attachment to the group [19].

The interpersonal connections in a goal-setting group may also be preexisting friendships. For example, based on the reactions of Houston users who shared their step counts with friends, the designers recommend features like "beat a buddy's step count" and ways for people to explain their numeric data to friends (e.g., "I had a low step count today because I was climbing.") [5]. Similarly, StepGreen users requested plug-ins for Facebook and Twitter, as well as ways to overlay their carbon footprint graph on those of their friends [15]. Though these studies were small, short-term deployments, the researchers behind them recommend embedding goal-setting technology in a social context, so that interpersonal attachments can motivate individuals to perform better.

Attachment to groups occurs not only through interpersonal bonds; groups can also stress shared experiences and similarities among members, creating a unified *social identity* in which the lines between the self and the group are blurred [23]. Members of the group feel a collective identity, which may manifest itself in group-specific jargon and generalized reciprocity [19]. For example, the "wrimos" of NaNoWriMo swap and edit each other's novels after November, and have donated more than $600,000 toward programs for young writers and public library improvement.

Whether people are attached to the group as a whole or to individual members, the outcome is group cohesion, a kind of "glue" that holds them together. Highly cohesive groups elicit stronger performances, at least when the group has a norm of high productivity [22]. (Cohesive groups of slackers actually degrade each other's performance.) Groups have the highest levels of productivity when personal goals do not conflict with group goals, and the

locus of control is voluntary [24]. Individuals feel like part of the group, and as such, work hard to achieve the groups' goals (which, in the case of goal-setting sites, are often their own personal goals). Working toward individual goals that are consistent with larger group goals creates a "special kind of group performance orientation that promotes group goal commitment and organic cooperation strategies" [24].

To explore these theories of goal-setting and group attachment, we focus our study on an active online community of songwriters.

ABOUT FAWM

February Album Writing Month, or FAWM, is an annual online songwriting challenge for musicians. The goal is for participants to compose at least 14 new songs (roughly an album's worth) during the shortest month of the year. The community tagline is "14 Songs in 28 Days." Since its inception in 2004, over 4000 users from 29 countries have registered, composing more than 28,000 original pieces.

The main features of the site include user profiles, discussion forums, a list of publicly-posted songs, and an audio jukebox. Users' profile pages consist of a progress meter, with tick marks from 0 to 14, which is highlighted with the word "winner!" upon reaching the 14-song goal. Profile pages include optional biographical information and musical influences, links to songs written so far, and a place for others to post short messages. FAWM includes a discussion forum with topics like "Demo Recording" and regional threads.

When participants post a new song, they may mark it "public" or "private." Both types count toward the user's 14-song progress meter, but only public songs are viewable to others. Public song pages include author-provided descriptive tags (e.g., "punk-rock," "piano,"), optional lyrics and liner notes, and an embedded audio or video demo, if available. Community members can provide feedback at the bottom of the page. Song-posting is only available from midnight February 1 to midnight March 1 (GMT−12 hours). Public songs are searchable and browsable, and demo recordings are shuffled in the site jukebox. This allows random access to songs produced by fellow participants, and facilitates exploration of—and giving feedback on—music by users outside their immediate circle of acquaintances.

In 2008, a leap year, the organizers upped the ante to "14½ Songs in 29 Days," with the extra half-song being a collaboration. Participants were encouraged (though not required) to co-write at least one song, which led to 252 documented collaborations, or 4% of the total output for the year. This trend continued into 2009 and 2010, with collaborations accounting for 7% and 8% of all songs posted to the site during those years, respectively.

A few FAWM projects have gained notoriety outside of the immediate FAWM community. For example, a 2008 tribute song about fantasy author Alan Moore went viral on YouTube[5], after being written up by author Neil Gaiman on his blog[6]. For FAWM 2006, three songwriters teamed up to compose songs about 14 different U.S. presidents each (which spanned all 42 presidents in history up to that point). The result was a critically acclaimed triple-album release during the 2008 election season [20]; the participants went on tour and performed at the South by Southwest (SXSW) Music Festival in 2008 and 2009.

