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What makes a video go viral? An analysis of emotional contagion and Internet memes

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ABSTRACT

What qualities lead some Internet videos to reach millions of viewers while others languish in obscurity? This question has been largely unexamined empirically. We addressed this issue by examining the role of emotional response and video source on the likelihood of spreading an Internet video by validating the emotional response to an Internet video and investigating the underlying mechanisms. Results indicated that individuals reporting strong affective responses to a video reported greater intent to spread the video. In terms of the role of the source, anger-producing videos were more likely to be forwarded but only when the source of the video was an out-group member. These results have implications for emotional contagion, social influence, and online behavior.

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1. Introduction

During the 2008 Presidential campaign, supporters of Senator Barack Obama created a video entitled "Yes We Can." This video "went viral" after the New Hampshire Primary, quickly spreading across the Internet. In fact, "Yes We Can" became the most popular online video of the 2008 campaign; with over 20 million views by the time Obama secured the Democratic nomination for President (Nahon, Hemsley, Walker, & Hussain, 2011; Wallsten, 2010). Wallsten performed a thorough analysis of the process by which the video went viral and determined that bloggers and personnel within the Obama campaign were largely responsible for attracting viewer and media attention. Nahon et al. reported similar findings. However, characteristics of the video itself may have made it especially likely to "go viral."

Political communications can be tailored to specific audiences most likely to be influenced (Karlsen, 2011), and although viewers may have found the video's content compelling, it also is likely that the visceral emotional reaction created by the images, music, message, and people in the video increased viewer interest and led them to forward it to friends and acquaintances. In fact, Robertson, Vatrapu, and Medina (2010) found that political video postings on Facebook during the 2008 campaign were often used to provide proof

of a candidate's character defect (e.g., dishonest, "flip-flopper") or to provide amusing footage of a specific campaign or candidate. In this paper, we investigate how the emotions produced by specific Internet videos affect each video's likelihood of being forwarded.

1.1. Contagion

Contagion involves the rapid spread of influential information among people (Cialdini, 2009). Recently, Guadagno, Cialdini, and Evron (2010) suggested that the rapidity with which people can spread information online enhances contagion. For example, survey data indicate that one in seven adult users report that they have uploaded a video to the Internet (Purcell, 2010), and 59% of people report that they "very frequently" or "frequently" forward Internet material to colleagues, peers, family or friends (Allsop, Bassett, & Hoskins, 2007). A particular form of contagion, emotional contagion, involves the convergence of one's emotional state with the emotional states of those with whom one is observing or interacting (Hatfield, Cacioppo, & Rapson, 1994). Whereas a dyadic interaction can produce emotional contagion directly, forwarding existing information to another person also can involve shared emotion indirectly. That is, when people watch Internet video clips, they may experience the same emotions as the people in the clip, and by forwarding that clip, they anticipate that the receiver will experience similar emotions. When one is embedded within an existing network of likeminded individuals (e.g., online political organizations), this contagion can spur appropriate behavioral responses by a mass of people (Karpf, 2010).

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While nearly two million videos are viewed on youtube.com every day, only a fraction of these videos spread rapidly (Youtube.com, 2010). Social media commentators (Cashmore, 2009) have found emotional commonalities between the most popular videos on youtube.com. Specifically, videos that are cute, humorous, or emotionally arousing draw more viewers. The "Yes We Can" video was contagious in nature; in fact, it spread from the Internet to other media, such as television and print. The pervasive spread of the "Yes We Can" video makes it an example of an *Internet meme*. Internet memes are a digital version of Dawkins' (1976) idea of memes, defined as individual bits of cultural information that propagate from person to person while undergoing variation, selection, and retention. Memes are transmitted throughout a population via social learning, and at any given time, members of a population either are adopting cultural traits (which become memes) or rejecting those traits through a complex interplay of social, emotional, and cognitive processes (Baker & Gammon, 2008).

Knobel and Lankshear (2007) documented the content of many Internet memes and found that most are intended to provide humor or social commentary. For example, they describe one Internet meme, "Bert is Evil," that involved Bert, the beloved Muppet from *Sesame Street*. Users manipulate and disseminate pictures of Bert that make him appear to be engaging in "evil" behaviors (e.g., participating in a Nazi rally). While this Internet meme may at first sound inconsequential, the question persists as to why people find a manipulated picture of a Muppet humorous enough to both create their own versions and pass along pictures created by others. Although no existing literature on Internet memes answers these questions, we can examine research on other viral behavior to construct a framework for the proposed studies.

1.2. Virality of stories

Research on one's willingness to disseminate emotion-laden news has produced mixed results. For example, Heath (1996) found that people prefer passing on bad news, while Nisbett and Wilson (1977) found that people prefer passing on good news because recipients of this good news will then associate the positive mood with the messenger. Berger and Milkman (2009) recently analyzed the emotional content of 7000. The New York Times articles in order to determine factors contributing to an article's virality. When accounting for several non-emotional factors (e.g., article placement on the Times website, author fame), a pattern emerged based on emotional content. People tended to email articles that evoked positive affect, anger, or anxiety, but tended to not email sad articles. This is consistent with the findings of the Pew Research Center, who found that people were more likely to watch "comedy or humorous videos" than any other category (Purcell, 2010). Berger and Milkman concluded that the increase in physiological response accompanying high-arousal emotions may facilitate action and a desire to share the content, while the decrease in physiological response accompanying low arousal emotions may promote the conclusion that the content is unexciting and, thus, unworthy of sharing.

