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VIRAL ALTRUISM? A NATURAL FIELD EXPERIMENT OF SOCIAL CONTAGION IN ON-LINE NETWORKS^{*}

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PRELIMINARY DRAFT

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Abstract

We present preliminary results from a small-scale natural field experiment aimed at exploring online social contagion, with an application to charitable giving. We worked in partnership with Heifer International, a non-profit organization aimed at fighting poverty in developing countries, and HelpAttack!, the developer of a Facebook application that facilitates donations to charities while broadcasting such activities to the donors' Facebook contacts. We ran a series of marketing campaigns, and randomized the broadcasting of users' pledges, thereby creating exogenous variation in the information that users' contacts were receiving. Although our campaigns reached as many as about 13 million Facebook users, 6,000 users clicked on the ad and only 18 pledges were made, without any subsequent pledge from these users' contacts. We offer potential explanations for this finding on the absence of network effects, and outline our plans for future developments of this on-going project.

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Introduction

The goal of this project is to study the role of on-line social contagion, with an application to charitable giving. Increasingly, marketing strategies rely on the idea that, through social networks, well-known processes such as word-of-mouth communication would be exponentially amplified. These network effects and the subsequent “social multiplier” would allow organizations to reach a large number of individuals in a short time and at limited cost.

There are three main channels through which social networks can affect charitable giving, and altruistic behavior more generally. First, an individual may provide information about a charity or cause to her social ties (“information” effect). Second, the specific actions of a donor may directly influence her peers, for example by signaling the quality of a given charity (“endorsement” effect). As argued by Banerjee et al. (2012), this is an important distinction because if the endorsement effect is dominant, then that requires the original users’ active involvement for the diffusion to take place. Third, research in psychology and behavioral economics has indicated that social recognition and pressure are key motivators of pro-social behavior (Benabou and Tirole, 2006; DellaVigna et al., 2012; Lacetera and Macis, 2010; Shang and Croson, 2009). Distinguishing between these three channels is especially important for charitable organizations that rely on a dispersed pool of donors and volunteers (e.g. people donating money or blood donors). The results of this study, however, will expand our knowledge of how social networks affect on-line behavior, beyond the specific case of charitable donations (e.g., optimal seeding campaigns to stimulate the adoption of products or on-line apps).

We propose to conduct randomized field experiments in partnership with with HelpAttack!, the developer of an application that allows users to donate to charities through Facebook status updates and Twitter tweets. Upon installation of the application, users can choose how much to donate per status update (in Facebook) or tweet (in Twitter), providing a maximum budget they are willing to commit or “pledge”. In addition, the application allows users to broadcast their donation activity to all of their contacts.

A randomized controlled design allows addressing identification issues that are particularly severe when studying social contagion and network effects. In our specific case, for example, donors may choose to inform only those individuals in their social group that are more likely to display altruistic behavior. Social networks display “homophily,” i.e., individuals tends to interact with similar people, implying correlation in altruistic behavior among friends. This

property of social networks would bias results obtained using observational data. By randomizing the broadcasting feature of the application (i.e., whether a donor's contacts are informed of her donation) we are able to 1) causally identify and quantify the “social multiplier” effect in the number of donations and amount donated, and 2) determine whether the size of the multiplier is associated with the initial user's characteristics (e.g., number of contacts, number of followers, position in the network).

The use of online social networks and the HelpAttack! application present some advantages for the data generation and collection process. The application collects data from the individual (Facebook or Twitter) profile of users, which we use as controls. In addition the application maps the ego-network of each user, providing a way to track the eventual donation activity of friends. Furthermore, the application allows us to track the effectiveness of the initial marketing campaign and the additional network effect, by tracing which users clicked on one of our ads and which ones clicked on a broadcasted message from a friend status update.

We present here preliminary results from a small-scale, pilot study conducted during the months of June and July 2012. We conducted a marketing campaign in 3 stages.¹ We used a combination of ads and sponsored stories that invited users to make donations to Heifer International, a non-profit organization aimed at fighting poverty in developing countries, through HelpAttack!. Users interacted with Heifer and HelpAttack! only and they were not aware that they were taking part in a study, thus ensuring that behavioral responses were not influenced by demand effects or social desirability biases (List, 2008).