Through its design, FAWM exhibits classical goal-setting motivators: a progress meter providing summary feedback, and a specific goal: to write 14 songs. The organizers also post weekly challenges with more specific goals, such as "use a color in the title," or "write a song in the 7/8 time signature," which account for about 8% of the songs in any given year. The social aspects of the site—profiles, forums, and comments—also provide a rich social context for participants working toward their individual goals. These features, plus more recent trends such as collaboration and user-driven "unofficial" challenges, foster both bond- and identity-based relationships. Regional FAWM groups have sprung up around the globe to write songs in person and tour or perform together. Since the website goes offline in late spring and remains dormant for most of the year, participants compare each January re-launch to "summer camp" in the forums. An entire vocabulary of jargon has also evolved, such as "fawmer" (a FAWM participant), "feasting" (attempting to write a large number of songs in one sitting), and "zong" (a song with zero comments).

The FAWM community also has several group-level goals. One is to collectively write as many songs as possible, which is clearly compatible with individual fawmers' goals. Another is providing feedback on each others' output, which is somewhat at odds with individual productivity but promotes social cohesion, and has lead to a annual campaign to "zong-bust," or ensure that all public songs have at least one comment by the end of March. There is a general emphasis on positive encouragement and quantity over quality, under the assumption that quality improves if one is forced to be consistently productive. Nevertheless, many active fawmers never reach the 14-song goal, and are happy to focus on fewer, higher-quality songs.

EFFECTS OF COMMENTS AND COLLABORATION

Group attachment theory suggests that to the degree the social features of FAWM, such as comments and collaborations, strengthen interpersonal bonds and social identification, they will influence member performance.

Therefore, as a baseline, we first hypothesize that those individuals who treat FAWM as a simple progress meter—those who only post "private" songs to increase their song count, and who do not write forum posts or comments—will have lower goal performance than those who share their songs and engage with others.

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[5] http://www.youtube.com/watch?v=5gu-uhudZS4
[6] http://bit.ly/gaiman_fawm

H1. Individuals who engage in social features of goal-setting communities will have higher goal performance than those who do not use the social features.

Next, for those members who post their songs publicly, feedback in the form of comments from other members should increase attachment to the group and thus goal performance. However, comments may simply be a "reward" or positive reinforcement [1], rather than a social connector to the group. Therefore, we expect comments that reinforce social identity to have a larger impact on goal performance. One common method for measuring social identity in language is to count in-group jargon and first-person plural, or "we"-type words, where the speaker implicitly forms a collective identity with the listener [3]. Therefore, we expect that comments containing FAWM-specific language and first-person plural will elicit a shared social identity and thus affect performance. Furthermore, group attachment suggests that beyond merely reaching their goals, members who identify with the group will engage in behaviors that favor that community, such as helping others reach their goals:

H2. Individuals who receive feedback that references a shared social identity will (a) have higher goal performance than those who do not receive such feedback and (b) go on to act in more community-favorable ways.

Another mechanism for increasing group cohesiveness and interpersonal bonds is collaborations, in which members work together on a single artifact. The act of collaboration involves repeated communication, and requires more effort than commenting, so it should have a strong effect on both goal achievement and community-favorable behavior:

H3. Individuals who collaborate one-on-one with others in the community will (a) have higher goal performance than those who do collaborate and (b) go on to act in more community-favorable ways.

More broadly, demographic and stylistic characteristics of collaborating songwriters may affect their liking for each other and the quality of their output. Musicians with highly dissimilar backgrounds, such as an American jazz pianist and a Dutch speed-metal guitarist, may bring novel and inspiring perspectives to one another, or may they may have so little common ground that coordination is difficult. Therefore, we ask a broader exploratory question:

RQ1. Among pairs who do collaborate, what features are associated with more successful outcomes?

METHOD
To examine the relationship between social feedback and collaborations on songwriter success and community-favorable behavior, we combined archival data from FAWM's server logs with a survey of a subset of members. Archival content included the metadata for the 28,883 FAWM songs from 2006 to 2010, including 1538 collaborations, profile information for all 4034 registered user accounts, and 90,547 comments they wrote on each

other's songs. We focus on the N=1836 fawmers who posted at least one song.

All members of the FAWM email list (n=584) were invited to take a brief web survey about their previous experiences, and n=176 completed it. Survey takers were generally more experienced and involved in the community than the average fawmer (all $p < .001$): they had written more songs per year (M=15.3 vs. 8.4), more comments across the years (M=200.3 vs. 30.4), and had far more collaborations (M=6.6 vs. 1.1). Because survey-takers were more active than average, their data is not considered a representative sample for quantitative analysis, but rather is used to illuminate patterns found in the broader archival data.

