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# Zygomote: Walking Together

**Chris Basham**

Indiana University  
School of Informatics  
Bloomington, IN 47406 USA  
csbasham@indiana.edu

**John Wayne Hill**

Indiana University  
School of Informatics  
Bloomington, IN 47406 USA  
jowhill@indiana.edu

**Ravikumar Jayaraman**

Indiana University  
School of Informatics  
Bloomington, IN 47406 USA  
ravijaya@indiana.edu

**Fanxing Kong**

Indiana University  
School of Informatics  
Bloomington, IN 47406 USA  
fanxkong@indiana.edu

**Abstract**

Though walking is generally considered beneficial for personal and social well-being, it is not an activity necessarily integrated in many individual's regular routine. By encouraging the user to walk *one more time* through three primary motivations, our mobile design solution acts as a first step toward long-term behavioral change and habit formation. Our iPhone application called Zygomote motivates through *social bonding* by visualizing the time the user spends walking with friends; *social accountability* by translating walking activity to measurable contributions to charities and causes; and *small accomplishments* by awarding the user for completing a variety of tasks. We conducted pilot study interviews and ethnographic studies to distill the problem space; and evaluated a paper prototype according to user scenarios.

**Keywords**

Walking, habit formation, mobile, community, motivation, social bonding, social accountability, small accomplishments

**ACM Classification Keywords**

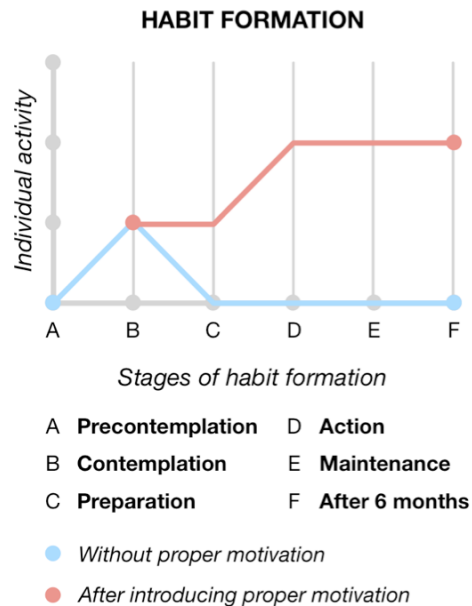
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

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## General Terms

Student design competition, walking, mobile interfaces and technology

## Introduction

Walking as a physical activity is currently not a habit for most people in the United States. "With today's hectic lifestyles, many people have difficulty fitting exercise into their lives and spending quality time with their friends" [4]. In recent years, governments and public organizations have taken steps to promote walking [2,8,10]. We tackled this problem through the themes of community and enjoyment in an effort to help people form a long-term habit of walking. In order to be user-centric we identified an effective target user group (through research), studied their needs using user-research methods, and then explored and iterated over various design solutions.

Throughout this paper we will explore the problem space (i.e. walking) and our design solution. First, we explain how and why we chose our target population. Second, we examine why walking isn't routine for our target population. Third, we review a variety of primary and secondary research, including pilot and ethnographic studies. Fourth, we present our design solution. Last, we explain and explore a user evaluation of our design and future directions for this solution.

### Target user group

The U.S. Department of Transportation reports "The decline in walking occurs more gradually as people age" [5]. We believe the best way to mitigate this decline is to steer it in its early stages, leading us to choose a target audience of 20-30 year old Americans. Since this

demographic is privy to many life-altering decisions (e.g. transitioning from life in academia to the workforce and starting a family), we believe they are more willing to accept such long-term behavioral change, and in turn attenuate the decline of physical activity within their own generation.

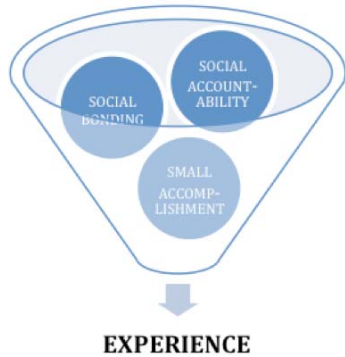
## Primary Research

In order to discover tacit motivations for walking and hindrances for purposeful personal change, we conducted ethnographic studies and pilot studies (interviews) concerning the walking habits of our target users. From our studies we distilled two categories of walkers. The first group was already self-motivated to walk, generally enjoying the routine experience of walking alone. The second set of walkers walked much more frequently with company due to enjoyable conversations. Clearly, the second group requires much more motivation before walking becomes habitual, and social factors appear to be a key encouragement.

