

## Visual Conversation Styles in Web Communities

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### Abstract

*Imagery and picture sharing are an important and growing part of online communities. Many prior studies of online interaction and collaboration rely heavily on text. This study takes a different analytic approach by focusing instead on the images that individuals use to present themselves and to interact. Image data collected from several online communities is analyzed to characterize a range of visual conversational styles. Four specific styles of visual conversation are illustrated and explained; positional play, image quote, text-in-picture and animation. These visual conversation styles are contrasted with textual communication techniques that are commonly taken for granted. The discussion identifies several tradeoffs when designing communities to promote visual conversation.*

### 1. Introduction

Imagery and picture sharing are an important and growing aspect of online community. A growing number of online communities are adding participant contributed imagery as a means of enhancing social cohesion and promoting interaction among the members. This study is focused on a genre of blog related web sites that include ‘cam’ or ‘portal’ pages. These portal pages are collections of pictures and images posted by community participants; readers and writers of the blog. These images provide a unique forum for individuals to express themselves in the virtual presence of other community members.

The communities in this study are distinct from a range of existing photo sharing and image oriented web sites. *Photo sharing* sites, such as flickr.com, Shutterfly and Kodak Gallery, are often organized around an individual’s collection of photos. These collections are shared with friends and potentially the world. Photo sharing is distinct from *photoblogging* as the latter often carries the aesthetics and goals of traditional photography, while photo sharing is oriented around the everyday ‘snapshot.’ In photoblogging high-resolution imagery is important to meeting the objectives for a quality photograph. A

third branch, *moblogging*, relies on the low resolution cameras that are in mobile phones. Moblogging can be characterized as something like ‘a-day-in-the-life’ of the individual mobile phone owner. A fourth, distinct branch, is *photo-game* where a web site posts an image and participants provide captions or digitally modify the image to create an interesting twist on the original image. Sites like worth1000.com and fark.com sponsor these games (sometimes called contests) both formally and informally. Winning images often display skill with digital image manipulation as well as a great deal of wit. In each of these four branches the photo is the primary unit of interest whereas for the online communities in this study, the community member is of primary interest.

The focus of this paper is a visual analysis of participants’ image posts. Our analysis revealed that some participants engaged in visual conversational turns; visual conversations. Interaction through imagery requires two or more images that are deliberate in how they address a topic of mutual interest to people involved. From this perspective, a visual conversation is a collaborative narrative that can be ‘read’ by an outsider, just like that of a text based conversation. In this ‘reading’ approach the conversational thread is available for anyone to inspect, given the patience.

In the following we review prior community studies, contrasting text and image as a focus. Given the large literature on this, it is necessarily brief. Next, we present an example of the type of community studied and a brief overview of how to conduct a visual data analysis on pictorial community data. In our analysis, we illustrate four visual conversation styles; positional play, image quoting, text in picture and animation. Lastly, based on the results we highlight a number of requirements for systems to support visual interaction. These requirements are applicable to online communities that already include image sharing. However, the results and design implications are more broadly applicable to websites that want to encourage participants to share their images with one another and interact with and through those images.

## 2. Web communities from text to images

Studies of online interaction and collaboration often focus on text exchange. Early community systems and laboratories supported text, email, or chat for participants whose computing environments could not handle computationally intensive video or audio [1-5]. Studies of mass interaction that distill and visualize large group interaction [6-8] are often based on text exchange. Systems built on web technologies can facilitate interaction that may include text, audio, and video. However, text has been and still is the common denominator for many studies of online community interaction and collaboration. The prominence of text has continued as blogging has grown.

Text has many characteristics that researchers find advantageous over visual data [9, 10]. Among the advantages; (a) text is relatively easy to collect, process and manipulate, (b) text is fairly easy to anonymize<sup>1</sup>, and (c) it is easier to apply analytical methods to text data. Sophisticated computational tools help simplify the analysis of large text corpuses, but the same is not yet true for image data. Many researchers have been trained in analytic methods using text as example data and can therefore begin analysis immediately. But text need not be the only form of community data.

The impact of photography and ‘the image’ on the individual [11] and the changing perceptions as society moves from still pictures to motion (video) [12] have been considered in art and the social sciences. Some researchers have focused more on the storage, manipulation and retrieval of an image [13-16]. While others have considered the requirements of systems that would facilitate the sharing and collaborative interaction over pictures [17, 18]. Research in picture sharing has even considered how people share pictures during mobile situations [19]. Our study builds on a growing understanding of computer mediated human-human visual interaction.