Survey questions included 5-point Likert agreement and satisfaction scales about each year's experience, as well as open-ended questions, such as "What stands out in your mind about the most 'successful' FAWM(s)?" Participants had access to their complete songwriting history while taking the survey. Fawmers also reported whether they had ever attempted to collaborate, and if so, chose a single good or bad experience to describe. They evaluated song quality (if one was produced) compared to solo efforts, and collaboration success. They explained how they decided to collaborate and what factors made them good or bad partners. The collaborations mentioned in the surveys were matched to songs in the archival data for analysis.

Independent Variables
The independent variables, *social identity feedback* and *collaborations*, were measured as follows. Feedback consisted the number of comments a user received on a given song within one week of its posting. Because FAWM has a community-wide campaign to write comments on songs that have none, and because of the very short (28 day) challenge window, we examine only those comments that came in the first week, rather than "zong-busts" that may have come too late in the month to affect the user's trajectory. Two-thirds (66.5%) of all songs received at least one comment in a week, and among those, the mean number of comments was 4.3 (Median=3.0).

To measure social identity language, we created two dictionaries: one of FAWM jargon (21 words including "fawmer", "fawmpilation", and "FAWK"), and one of "we" words (12 terms including "us", "let's" and "ours") taken from the first-person plural category of the Linguistic Inquiry and Word Count (LIWC) software [17]. Such "bag of words" approaches have been successfully used to model many social psychological phenomena, including relationship stability, gender differences, and lying [17]. Comments containing words from either dictionary were marked as referencing shared social identity. Social identity feedback in comments was rare (only 2.1%). Examples include *"Woah, yes, rock!! Or FAWK, whichever you prefer. I think that's the best intro to a song I've heard so far this FAWM."* and *"listening to this, i'm suddenly reminded that you, yes YOU, [name omitted], are the only fawmer who has made me cry more than once with your*

music. on two separate occasions in two previous fawms, you have posted a song that just cut to my cold heart and moved it.” Because comment counts were low, two binary variables, *Got comments*, and *Got social identity comments*, were created for each song.

Collaborations consisted of songs for which two authors were listed (both had edit control); approximately 40% of fawmers (n=727) participated in at least one collaboration. For each author, a binary variable, *Collaborated this year*, indicated whether the person had collaborated with someone else at a previous point that year. Since collaborations were not formally recorded until 2008, this variable is set to null for 2006 and 2007.

Dependent Variables

For *goal performance*, we use two measures: number of songs produced that year, and likelihood of "winning," or reaching 14 songs. FAWM does not have a public song quality measure; fawmers may privately rate songs but generally only do so as a "bookmarking" feature, and less than 1/3 of the songs have even a single rating. Therefore, we focus on quantity rather than quality, consistent with the ethos of the community.

For *community-favorable behavior*, we include a portfolio of future behaviors, including whether they made monetary donations, zong busts, forum posts during the "offseason" (after March 1 or the following January), and returned to participate the following year.

Modeling Goal-Achievement and Community Outcomes

To analyze the connection between social features of FAWM and performance/community-favorable outcomes, we performed a series of regressions. For models of "countable" outcomes, such as number of songs, zong busts, and offseason forum posts, we use negative binomial regression, which is appropriate for over-dispersed count data [8]. For models of binary outcomes, such as whether someone "won," donated money, or returned a future year, we use logistic regression.

Analyses are conducted at the person-level, with one observation per person. Earliest interactions in a group have been shown to have the largest impact on social integration, because prospective members use those initial exchanges to evaluate whether they'll benefit from joining the group [3], and so models are based on comments received on a fawmer's first post, or collaborations occurring in a fawmer's first year. Analyses of more senior members are also described, where appropriate. All regressions control for the age and gender of the fawmer.

Survey Measures of Successful Collaborations

To characterize successful collaborations, we mapped the 75 collaboration instances named by survey takers to songs in the archive. For these collaborations we computed several features, such as the day of the month, and differences in geographical location, age, and gender. We also consider the following, up to the point of collaboration: FAWM experience (in years), number of previous songs, and number of previous collaborations (with anyone). For user text fields (e.g., songwriting influences, song lyrics and tags to date), we use the cosine similarity [16] between the concatenations of each user's text as additional features. Finally, we include the number of direct (i.e., song and profile comments) and indirect (i.e., posting to the same forum thread) interactions between the two users to date. From these features we induced decision trees to characterize (1) successful collaborations and (2) high-quality songs, as reported by respondents.