Our campaigns reached a total of about 13 million Facebook users, and generated reactions in the form of “likes” (about 1,989), “shares” (304) and “comments” (213). However, even though almost 6,000 users clicked on the ads, only 18 Facebook users installed the application and pledged some money.² Further, the broadcasting feature did not generate additional installations of the app or pledges. In fact, of these users' 2,605 contacts, none made further pledges.

Thus, in our pilot study we found no evidence of a network (or social multiplier) effect in charitable giving. This result is in striking contrast to those of Aral and Walker (2011) and Banerjee et Al. (2012), who found strong evidence of peer influence and social contagion in different contexts. Banerjee et al. (2012), like us, tried to disentangle information and

¹ A similar approach was adopted by Aral and Walker (2011).

² The number of new Twitter pledges was 8. At the time of writing we don't have data on the network or individual controls for these users.

endorsement effects in social networks. Our work differ from theirs in two major ways: first, we are looking at on-line behavior while they consider interactions among villagers in India; second, in our setting the “broadcasting” will be exogenous whereas in their context the assignment of the injection points and the information transmission were non-random. With respect to Aral and Walker (2011), the application they use in their study allowed users to write and share movie recommendations, whereas in our context users are invited (by the application) to make *monetary donations* to charity, which is a costly activity. In the remainder of the paper, we describe the pilot study in detail, and discuss what we learned from it and what our next steps will be for this project.

Pilot Experiment: Research Design

Partner organizations

The pilot study was conducted in partnership with HelpAttack!, the developer of the application, and Heifer International, a charity.

HelpAttack! (<https://www.helpattack.com/>) is a company that developed the application used in our pilot experiment. The application allows Facebook and Twitter users to donate to a charity of their choice, through Facebook updates, tweets or blog posts. The user pledges an amount of money (e.g. \$20) and decides the rate per update (e.g. 20c per Facebook update). Each time the user updates her Facebook status, the application records a donation of to the charity. The company’s business model is based on keeping 8.25% of each donation (also to cover credit cards fees and administrative costs). Figure 1 and 2 show sample HelpAttack! pledge pages.

[Figure 1 about here]

The pilot experiment allowed users to donate to Heifer International (<http://www.heifer.org/>). Heifer’s mission is “to end poverty and hunger,” with a unique approach. The charity provides domesticated animals and training to families, to improve their nutrition and generate income in a sustainable way. The family that receives the gift agrees to donate the offspring of the animal to another family in need. The animals are both a source of food and income. Milk from cows and goats, eggs from chicken, and honey from bees can be shared in the community or sold in the marketplace. In addition, the families receive training on sustainable practices. The additional

income and the training promote new opportunities for the creation of entrepreneurial activities, co-ops, community savings groups. Figure 2 shows the HelpAttack! Pledge page for Heifer International as seen by the users in our experiment.

[Figure 2 about here]

In our pilot study, we chose to work with one charity to decrease the costs of coordination, and because this allowed us to obtain immediate feedback on the marketing campaign and flexibly change it during the pilot. Heifer is a relatively small charity, which guaranteed fast decision-making with respect to the issues that we had to face during the campaign, allowing us to quickly adapt and experiment with different strategies. In addition, allowing the users to choose the charity would make the identification of network the social multiplier more challenging.³

Experimental design

The pilot experiment started with a marketing campaign on Facebook, with a mix of sponsored stories and ads which asked users to donate to Heifer International using the HelpAttack! application. If a user clicks on the ad or sponsored story, she is re-directed to the webpage of Heifer International in the HelpAttack! website.

The user can then decide to install the application or leave the page. Once a user installs the HelpAttack! application and makes a pledge to Heifer International, it also gives permission to the app to monitor her donation activity and download information from her public profile. The app downloads her friends list from Facebook, and the personal data from her public profile (e.g., gender, marital status, location, etc).