Heath, Bell, and Sternberg (2001) found similar results when examining another viral phenomenon, urban legends. The authors postulated that both positive and negative content will succeed in the "marketplace of ideas," as long as the emotion is one that is suitable for consumption by a particular audience. For instance, if an office worker finds an amusing Internet video, she may share the video with officemates as a way of sharing a positive mood during the workday. Establishing similarity through a shared emotional experience can increase closeness and liking (Anderson, Keltner, & John, 2003). Likewise, sharing positive emotions through social talk helps form and reinforce coalitional bonds between individuals (Peters & Kashima, 2007). Peters and Kashima further

suggest that social talk between in-group members that is both directed toward out-group members and anger-inducing may heighten negative feelings toward the out-group target. Derogating out-groups, in turn, can serve to bolster positive perceptions of the in-group and self-esteem (Fein & Spencer, 1997). This Emotional Selection Hypothesis helps to explain the spread of both positively and negatively valenced memes (Peters & Kashima, 2007).

1.3. The role of social validation

Besides emotional content, one factor that may contribute to the proliferation of Internet memes is social validation. Social validation is the tendency for individuals to look to others to see what others are doing to determine if a behavior is normative and appropriate (Cialdini, 2009). In environments where the correct course of action is ambiguous, people rely even more heavily on the cues provided by others. People are also more likely to follow the cues of others when the others are a member of their in-group and thus more similar to them. In a one such study, Salganik, Dodds, and Watts (2006) created a laboratory "music market" online where 14,000 participants were allowed to download songs they had never been exposed to previously. The researchers manipulated whether participants were made aware of other participants' choice to download a song. The results of the study demonstrated that increasing cues of social validation (providing participants with knowledge of other participants' download choices) decreased the predictability of success based on song quality. Thus, in terms of Internet videos, when one receives a forward from an in-group member, that may serve as a signal that the video is appropriate to forward to others.

1.4. The current studies

Drawing on the theoretical foundations provided by emotional contagion and social validation, we conducted two studies. In Study 1, we selected four pairs of videos that were intended to invoke positively- or negatively-valenced emotions. We also selected a pair of control videos that we intended viewers to find emotionally flat and boring. We expected that Internet videos are spread amongst Internet users in a manner similar to the way that urban legends spread (Heath et al., 2001), namely, based upon the strength of the emotion a video is able to evoke. For example, people were more likely to pass along an urban legend depicting a dead rat in a soda can when the story was manipulated to maximize its disgusting qualities (Health et al.). Thus, we expected emotional content of videos to show a positive relationship with a desire to forward those videos.

In Study 2, we also manipulated the alleged source of the video. One group of participants were told to imagine that the video came from a fellow student of their university, while in another group, participants imagined that the video came from a student attending a rival university. Previously, this manipulation has proven sufficient to create perceived in-group or out-group status (Moore et al., 1999). People tend to exhibit favoritism toward members of their in-groups, even when the groups are minimal (Tajfel, Flament, Billig, et al., 1971) or formed on the Internet (Amichai-Hamburger, 2005). Thus, via the principle of Social Validation, we expected participants to be more likely to forward a video if it allegedly comes from a member of their in-group.

Hypotheses:

(1) We expect a main effect for emotional content such that videos evoking any emotion will be forwarded more than videos with no emotional content.
(2) We expect a main effect for emotional content, such that videos evoking positive emotion (i.e., funny or cute) will be forwarded more than videos evoking negative emotions

(i.e., anger or disgust). We expect this because individual studies show an effect for both, positively-valenced information tends to be forwarded more consistently across studies.

(3) We expect a main effect for source of video, such that participants will be more likely to forward videos coming from in-group members than out-group members.

2. Study 1

2.1. Method

2.1.1. Procedure

256 (101 male, 155 female) undergraduate psychology students participated in the study. Their mean age was 18.91 (*SD* = 1.31). Participants reported their ethnicity as follows: 86.1% Caucasian, 10.7% African American, 1% Asian, 0.3% Native American or Pacific Islander, 1.6% Hispanic, and 0.3% other. Approval from the Institutional Review Board was granted prior to data collection.

Participants logged onto the online participant pool to sign up for the experiment, which was described as a study investigating what people think of Internet videos on sites such as youtube.com. Participants then received a link to a website hosting the stimulus materials. The research material was powered by a program called Riddle Me This, an online survey collection tool that has video presentation and random assignment capabilities (Loewald, 2011).

The experiment began with the presentation of information on the study and a request for participants' consent. Once participants consented, they then provided basic demographic data and watched one of twelve randomly assigned videos. After the video, to assess forwarding intentions, participants were asked, *"How likely would you be to share this video with others?"* and responded using a Likert scale (1 = "*Not at all likely*"; 7 = "*Extremely likely*"). They then rated the video on four emotional categories: cute, funny, disgusting, and anger-inducing (e.g., "*I thought the video was cute*"; 1 = "*Strongly Disagree*"; 7 = "*Strongly Agree*"). Finally, they completed the PANAS short form (Watson, Clark, & Tellegen, 1988), basing their answers on the affect they experienced while watching the video. After filling out the dependent variables, participants were debriefed and dismissed.