## Secondary Research

Meanwhile, the American Heart Association and WIN [3,9] show that habit formation involves five stages. The first stage is *precontemplation* when an individual does not consider changing behavior; second is *contemplation* when the person considers change and attempts to build motivation; third is *preparation* when plans or goals purposefully but irregularly change; fourth is *action* when behavior change is regular for less than six months; and last is *maintenance* when the habit is formed after regular change for more than six months. Based on this information, we created a graph to illustrate how proper motivations can strongly influence habit formation [Fig. 1].

**Figure 1:** Proper motivations encourage habit formation.



**Figure 2:** Three motivations produce an engaging user experience.



**Figure 3:** Avatar clouds merge to suggest significant social bonding.

The research suggests three forms of motivation for starting and sustaining habits early in its conception (i.e. at the *contemplation* stage): social bonding, social accountability, and small accomplishments [3,9]. A combination of these motivations produces an engaging and enjoyable walking experience [Fig. 2], encouraging the user to walk *one more time* which done repeatedly leads to habit formation.

Tascos et al [7] show that social motivation coupled with persuasive technology can encourage physical activity among young people. Consolvo et al [4] continued, encouraging physical activity of users by allowing them to share step-count information with friends via mobile phones. They identify four key design requirements for such technologies, such as to sustain the activity through social support; to give proper credit for the activity; to fit the activity into their daily lives; and to create awareness of the physical activity.

### Final Concept

Guided by primary and secondary research, we explored a variety of concepts, including glowing shoelaces prompting the user to walk; a game in which a team of users virtually travel to various cities according to their physical walking activity; and a utility suggesting dating activities within walking distance, etc. After reducing and categorizing all the concepts via an affinity diagram, we concluded the final concept would need to emphasize an enjoyable group experience, encouraging the user to walk *one more time*, as a first step toward long-term behavioral change.

We're answering this problem through a mobile application called Zygomote. The name "Zygomote" is a composite of two Latin bases, "zygo" meaning "to join"

and "mote" meaning "motion." Essentially, Zygomote encourages people to *join in motion* and walk together, according to three primary motivations: social bonding, social accountability, and small accomplishments. A 2D visualization illustrates the time the user spends walking with friends; the user's walking activity translates to measurable contributions to charities and causes; and the user frequently earns virtual awards for small feats. We believe a combination of these three features will encourage individuals to walk *one more time*. Zygomote will be initially developed for the iPhone, currently the most popular smartphone in the U.S. [6], due to its geo-location and accelerometer abilities.

### Social bonding

Walking with others (for causal conversation, a date, etc.) happens not always intentionally or for extended periods of time. These moments are jumbled and lost in long-term memory, and it becomes all too easy to forget to intentionally devote time to others. By illustrating users' social walking activities, we want to remind them of the experience of walking with others, so they will do it again. Users will be networked according to the relationships established in their respective Facebook accounts.

Once the application loads, the users' history of walking with others is graphed on the opening Home screen. Every individual involved is represented by their Facebook profile image and an abbreviated name label, surrounded by a cloud. The spatial displacement of friend avatars is relative to the last time walked with the user. If the frequency of walking with an individual reaches a threshold, the friends' and the user's clouds merge into a single entity, suggesting the two have bonded closer in their relationship [Fig. 3]. As users



**Figure 4:** Home screen with information bar under the cloud visualization.



**Figure 5:** Profile screen listing various details about the user's activity.

notice the movement of the clouds resulting from causal actions, we hope users will purposefully change their behavior to walk with others more frequently.

As more avatars flood the visualization as a result of walking with numerous friends frequently, friends are automatically grouped to accommodate the smaller display resolution. Tapping an avatar reveals an information bar [Fig. 4], which can be tapped to reveal the user's full Zygomote profile [Fig. 5], listing items such as statistical walking information, recent walking partners, and Zygomote-earned achievements. By viewing more detailed profile information from peers, users will be more inclined to experiment to earn specific awards or to expand their social walking circles.

Using the pinch gesture, the user can zoom in and out to variably adjust the range of walking history, from, for instance, last week to the last three months. Studying the available gestures, pinching seemed to be the most appropriate method of control, given spatial zooming connotations.

#### *Social accountability*

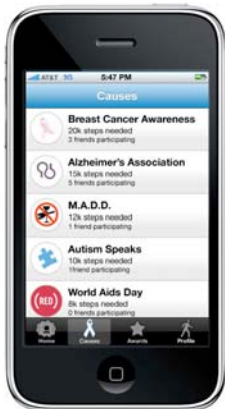
For those wanting to endorse a social movement, walking for community-driven charities or causes can be a powerful approach to actively and purposefully promote it. By voluntarily committing one's time to a given activity, the individual is positioned within and supports that community. Walking to raise awareness of some issue is a common theme annually repeated throughout many American cities involving millions of participants [1]. Though the experience of walking with these communities can never be or should be artificially replaced, they can be digitally supplemented, allowing

others not able or willing to walk in these populated events to still contribute in a measurable way.