The augmentation of instant messaging (IM) with pictures is a current trend in computer mediated text and picture interaction. Lascaux [20] is an IM client that allows images to be sent with the text of an instant message. Through a small group deployment of Lascaux, Volda & Mynatt identified six ways that users appropriate images to enhance conversation. While our focus is not on synchronous interaction, there is some text associated with the images in the study. Our findings extend image interaction beyond a

1. Although modern search engines are changing how “anonymous” any given text can become. Indeed, text may be less anonymous than visual information because of the ease with which it can be searched – and found.

small laboratory deployment to broader visual interaction and community in the web.

The analysis relies on visual data analysis techniques [9, 10, 21, 22] to analyze visual interaction in several, similar, online communities. While the use of visual data analysis is common in the areas of anthropology and communication studies, they have not been for the analysis of online communities. Our analysis swaps the prevalent focus, giving primacy to visual interaction over text interaction.

### 2.1. An example community

At first glance, these communities look similar to traditional blog sites. Many have a home page that is mostly text, text with graphics, and possibly some small advertisements. Some community sites are maintained by a single individual, much like a personal blog. Other sites have a topical focus set by an individual or a group who administer the site together. Common topics include video games, online comics or the minutiae of everyday life. In other communities the focus changes as the interests of the participants’ shifts and changes over time.

Figure 1 shows a portion of a typical home page. The left edge contains a set of links to other pages in the site including “Monkey Cams” which is the portion of the site where the individuals interact visually. Many sites use the term cams or portals to label this link. Figure 2 shows a portion of a portal page for this site. This portal page, like many, is designed as a regular grid of web cam images (i.e., a 2 X 8 in this case). Additionally, each image has a user name or handle below it. The participant picks a name when she contacts the site administrator to join the community. This layout is reminiscent of early video systems, such

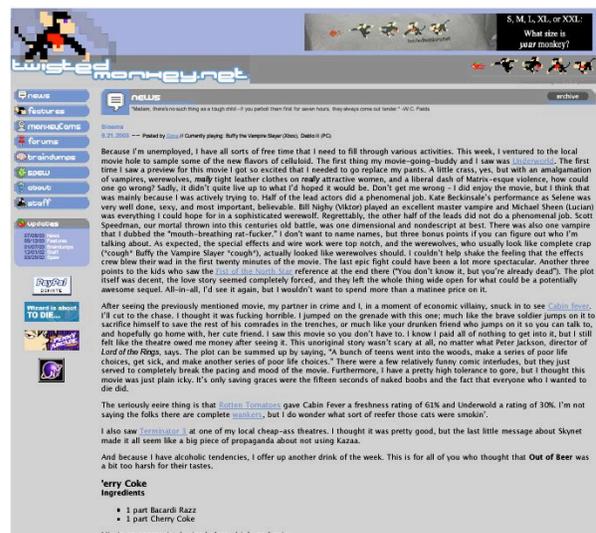


Figure 1 – A typical home page



**Figure 2 – Portion of a typical portal page**

as Portholes [23], and Cruiser [24].

These cam images are not live. Each participant sets their camera, poses, and takes a picture. Often a small amount of text is added to the image (see Figure 2). Dates, explanatory text, song lyrics, comments to other participants are all fairly common text. Simple video titling is a feature of the cam software that is commonly used. Participants will sometimes chop their pictures. Chopping is the term for the manipulation of an image in Photoshop, GIMP or other image manipulation software.

The image is then placed on a web server under the control of the participant, where a consistent URL can be used to retrieve and view the image. Many of these communities implement a portal page in the same way. The participants' images are hotlinked from some other server. That is, when the portal page is loaded, the images are individually fetched from another web server. The participant must tell the site administrator the URL that points to the cam image. This approach allows the participant to update their picture without needing to upload the image to the community server. Additionally, a participant often provides another URL, called an exit, to associate with the image. When a viewer clicks on the image of a participant, they are taken to the specified URL, exiting the community web site. These exits often point to participant specific home pages. Some sites allow the user to provide several different URLs to point to different kinds of web pages.

