Watching Together: Integrating Text Chat with Video

Justin D. Weisz, Sara Kiesler, Hui Zhang,
Yuqing Ren, Robert E. Kraut, Joseph A. Konstan

Carnegie Mellon University
School of Computer Science
Pittsburgh, PA 15213
{jweisz, kiesler, hzhang, yren, kraut}@cs.cmu.edu

University of Minnesota
200 Union Street SE
Minneapolis, MN 55455
konstan@cs.umn.edu

ABSTRACT

Watching video online is becoming increasingly popular, and new video streaming technologies have the potential to transform video watching from a passive, isolating experience into an active, socially engaging experience. However, the viability of an active social experience is unclear: both chatting and watching video require attention, and may interfere with one another and detract from the experience. In this paper, we empirically examine the activity of chatting while watching video online. We examine how groups of friends and strangers interact, and find that chat has a positive influence on social relationships, and people chat despite being distracted. We discuss the benefits and opportunities provided by mixing chat and video, uncover some of the attentional and social challenges inherent in this combination of media, and provide guidance for structuring the viewing experience.

Author Keywords

Video, interactive television, social TV, chat, strangers, friends.

ACM Classification Keywords

H.5.3 Group and Organization Interfaces – synchronous interaction.

INTRODUCTION

Watching video online is becoming an extremely popular activity. Google Video and YouTube allow people to watch hundreds of thousands of user-contributed videos, as well as rate them and leave comments. Some video content is even being produced specifically for the Internet [12], and recently, traditional media companies such as ABC and CBS have been experimenting with streaming television shows online (e.g. http://abc.go.com/fes). Movies are moving online as well, with Lycos Cinema allowing users to watch movies and chat with other users in their screening rooms (http://cinema.lycos.com). Finally, new media

companies such as ManiaTV.com produce television solely for the Internet, coupled with real-time chat.

However, despite the growing popularity of online video, and especially video-centered interactions, to our knowledge there is no research that examines how people experience video broadcasts with real-time chat. Conversation is one of life's most enjoyable experiences, but it also consumes considerable attentional resources. Anyone who has attempted to watch a movie while others are talking knows of the effort in, and distraction that results from, trying to listen to the dialogue, follow the story line, and listen to (or fend off) the chatter of others.

In this paper, we report our studies of people's experience of watching videos online, while simultaneously chatting with others using a text chat feature. We asked if user experience and relationships would be enhanced or harmed by this activity. If interactions are interwoven with watching video, will viewers be able to submerge themselves in the video? Will social interaction be fun because of the shared viewing experience, or will it just be annoying? How might the video experience be structured to leverage both watching and chatting?

We find these questions important to HCI for several reasons. First, HCI has a history of interest in the human capacity for processing parallel streams of information, and in understanding the effects of interruption on computer use experiences (e.g. [7]). Second, the effect of shared video watching on relationships has direct implications on the potential to use this computer-mediated communications tool to build social capital [19]. Finally, the nature of our study yields design implications for those who have already deployed chat with video systems.

We conducted two studies to investigate watching and chatting. The first was an exploratory study designed to answer some preliminary questions about live video and chat. Would people chat during a movie? Do they enjoy the experience, or find it too distracting? From this study, we learned that people do chat, and chat is distracting while watching a movie. Our second study evaluated two methods of reducing distraction: inserting intermissions in between video content, or reserving a period for discussion after the video. This study also examined the social experience of

watching together: how are people's relationships affected, is this an activity that promotes conversation among strangers, and how does conversation affect evaluations of the video itself? We found that chat had a positive influence on the relationships of friends and strangers, the presence of the media was a large influence on conversations, and intermissions did reduce feelings of distraction without affecting the amount of chat that occurred.

VIDEO AND INTERNET TELEVISION

Live streaming video online extends the reach of conventional television broadcasting, by enabling people who are not co-located to participate in a shared viewing experience. For instance, members of an online political group could watch their candidate as part of a community event, and discuss the event on community forums. Friends separated by distance can chat and "hang out" online while watching their favorite shows together. Families can use streaming video to keep in touch with one another, sharing important events such as birthday parties and weddings.

Real-time communication may enhance these experiences even further, because it contains a level of intimacy unlike asynchronous forms of communication [18]. In coming together for interaction around a shared experience, people signal their mutual interest and trust with one another, which in turn creates a sense of unity in the group [1]. Further, interaction drives liking of others (e.g., [3]), and in online communities, interaction with others is a major determinant of the extent to which people build relationships with one another [15,22]. Attachment increases if members have a sense of virtual co-presence, or a subjective feeling of being together with others [21] and synchronous interaction fosters the formation of relationships between strangers [24]. Hence, the combination of live streaming video with social interaction promises a wide range of benefits for the creation and maintenance of ties between people online.

Until recently, publishing live streaming video on the Internet has been costly. Server-based video solutions have required significant server and network capacity, are rather expensive, and are feasible only for large companies and organizations. Peer-to-peer video streaming technologies [5] can provide high-quality streaming video at a lower cost, by taking advantage of the network resources available among viewers. Thus, it is now possible for online communities to cost-effectively provide live video and chat events for their members. We believe that these technologies will change how people experience video, transforming a passive viewing experience on a TV into an active one on the computer, watching online with a community of other viewers.

It might be argued that video is not meant to be a social, or at least, an interactive experience. Previous work suggests that people who are alone greatly enjoy media content from television, movies, and music sources, and that doing so is often used as an escape from everyday cares [9,13].