2.2. Materials

Videos: We collected the stimulus videos from youtube.com. Eight of the videos were selected to represent one of four emotional categories: "disgusting" (Mantis-Disgust = a young woman eating a live preying mantis, Spider-Disgust = a young man draining a swollen spider bite), "cute[1]" (Charlie-Cute = a toddler biting his older brother in fun, David-Cute = a young child returning from the dentist in a drug-induced haze), "funny" (SNL-Funny = a Saturday Night Live video clip, Ninja-Funny = a cat stalking a video camera), and "anger-inducing" (Marine-Angry = a United States Marine throwing a puppy over a cliff, Taser-Angry = police tasering a student at a political rally). We included two neutral videos to serve as controls (Stitch-Control = a woman explaining cross-stitching techniques, Basket-Control = a woman explaining basket-making techniques). Thus, in total we used 10 videos in Study 1 with 2 representing each category.

With the exception of the control videos, we selected videos based on their previous popularity (determined via their "view count" on youtube.com) and selected videos that peaked in popularity around 2005–2007 in order to reduce the likelihood that participant had already viewed the videos. These videos were selected

specifically because they had been successful. Because we did not know the formula to make videos popular – indeed this was the purpose of the proposed study, we followed the full cycle approach to research (Cialdini, 1980) and drew our stimulus materials from the world around us. To control for popularity, we made sure to ask whether the participants had ever watched the videos before and found no significant differences between the groups (those who had seen the videos and those who had not) in terms of their likelihood of forwarding the videos.

Positive and Negative Affect Scale (PANAS) short form: To measure affective responses, participants completed the 20-item PANAS (Watson et al., 1988). The PANAS is a widely, commonly used measure of individuals' affective responses to stimuli. The scale consists of twenty emotional descriptors, and participants were instructed to "indicate to what extent you feel this way right now." For each item, participants provide a rating from 1 ("*very slightly or not at all*") to 5 ("*extremely*"). This scale was developed to assess positive affect (PA) – how active, alert, and enthusiastic a person feels – and negative affect (NA) – feeling displeasure and distress. These two types of affect are two distinct dimensions of mood quality. Higher scores indicate greater PA (e.g., excited, enthusiastic) or NA (e.g., distressed and displeased).

3. Results

We conducted a one-way ANOVA to explore the impact of video content on likelihood to forward the video and found it to be significant, $F(8, 218) = 13.32$, $p < .01$. Participants were most likely to forward the SNL-Funny video (see Table 1), and the Bonferroni test identified this value as significantly higher than Spider-Disgust, $t = 4.21$, $p < .01$, Marine-Angry, $t = 5.44$, $p < .01$, Stitch-Control, $t = 6.08$, $p < .01$, and Basket-Control, $t = 6.69$, $p < .01$. This was followed by the two Cute videos, then the negative affect videos.

We also combined the two videos of the same category into a single variable (e.g., the two cute videos were combined into one group), except in the case of the Funny category, as there was only one video. We then conducted another one-way ANOVA to examine the impact of affect category on likelihood of forwarding. The ANOVA was significant, $F(4, 222) = 22.35$, $p < .01$. Participants were significantly more likely to forward the Cute videos and the Funny video (see Table 2) than the Disgust videos, the Angry Videos, and the Control videos. In addition, participants were significantly more likely to forward the Disgust videos and the Angry videos than the Control videos.

Additionally, we conducted a linear regression using PA and NA scores to predict Likelihood of Forwarding. PA significantly predicted Likelihood of Forwarding, $t(224) = 9.66$, $\beta = .54$, $p < .01$, such that greater reported positive affect was associated with greater likelihood of forwarding. NA also significantly predicted Likelihood of Forwarding, $t(224) = -4.00$, $\beta = -.23$, $p < .01$, such that greater reported negative affect was associated with a lower likelihood of forwarding. See Table 3 for details on the regression analysis.

3.1. Manipulation check

We conducted a series of one-way, between-groups ANOVAs to examine whether the videos elicited category-appropriate responses from participants (e.g., Did participants find the Cute videos cute?). For each ANOVA, we conducted a Bonferroni posthoc analysis to determine if the video of a particular category differed significantly from the Control videos in terms of the corresponding affect variable. Videos that failed to differ significantly from the two controls were excluded from the overall analysis. We also calculated effect sizes (Cohen's *d*) for each posthoc comparison in order to determine whether the salient affective aspects of the videos

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[1] Owing to the large range of content people find humorous, we differentiated between funny videos involving children (labeled "cute") and funny without children (labeled "funny").

Table 1
Means for likelihood of forwarding by video in Study 1.

	M	SD
SNL-Funny	4.81[*]	1.50
Ninja-Funny	3.31	1.83
Charlie-Cute	4.76[*]	2.15
David-Cute	4.48[*]	2.00
Taser-Angry	3.72[*]	1.81
Marine-Angry	2.09	1.44
Mantis-Disgust	3.34[*]	1.75
Spider-Disgust	2.77	2.12
Stitch-Control	1.65	1.39
Basket-Control	1.38	1.02

Note: Behavioral intention rated from 1 to 7, where higher scores indicate greater likelihood of forwarding.
[*] Indicates significant difference from both controls, $p < .01$.