Just as one may volunteer to walk for a cause during a given event, Zygomote users can join a cause, donating every step as a physical token of support for the cause of choice [Fig. 6]. To prevent registering steps for multiple causes simultaneously, only one cause can be joined at a time. Once a user completes a walk or series of walks according to cause-specific conditions (e.g. walk ten kilometers), this accomplishment is registered with the charity and financially supplemented by the corporate sponsors already supporting it. Given donations are not solely contributions by businesses, the system would also need a solution for individual pledges to be easily fulfilled. Also, to better promote the user as part of the larger charity community, their work would need to be recognized in a public setting, such as during the scheduled events or on the respective charity websites.

#### *Small accomplishments*

Earning small rewards for completing a challenge is another powerful motivator. Those choosing to diet, for example, may leniently treat themselves to chocolate for a full day of healthy eating; or a student may attend the movie theater after dedicating a week to meticulously studying for an exam. As video games reward gamers with badges to encourage extended gameplay, by challenging users with virtual achievements, we can appreciate the user for walking under various circumstances and conditions, of which may otherwise be considered trivial or an annoyance. For instance, a Trenchfoot Award is achieved while walking during heavy rain; Newbie for starting a first walk; and Ultramarathon after walking 100 miles [Fig. 7]. Also, an



**Figure 6:** Causes screen lists various causes and charities the user may join.



**Figure 7:** Awards screen lists numerous achievements awarded and yet to be earned.

Award is earned for every completed Cause. Additional challenges could be presented encouraging group coordination, such as a Five Kilometer Relay. Similar to Causes, a publicly accessible leader-board or ranking system could encourage healthy competition and better visualize walking trends according to certain locales.

## Evaluation

### *Prototype*

To evaluate our design, we developed a paper prototype [Fig. 8], consisting of four unique sections: Home, Causes, Awards, and Profile. More than twenty different screens showing various states of the application were printed on black-and-white iPhone templates.

### *Usability Studies*

We conducted an evaluation of Zygomote using scenario-based testing with four participants within the target demographic. Participants were briefed about the application and provided the scenario. During the test, they were asked to think-aloud and freely explore the application, performing specific tasks when prompted. Testing sessions were videotaped for later analysis. After the test, participants completed a questionnaire to rate the design and provide comments.

The subjects rated our application as easy-to-learn and easy-to-use, earning Zygomote an overall average of 5.5 along a 7-point likert scale [Fig. 9]. All four participants accomplished most of the tasks and understood interface feedback. Three participants considered it useful and acknowledged it would motivate them to walk more. "It will surely encourage me to walk more with friends," one of the participants said.

Despite general user satisfaction, a number of usability problems were unveiled. First, in all usability tests, users did not intuitively pinch to zoom and adjust the Home screen time range, but rather searched for user interface elements to tap or settings to change. Second, though the step-counter on the top of the Home screen directly relates to the set time range, users did not notice the connection. Third, one participant inferred the friends listed in the Award section assisted the user in its earning, rather than the friends earning them independently. Additionally, other participants were concerned about profile information privacy; quickly recommending causes to friends; and visually comparing walking progress over time as a form of persistent feedback.

## Future development

First to expand Zygomote's user base, the application would be available free of charge in the Apple App Store; and advertised during athletic charity events. Corporate sponsors will provide income for Zygomote through in-application advertisements. Additionally, Zygomote would consider concurrently developing on other platforms, such as Google Android, Palm WebOS, and Facebook to minimize hardware bias, and thus not isolating potential users.

Second to keep Zygomote users interested in the application, users can be tangibly shown the affect they have on the environment. One initiative could be that Zygomote representatives coordinate with local governments to plant trees around pathways where Zygomote users tend to walk. Each tree will be labeled with a plaque, thanking the local users who contributed to its planting, with local users earning a Zygomote Award.



**Figure 8:** Paper prototype of the Home cloud visualization.

CATEGORY	RATING
Ease of use	5.6
Ease of learning	6.0
Comfort to use	5.5
Aesthetic Interface	5.1
Functionality	4.0
Overall System	5.5

**Figure 9:** Analyzed participant responses to satisfaction questionnaire, ranged from 1.0 to 7.0; 7.0 is the most satisfied.

## Conclusion

Although walking is currently not a habit for most Americans, by presenting a combination of three research-inspired motivations (i.e. social bonding, social accountability, and small accomplishments), Zygomote should encourage individuals to purposefully walk more regularly. User evaluations uncovered some usability problems (of which will be addressed during further design iterations and testing); and confirmed it is both easy to learn and use. Our strategies suggest how to implement, refine, and sustain this system. Furthermore, one user's comment that Zygomote will "surely encourage me to walk more with friends" indicates our design could be very successful in real-world application.

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