However, for others, sharing video experiences could enhance their enjoyment of both the video content and one another. Brown and Barkhuus [2] studied people's television-watching behaviors and found that one motivation for downloading TV shows was to keep up with Internet discussion forums. In the Social TV project [17], researchers investigated interaction patterns among people watching TV together. They found that viewers are adept at both following the video content, and communicating with each other during the show. Therefore, socializing around media is perhaps just as important as the media itself, and supporting social interactions during media consumption can significantly affect, and we hope enhance, the viewing experience.

Previous work in Interactive Television has focused on creating systems that allow people to communicate during live television broadcasts. AmigoTV [4] combines voice chat with an overlay display on the TV showing avatars of other viewers, and allows users to see what their friends are watching. Media Center Buddies [20] allows viewers to send instant messages and chat with one another while watching. Telebuddies [14] encourages social interaction both through text chat and by allowing content producers to add quiz games and trivia contests to their broadcast. Reality IM [6] combines social interaction with additional contextual information about a TV program, such as advertisements and sports statistics. However, although each of these systems enables people to chat with one another while watching, their creators have not performed systematic evaluations of the effects of chat on the viewing experience.

Distraction in Simultaneous Video and Chat?

Considerable research shows that people cannot pay close attention to verbal information from two sources simultaneously, and they cannot fully process material from an auditory and a visual source, such as conversation with a partner and onscreen dialogue [23,25]. Further, if people watch videos or TV as an escape [9], conversing with others might interfere with their immersion in the content. Geerts [11] compared computer-mediated text and audio chat while watching television, and concluded that Interactive TV systems need to carefully balance the activities of watching and communicating to minimize distraction from the television program. Thus, watching live video online while chatting with others could end in frustration, rather than a positive experience.

MOVIELENS MOVIE NIGHT

To explore the issue of chat and video, we conducted an initial exploratory study in the MovieLens movie recommendation community (http://www.movielens.org). We showed MovieLens members a series of feature films using the End System Multicast (ESM) software ([5], http://esm.cs.cmu.edu/). ESM enabled us to deliver live streaming video to participants who lived around the world, so everyone who signed up could watch the movies at the

same time. ESM also provided an IRC-based chat feature, allowing people to chat while watching the movies.

We recruited fifteen MovieLens members to participate in our preliminary study, through a series of email invitations and website advertising. Five films were shown, and participants tuned into two movies on average. Multiple chat groups were formed per showing, and the ten assembled chat groups had an average of four people each.

Chat Usage

Our primary question in this study was whether or not our participants, who were strangers to one another, would chat while watching the movie. On one hand, we felt that they might talk with one another because they were in a study together; on the other, they might become so engrossed in the movie that chat would be ignored altogether. We found that participants did in fact chat, and the chat groups each produced an average of about 190 lines of chat over the course of a 2.5 to 3 hour movie. This corresponds to about 1.1 lines of chat each minute. Thus, while chat occurred at a very relaxed pace, participants nonetheless chatted.

At the end of the study, participants were asked to rate their enjoyment of the chat on a 7-point Likert scale. They reported moderate enjoyment on average (M = 4.3, SD = 1.6). As suggested by the large standard deviation, some participants greatly enjoyed the chat, and felt that it helped their understanding of the video content.

> *"It was very fun - it was helpful that someone who actually understood the movie could help me understand it - very much increased my enjoyment of it." (ML1)*

> *"I'm also responding positively to the notion of there being a community of people out there sharing my experience." (ML3)*

> *"For me the chat feature was a big part of what made me tune in to the movies … If the chat hadn't been there, I think I could just as well watch a movie on the TV, or downloaded a movie in advance." (ML14)*

Others felt that the chat was distracting, and one did not see any value to the chat feature at all.

> *"I'm not interested in chatting online, especially not during watching a movie." (ML6)*

> *"[I] disliked that [the chat] was somewhat distracting; had there been more chatter it could have become annoying." (ML3)*

> *"[I] just didn't find it possible to concentrate on movie and chat. If I'm watching a movie, I don't want/need other stimuli." (ML2)*

Finally, one participant felt that, with practice, the distraction might become less bothersome.

> *"[I] don't find it too distracting--I'm taking an online class where we have audio and chat going at the same time, so I'm getting used to multitasking like this" (ML13)*

These comments about distraction speak directly to the research on attentional resources cited above, as well as Geerts' study on chat and distraction in Interactive Television [11]. Thus, our preliminary data reinforces the existence of this tradeoff — the fun of sharing and discussing a video with others, versus the potentially negative impact of distraction on perceiving and processing the video content. To understand this tradeoff better, and to investigate whether it could be mitigated, we carried out a controlled experiment.

CARTOON-WATCHING EXPERIMENT

Based on our observations in the MovieLens study, we formulated three main research questions about the shared video experience. First, would chat enhance the media experience? Prior research suggests that people love interacting when they are engaged in a mutually entertaining activity (e.g., [16]), but does this interaction enhance the value of the entertainment? Decades of research suggest that social interaction increases liking (e.g. [3]). Thus, does chat with video increase peoples' liking for one another?

Second, how would chat affect relationships with strangers versus friends? We raised this question out of curiosity about video with chat as a way to introduce newcomers to one another in online communities. Would watching together be an effective mechanism for breaking the ice?