[Figure 3 about here]

The experimental design is simple: we randomly turned on and off the “broadcasting” feature of the application (Figure 3). Thus we have two conditions, C1 and C2, defined as follows:

- C1: Broadcasting “off”. Any donation activity is private to the individual.
- C2: Broadcasting “on”. Any donation activity is automatically notified to the user’s contacts.

³ In principle we are also interested in testing if the identity and the mission of the charity could influence both the initial recruitment and the viral diffusion of the donations. However, this test would require a more sophisticated design where we are able to control for the charity quality and user base. We plan to explore these issues in future research.

Figure 4 shows the details of the HelpAttack! viral feature in the pledge webpage, and Figure 5 shows examples of the broadcasted updates that appear on donors' Facebook pages.

Our intervention randomizes the availability of the "Spread the word!" option at the time of pledging. Treated users have the option, while control users do not.

[Figure 4 and 5 about here]

We then tracked the donation activity of the user and the donation activity of her contacts, if any. If a contact of the initial user started a new pledge with HelpAttack!, we were able to track her activity and link it to the initial user's activity.

The comparison of the donation activity for the list of contacts in the two experimental conditions C1 and C2, allows us to causally identify if there is an effect of the broadcasting feature of the application on the number of donors and the amount pledged to Heifer International.

Advantages and limitations of the design

The major advantage of the design is that it allows us to track the diffusion starting from a set of seeding nodes, i.e. the initial users. The randomization provides the exogenous variation necessary to estimate causal effects of the broadcasting feature of the application. The use of the application is crucial to track the diffusion: we would not be able to track the social contagion without the friends list of the initial users, which is something that HelpAttack! does whereas the charities do not normally do. In addition, the application records the time series of status updates for the users (i.e., their donation activity), which provide us with a panel data of donation activity that can be potentially exploited independently of the experimental setting.⁴

On the other hand, a limitation of the experimental design is that we cannot obtain data on individuals that do not install the application and pledge a positive amount of money to the charity. This is due to the legal requirements of the application, which cannot collect data from the Facebook profile without the users' permission. This limitation is shared by other studies, such as Aral and Walker (2011). Banerjee et al. (2012) collected individual-level data on the entire network before the diffusion took place, so they were able to avoid this issue.

⁴ At the time of writing, we were not able to include the analysis of this panel data.

Pilot Experiment: Implementation and Results

Initial recruitment

The initial recruitment of the participants is crucial and proved to be quite a challenge in our pilot experiment. Following Aral and Walker (2011), we relied on a mix of Facebook ads and sponsored stories, in collaboration with HelpAttack! and Heifer International.

The campaign was executed in three stages. The first stage started on June 7, 2012 with the sponsored story showed in Figure 6 below, and a Facebook ad which mimicked the sponsored story. Our target audience for the campaign was the US population 18-65 years old.

[Figure 6 about here]

During the first week (6/7-6/13), the sponsored story, which reached more than 888,000 Facebook users, was “liked” by 254 people, “shared” by 34, and prompted 42 comments on the Heifer Facebook page. 611 users clicked on the link, to be re-directed to the HelpAttack! page. The ads were extremely ineffective in terms of number of installations and pledges: with a total reach of 2,860 and 1,354 respectively, generating only 1 click. This first campaign thus generated only 3 new Facebook pledges.

In the second stage, started on June 22, 2012, we used a similar sponsored story and ads (Figure 7), but increased the bid per click, which would give the ads greater visibility.

[Figure 7 about here]

The second campaign reached a significantly higher number of Facebook users: the total reach for the sponsored story was 3,742,000, with a total of more than 9 million impressions in 10 days. The story received 1,512 “likes”, generated 164 comments and was shared by 236 Facebook users. The total number of clicks was 4,859. The ads generated in total only 235 clicks, even though the number of impressions was beyond 1 million. Overall, the second d campaign generated an additional 19 pledges: 15 Facebook pledges and 4 Twitter pledges. Thus, the first two stages of the campaign generated a total of 18 usable Facebook pledges (and 8 Twitter pledges).⁵

In the third stage, started on July 27, 2012, we offered to match the pledge of initial users with a \$5 donation (Figure 8). This is a common scheme, used by many charitable organizations to

⁵ Some pledges were deleted after few days, some users became inactive. The remaining Facebook users were considered for the analysis.

promote donations, and has been found to increase not only the revenue per solicitation, but also the response rate (Karlan and List, 2007). Specifically, for each user's pledge, an extra \$5 would be given to Heifer by an anonymous "generous donor".