In communities where there are a large number of participants there are several portal pages. When a visitor clicks on the cam or portal link they are taken to the first portal page. From the first portal page,

navigation links allow a visitor to move arbitrarily among any additional portal pages. For example, in Figure 2 there are links near the top of the page for 'portal one' and 'portal two.' This design provides status to individuals on portal page one, because their cams are seen first by visitors. Administrators use this design and associated status to reward participants who update their images and participants who promote the community.

A participant is often given a specific grid location on a specific page. Their hotlinked image will consistently appear in that cell on that portal page until the administrator reallocates the cells on the portal pages. These reallocations happen relatively infrequently, but the implicit claim is that reallocation is based on merit. In most communities, merit is a function of frequent updates and promotion of the community site. But site administrators will make requests for monetary donations to help maintain the server on which the site runs. From an administrators view, donations are certainly worthy of merit. Individuals who merit a more prestigious location are moved to lower numbered pages.

### 3. Data collection & analysis

We initially performed a cursory survey of web sites that included cam or portal links and initially found about a dozen sites. We developed a web archiving tool that allows us to archive the participants' pictures in their web page context. New pictures are sometimes posted in response and in relation to existing pictures. Thus having the initial image in relation to any subsequent updates is critical to analyzing interaction.

We began archiving 9 web sites, capturing each cam or portal page twice a day. Archived sites were picked to represent a range of the types of sites available and those that seemed to have active participation. New, and interesting sites were added to the archiver as they were found. We archived up to 25 sites at one time. When participants had stopped updating pictures on a site for at least one month, we stopped archiving it.

#### 3.1. Ethics in community study

Readers may be concerned about the ethical and human subjects implications of this type of research. Over the past several years research societies have been considering how to frame issues of data collection from Internet sources [25-27]. We concur with many of the concerns expressed in this literature. Our primary concern is to accord the individuals who appear in the imagery, dignity, respect of person and property, and to

the degree that we can, privacy. In short we seek to be a ‘good citizen’ in the eyes of the participants.

For sites whose data would be used in publication, we contacted site administrators to notify them of our on-going research project. We obtained administrator permission to publish site specific screen shots. Additionally, we have made a good faith effort to contact every participant who has an image in one of the following examples. In the cases where the participant responded and where we received permission, the image is used unaltered.

In cases where the participant did not respond we sought help from site administrators to get a response. In some cases we were told that the participant as not been ‘seen’ in quite some time. If the participant did not respond then (with some trepidation) the participant’s image and username has been digitally altered to obscure and anonymize the image. We feel our approach meets a test of reasonableness in an attempt to balance our need to protect participants while still communicating our research results.

Several aspects of these communities factored into our decision making. In some cases the data is already quite anonymous because it does not contain the individual participant. Participants reuse and repost each other’s images, as in a visual ‘creative commons’ but this is not a consistent norm. In some communities, reuse within the community has upset some participants. Even though images are hotlinked and the URLs can be seen, some participants specifically disallow hotlinking without their express permission. Recognition of ownership and seeking permission are clearly viewed as measures of respect for the individual in these communities.

All of our data collection takes place in public communities. An observer of these communities is not required to have a membership or login to the community to view visual postings. These visual postings are made in a group setting, and many participants have relatively low expectations of privacy. In responding to our request for permission to use an image, one participant wrote “I mean, if I didn’t want people to see the pictures I wouldn’t have posted them on the web.”

### 3.2. Visual data analysis

The data was analyzed using visual data analysis techniques. One can engage a visual analysis asking different research questions. A content analysis asks the question “What is in the images?” where an ethnographic analysis is more likely to ask “What are the images about?” In this study visual analysis was focused on asking “What is the relation among a set of images?” Visual analysis has several steps that are

similar regardless of the type of research question asked [9]. These steps are (a) selecting a phenomena of interest, (b) finding or developing a documentary source, and (c) sampling the documentary source for analysis.

For this case, steps (a) and (b) were satisfied by focusing on the participation in these communities and by developing an archiver that saves images into a local repository. Our interest in understanding ‘interaction’ creates a problem for traditional notions of sampling (the third part of framing a visual analysis). Simply sampling pages looking for examples of participant-participant interaction might not yield interesting results. Interaction in these communities can evolve over a relatively extended period.

For this analysis we considered data in chunks of three months duration. Every archived site that had at least three months of participant update activity was included in the analysis. A total of 19 sites met this criterion over an 18 month segment of the archive. For each three month period, we examined very cam or portal page of the site looking for any references between participants. Text titling, visual similarity, and image juxtaposition are a few clues to a ‘conversation’ in process.