Table 2
Means for likelihood of forwarding by video category in Study 1.

	M	SD
Funny	4.81[a]	1.50
Cute	4.62[a]	2.06
Disgust	3.09[b]	1.93
Angry	3.00[b]	1.84
Control	1.51[c]	1.21

Note: Behavioral intention rated from 1 to 7, where higher scores indicate greater likelihood.
Cells with different superscripts differ significantly from one another, $p < .01$.

were salient to a comparable degree (e.g., Was the disgusting video as disgusting as the cute video was cute?).

The item, "*I thought the video was cute*," produced a significant effect, $F(9, 246) = 19.48$, $p < .01$. Participants rated Charlie-Cute ($M = 5.16$, $SD = 1.70$) as significantly cuter than Stitch-Control ($M = 2.15$, $SD = 1.60$), $t = 6.95$, $p < .01$, $d = 1.82$, and Basket-Control ($M = 2.43$, $SD = 1.63$), $t = 6.39$, $p < .01$, $d = 1.64$. Participants also rated David-Cute ($M = 4.28$, $SD = 1.70$) as significantly cuter than Stitch-Control, $t = 4.92$, $p < .01$, $d = 1.29$, and Basket-Control, $t = 4.33$, $p < .01$, $d = 1.11$. The Cute videos did not differ significantly from one another.

The item, "*I thought the video was disgusting*," produced a significant effect, $F(9, 246) = 31.06$, $p < .01$. Participants rated Spider-Disgust ($M = 5.88$, $SD = 1.86$) as significantly more disgusting than Stitch-Control ($M = 1.60$, $SD = 1.27$), $t = 9.38$, $p < .01$, $d = 2.69$, and Basket-Control ($M = 2.00$, $SD = 1.23$), $t = 8.62$, $p < .01$, $d = 2.46$. Participants also rated Mantis-Disgust ($M = 5.41$, $SD = 1.64$) as significantly more disgusting than Stitch-Control, $t = 8.72$, $p < .01$, $d = 2.60$, and Basket-Control, $t = 7.91$, $p < .01$, $d = 2.35$. The Disgusting videos did not differ significantly from one another.

The item, "*I thought the video was funny*," produced a significant effect, $F(9, 246) = 14.62$, $p < .01$. Participants rated SNL-Funny ($M = 5.50$, $SD = 1.66$) as significantly funnier than Stitch-Control ($M = 2.00$, $SD = 1.49$), $t = 6.65$, $p < .01$, $d = 2.22$, and Basket-Control ($M = 2.33$, $SD = 1.88$), $t = 6.11$, $p < .01$, $d = 1.79$. Participants also

rated Ninja-Funny ($M = 3.83$, $SD = 2.07$) as significantly funnier than Stitch-Control, $t = 3.56$, $p < .05$, $d = 1.01$. However, participants did not rate it as significantly funnier than Basket-Control ($p = .16$). Moreover, SNL-Funny was rated as significantly funnier than Ninja-Funny, $t = 3.52$, $p < .05$. Thus, Ninja-Funny was dropped from the analysis.

The item, "*The video made me angry*," produced a significant effect, $F(9, 246) = 14.54$, $p < .01$. Participants rated Marine-Angry ($M = 5.09$, $SD = 2.09$) as significantly more anger-inducing than Stitch-Control ($M = 1.55$, $SD = 1.10$), $t = 7.58$, $p < .01$, $d = 2.12$, and Basket-Control ($M = 1.81$, $SD = 1.44$), $t = 7.11$, $p < .01$, $d = 1.83$. Participants also rated Taser-Angry ($M = 3.83$, $SD = 1.97$) as significantly more anger-inducing than Stitch-Control, $t = 5.14$, $p < .01$, $d = 1.43$, and Basket-Control, $t = 4.62$, $p < .01$, $d = 1.17$. The Angry videos did not differ significantly from one another.

3.2. Manipulation check

We conducted a series of 4 (Video Content) × 2 (Video Source) ANOVAs to verify that the participants experienced the categorically appropriate affective responses to the videos. Bonferroni tests were conducted to examine differences between conditions.

The item, "*I thought the video was funny*," produced a significant main effect for Video Content, $F(3, 147) = 74.86$, $p < .01$, $r = .78$. Bonferroni tests revealed that participants rated the Funny video ($M = 6.14$, $SD = .99$) as significantly funnier than the Disgusting video ($M = 4.04$, $SD = 2.10$), $t = 5.30$, $p < .01$, the Angry video ($M = 1.61$, $SD = 1.43$), $t = 12.87$, $p < .01$, and the Control video ($M = 2.19$, $SD = 1.47$), $t = 12.91$, $p < .01$. No other main effects or interactions were significant.