Third, we wondered if structuring the video experience might reduce distraction. Both the video and the chat require mental processing of verbal material: one must attend to the video to see and hear what goes on, and one must attend to the chat to keep track of what others have said and to formulate responses. We reasoned that perhaps the information lost in multitasking occurs mainly in one direction at a time. Processing chat may cause one to miss what occurs in the video, but processing video only causes one to miss what people are saying when they say it. Because text chat has a history log (as we studied it), viewers can catch up with the conversation when the complexity of the video is low (e.g., when there is no dialogue). Alternatively, viewers can wait for periods of low complexity or a break, and resume chat during those periods. If all viewers are watching at the same time, coordinating periods of chat with viewing is not impossible. Nonetheless, we speculated that a structured experience with break periods designated for conversation might aid the coordination of viewing and chat, and reduce distraction. Our idea is akin to intermissions in a play, or breaks in a sporting event.

From these arguments, we made the following predictions.

H1. Chat will enhance the media experience. That is, in comparison to watching with others without chat, viewers with chat will have more fun; they will rate the content better; they will enjoy talking; and they will like the other people watching with them better.

H1a. Chat will increase liking mainly among strangers, because friends already like one another.

H2. Chat will be distracting while watching a video.

H2a. As chatting during the video is distracting, viewers will take advantage of intermissions as a time to chat without being distracted.

H2b. Intermissions will reduce feelings of distraction.

We used cartoons in this study because they represent the kinds of videos seen on YouTube and Google Video, they are a few minutes long, it is easy to insert intermissions between them, and we could pick a diverse enough set of content to appeal to all of our participants.

METHOD

We studied shared viewing and chat in a controlled laboratory experiment in which small groups assembled to watch a series of cartoons. Participants sat at separate computers to simulate the experience of watching videos remotely on the Internet. The order of the cartoons was randomized between groups.

Experimental Design

To test the effect of chat on user experience (H1), we compared groups where people were able to chat with one another (two Chat conditions) with a control condition where groups watched the cartoons without the chance to chat with one another (No Chat condition). To test the impact of chat on groups of strangers (H1a), we assembled groups of strangers and groups of friends for the study.

To test the effects of structuring the video experience (H3), we compared two forms of chat. In the Intermission condition, each cartoon was separated by a brief intermission, to give participants a period of silence where they could chat without a video distraction. In the End Break condition, participants were given extra time to converse after all of the cartoons had played. In both cases, our structuring was entirely voluntary and suggestive; participants could chat whenever they wanted.

This experiment used a 3 X 2 between-groups factorial design with Video Structure (No Chat, Intermissions, End Break) and Group Composition (Friends, Strangers) as the independent variables (Table 1).

Participants

The sample was 85 participants in 30 groups. Participants were recruited in groups of two to four people (M = 2.8) from the psychology experiment directory at CMU. To recruit groups of friends, we asked that people interested in the experiment find two friends to participate with them. To recruit strangers, participants simply signed up in one of the time slots we offered. Group size did not differ significantly among the experimental conditions (F [3,16] = .6, n.s.).

Video Structure

		No Chat	**Intermissions**	**End Break**
Group Composition	**Friends**	5 groups	5 groups	5 groups
	Strangers	5 groups	5 groups	5 groups

Table 1. Experimental design.

The average age of the participants was 24.3 years (SD = 7.3 years); approximately half were female. Seventy-five percent of participants were students, five percent were faculty or staff, and the rest were alumni, retired or did not list their affiliation. Participants were paid $15 each for their participation, which took approximately one hour.

Overall, watching video was a popular activity for our participants. Fifty-six percent of participants reported watching videos on YouTube or Google Video, and 61% reported watching movies or television more than once a week in the past month. Thirty-nine percent of participants reported renting movies from vendors like NetFlix and Blockbuster.

Procedure

Participants were informed that they would watch a series of cartoons on the computer, and take a survey at the end. Participants were seated in an arrangement such that they were visually separated from one another. While participants remained in audio range to one another, they wore headphones to hear audio from the computer. No group chatted aloud to one another, although several participants did laugh out loud during the study.

As this study was conducted using laboratory machines on a LAN, we used Windows Media Player to play streaming video from a server on the LAN. Everyone watched the same content at the same time. We also used the mIRC IRC client (http://www.mirc.com/) for chat, and collected chat logs using an open-source IRC server, instrumented to log timestamps, message senders and the contents of each line of chat. A picture of the typical arrangement of a participant's screen is shown in Figure 1. Participants were allowed to rearrange the window positions and sizes to their liking, and about one-third of participants did this.

We showed participants seven cartoons. The cartoons came from Channel Frederator, a popular online video podcast. The cartoons followed themes of education, humor, love, character struggles, and a music video. The podcast encourages its members to rate their cartoons on a 5-point Likert scale, and we chose cartoons that were well liked by the community (M = 4.0, range = 3.8 to 4.3). None of our participants had previously seen these cartoons before.
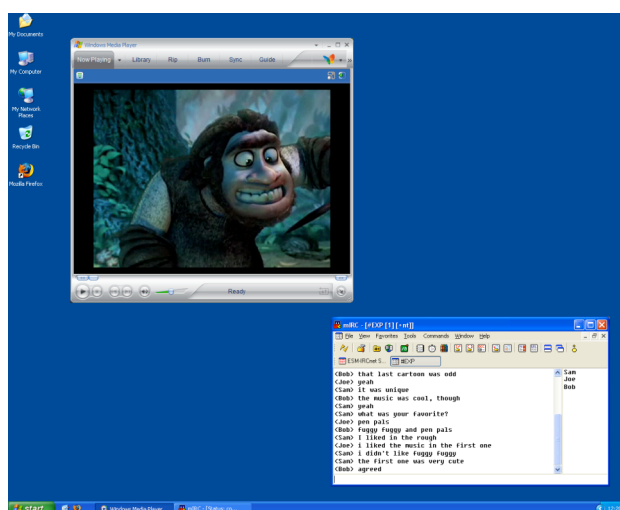
Figure 1. Typical arrangement of video and chat windows. Participants were allowed to move and resize the windows to their individual preference.