[Figure 8 about here]

In the first two weeks of the third campaign with the matching scheme, only 7 additional pledges were made. For these pledges we did not have all the information at the moment of writing this draft, therefore they are not included in the analysis.

Social contagion

Overall, our three marketing campaigns generated more than 30 pledges. However, some of these users deleted their pledge after few days, or were inactive, and some were Twitter users. We were left with 18 "usable" pledges for Facebook. These were the initial users from which we tracked the diffusion: 10 initial users were assigned to treatment group – broadcasting "on", and 8 were assigned to the control group – broadcasting "off". The former group had a total of 1,531 friends, and the latter 1,074 friends.

Table 1 reports the descriptive statistics for the initial 18 users and the results of the experiment. Of these 18 users, 16 were females and only 2 males. Most pledges were based on the default HelpAttack! pledge (maximum amount \$20, 1-month period). The rate per Facebook update was quite variable. There are no dramatic differences between control group and treatment group in terms of observable actions and characteristics, excluding the rate per Facebook update. Some profiles are not completely public. Some users do not make their profile information publicly available, and the application can legally collect data from public profiles only. For some users we have hometown, location and several other controls. These variables will be useful in a larger scale field experiment to test if the characteristics of the initial users are correlated with the donation activity.

The main result of the experiment is that the social contagion did not take place. Of the 2605 friends of our initial users, none pledged to Heifer International. The application automatically sends several broadcasting messages of the donation activity to the friends of the treated group: one at the moment of the initial pledge, one after few days, one after the user reached half of the total amount pledged and one at the end of the period. Even if this reinforcement mechanism was in place, there was no additional pledge generated through the network of the treated users.

Summary and Discussion

Our small-scale pilot experiment generated 18 initial usable pledges. However, the broadcasting feature did not generate any additional installations of the app nor pledges. In fact, of these users' 2,605 contacts, none made further pledges. This result is in striking contrast with Aral and Walker (2011), who found much higher adoption rates, and strong evidence of peer influence and social contagion effects in a similar context. Below we discuss some possible reasons for our results, and describe how we intend to proceed with this project.

The adoption rate in our experiment was very low. There are several reasons that could explain the low rate of adoption in our experiment. First, in our study, users were being invited to make monetary donations, i.e., a costly activity. Related interventions such as Aral and Walker (2011) simply required users to install an application that allowed them to give “free” movies recommendations. Thus a possibility is that social contagion through social networks occurs only when activities are free, and even relatively small costs are enough to discourage individuals or “shield” them from some form of imitation or pressure. Second, at some point users were requested to give their credit card information.⁶ While most applications on Facebook do not ask users to pay at the time of installation, HelpAttack! requires a commitment on a pledge. Therefore, a second obstacle to contagion may be given by privacy concerns, which have been found to be relevant in online markets and social networks in particular (Goldfarb and Tucker, 2012). Third, the charity was relatively small; this suggests that networks effects, in this context, may need a very large user base to even be started. Fourth, it is a known fact that Facebook ads are generally very ineffective in terms of click rates. Consistent with our first and second points above, this may suggest that people see social networks as essentially free platforms for personal exchanges, and not as a vehicle for costly or commercial activities. A fifth explanation is in terms of salience of the information broadcasted, and the attention that users might give to it. The frequent updates on Facebook and Twitter make each single post hard to notice and, even if noticed, to remember and have salient for a long time on display. Consistent with attention being limited to the immediate time a post is made, and with the reluctance to commit even small

⁶ This is done through an external company, FirstGiving. HelpAttack! does not store any financial or credit card information from the users.

amounts of money, we note that the sponsored stories were much more effective in terms of impressions and clicks.