When participants appeared to be in a conversation, the visual conversation thread was traced forward and backward to find a beginning and an end of each conversation. For each thread, the relevant site, page, start date, end date, topic and any relevant comments were entered into a database. This approach identified a little over 200 visual conversations in the sample.

## 4. Visual conversation in the wild

The analysis identified six broad categories of visual conversation style. These categories are not exclusive because conversation is never purely one thing or another. Conversation moves among topics and thus can employ more than one conversational style at a time.

- *Positional Play* – In this technique the participants rely on the physical juxtaposition of images to interact and visually converse. Glancing, pointing, and physical reference are important to creating a sense of the conversational intent and rich interaction.

- *Image Quote* – Participants will sometimes take a picture posted by another participant, modify it, and repost the picture. In many of these cases the new image, a derivative work, is a direct conversational reference to the original post. At other times, the new image is a reference or meta-comment on the original.

- *Text-in-Picture* – It is hard to maintain a conversation completely in pictures. Thus, participants rely on video titling or chop text into the image before

it is posted. Adding text to a picture is often used to clarify the intent of a given participants' post by saying something to whom or about what the visual response is directed. Simply having text in a picture does not satisfy this category. Many posts will include some text. In this category, text is specifically used to bridge visual contributions and participate in an ongoing interaction.

- *Animation* – Participants will use a sequence of images and animation to elaborate a conversational response. In some cases animation is used as a trick to respond to several other participants at the same time. Animation is also used to demonstrate a visual and creative competency with the visual medium.

- *Collaborative Story* – At times participants will collaborate on the creation of a fictional narrative. These are not like text narratives that have a plotline or flow. Instead, a visual will suggest or allude to character and plot development that the viewer cannot see; but should imagine.

- *Theme* – Some web sites promote a weekly 'theme.' A theme is like an orchestrated cheer or shout by the members of the community; somewhat like a cheer at a sporting event. Many sites allow the members to vote or comment on a proposed theme, often through online text based forums, in advance. Interestingly, some themes are impromptu. That is, a participant will post an interesting image and it will garner broad imitation or response by other participants in the community.

In the following sections we illustrate and describe four of these six interaction styles. For purposes of space, we omit a detailed discussion of *Collaborative Story* and *Theme*.

#### 4.1. Positional play

Participants will sometimes rely on the relative positions of their images to interact or respond. Figure 3a and 3b shows page excerpts where a 'glance' is used to focus the attention of the viewer. In Figure 3a, Dana poses with her solved Rubik's Cube, and modifies the image to include just a little text that says "I'm such a nerd." This image is on the site for about a day when Mike takes a picture of himself holding another Rubik's Cube, looking up and to his left. He also modifies the picture to include some text saying, "I'm averaging about 3 1/2 minutes. How fast are you?"

The visual response by Mike is interesting in several ways. First, recall that individual participants pose and take their own pictures. For this 'glance' to work Mike must know how his image will be displayed in relation to what he wants his image to be glancing at. Additionally, what makes this image interesting is that Mike's Rubik's Cube is not solved!



(a) – Rubik's cube and comment



(b) – Glance, cube and challenge

Figure 3 – Positional play with glance

When considering this, the obvious 'topic' of visual conversation (solving a Rubik's Cube) is not actually the point of conversing.

A second example of positional play highlights how participants construct a visual conversation through the use of objects at hand. The site had an "action figure" theme at the beginning of this exchange and the participants in this visual conversation had both participated in that theme. Figure 4a shows the initial post for both participants. Scytale took a picture of an action figure and chopped that into a background. The very small text across the bottom of Scytale's post says "Action figure theater at HotButteredFunk." Fizz also posts a picture of two Teenage Mutant Ninja Turtle (TMNT) action figures that were recently purchased. Fizz's post says "These new turtles own. Damn you Toys R Us for only having these 2" with a TMNT logo chopped into the lower middle of the image. Several days later (Figure 4b), Scytale updates his image with a different action figure and the text (again very small) saying "Gundam Crush Ninja Turtle." Several days



(a) – Two neighbors post for Action Figure theme



(b) – One issues a visual challenge ...



(c) – ... the neighbor visually responds

#### Figure 4 – Positional play with objects

after that (Figure 4c), Fizz updates with a new picture of Ninja Turtle action figures saying, “Bring it.”