The item, "*The video made me angry*," produced a significant main effect for Video Content, $F(3, 147) = 68.47$, $p < .01$, $r = .76$. Posthocs revealed that participants rated the Angry video ($M = 5.45$, $SD = 2.16$) as significantly more anger-inducing than the Disgusting video ($M = 2.18$, $SD = 1.54$), $t = 9.13$, $p < .01$, the Funny video ($M = 1.02$, $SD = .15$), $t = 13.67$, $p < .01$, and the Control video ($M = 1.64$, $SD = 1.23$), $t = 12.29$, $p < .01$. No other main effects or interactions were significant.

Finally, the item, "*I thought the video was disgusting*," produced a significant main effect for Video Content, $F(3, 147) = 103.48$, $p < .01$, $r = .82$. In this case, however, the posthoc tests showed no difference between the Angry video ($M = 5.55$, $SD = 2.16$) and the Disgusting ($M = 5.25$, $SD = 1.67$) video, perhaps due to the question's failure to differentiate between moral and physiological disgust (Rozin, Haidt, & McCauley, 1999). However, participants rated the Disgusting video as significantly more disgusting than the Funny video, ($M = 1.12$, $SD = .32$), $t = 12.37$, $p < .01$, and the Control video, ($M = 1.66$, $SD = 1.07$), $t = 11.18$, $p < .01$. No other main effects or interactions were significant.

4. Discussion

In Study 1, results provided mixed support for Hypothesis 1. Although at the categorical level, the participants were significantly more likely to forward videos identified as anger- or

Table 3
Regression table from Study 1.

Model	Unstandardized B	Standard error	Standardized β	t-Score	Significance
Constant	1.48	2.11		.70	.48
PANAS positive	.18	.02	.54	9.55	.00
PANAS negative	−.05	.01	−.23	−3.99	.00
Participant age	−.03	.10	−.02	−.29	.77
Participant gender	.26	.25	.06	1.05	.29

disgust-inducing, the general ability of the videos to produce NA showed a negative relationship with likelihood of forwarding. The results supported Hypothesis 2: participants viewing a video eliciting positive emotion were significantly more likely to forward that video. This was supported both by the video category and the general ability of the videos to elicit PA.

While generalizability is always an issue with studies using specific exemplars to represent a category (Wells & Windschitl, 1999), the pattern of results seems to indicate that our results are applicable across multiple videos. In terms of affect category's impact on likelihood of forwarding, the Cute and Disgusting videos clustered together (see Table 1), and results were even more distinct in terms of valence: participants showed a significant preference for forwarding positively valenced videos over all other videos, as well as a preference for negatively valenced videos over the non-emotional control videos (see Table 2). As with any study of this type, more videos and affect categories should be examined before any sweeping conclusions are drawn.

Study 2 attempted to clarify the role of affect in one's likelihood of forwarding a video. First, the number of videos used was reduced to reflect only those that showed the strongest emotional content. Second, we reduced the number of categories by collapsing the Cute and Funny videos together. The original distinction between categories (Cute videos involved children) was rather arbitrary, and since we found no significant difference between the categories for any of our dependent measures of interest, we combined them. Third, we divided the PANAS into more specific subscales. Finally, we examined the effect of video source (ingroup vs. out-group) on likelihood of forwarding.

5. Study 2

5.1. Overview

Study 2 utilized a design similar to Study 1. Instead of using ten videos, however, we narrowed our options down to the four videos from Study 1 that yielded the strongest affective responses: one Funny video (Charlie-Cute), one Angry video (Marine-Angry), one Disgusting video (Mantis-Disgusting), and one Control video (Stitch-Control). These selections also provided the tightest range of effect size estimates between the affect categories and the control. Owing to the lack of significant difference between the videos labeled "funny" and those labeled "cute" in Study 1, this category was collapsed. Furthermore, the alleged source of the video was manipulated, such that participants either imagined that the video came from someone attending their own university (a member of their ingroup) or someone attending a rival university (a member of their outgroup). This allowed us to manipulate ingroup vs. outgroup and examine its impact on what types of videos go viral.

6. Method

6.1. Procedure

Participants were 163 undergraduate psychology students (86 female, 77 male). Eight participants were dropped from the study, four because they suspected the Video Source manipulation and four because they were substantially older than the rest was false of the sample and, therefore, may have been differentially affected by the video source manipulation. With these exclusions, the mean age of participants was 19.46 (SD = 1.32). Ethnicity was reported by our participants as follows: 74.8% Caucasian, 20.9% African American, 1.8% Asian, 0.6% Native American or Pacific Islander, 1.2% Hispanic, and 0.6% other. Approval from the Institutional Review Board was granted prior to data collection.

The procedure for Study 2 differed from Study 1 in three respects. First, individuals participated in a lab instead of online from a remote computer. Second, the study featured a new manipulation: we instructed participants to imagine that they had received the video from an email address unique to either their home university or a rival university. Finally, participants were randomly assigned to watch one of four videos selected from Study 1.