Each cartoon lasted between three and six minutes. In the Intermission condition, one-minute intermissions were placed in between each cartoon. In the End Break condition, participants were given a six-minute period for discussion at the end of the cartoons, keeping the break time the same for these conditions.

In both chat conditions, participants were told that they could chat with the other participants at any time during the study (cartoons or breaks), about any topic. Participants were only told of the availability of the chat feature, not that it was a mandatory requirement of their participation. In the No Chat condition, participants did not have the chat feature and did not receive the breaks.

Measures
All participants rated each cartoon immediately after it had finished, to avoid difficulties in recall. These ratings were made on 5-point Likert scales, representing how much they liked each cartoon. All participants also completed a final survey consisting of 10 questions about chat, the watching experience, and the other people in their group (several questions were omitted for participants without chat). Exploratory factor analysis revealed that four factors accounted for most of the item variance and thus four scales were constructed (Table 2).

RESULTS
We first briefly present data pertaining to the usage and pace of the chat. We then discuss tests of the hypotheses. We also describe the conversations that occurred in the groups, to give a sense of the experience of watching together, from our participants' perspectives.

Chat Amount and Pace
On average, the 20 groups with chat produced an average of 233 (SD = 174) lines of chat, at a rate of approximately 5

Scale	Items	Example item	α
Fun and enjoyment	2	"I had fun watching the cartoons"	.93
Chat enjoyment	3	"I enjoyed chatting with other people"	.89
Liking of others	4	"I liked them"	.81
Closeness	Up to 3	"During the study, how close did you feel to Participant X?"	.84

Table 2. Scales used in experiment. Items were rated on a 5-point Likert scale (strongly disagree to strongly agree).

lines of chat per minute. Not surprisingly, groups of friends (M [SD] = 337 [158] lines) chatted more than groups of strangers (M [SD] = 129 [123] lines; F [1,15] = 8.5, p = .01). Video Structure did not affect the amount of chat (intermission M [SD] = 205.1 [161.3] lines, end break M [SD] = 261.4 [190.6] lines, F [1,16] = .74, n.s.).

Chat among friends occurred at a rapid pace, with an average message inter-arrival time of 8.1 seconds (SD = 14.2 sec., median = 5 sec.). In stranger groups, chat occurred at about half the rate, with an average message inter-arrival time of 15.7 seconds (SD = 37.0 sec., median = 7 sec.), and this difference was statistically significant (F [1,4625] = 7.6, p < .01).

For strangers, intermissions slowed the pace of chat. Stranger groups with intermissions had an average message inter-arrival time of 27.7 seconds (SD = 60.5 sec., median = 11 sec.), and stranger groups with an end break had an average message inter-arrival time of 9.9 seconds (SD = 12.7 sec., median = 6 sec., F [1,4641] = 176.9, p < .001). Chat pace in friend groups was not affected by intermissions (F [1,4641] = .94, n.s.).

Effects of Chat on the Media Experience
Our first hypothesis (H1) was that chat would enhance the media experience; people would have more fun watching the cartoons together with chat, they would rate the content higher, they would enjoy using the chat feature, and they would like the other people in their group better. To test this hypothesis, we examined cartoon ratings, and the scales measuring fun and enjoyment, chat enjoyment, liking, and closeness. The analyses discussed are ANOVAs using Group Composition (Friends vs. Strangers) and Video Structure (No Chat vs. Intermissions vs. End Break) as independent variables. Because each group had multiple members, we included group as a random effect. In some cases, we perform contrasts between groups with chat (Intermissions and End Break) and groups without chat.
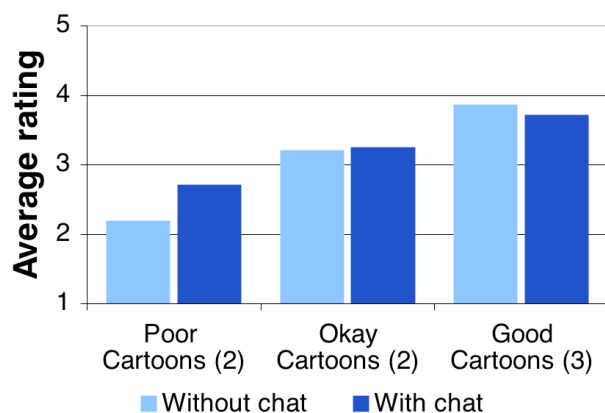
Figure 2. Effect of chat on ratings for poor, okay and good cartoons.

Overall, we found that chat neither enhanced nor detracted from the enjoyment of the experience, but it did have significantly positive effects on people's relationships with others in the group.

Cartoon Ratings
On average, cartoons received a rating of 3.3 out of 5 (5 highest). Treating the individual cartoon ratings as a scale, a principle components analysis revealed three components with an Eigenvalue greater than 1: two "poor" cartoons (M [SD] = 2.5 [1.1]), three "okay" cartoons (M [SD] = 3.3 [1.1]), and three "good" cartoons (M [SD] = 3.8 [.7]). The correlation of our participants' ratings and the ratings from Channel Frederator was .62. To account for these differences, and because cartoon ratings were correlated with other aspects of the experience (Table 3), we included a factor of cartoon quality, with three levels, in the ANOVA as a control variable.