This visual conversation is interesting along several dimensions. The placement and orientation of the objects in the conversation is purposeful. In Figure 4b the Gundam action figure (on the left) is posed in motion, oriented in a direction to convey movement against the Ninja Turtles (to the right). In the response of Figure 4c, the Ninja Turtles are aligned and oriented in a defensive posture specifically to convey readiness to repel the visual intrusion of Gundam. This positional play is facilitated by the fixed relative positions of Scytale’s and Fizz’s cam pictures. This visual conversation would not be the same if the participants could not rely on the fact that they are neighbors on this specific page in this specific community.

This visual conversation takes place over an extended period of time; 18 days. The current presentation hides many days of apparent inactivity by focusing on the specific turn taking in the visual conversation. Some visual conversations require considerable time to emerge as participants observe one another’s responses and formulate their conversational turns. In this case, Figure 4c includes all four of the Ninja Turtles (a now complete collection), which resolves the problem that the participant mentions in the text titling of Figure 4a.

## 4.2. Image quote

An image quote is one way that participants can engage in a conversation when they are not direct neighbors. Naturally, not all conversations can be facilitated through positional play. Many of these web communities rely on a regular grid layout using an HTML table to organize participant’s images. Given this layout, the probability is small that two participants who want to interact are also neighbors.

An image quote should be thought of as similar to a text quote like those used in Usenet, bboards, or email messages. In text a responder will take all or a portion of a prior message in order to create a response. In some cases, new text (the response) will be interleaved with text from a prior post. Image quoting is a similar practice used in visual interaction.

Figure 5 shows a sequence that uses and reuses images as part of a visual interaction. The sequence starts with simultaneous posts by SpunOne and zoomchick (Figure 5a and 5b). One of them had visited the other and they took the time to document their face-to-face meet-up with a pair of cam images. Soon after these posts, Jibblies takes the image posted by SpunOne and modifies it by simply adding the text, “She is touching me! i think i just crapped my pants...” But Jibblies, perhaps not happy with this visual ribbing, modifies and reposts the image with new text saying, “My spidey sense is tingling ... wait ... no ... that isn’t my spidey sense...” Then two other people get in on the conversation. Spanky quotes the image from zoomchick and adds a small titling saying, “Welcome to Sprockets, I am Deiter und zees ees zoom.” Finally jory, quotes the image from SpunOne adding a type of cartoon speech bubble with SpunOne saying, “Honey I shrunk the ...” and zoomchick responding “Crikey!”

In this example, the use of image quoting is relatively clear because the whole image is re-used as part of the conversation. SpunOne and zoomchick make a statement with their posts and three other participants eventually post a response, quoting the original posts in the process.

Less obvious is the way visuals can be used as an allusion (an indirect reference) to a visual conversation topic. In the example of Figure 5, the exact same pictures are used and the allusion is actually rather direct. However, the use of visual style in the picture, image subject, framing, sharpness, contrast as well as the way in which an image is chopped (modified in image manipulation software), can all be used to indicate participation in a visual conversation.



Figure 5 – Full image quote

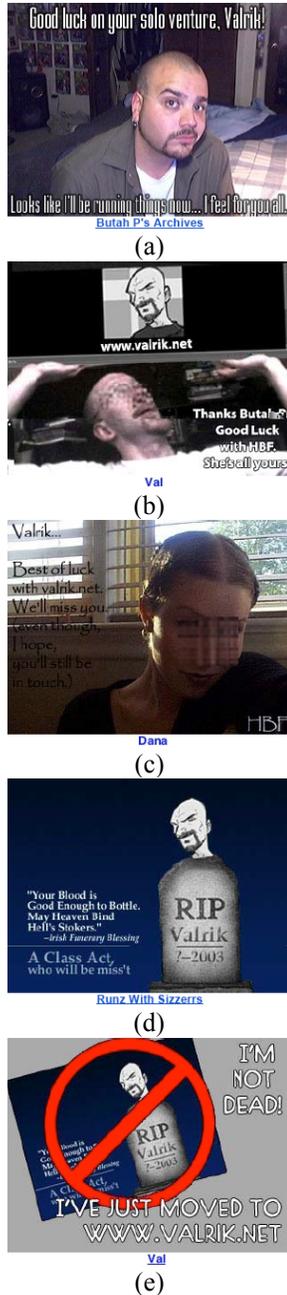


Figure 6 – Partial image quote

Depending on the pervasiveness of the visual allusion, a large number of posts alluding to the same topic might then be considered as illustrating the theme category.