Future research will be devoted to assess the validity of these explanations. First of all, we will conduct similar field experiments in partnership with additional charities with larger user bases. Second, we will include results from Twitter. In contrast to Facebook, Twitter allows us to distinguish between the positions of *followers* and *followed* users, and this could be important for determining the directionality of influence. Finally, in the full study we will combine reduced-form and structural estimation. The structural model will allow us to combine the identification power of the exogenous variation from the experimental design, with the possibility of simulating counterfactual experiments. This will allow us to test simple modifications of the viral feature of the application and their effect on rates of adoption and donations.

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FIGURES

Figure 1: HelpAttack! Sample pledge page.

HI ANGELO + NEW PLEDGE! PUBLIC PAGE MY DASHBOARD SETTINGS LOGOUT

Change Causes?

Heifer International

Give with your Facebook updates. Start today!

Suggested:

Per Facebook update 77¢

30 Day Limit \$20

Later, you can donate with your credit card

How many days? 30

Why are you giving?

Goal Fundraising with friends! \$20

Pledge!

Questions? Confused? help@helpattack.com

BE A HERO

Give with your Facebook updates and end hunger!! It costs \$20.00 to buy a flock of chickens that provides nutrition for a family in need.

JOIN US

pledged \$6.67 per Tweet to [Heifer International](#)

pledged 50¢ per Facebook update to [Heifer International](#)

pledged 34¢ per Tweet to [Heifer International](#)

pledged \$1.00 per Tweet to [Heifer International](#)

pledged 43¢ per Facebook

SOCIAL MEDIA FUNDRAISING

Build support from your online communities with HelpAttack! Raise donations and awareness with Facebook updates, Tweets, #hashtags, blogs, and more...

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Figure 2: HelpAttack! Pledge page for Heifer International

Figure 3: Experimental Design

The treated group of initial users broadcasts the information about the charity and the donation activity to their friends. The control group of initial users has the broadcasting feature of the application turned off.

Figure 4: HelpAttack! Sample pledge page viral features – Details.

Help the cause and tell your friends!

I'm giving per Facebook update to American Red Cross - join me!
<http://helpattack.com/joinme/12345>

☒ **Spread the word!** [Write your own? \(+\)](#)

We'll send these messages on your behalf if the box is checked above. To disable a message, just delete it. We'll fill in the [bracketed] parts.

Start	I'm giving to American Red Cross with Facebook updates - join me! [Link]
Halfway	I'm helping American Red Cross with Facebook updates [Link]
Almost Done	Give to American Red Cross with HelpAttack! I've pledged [Count] Facebook updates, join me! [Link]
Done	I'm giving to American Red Cross, [Count] Facebook updates so far [Link]
Donated!	I gave [Count] Facebook updates to American Red Cross, check it out: [Link]

Pledge!

pledged **5¢** per Facebook update to [American Red Cross](#)

pledged **5¢** per Facebook update to [American Red Cross](#)

pledged **50¢** per Tweet to [American Red Cross](#)

pledged **23¢** per Kim's Pinterests to

Figure 5: Examples of broadcasted messages.

Figure 6: Sponsored story for campaign (1st stage)

Figure 7: Sponsored story for campaign (2nd Stage)

Figure 8: Sponsored story for campaign (3rd Stage)

TABLE 1: Results of the pilot experiment

	<i><u>All Subjects</u></i>			<i><u>Treatment</u></i>			<i><u>Control</u></i>		
	Intitial pledges = 18 Number of friends=2,605			Intitial pledges = 10 Number of friends=1,531			Intitial pledges = 8 Number of friends=1,074		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Amount Pledged	18	18.06	3.89	10	17.5	4.25	8	18.75	3.53
Amount Donated	8	15.64	4.01	5	14.424	3.89	3	17.66	4.05
Cents Per Update	18	33.83	34.10	10	40.7	42.17	8	25.25	19.67
Female	18	0.89	0.32	10	0.9	0.32	8	0.875	0.35
Number of Friends	18	144.72	115.43	10	153.1	137.50	8	134.25	88.48
Additional pledges through network effect	2,605	0		1,531	0		1,074	0	
Additional amount donated through network effect	2,605	0		1,531	0		1,074	0	