	Rate	Fun	Enjoy	Like	Close
Cartoon ratings (Rate)	1.0	.47‡	.23	.26*	.24*
Fun & enjoyment (Fun)		1.0	.29*	.26*	.11
Chat enjoyment (Enjoy)			1.0	.58‡	.39†
Liking of others (Like)				1.0	.63‡
Closeness to others (Close)					1.0

Table 3. Correlations of the cartoon ratings and scales. N = 84 for all scales, except N = 54 for Chat enjoyment. *p < .05, †p < .01, ‡p < .001
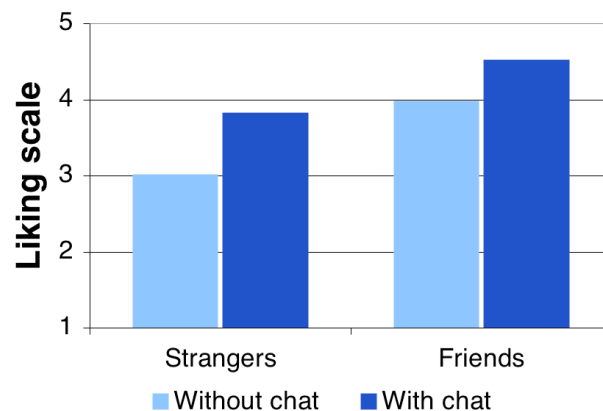

Figure 3. Effect of chat on liking of others.

We found a marginally significant interaction between Video Structure and cartoon ratings (F [4,213] = 2.3, p = .06) on the cartoon ratings (Figure 2). A contrast between the groups with and without chat indicates that groups with chat enjoyed poor cartoons more than groups without chat (F [1,213] = 4.5, p = .03). Thus, chat can supplement poor material by making the experience of watching it more enjoyable.

Fun and Enjoyment
Fun was significantly correlated with participants' average cartoon ratings (Table 3). However, the ANOVA predicting fun from Group Composition (Friends vs. Strangers) and Video Structure (Intermissions vs. End Break) showed no significant main effects or interactions.

Video Structure also did not affect enjoyment of chat (F [1,37] = .11, n.s.). However, friends enjoyed the chat more than strangers (friends M [SD] = 4.4 [.57], strangers M [SD] = 4.0 [.67], F [1,34] = 4.0, p = .05).

Liking and Closeness
As shown in Figure 3, there was a significant main effect of chat on liking. Participants with the chat feature liked their other group members more (M [SD] = 4.2 [.7]) than participants without the chat feature (M [SD] = 3.5 [.7]), F (1,49) = 15.7, p < .001. As expected, friends liked each other more (M [SD] = 4.4 [.6]) than strangers (M [SD] = 3.6 [.8]), F (1,49) = 24.5, p < .001. Friends with chat also liked each other more (M [SD] = 4.5 [.54]) than friends without chat (M [SD] = 4.0 [.61]), F (1,49) = 5.2, p = .03.

The ANOVA on closeness (Figure 4) also showed a significant main effect of chat. Participants with chat felt closer to others in the group (M [SD] = 3.6 [1.8]) than those without chat (M [SD] = 2.2 [1.5]), F (1,54) = 21.5, p < .001. Further, friend groups felt closer with chat (M [SD] = 4.9 [1.3]) than without (M [SD]= 3.0 [1.6]), F (1,54) = 21.3, p < .001. Stranger groups also felt closer with chat (M [SD] = 2.1 [.94]) than without chat (M [SD] = 1.3 [.44]), F (1,54) = 4.0, p = .05. Finally, friends felt closer (M [SD] = 4.3 [1.7]) than strangers (M [SD] = 1.9 [.90]), F(1,54)=73.7, p < .001.
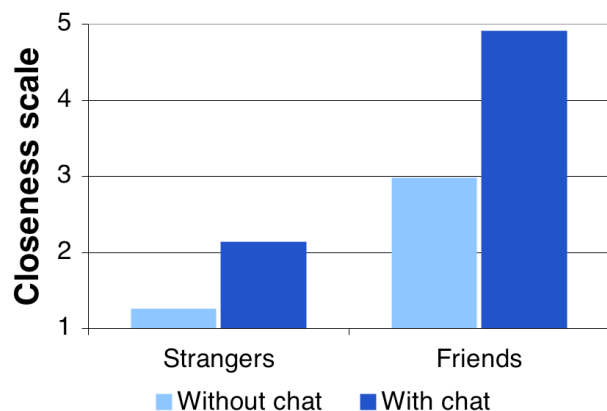
Figure 4. Effect of chat on feelings of closeness.

Chat and Distraction

As in the MovieLens study, participants in this study mentioned being distracted by the chat. Intermissions and the end break were added to this study in order to give people an opportunity to chat without missing video content. Participants took advantage of these breaks, conducting roughly 33% of their chat during the breaks, even through the breaks only accounted for about 10% of the time spent in the experiment. However, the majority of chat (62%) occurred during the cartoons, which accounted for about 70% of the time in the experiment. The remaining 5% of chat was spoken either before the cartoons began, or after they ended. The type of break (Intermission vs. End Break) did not influence how much chat occurred during the cartoons or the breaks (during the cartoons, F [1,16] = .4, n.s.; during the breaks, F [1,16] = .01, n.s.).