The next example demonstrates two different types of image quoting in the same conversation. Figure 6 is a conversation where one site administrator is leaving to run his own solo website. In the first image (Figure 6a), Butah P, a site admin, posts a picture of himself and says “Good luck on your solo venture, Valrik. Looks like I’ll be running things now... I feel for you all.” Valrik responds by posting a chopped image of himself saying, “Thanks Butah P. Good Luck with HBF. She’s all yours!” Chopped into Valrik’s post is a small graphic caricature of himself as well as the URL for his new web site. Danielle, another site admin, also posts wishing Valrik well on his new project saying, “Valrik ... Best of luck with valrik.net. We’ll miss you. (even though, I hope, you’ll still be in touch.)” A later post by Runz With Sizzerrs (Figure 6d) quotes from Valrik’s post by using the caricature of Valrik. In the post from Runz With Sizzerrs he chops Valrik’s caricature to a gravestone showing “RIP Valrik, ? – 2003” perhaps suggesting that Valrik is going away permanently, as in dead. Valrik responds quoting the whole image posted by Runz With Sizzerrs. Valrik takes the whole image and repurposes it to say, “I’M NOT DEAD! I’VE JUST MOVED TO WWW.VALRIK.NET”

In this visual conversation we see an example response where a portion of an image posted by one participant is re-used by another participant. As well, we see a response-to-response where the original participant takes a visual response and quotes the whole image to create a clarification. The quoting behavior that we take for granted in textual interaction is also used here in visual interaction.

### 4.3. Text-in-picture & Animation

Maintaining a conversation purely through visuals is quite difficult. Some people seem to naturally think and communicate visually; for the rest of us, text is a useful bridge. Adding text to an image is relatively easy. Popular image capture software can easily and automatically put a small text banner across the top and/or bottom of a captured image (see Figures 3a and 3b, lower right quadrant, for an example of this). Text will often serve to indicate to whom a response is directed or the topic to which the post refers.

The examples in Figures 3, 4, 5 and 6 all include some text. However, in those examples, the text is not always essential to understanding the response. In examples of positional play, the use of glance, pointing, and object position make the reference clear.



**Figure 7 – A home improvement conversation**

In examples of image quote, the creative reuse of imagery also makes the reference clear. In examples of text-in-picture, the text and titling in the picture is essential to understanding an individuals' contribution to the conversation.

In the next sequence we have a discussion of a home improvement project; the installation of a ceiling fan. Tom Brazelton points up to the ceiling fan over his head and says, “See that ceiling fan? I installed it, bitch!” (Figure 7a) In response, Lusiphur Malaché post a picture of himself pointing to his own ceiling fan (Figure 7b) and says, “Ok Tom, while yer at it you could fix mine!?” with additional text pointing to the fan that says “Broken.” In Figure 7c, Ant post a picture of a ceiling fan with a little titling that says “Show off the fan you installed yourself @ HBF.” The last post in the conversation is a picture of a small desk fan posted by BeerNinja (Figure 7d) with the text “It may not be a ceiling fan, but I still installed it. Well took it out of the box and plugged it in... I just wanna be cool like you guys ... STOP PICKING ON ME!”

However, what makes BeerNinja cool, or at least makes the post significant is that it is animated. Figure 7d is a 3 frame animated GIF with the fan blades spinning behind the protective cover of the desk fan. Throughout the conversation we have various ceiling fans, a new one that is still (Figure 7a), a broken one that supposedly does not turn (Figure 7b), and one that is in motion (blurry blades in Figure 7c). Finally, in the end, we have a desk fan, but the visual presentation is actually working and running. The effect is quite striking and caps off this otherwise pedestrian home improvement conversation.

## 5. Designing to support visual conversation

Visual imagery and visual interaction are growing. Designing communities to support this kind of interaction naturally presents tradeoffs. Some tradeoffs, like how a user indicates which image she is responding to, or how to present visual threading become evident by observing existing systems like those in this study. The following sections describes

five tradeoffs in designing systems that would support interaction through images.