RESULTS

Effect of Avoiding All Social Features

A small number of fawmers (n=96) chose not to use any social aspects of the site during their first year. They uploaded songs so that their progress meters would increase, but did not share the songs publicly, and did not write any comments or forum posts. A binary variable, *Is private*, distinguishes these songwriters from the other first-year fawmers. Table 1a presents a negative binomial regression modeling the number of songs first-year fawmers wrote, controlling for age and gender, based on whether they were exclusively private or not. The intercept represents a typical "public" fawmer, who wrote $e^{2.27}=9.7$ songs his first year. Completely private fawmers wrote significantly fewer songs, $e^{(2.27-0.62)}=5.2$ *(p < .001)*. A logistic regression on the likelihood of winning (not shown) confirms that social site users are 34% more likely than the non-social users to reach the goal of 14 songs ($\beta =0.29$, SE $=0.06, p < .001)$. Hypothesis 1 is confirmed.

Survey respondents confirmed the value of the social context, as well. As one puts it, *"There's just something about being able to enter a place where everyone else is doing what you're doing, and they get to listen to your stuff that makes it easier to put out music. I never write as much post- or pre-FAWM."* (S145). Another felt *"very plugged in to the community and drew a lot of inspiration"* (S4).

Because it was not possible for other community members to comment on these non-social users' content, the 94 non-social users are excluded from the following analyses.

Effect of Social Identity Comments

To determine the effect of social identity language, we take a single snapshot of each fawmer at his or her first song post. Table 1b presents a negative binomial regression modeling the number of songs written that first year, based on whether the first song received any comments in the first week, and whether these comments contained social identity language. The intercept represents average fawmers whose first song received no comments within a week; they went on to post $e^{2.12}=8.4$ songs their first year. Fawmers with at least one comment posted 21% more songs (10.1 songs total their first year, *p < .001*). The additional effect of at least one of those comments containing social identity language is of practical significance, 54% more songs (12.8 total), but does not meet statistical significance ($p = .09$).

	First year song count						Donated money in the future?			
	a. Non-social		b. Comments		c. Collaboration		d. Comments		e. Collaboration	
	β	SE	β	SE	β	SE	β	SE	β	SE
Intercept	2.27 ***	0.11	2.12 ***	0.05	2.25 ***	0.07	0.19 *	0.05	0.26***	0.03
Male	-0.03	0.04	-0.06	0.05	-0.09	0.08	0.03	0.02	0.02	0.03
Age	0.01 ***	0.00	0.01 ***	0.00	0.01 ***	0.00	0.01 ***	0.00	0.01***	0.00
Songs written in year							0.02 ***	0.02	0.02***	0.00
Avg. comments per song									0.04***	0.01
Is private	-0.62 ***	0.11								
Got comments			0.19 ***	0.05			0.11 ***	0.03		
Got social identity comments			0.24 .	0.14			0.15 *	0.07		
Collaborated this year					.40 ***	0.00			0.07 *	.03
	N=1826		N=1730		N=1459		N=1181		N=814	

*** $p < .001$ ** $p < .01$ * $p < .05$ ᐧ $p < .10$

Table 1. Negative binomial models estimating the number of songs a member will post by the end of his or her first year, and logistic regressions estimating the likelihood of a future monetary donation to the group. Song-count models are based on whether the user (a) is non-social (private), (b) received two kinds of comments on his first song, or (c) collaborated in that year. Donation models (d, e) control for the number of songs completed in the first year, and collaboration model (e) includes average comments per song. Continuous variables (age, songs written, comments per song) are centered at their means.

Following these first-year fawmers through the end of 2010, the impact of those early comments grows in magnitude, with those receiving social identity comments on their first song posting 1.4 times as many songs as those who received non-social-identity comments ($\beta = 0.35$, SE=0.18, $p < .05$), and 2.1 times as many than those who received no comments ($\beta = 0.73$, SE=0.24, $p < .001$), (M=26.2 vs. 18.4 vs. 12.6 songs, respectively).