Although the structure of the breaks did not influence when participants chatted, it did influence how distracted they felt. Participants were asked how distracted they felt from the chat feature, on a 7-point Likert scale (1 = not distracted at all, 7 = very distracted). Participants with intermissions reported feeling less distracted (M [SD] = 3.6 [1.9]) than participants with an end break (M [SD] = 4.1 [2.0]). This difference is marginally significant, F (1,54) = 3.7, p = .06, suggesting that intermissions tended to reduce feelings of distraction from the chat. Further, the average distraction of End Break groups was significantly correlated with the amount of chat that occurred during the cartoons (r = .8, p = .006), whereas the average distraction of Intermission groups was not correlated with the amount of chat that occurred during the cartoons (r = .07, n.s.).

One explanation for the difference in distraction is that groups with intermissions simply chatted less than groups with an end break, and thus felt less distracted. However, Intermission groups didn't produce a significantly different amount of chat (M [SD] = 205.1 [161.3] lines) as End Break groups (M [SD] = 261.4 [190.6] lines), F (1,18) = .5, n.s. Further, Intermission groups did not differ significantly from End Break groups in the amount of chat during the

cartoons (intermission M [SD] = 129.5 [117.3] lines, end break M [SD] = 161.3 [134.8] lines, F [1,16] = .4, n.s.).

Break Preferences

As mentioned earlier, introducing intermissions into a sequence of cartoon videos is analogous to introducing commercials in sports programming during breaks in play. While they take advantage of the natural breaks in the game, they can fragment the experience, and may frustrate viewers who wish the breaks were shorter or nonexistent. We asked participants about their opinions of the break periods, and which type of break they would prefer. The results were overwhelming: 100% of participants with intermissions reported preferring intermissions, and 52% of participants with an end break reported wanting an intermission. Further, there was no difference in break preferences between friends and strangers (χ^2 = .9, n.s.).

On the other hand, participants also wanted flexibility for when they chatted. Of the 57 participants with chat, the majority reported that they preferred to chat throughout the entire experience (63%), rather confining their chat to just the break periods (23%), just the cartoons (9%), or not chatting at all (5%). This finding suggests that people would not like enforced chat periods, and their behavior confirms it (62% of the lines of chat spoken during the experiment were spoken during the cartoons).

Chat Content

For both friend and stranger groups, the cartoons were a major topic of conversation. Favorite chat topics included "the cartoons themselves" (C16), "the music and the quality of the drawings" (C22), "the rating" (C23), "how good each cartoon was" (C27) and "[the] artistry of videos" (C58).

Participants also made jokes and talked about their lives. For example:

"We discussed some stuff about our professors by comparing them to the characters. One was related to [two] professors who are a couple and that was hilarious." (C1)

"I liked chatting with my friends about our inside jokes. It may appear that we don't like each other, but there is so much love between the three of us that it is hard for a stranger to imagine." (C4)

Stranger groups were able to find common ground with each other, and their favorite topics included "information about graduate school" (C13), "smoothies at Lulu's" (C53, about a local restaurant) and "rating the cartoons" (C56).

To follow up on these informal impressions, we conducted a detailed coding of the chat logs to understand how much participants spoke about different topics. We used the "line of chat" as our unit of coding, but as the content in a single line was not always enough to determine an adequate code, we considered each line of chat in its context.

Category	Example chat (original form)	% chat
Cartoons	"the colors are pale looks like a bad chinese cartoon of the late 80's" (C21) "i thought the penguin one had really good music too" (C34) "the dots are supposed to represent human activity and thier choas + beauty" (C59)	41.6
Evaluations	"[this] music is awesome" (C20) "hmm so far i actually like the pengiun one the best" (C34) "That was a bit gross although it was a bit funny" (C15)	13.7
Personal	"im doing sociology and urban studies" (C34) "it is supposed to rain this evening?" (C59) "what's the Catholic deal with seperation...I know divorce is a big no no" (C11)	22.8
Study	"im so happy we're doing this, this is a bonding experience" (C5) "we only have 2 more [cartoons], Im kinda sad about it" (C45).	12.7
Laughter	":D", "haha", "lol" and many variations thereof "haha, happy endings are overrated" (C16)	7.4 solo 9.4 mixed
Greetings & partings	"hi", "hello", "yo", "bye" and many variations thereof	1.8

Table 4. Examples of chat in each coding category. Lines of chat were coded into one of these categories, except for laughter, which included lines of chat either solely consisting of laughter (7.4%), or containing other content (9.4%).

We developed our coding scheme iteratively, developing codes by reading through the chat logs, coding a subset of the chat, and then resolving discrepancies by clarifying the definition of the category, or adding or removing categories. The reliability check was performed by the first author and an independent coder on 12% of the chat lines. We achieved a good inter-rater reliability after four iterations (Cohen's Kappa = .78).

The categories were: the cartoons, evaluations and ratings of the cartoons, personal topics, laughter, study chat, and greetings & partings. Each line of chat was coded under only one of these categories, except for laughter, which frequently co-occurred with other chat, and thus was coded separately. A breakdown of the amount of chat in each coding category is shown in Table 4.

Cartoon, Personal and Evaluation Chat
A large majority of the lines of chat, 41.6%, were about the cartoons, as well as relations of the cartoons to people's lives. For example, participant C59 said, "this is my husband at work on our house," and participant C2 said, "we must ask lisa if this is [what] happened to her home today" while watching the cartoon about a plumber.