### 5.1. Locus of Image Control

All of the systems in this study do not store the user image on the community server; the images are hotlinked into the page when viewed. This design is different from the larger, more commercial systems like flickr.com and Shutterfly, that specifically require users to upload their images. The hotlink design facilitates two things. First, the participants maintain control over their own images, which results in a level of respect between the site administration and individual members. Secondly, because site administrators fund most of these community sites, the hotlink design decreases the cost of maintaining the community server (lower bandwidth and lower disk space requirements). However, by not maintaining a copy of the image, the community system is at a disadvantage when trying to implement other potentially desirable features.

### 5.2. Visual History

Since the sites do not maintain copies of the members' images, there is no persistence in the imagery. From a longer term perspective, persistence and a sense of community history are important features that help members feel part of the community and help newcomers understand what the community is about. Long term members know each other and the longer their participation the more they have a sense of what others have visually ‘said’ in the past, but newcomers just cannot know.

A near term visual history also has benefits. Specifically, a near term visual history would make it easier for current and new members to engage an ongoing conversation. It would allow conversants to see what had happened before in the conversation and create an appropriate reply.

### 5.3. Indicating Visual Reply

In addition the lack of history, the current sites do not have anything similar to a visual ‘thread.’ Threading of text messages often relies on the values in the `subject:` or `in-reply-to:` header flags. That is, text messages explicitly include semi-structured text meta-data from which a system can infer message relation and user intent. Some picture data formats include the ability to add limited meta-data, but there are few ways for individual users to see or manipulate that data to create relationships among visual posts. The rise of ‘tagging’ techniques, like those in flickr.com or del.icio.us, are potentially useful for clustering images in a visual conversation, but are not designed to represent the temporal and hierarchical relationships of a thread.

Threading information for a visual conversation could be supported in a number of different ways. One possibility is to appropriate an existing field in the image meta-data, such as the `com` (comment) or unknown meta-data fields in JPEG images. An alternative technique would be to implement a convention to which participants could agree. For example, creating an RSS feed that used structured XML to indicated if and to what a given image was a response.

### 5.4. Visual Threading

The presentation of a visual thread is also challenging. Given the ability to collect visual reply information, either through some automated method or through the direct indication of the participants, effective presentation may require knowledge of the visual conversation style. Hierarchical views (trees, nesting) and sequential views (lists) are relatively effective for presenting text message threads, but these techniques are not effective for some visual conversations. Visual conversations that rely on image juxtaposition, like that in positional play, need to be presented in a specific relative position or the individual turns in the conversation will not make sense. Further complicating the design of an effective presentation is that any single visual conversation might employ more than one conversational style at a time.

We have conducted some design explorations that consider this tradeoff, but have not identified a design that is sufficiently general.

### 5.5. Text and Image Fluidity

It is clear from our analysis that members have a difficult time maintaining ‘pure’ visual conversations.

The use of text in a visual conversation is clearly important and will allow more users to participate. The interleaving of text and visual image, such as that in Lascaux [20] or fark.com, is an important mechanism. In our examples, the members are using tools that specifically support text titling with a wide range of styles. Simplifying the use of text titling or just including it as a feature in standard image capture tools will lower one barrier to contributing to a visual conversation. Alternatively, the community website design could employ layers to allow text on top of the user supplied image.

## 6. Conclusion

Online interaction is emergent and reflects how individuals appropriate a given technology at a specific point in time. Any characterization is merely a snapshot of the phenomena. Researchers have only started to study how people use imagery and pictures to interact online. Our analysis identifies several techniques that are currently used when ‘conversing’ through imagery.

Picture sharing, posting, and visual conversation is a growing online phenomenon. Pictures of and by participants in an online community contribute to the overall feeling of cohesiveness and shared understanding in the community. Even in communities where exchanged pictures are assumed not to be accurate portrayals of the participant, a picture still increases the feelings of community and a sense that one somehow knows the other participants [28]. For this reason, it would seem, buddy icons, picture sharing, and visual participation are being included in more and more systems.

Some online communities are using visual imagery to move past a static picture of everyday life to a dynamic interactive medium where rich interaction and conversations can occur. Our results identify several styles of visual conversation currently in use among several online communities. The topics of visual conversation comprise the full range of everyday interaction. The examples presented here include conversations about hobbies, relationships, the weather, and home improvement, but the breadth of visual conversation topics is very wide. Based on the analysis we provide a number of design guidelines useful in designing virtual communities that will facilitate richer visual interaction and conversation

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