However, a logistic regression on likelihood of winning shows that neither receiving comments nor social identity language is significantly associated with reaching 14 songs in a year ($p = .06$ and 0.94, respectively). Combined, these results provide partial support for Hypothesis 2a: Early comments are associated with increased annual song counts, and comments eliciting a shared social identity are associated with long-term songwriting gains, but fawmers are no more likely to "win" in the event when they receive either kind of comment.

Receiving comments with social identity language had a uniformly positive association with all of the community-favorable outcomes, modestly—and in the case of donations, substantially—over and above the effect of merely receiving comments, partially supporting Hypothesis 2b. Controlling for how many songs they wrote in their first year, newcomers who received inclusive comments on their first songs were 16% more likely to donate money to FAWM than newcomers who received generic comments ($p = 0.05$), and 30% more likely to donate than newcomers whose first songs received no comments in a week ($p < .001$) (see Table 1d). The effects of these comments with social identity are associated with pro-social behaviors over and above any that are attributed to producing many songs. Table 2 summarizes the differences in both goal-oriented and community-favorable outcomes. Overall, fawmers who got a comment were significantly more likely to act in ways favorable to the community. Beyond the effects of simply getting a comment, getting a comment with social identity language

is marginally associated with "offseason" activity ($p = .06$) and likelihood of returning to a future FAWM ($p = .06$). However, there is no added benefit of social identity language on future zong-busting ($p = .23$).

Survey participants confirm the benefits of comments: *"The positive and immediate feedback on songs is a huge motivator"* (S74) and *"how exciting it was to get feedback on my songs, having been a real 'closet' songwriter in the past!"* (S103). *"Comments show that people listened to and 'got' my songs"* (S65). Several explicitly referred to a shared social identity: *"I felt like I was part of a community, felt like I mattered and I was making new friends almost every day and branching out. I also felt like I was being challenged, poked and prodded to grow and stretch musically"* (S55) and *"The first year i did it it was the immense communication and support network in the comments and forums. it really helped get well over fourteen songs out which i was really happy with most or all of."* (S79).

	First song comments			Collaborated	
Goal-oriented	None	Any[a]	Social[b]	No	Yes[c]
First year songs	8.4	10.1 ***	12.8 .	9.5	14.3 ***
Long-term songs	12.6	18.4 ***	26.2 *	27.6	48.3 ***
Won (reached 14) %	51.7	60.5 .	59.5	36.1	68.1 ***
Community-oriented					
Donated money %	18.2	28.0 ***	46.2 **	20.1	41.7*
Returned %	32.1	52.1 ***	73.1 .	38.6	72.4 ***
Future zong busts	3.2	9.6 ***	54.1	5.0	18.1 ***
Future offseason	3.3	11.9 ***	56.4 .	1.9	7.9

*** $p < .001$ ** $p < .01$ * $p < .05$ ᐧ $p < .10$

Table 2. Summary of goal- and community-oriented outcomes, based on early comments and collaborations. Statistical significance from regressions like those in Table 1, where (a) is significance of receiving any comment, (b) is additional significance of receiving a comment with social identity language, and (c) is the difference between those who collaborated and those who didn't.

Effect of Collaborations

To determine the effect of collaborations on fawmers' goal performance and community-favorable behaviors, we take a different snapshot of each participant, this time at the end of his or her first year. As collaborations were first introduced in 2008, participants who joined earlier are excluded from analysis. To avoid endogeneity in measuring song counts—the circular connection between number of songs written and likelihood that one of them was collaborative—we do a very conservative estimate and only count *solo* songs authored in a year, in effect penalizing people for their collaboratively-written songs. Table 1c presents a negative binomial regression on solo songs authored in a year, and the effect of having collaborated at least once in that year.

First-year fawmers who did not collaborate wrote, on average, $e^{(2.25)}$=9.5 songs. Those who collaborated at least once wrote $e^{(2.25+.40)}$=14.3 *solo* songs (with a mean of 14.8 total songs, including those collaborations). To further control for prolific songwriters (who may be prone to both writing many songs and collaborating), we take the same snapshot of second-year fawmers, and control for the number of songs they wrote in the previous year (not shown). The results are consistent: second-year fawmers who collaborate write 33% more *solo* songs than fawmers who never collaborate *(β = 0.28, SE = .07, p < .001)*, even when accounting for the previous year's output. A logistic regression (not shown) confirms that first-year fawmers who collaborate are 36% more likely to reach 14 songs *(β = 0.31, SE = .03, p < .001)*. Hypothesis 3a is confirmed.