The dependent measures were the same as in Study 1. However, we analyzed the PANAS differently in order to make a more specific determination of participants' affective states. The PANAS consists of ten positive emotional terms and ten negative emotional terms. Gaudreau, Sanchez, and Blondin (2006) subdivided the negative items into an Afraid subscale (consisting of the following items: "*distressed*," "*afraid*," "*nervous*," "*jittery*," and "*scared*") and an Upset subscale (consisting of "*upset*," "*guilty*," "*hostile*," "*irritated*," and "*ashamed*"). For the current sample, the Upset (α = .89) and the Afraid (α = .88) subscales proved highly reliable. Conversely, Egloff, Schmukle, Burns, Kohlmann, and Hock (2003) subdivided the positive items into subscales encompassing Joy (consisting of "*excited*," "*proud*," and "*enthusiastic*"), Interest (consisting of "*interested*," "*strong*," and "*determined*"), and Activation (consisting of "*active*," "*alert*," "*attentive*," and "*inspired*"). For the current sample, the Joy (α = .77), Interest (α = .51), and Activation (α = .70) subscales showed lower reliability than the Afraid and Upset subscales, but this is predictable, given the few items in the reliability analysis (Cortina, 1993).

In effort to address issues of multicolinearity, we examined the intercorrelations among the variables and found a particularly high correlation between the Upset and Afraid subscales (r = .81). For this reason, these two variables were analyzed together and separately in order to search for discrepancies.

7. Results

To determine what type of video participants were most likely to forward, a 4 (Video Content) × 2 (Video Source) ANOVA was conducted using Likelihood of Forwarding as the dependent variable (i.e., "*How likely would you be to share this video with others?*"). The main effect for Video Content was robust, $F(3, 147)$ = 47.28, p < .01, r = .70. Participants were most likely to forward the Funny video (M = 5.07, SD = 1.86). Bonferroni tests indicated that this value was significantly higher than that of the Disgust video (M = 3.50, SD = 2.03), t = 3.97, p < .01, the Angry video (M = 2.29, SD = 2.16), t = 7.26, p < .01, or the Control video (M = 1.17, SD = .51), t = 11.68, p < .01. In addition, participants were significantly more likely to forward the Disgust video than the Angry video, t = 2.85, p < .05, or the Control video, t = 6.13, p < .01. Participants were also significantly more likely to forward the Angry video than the Control video, t = 3.04, p < .05. Thus, regardless of the valence of the emotional, participants were more likely to forward a highly emotional video than the Control. See Table 4 for a comparison of means by condition and Table 5 for the ANOVA summary table.

The analysis revealed no main effect for Video Source, but there was a marginally significant interaction effect, $F(3, 147)$ = 2.51, p < .07, r = .22. In examining the individual cells, we found a marginally significant difference for the viewers of the Angry video, such that those who thought that the video came from an outgroup member (M = 3.15, SD = 2.61) were more likely to forward the video than if the video came from an in-group member (M = 1.67, SD = 1.57), t (29) = −1.98, p < .06. This result is opposite the prediction of Hypothesis 3.

7.1. Analysis of PANAS scores

PA and NA scores from the PANAS were used to predict Likelihood of Forwarding in a linear regression. As with Study 1, PA

Table 4
Means for PANAS subscales across video category in Study 2.

Video category	PANAS subscales				
	Joy	Interest	Activation	Afraid	Upset
Disgusting SD	1.86** (.87)	2.04** (.80)	2.21** (.69)	1.74* (.91)	1.55 (.85)
Funny SD	2.21** (.86)	2.09** (.51)	2.10** (.64)	1.11 (.20)	1.03 (.11)
Angry SD	1.37 (.82)	1.92** (.84)	2.41** (.86)	2.79** (1.16)	3.16** (.97)
Control SD	1.16 (.36)	1.41 (.57)	1.61 (.71)	1.26 (.41)	1.35 (.52)

Note: Affect was rated on a scale of 1–5, where higher scores indicating greater emotion.
* Indicates significant difference from Control, $p < .05$.
** Indicates significant difference from Control, $p < .01$.

Table 5
ANOVA table from Study 2.

Source	Sum of squares	Df	Mean square	F	Significance	Partial Eta
Corrected model	403.58	7	57.66	21.80	.00	.71
Intercept	1323.65	1	1323.65	500.50	.00	.88
Video content	375.11	3	125.04	47.28	.00	.70
Video Source	1.36	1	1.36	.51	.48	.05
Content × source	19.94	3	6.65	2.51	.06	.22
Error	388.77	147	2.65			
Total	2093	155				
Corrected total	792.35	154				

significantly predicted Likelihood of Forwarding, t (152) = 10.14, β = .63, $p < .01$, such that greater positive affect was associated with an increased likelihood of forwarding. NA also significantly predicted Likelihood of Forwarding, t (152) = −3.48, β = −.22, $p < .01$, such that greater reported negative affect was associated with a decreased likelihood of forwarding.

When all the scores of the PANAS subscales (Joy, Interest, Activation, Afraid, and Upset) were used to predict Likelihood of Forwarding in a linear regression, only Joy remained a significant predictor, t (149) = 5.90, β = .52, $p < .01$. This supports the idea that high arousal positive emotion trumps all other affective factors in determining one's choice to forward a video. All subscales showed a positive relationship with the Likelihood of Forwarding variable except for the Upset subscale ($p = .15$).

In effort to guard against multicollinearlity issues, we analyzed the two negative affect subscales separately from one another. When Afraid was analyzed along with Joy, Interest, and Activation, once again, only Joy remained significant, t (150) = 6.29, β = .55, $p < .01$. On the other hand, when Upset was analyzed along with Joy, Interest, and Activation, only Joy remained significant, t (150) = 5.91, β = .52, $p < .01$, but Upset also became a marginally significant negative predictor, t (150) = −1.82, β = −.12, $p < .08$, such that the more upset a video caused participants, the less likely they were to report forwarding that video.