Participants also spoke about their personal lives during the chats without reference to the cartoons, talking about their course of study, the weather, sporting events, roommates, and even marriage. About 23% of chat was personal and unrelated to the video.

We performed ANOVAs on the percentages of chat in these categories, controlling for the duration of the chat. There were no effects of the independent variables on the cartoon category, but End Break groups tended to have more personal chat (M [SD] = 24.6% [17.0%]) than Intermission groups (M [SD] = 11.8% [10.8%]), F (1,16) = 4.0, p = .06.

About 14% of the chats were about participants' evaluations of the cartoons. Strangers chatted about the cartoon ratings about twice as much as friends (30% vs. 15%), but this difference was not statistically significant (F [1,16] = 2.6, n.s.).

Laughter
Spontaneous laughter occurred frequently. We coded laughter by looking for "lol", "haha", etc. We also coded happy smilies such as :) and :D, as they were often used to express positive emotions. In total, 7.4% of the lines of chat solely consisted of laughter, and 9.4% of the lines of chat contained some form of laughter. Strangers did not differ from friends in their laughter (F [1,16] = .83, n.s.).

Chat Likes and Dislikes
In the survey, participants were asked what they liked and disliked about the chat feature, and several themes emerged. Fifty-four participants listed reasons for why they liked chat, including: chat was entertaining, it made the experience more fun, and enabled them to make jokes (33%); chat promoted sharing and discussion, and learning other people's opinions (41%); and chat made boring material more fun (9%).

Fifty-two participants listed reasons for not liking the chat: chat was distracting (31%); it was hard to think about chat topics, they felt forced to chat, or they were unsure of what to say to strangers (13%), or complaints about the user interface (8%). Nineteen participants simply wrote "nothing", suggesting they were satisfied with the chat.

DISCUSSION

We set out to learn about the activity of watching video together and to understand the role of communication while watching a video. Our first study, in the MovieLens online community, showed that strangers would watch video and engage in chat with others. For some, chat added a sense of community and awareness of others. For others, chat was a burden; another source of information to be monitored in addition to the video. Understanding this tradeoff and how to mitigate it was the focus of our second study.

Effects of Chat on the Viewing Experience

For the cartoon study, we made several predictions based on our experience with the MovieLens study. The first was that chat would enhance the experience of watching together (H1): people would have more fun, they would rate the content higher, they would enjoy using the chat, and they would like the other people watching with them better. In turn, we found that while people did enjoy using the chat, chat did not have a significant effect on fun; participants with and without chat both had fun in the study. One possible explanation for this null result is a ceiling effect. Because we selected highly rated cartoons from Channel Frederator, watching the cartoons was already fun for most participants.

We also found that chat made poor content better (Figure 2), perhaps best described by a comment made in one of the chat groups, "I feel bad....I really am paying more attention to the chat than the cartoons...primarily because we are so much more entertaining" (C11). Some participants also described this effect when they listed benefits of chat.

We predicted chat would have positive effects on social outcomes, primarily among strangers (H1a). With chat, both friends and strangers increased their liking and closeness to one another with chat. However, our results are from between-groups comparisons; thus, we cannot know exactly how much chat improved liking and closeness, nor can we estimate the duration of these effects.

Chat, Breaks and Distraction

Our second hypothesis (H2) predicted that people would be distracted while chatting and watching a video, and we found that this was the case. However, participants did not confine their chat to solely the break periods (H2a), and the amount of laughter chat shows that chatting in real-time had some benefits. Social laughter is known to increase people's enjoyment and evaluations of material [10] and many participants enjoyed making jokes in the chat.

Intermissions did reduce feelings of distraction (H2b), even though they did not influence the extent to which people chatted during the cartoons. Overall, intermissions did not have a negative impact on participants' enjoyment of chat, and participants overwhelmingly preferred intermissions; all participants with intermissions preferred them to an end break, and over half of the participants with an end break would have preferred intermissions.

Lessons Learned

Our research is an initial investigation into the social effects of Interactive TV. Overall, our results suggest that chatting while watching videos is a fun, engaging activity, enjoyed both by friends and strangers. For friends, shared activities are often used as a way to cement friendships, because they provide something to talk about [8]. For strangers, chatting while watching provides an opportunity to form new relationships, as the videos provided common ground (65% of their chat was about cartoons or evaluations). However, the videos alone may not be enough to sustain conversation, as some people reported running out of things to say and feeling awkward. We speculate that moderated discussions may be beneficial for strangers, especially when coupled with an end break to reduce distraction.

Finally, we learned that structuring the video experience with intermissions during natural break periods reduces feelings of distraction.

Limitations and Future Work

Many questions are raised by our studies. First, although we have found one approach to reducing feelings of distraction from integrating chat and video, there are many others. One might use a cleverer user interface design, for example, by timing the onset of chat for more ideal times (e.g. during non-dialogue parts of the video), by merging the chat into the video window, or by using audio chat as in AmigoTV [4]. Clutter and other human factors issues would need to be addressed.

Genre seems to play an important role in the shared video experience, and it is important to understand how techniques for reducing distraction interact with genre. We found that intermissions worked well for short cartoons. However, many television programs place commercials in the midst of the drama, and it is unclear if they would have the same effect at reducing distraction, and if interaction during these periods would help or harm the experience.