Though the causal direction between collaborations and song production cannot be determined from this observational data (see the Discussion section), the survey takers strongly point to collaborations as being a part of their most successful years. *"If we're talking about sheer numbers though - collaboration either in big groups (with local FAWMers) or online whenever the opportunity comes up - seems to be the secret. That, and feeding off the encouraging energy"* (S59). *"They make you a better songwriter in every way. My mind continues to be blown every time at what I can accomplish with a partner . . . and you learn so much in the process"* (S220).

Collaborations are also strongly associated with future community-favorable behaviors. Controlling for how many songs a first-year fawmer wrote, how many comments per song received, age, and gender, a logistic regression on the likelihood of donating money (see Table 1e) reveals that those who collaborated are 7% more likely to donate money to support the project. Similarly, they are 19% more likely to return another year *(β = 0.17, SE =.05, p < .001)*. They also perform significantly more zong-busting. However, they are no more likely to talk with other fawmers in the offseason *(p = .14)*. Hypothesis 3b is confirmed in all cases but one.

Survey takers described how collaborations increased their attachment to the group: *"My first FAWM was successful and inspiring, but in the subsequent years I became more connected to the community. Once I began collaborating, even on a limited basis, those quickly became my favorite experiences and favorite songs"* (S146). Many relationships moved from identity-based connections as fawmers to more bond-based relationships through collaborations: *"We had met through FAWM and been friendly for years but had never worked together, which seems (in FAWM terms) like an obvious extension or integral part of a friendship"* (S29).

Qualities of Successful Collaborations

To characterize successful collaborations, we induced decision trees from features in the archival data to predict the survey responses to two questions: (1) whether the collaboration was a success, and (2) the quality of the song. Respondents scored these on a five-point scale, which we convert to binary classification task by grouping ratings of 1-3 as "negative" and 4-5 as "positive." Because survey responses were heavily skewed toward positive (76% or higher), we use a cost-sensitive variant of the C4.5 learning algorithm to produce more accurate trees—which weights the negative examples more heavily than positives during training—as implemented by the WEKA toolkit[7].

Figure 1 shows the tree predicting collaboration success. If the partners have had no indirect contact via the website (i.e., posting in the same forums), then it is considered a success. This seems counterintuitive at first, but actually reflects a number of fawmers who know each other in real life and are likely to collaborate anyway, at least one of whom doesn't engage much with the FAWM community at
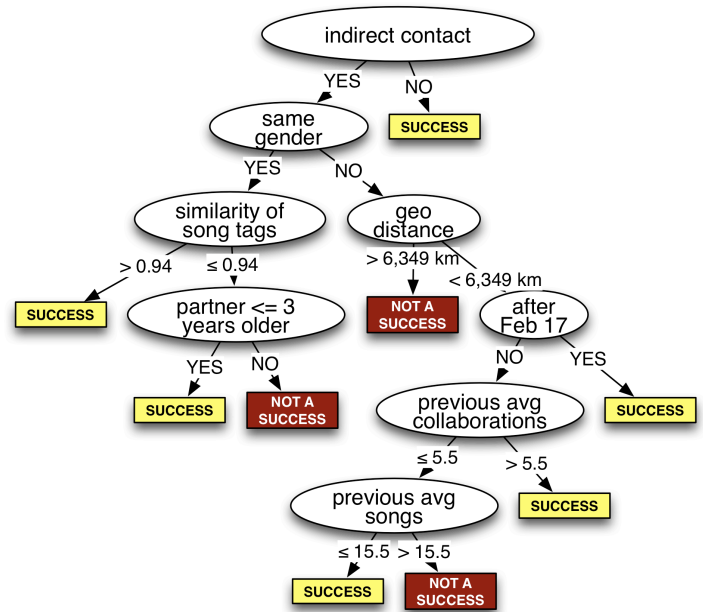

Figure 1. Decision tree predicting successful collaborations.