In effort to reconcile the increased likelihood of forwarding of Disgusting and Angry videos with NA's negative relationship to forwarding, we conducted a 4 (Video Content) × 2 (Video Source) MANOVA using the Joy, Interest, Activation, Afraid, and Upset subscales of the PANAS as the dependent variables. Overall, there was a significant main effect for Video Content, *Wilks' Λ* = .28, $p < .01$, and a significant interaction effect, *Wilks' Λ* = .84, $p < .05$. Bonferroni tests conducted across video categories (see Table 3) revealed that the Disgusting video produced higher scores than the Control in all of the subscales that constituted "positive affect," and the Angry video produced higher scores on two of the three PA subscales.

In examining potential causes of the significant interaction effect, by far the largest difference in terms of Video sources was in Interest ratings within the Angry condition. Interest of participants was significantly greater when they imagined receiving the Angry video from an out-group member ($M = 2.36$, $SD = 1.00$) as compared to an in-group member ($M = 1.61$, $SD = .52$), t (29) = 2.70, $p < .05$.

7.2. Explaining the video source interaction effect

Since we found parallel effects for Likelihood of Forwarding item and the Interest subscale of the PANAS for participants viewing the Angry video, we conducted a path analysis using the procedure outlined in Kenny et al. (1998) to examine whether the emotional reaction to the video mediated the impact of Video Source on Likelihood of Forwarding (see Fig. 1). First, a linear regression was conducted that established a marginally significant relationship between Video Source and Likelihood of Forwarding, t (29) = −1.98, β = −.35, $p < .06$, such that participants were more likely to forward the Angry video if it came from an out-group member. Second, we conducted a linear regression establishing a significant relationship between Video Source and Interest, t (29) = −2.70, β = −.45, $p < .05$, such that participants reported more interest in the video if it came from an out-group member. Third, we conducted a linear regression establishing a significant relationship between Interest and Likelihood of Forwarding, t (29) = 2.98, β = .49, $p < .01$, such that greater interest was associated with a greater likelihood of forwarding the video. Finally, we conducted a linear regression using Video Source and Interest as predictors and Likelihood of forwarding as the dependent variable. Interest remained significant, t (28) = 2.27, β = .41, $p < .05$, while Video Source became non-significant ($p = .39$), suggesting full mediation of the effect. This was confirmed by a significant Sobel test, $z = 2.00$, $p < .05$ (Sobel, 1982).

8. Discussion

Once again, the results related to Hypothesis 1 were mixed. Participants were significantly more likely to forward the Disgusting and Angry videos when compared with the Control. However, NA continued its significant, negative relationship to forwarding. In effort to reconcile this paradox, we examined the PANAS subscales
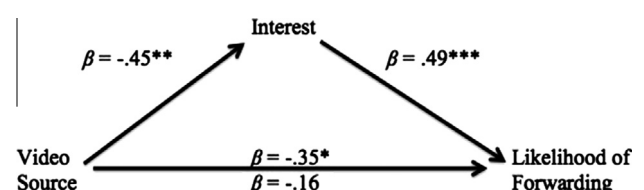

Fig. 1. Mediation analysis of the effect of video source on likelihood of forwarding (Study 2). Note: *$p < .10$, **$p < .05$, ***$p < .01$

across video conditions and found that the Angry and Disgusting videos actually produced higher Interest and Activation (two sub-scales associated with PA) when compared to the Control video. In fact, the Angry and Disgusting videos produced the highest overall Activation scores. When breaking down the components of Activation ("*active*," "*alert*," "*attentive*," and "*inspired*"), we found that, with the exception of "*inspired*," the components seem to indicate a diffuse arousal, as opposed to positively valenced arousal. As a result, this may indicate an "arousal hierarchy" in terms of video content: videos evoking positive emotion are most likely to be forwarded, videos evoking diffuse arousal are more likely to be forwarded than negatively arousing or non-emotional videos, and videos evoking negative emotion are more likely to be forwarded than non-emotional videos.

Once again, Hypothesis 2 was supported. Participants rated the Funny video as the one they would most likely forward, PA was a significant, positive predictor of forwarding, and when all the PANAS subscales were included as predictors, only Joy remained significant.

The results showed little support for Hypothesis 3. Video Source did not impact Likelihood of Forwarding, with one intriguing exception: the Angry video was more likely to be forwarded when sent from an out-group member. This finding was only marginally significant, but warranted an exploratory path analysis since the analysis of the PANAS scores produced a significant parallel finding. Specifically, participants showed more interest in the Angry video when it came from an out-group member than an in-group member. Although participants found the video upsetting regardless of source (based on Upset and Afraid scores), when it came from an out-group member, they also found it interesting. Perhaps this video (which not only induced anger, but also disgust) reinforced the individual's derogatory stereotype of people who attend the rival university, and the participants considered forwarding it onto likeminded individuals who would have the same reaction, reinforcing in-group solidarity. This explanation would fall in line with the Emotional Selection Hypothesis (Peters & Kashima, 2007).