Finally, our results pertaining to strangers must be taken with care. We brought strangers to the laboratory for purposes of chatting while watching cartoons, and they did just that. Participants in the MovieLens study were also strangers to one another, and in that study it was clear that for some people, chatting while watching was not an activity in which they were interested. Thus, understanding their reasons for disinterest, as compared to the enjoyment of strangers in the cartoon experiment, are of importance to media producers and online community leaders, so they can appeal to and engage a wider audience.

CONCLUSION

New peer-to-peer video streaming technologies promise to fundamentally change how we experience media. No longer will the experience be passive, or confined to the social boundaries imposed by the physical world. Watching video online enables us to actively engage with each other as we engage with the video, but active engagement comes at a

cost. Attention is a limited resource, and we have shown that while chatting and watching simultaneously is fun, and has social benefits, it is also distracting. Intermissions can help reduce this distraction, although they may not be appropriate for all types of content. Therefore, future research is needed to gain a better understanding of the viewing experience, and understand what factors contribute to a successful experience and successful interactions.

REFERENCES
1. Arkin, R. M., and Burger, J. M. Effects of unit relation tendencies on interpersonal attraction. *Social Psychology Quarterly*, 1980, 43, 380-391.

2. Brown, B., Barkhuus, L. The television will be revolutionized: effects of PVRs and filesharing on television watching. In *Proc. of CHI 2006*. ACM Press, New York, NY, 663-666.

3. Cartwright, D., and Zander, A. Group cohesiveness: Introduction. 1953. In D. Cartwright & A. Zander (Eds.), *Group dynamics: Research and theory*. Evanston, IL: Row Peterson.

4. Coppens, T., Trappeniers, L., Godon, M. AmigoTV: towards a social TV experience. In *Proc. EuroITV 2004*, University of Brighton, U.K.

5. Chu, Y., Ganjam, A., Ng, T. S. E., Rao, S., Sripanidkulchai, K., Zhan, J., Zhang, H. Early experience with an Internet broadcast system based on overlay multicast. In *USENIX Annual Technical Conference,* 2004.

6. Chuah, M. Reality instant messaging: injecting a dose of reality into online chat. In *CHI 2003 Extended Abstracts*. ACM Press, New York, NY, 926-927.

7. Czerwinski, M., Cutrell, E., & Horvitz, E. Instant messaging and interruption: Influence of task type on performance. *Proceedings of OZCHI* 2000, Sydney, Australia, Dec. 4-8.

8. Deaux, K., & Major, B. (1987). Putting gender into context: An interactive model of gender-related behavior. *Psychological Review*, 94, 369-389.

9. Finn, S. and Gorr, M.B. Social isolation and social support as correlates of television viewing motivation. *Communications Research*, 2001, 15, 135-158.

10. Fuller, R. and Sheehy-Skeffington, A. Effects of group laughter on responses to humorous material: A replication and extension. *Psychological Reports*, 1974, 35 (1, pt. 2), 531-534.

11. Geerts, D. Comparing voice chat and text chat in a communication tool for interactive television. In *Proc. NordiCHI 2006*. ACM Press, New York, NY, 461-464.

12. Helft, M. Young Internet Producers, Bankrolled, Are Seeking Act II. *The New York Times* (Sept. 25, 2006), http://www.nytimes.com/2006/09/25/technology/25digg .html

13. Hills, P., and Argyle, M. Positive moods derived from leisure and their relationships to happiness and personality. Personality and Individual Differences, 1998, 25, 523-535.

14. Luyten, K., Thys, K., Huypens, S., and Connix, K. Telebuddies: social stitching with interactive television. In *CHI 2006 Extended Abstracts*. ACM Press, New York, NY, 1049-1054.

15. McKenna, K. Y. A., Green, A. S., & Gleason, M. E. J. Relationship formation on the Internet: What's the big attraction? *Journal of Social Issues,* 2002, 58(1), 9-31.

16. Nardi, B., and Harris, J. *Strangers and friends: Collaborative play in World of Warcraft*. In *Proc. CSCW 2006*. ACM Press, New York, NY, 149-158.

17. Oehlberg, L., Ducheneaut, N., Thornton, J. D., Moore, R. J., Nickell, E. Social TV: Designing for distributed, sociable television viewing. In *Proc. EuroITV 2006*, Athens, Greece.

18. Powazek, D. M. *Design for community: The art of connecting real people in virtual places*. 2002. Indianapolis, IN: New Riders Publishing.

19. Putnam, R. D. Tuning in, tuning out: The strange disappearance of social capital in America. *PS: Political Science and Politics*, 1995, 28(4), 664-683.

20. Regan, T., and Todd, I. Media center buddies: instant messaging around a media center. In *Proc. NordiCHI 2004*. ACM Press, New York, NY, 141-144.

21. Slater, M., Sadagic, A., and Schroeder, R. Small-group behavior in a virtual and real environment: A comparative study. *Presence, Teleoperators and Virtual Environments, 2000,* 9(1), 37-51.

22. Utz, S. Social identification and interpersonal attraction in MUDs. *Swiss Journal of Psychology,* 2003, 62(2), 91-101.

23. Welford, A. T. Single channel operation in the brain. *Acta Psychologica*, 1967, 27, 5-21.

24. Weisz, J. D., Erickson, T., and Kellogg, W. A. Synchronous broadcast messaging: The use of ICT. In *Proc. CHI 2006*. ACM Press, New York, NY, 1293-1302.

25. Wickens, C. D. Multiple resources and performance prediction. *Theoretical Issues in Ergonomics Science,* 2002, 3(2), 159-177.