large. If they do interact indirectly (and thus possibly met through the site), the classifier checks for the same gender and very similar song tags, in which case it will be a success. A less similar collaborator is successful if he is no more than three years younger than the partner (suggesting fawmers who find value in a peer-mentoring relationship). If they are different genders and live more than 10 time zones apart, it is not likely a success (possibly due to communication overhead). Otherwise, collaborations that take place after February 17 are successful: the fawmers either spent ample time working together, or made sufficient progress toward individual goals that they are comfortable with the potential overhead of collaboration. Collaborations earlier in the month between experienced collaborators are successful, but prolific songwriters without much collaboration experience find those efforts less successful; they likely prefer to work alone. This approach is 80% accurate, with an area under the ROC curve (AUC) [18] of 0.65 and a Cohen's κ of 0.24 using leave-one-out cross-validation (a model was induced on 74 instances and predicts the 75th, repeated for all instances in the data set). While these figures are low, they are better than chance and good for such a small labeled set (n=75) and skewed sample (88% positive).

Figure 2 shows the resulting tree for predicting song quality. First, if the partners have an average of two previous collaborations under their belt, they are likely to think the song is good; this implies that a more seasoned pair of collaborators will be satisfied with their output. If they have collaborated less, but have been in FAWM for several years, the song quality is predicted to be low, i.e., experienced fawmers with less collaboration history probably prefer their solo songs to co-writes with others. Younger pairs, or older pairs of different genders also feel
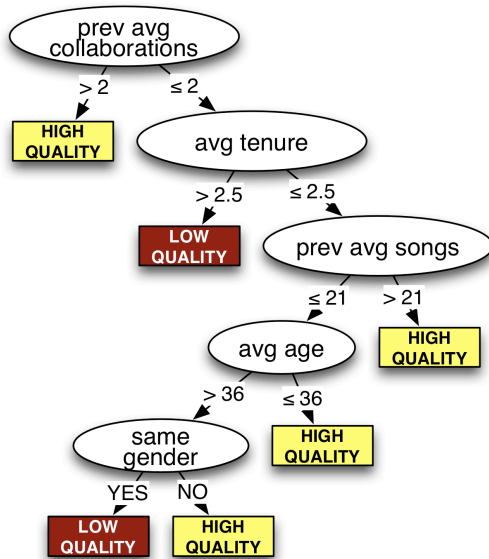

Figure 2. Decision tree predicting high quality songs.

their songs are of high quality. This model is qualitatively similar, with 72% accuracy, AUC = 0.63, and κ = 0.25 (76% positive skew in the data).

DISCUSSION

Overall, we find compelling evidence that members who take advantage of the social features of this personal goal-setting site perform better on their individual goals than those who do not. People who treat FAWM as a website rather than a community—those who keep their songs private, and do not interact with other users—do not do as well. They write half as many songs. One explanation may be that they are simply less committed to using the site, and instead have stronger offline networks for musical and moral support. That they join FAWM at all indicates an interest in the challenge, and 43% of them spend at least two weeks on the site, suggesting a modicum of commitment. In the current analysis we do not follow these non-social users past their first year (only 12 come back), but follow-up interviews might reveal the reasons why they chose not to engage. Perhaps a forum post turned them off the day they joined, or they believed social interactions would distract them from their primary task. One participant says the social aspects are *"too much added pressure to the 14 song goal."* (S23).

Looking at the relationship between receiving comments on an early song and goal achievement, we see a strong effect for receiving comments in general, and modest additional impacts for receiving comments with in-group jargon and inclusive language. In particular, this social identity language is connected to longer-term songwriting success. Similarly, we see trending additional impacts of this language on future community-centric activities, such as returning the following year and chatting with other fawmers during the offseason. The most dramatic effect of this class of comments is monetary donations, with those who felt included in the community after their very first song being far more likely to contribute financially to the maintenance of the site.

One-on-one collaborations with other community members are also strongly correlated with both goal achievement and community-favorable behaviors. In particular, people who collaborate are more likely to make it all the way to the finish line. It may be that the tight connection with another goal-seeker increases persistence, or that the partner inspires new ideas, reducing writer's block. In the present study, we do not know about the process behind each collaboration, but we can expect that certain kinds are better for quantity, others better for quality, with differential impacts on the social relationship of the collaborators and their connection to the group. For instance, some fawmers collaborate by posting lyrics and soliciting music. In such cases, collaboration is highly independent and does not necessarily facilitate interpersonal bonds. In other cases, two fawmers exchange ideas back and forth extensively over email, chat, and Skype, and the task interdependence and communication

effort involved may strengthen their relationship, but impede individual songwriting progress.