Although this discussion of the role of Video Source currently amounts to little more than speculation, it does raise another important point about the targets of our forwarding efforts: one may base a global decision to forward a video on different factors than a decision to forward a video to a specific individual. That is, although we may not forward upsetting videos to a general audience, we might send it to a specific person if it reinforces an existing, shared attitude of importance (e.g., a political or religious message). For instance, a recent report indicates that militia groups have tripled in number since 2008 (Guarino, 2010), and according to Mark Potok of the Southern Poverty Law Center:

> ... social networking sites have become really where the action is on the radical right, as well as the more kind of center-right. You know, these sites have been very, very effective in moving forward the movement in general. You know, it's remarkable to see. For instance, to go back to the Hutaree militia, the very large number of videos that they produced on YouTube, if you went to their Face-book page, you would see that they had, you know, 366, quote-unquote, "friends" and that these friends were real—they were all the other well-known militias, basically, in the country. So it gives you a sense of, you know, how easily these groups are able to merge with each other, to talk with one another, and to gin up the anger that is out there (Democracy Now, 2010).

Similarly, Wallsten (2011) found that political bloggers prefer posting videos that are not only ideologically consistent with their existing philosophy but disparaging to opposing politicians. Thus, while understanding and studying memes with a negative emotional valence may be more complex than memes with a positive emotional valence, it may be no less socially relevant.

9. General discussion

Consistent with emerging theory and research on affect, these results highlight the idea that not all positive and negative emotions are alike (Gable & Harmon-Jones, 2010). Thus, only content that generates stronger affective responses are likely to spread as a viral video. In addition, since the people to whom we are forwarding the information are likely friends and acquaintances, we are more likely to forward positively-valenced information because we want our friends to experience the same vicarious pleasure that we did (Peters & Kashima, 2007).

These results also support the theoretical framework presented by Guadagno et al. (2010) on the role of contagion in the spread of Internet memes. Specifically, contagion may be more likely online due to the ease with which information can be transmitted between individuals. Sharing information with twenty friends in order to increase group solidarity and engage in a shared emotion is easier and faster online. By forwarding a single email, an individual can simultaneously share information with countless others. Accomplishing a similar feat offline would require substantially greater resources and time. Thus, while the Internet itself may not motivate the spread of Internet memes, the ease with which it enables individuals to spread them may exacerbate the extent to which memes propagate online.

9.1. Limitations and future research

Using a largely young, Caucasian, undergraduate subject pool limits the generalizability of these findings to other populations. This is a population that this research team has used repeatedly for research on Internet behavior (e.g., Amichai-Hamburger, 2005; Guadagno, Okdie, & Kruse, 2012; Muscanell & Guadagno, 2012; Ok-die, Guadagno, Rempala, & Eno, 2011). Given that marked differences exist in Internet use among different aged users (e.g., the greater propensity among college-aged adults for watching online videos, particularly humorous videos; Purcell, 2010), future research should assess whether older and younger populations demonstrate similar behavior intentions to forward Internet videos as a function of emotional contagion. Similarly, our sample was culturally homogenous. Culture may dictate different behavioral reactions to affective responses. For example, if people in collectivist cultures are less likely to display affect than people in individualist cultures (e.g., Matsumoto, Yoo, Hirayama, & Petrova, 2005), does this make them less likely to forward videos that engender affect?

In addition, more care should be taken in the future to make certain that participants had not previously watched the stimulus videos. We attempted to curtail this by choosing dated videos and found no significant differences on the variables of interest, but a more systematic process for selecting the videos would be preferable.

As mentioned previously, one must remain guarded in extrapolating results from a few specific videos to a general category of affect-eliciting stimuli. Those videos may have possessed specific characteristics, independent of the affect they induced, that led to the preference of forwarding. Also, a few of the videos may not have been ideal for the category. One necessary future step would be to find an anger-inducing video that did not also engender moral disgust and see if the results replicate. Finally, it might be worthwhile to find affect-neutral, yet still interesting videos to compare with the positively or negatively valenced videos, rather than videos about cross-stitching and basket-weaving, videos that college students would probably not even watch, much less forward to their friends.

Study 2 briefly examined the impact of video source on the participants, but future research should also take into account

the target of the forwarded video. Who do we forward these videos to? Would we forward an anger-inducing video to the same person we would forward a humorous video? Do videos involving complex issues subject to alternative interpretations require shared perception on the part of the sender and the receiver? All of these issues are potentially rich areas for exploration.

Furthermore, both Wallsten (2010) and Nahon et al. (2011) make it clear that the relation between viral videos and blogs, especially ones with a high readership, also needs to be further examined. At this time, there is little know about who watches videos promoted on these popular blogs and about which viewers spread the videos. Future research should examine both of these questions. Additionally, rather than using exclusively experimental designs, another way of tracking the dissemination of videos of varying emotional content could be using the meme-tracking method developed by Leskovec, Backstrom, and Kleinberg (2009). Specifically, we could categorize the emotional content of a video soon after its introduction and track the extent of its dissemination.

Finally, we speculated as to *why* participants preferred to forward positively valenced videos, but these studies neglected to actually test that motivation. Future research should test whether individuals actually are motivated by a desire for in-group solidarity and whether forwarding videos actually produces that effect.

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