Though song quality is not a focus of the present study, survey respondents frequently indicate that collaborations lead to some of their highest-quality songs, often because partners have complementary skills. "*Collabs have helped me build confidence as a songwriter and vocalist and trust my own abilities. They have pushed me in new directions and into new styles I would not have attempted myself but have wanted to try. Working with people who are amazing at what they do makes me push myself to become better at what I do to match them. I am no longer limited by my weaker areas because in most cases, we are each contributing our strengths . . . this is why I say that the collabs I am really serious about are generally higher quality. I think I'm more proud of collab songs than anything I've done solo. On the flip side working with people new to songwriting and FAWM is wonderful because I can do those things for them, and that's really important too*" (S10).

Though many participants claim that having partners with different backgrounds lead to their most successful songs, the decision trees modeling collaboration success tend to label very similar pairs (in gender, song tags, and to some extent, geographic location) as being successful. This may be modeling the pairs who are simply more likely to find and like each other because of their similarity. In the future we intend to promote optional partner matching, randomly assigning highly similar and dissimilar partners to measure the extent to which homophily affects collaboration.

One of the most surprising facets of the machine learning models predicting successful collaborations is the large number of fawmers who had no indirect contact with each other—as far as was obvious from the server logs—and yet reported highly successful collaborations. In these cases, one fawmer brought another friend from the outside in, using a preexisting relationship to further a songwriting goal in the context of the broader community. In the current study, we do not examine the long-term attachment and productivity of fawmers recruited through offline friends, but would expect them to have greater commitment to the group through those strong interpersonal bonds.

Finally, though many fawmers regaled the benefits of social features, designers of goal-setting sites hoping to stimulate productivity and pro-social behavior should be careful to avoid cohesion within small groups that may make some members less productive or feel less welcome: "*While I understand that a lot of my fellow FAWMers really enjoy collaborating as well as the social aspect of the FAWM process, I'm not interested in becoming part of it. I honestly feel that it's all become somewhat clique-ish, and I'm not really interested in becoming part of that clique either. I want to write songs, not post on forums.*" (S131)

Limitations and Future Directions

The archival data do not allow us to determine causal relationships between social activities, goal production, and community attachment. In fact, the relationship is likely reciprocal, as previous work has shown that high group cohesion causes productivity gains, which in turn, lead to even higher cohesion [22]. Furthermore, individual differences in participants such as extraversion may predispose some to be both more social and more productive. Triangulating with survey responses lends support to the claims that comments and collaborations increase productivity and attachment, but the survey participants may also be more social and more productive than average. However, the present study reveals the value of social features of goal-setting sites, and sets the stage for more controlled experiments, such as recommended collaboration pairings, or campaigns to make new members feel like part of the community.

The FAWM archives have no data about collaborations that failed to produce a song, so the present study is limited to the self-reported successes and failures of a small group of participants. The decision trees begin to paint a picture of potentially successful collaboration partners, but do not have enough negative training examples to make more accurate predictions. Therefore, we intend to include mechanisms for community members to indicate collaborations at their initiation, thus providing both completed and incomplete collaborations as training data.

In the analyses of social identity comments, we do not consider the social role of the *commenter*. It may be that more central or popular community members inherently reflect that centrality in their language, and that the novice fawmers are more affected by *who* comments than by what they say. Furthermore, the dictionary approach to finding comments with social identity language lacks the nuance to distinguish between sincere attempts to make a newcomer feel like a part of the group, and less inviting, jargon-laden comments. However, even this inexact approach highlights the potentially subconscious effect of a few specific words, suggesting they shape a newcomer's long-term experience.

Finally, FAWM is an example of one very cohesive and productive goal-setting community, and its artifacts are digital. The collaboration findings may not be directly applicable to groups with less tangible goals, like weight-loss challenges. Yet the majority of the features connected with success in FAWM—forums, comments, profiles— appear in other communities, and to the extent that they stimulate shared social identity and interpersonal bonds, they can be effective in promoting goal achievement.

CONCLUSION

Contrary to the assumption that engaging in social activities would distract from an individual's ability to focus on a short term, challenging goal, we find strong evidence that interacting socially with other goal-setters is associated with greater success. Members who receive social feedback when they first join a community, and those who engage in one-on-one collaborations, are more successful long-term. Not only do they perform their goals better, they feel more

"plugged in" to the group and act in ways that enable others to reach their goals, as well.

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