

Storming the Servers: A Social Psychological Analysis of the First Internet War

Rosanna E. Guadagno, Ph.D.,¹ Robert B. Cialdini, Ph.D.,² and Gadi Evron³

Abstract

In April 2007, the First Internet War began. Owing to the relocation of a World War II-era Soviet war memorial in Estonia, angry protestors, primarily of Russian descent, engaged in a month-long series of coordinated online attacks on Estonia's Internet infrastructure that disabled it for several days. We analyze this real-world event from a social psychological perspective. Specifically, we review the details surrounding the event and examine why protest manifested in this form of online attack and discuss how it was successfully orchestrated from a framework provided by social psychology, the science of human social interaction. We argue that the psychological principles of loss, relative anonymity of online interaction, group membership and adherence to group norms, social validation, and contagion all contributed to the success of the attacks.

Introduction

IMAGINE A DAY without the Internet: no e-mail; no Web surfing; no instant messaging; no blogging; no forum posting; no online news, banking, auctions, or shopping. What if that day stretched into days? Would you be able to effectively manage your life? Perform your job? Keep in touch with friends and family? Feel connected to the world? For many people, particularly the citizens of Estonia, the answer to these questions is no. This may sound like a horrible nightmare or the plot of a science fiction movie, but it actually happened in Estonia, a Baltic nation in Northeastern Europe that is known, among other things, for being a leader in technology use and therefore heavily reliant on its Internet infrastructure for day-to-day living.

Overview of the Incident

On April 26 2007, violence erupted in Estonia in response to a plan from Estonian authorities to move a bronze statue of a Soviet soldier—a World War II-era memorial for the Unknown Soldier (see Fig. 1)—along with the graves of fallen Soviet soldiers from a central location in the capital city of Tallinn to a military graveyard outside the city. The ensuing reaction against the relocation of this statue manifested in protestors waving the Soviet flag, rioting and looting, the boycott of Estonian products in Russian stores, and a month-

long series of coordinated attacks on Estonia's Internet.¹⁻⁴ These attacks shut down Web sites belonging to Estonia's president, prime minister, parliament, government agencies, banks, and news agencies.

Protesters used a form of attack called a distributed denial of service attack (DDoS): the repeated transmission of data to a specific Web site so dense that it disables the targeted Web site or makes access to it difficult. The attacks were costly for Estonia: for example, one bank reported a loss of at least \$1 million; members of the Estonian parliament went without e-mail for several days; Estonians traveling abroad could not access their bank accounts online. While there were no physical injuries or deaths in this war, the financial and productivity losses were high, especially given that Estonians are extremely reliant on the Internet for services ranging from voting to banking (e.g., most banking transactions in Estonia are conducted solely online) to parent-teacher conferences.^{2,3} The attacks could have been catastrophic.

To facilitate participation in the Internet attacks on Estonia, easy-to-understand step-by-step instructions enabling even novices to take part spread rapidly throughout the Russian-language Internet. The same instructions or variations thereof were posted on blogs and message boards by different people who typically were longstanding members of a particular online community.⁶ Instructions were often paired with statements aimed at empowering the individual to make a difference, such as: "You do not agree with

¹Department of Psychology, University of Alabama, Tuscaloosa, Alabama.

²Department of Psychology and Marketing, Arizona State University, Tempe, Arizona.

³The Yuval Ne'eman Tel Aviv Workshop for Science, Technology and Security, The Harold Hartog School of Government & Policy, Tel-Aviv University, Tel-Aviv, Israel.



FIG. 1. The statue commemorating the unknown Soviet soldier from World War II whose relocation served as the catalyst for the attacks on Estonia's Internet infrastructure.

the policy of eSStonia [sic]??? You may think you have no influence in the situation??? You CAN have it on the Internet."¹ As the attacks continued over the course of days, more and more messages with instructions were posted, and more and more people started participating in the attacks. As participation in the attacks increased, so did the technological sophistication of the attacks (possibly as a reaction to attempts by the Estonians to defend their Internet infrastructure).²

Who were the individuals engaging in the attacks against Estonia's Internet infrastructure? Why did they select this form of retaliation? Why was it so successful? We address these questions from the framework of social psychology in our examination of the social psychological aspects of this incident, which has been called the First Internet War or Web War One.^{1,2} Although there are other documented incidents of online attacks on both individuals and organizations, the Estonian incident is considered as the First Internet war because it is the first documented example of a series of coordinated attacks that successfully incapacitated the online infrastructure of a nation for several days, and we use terminology that is consistent with other work on the subject.¹⁻³

We first review the relevant historical and political climate in Estonia, then review the social psychological literature that can explain why the Internet war against Estonia was so successful. We conclude with a discussion of the implications of this incident in practical terms (i.e., the potential use of the

Internet as a medium for future attacks) and in terms of social psychological theory and research.

Historical Background

To fully understand the social dynamics that led up to the First Internet War, more information on Estonia is in order. Prior to regaining its independence in 1991, Estonia was occupied by Russia and the Soviet Union for most of the 20th century. During World War II, Estonia was briefly occupied by Germany until the Soviet army reclaimed it.⁵ The statue whose relocation was the catalyst for the First Internet War was erected as a memorial to Soviet soldiers who fell during the reoccupation of Estonia during World War II. Around the same time that the statue was erected, the Soviet secret police began deporting Estonians to Siberia, so many ethnic Estonians see this statue as a symbol of Soviet oppression.¹ Estonia regained its independence when the Soviet Union dissolved in 1991. It is currently a parliamentary democracy and a member of the European Union and NATO.

Only 60% of Estonia's citizens are ethnic Estonians, and most of the remaining citizens are from other provinces of the former Soviet Union, the majority of which are ethnic Russians.^{1,5} Owing to the historical events and demographics outlined here, it is not surprising to discover that Estonians of Russian descent would feel some ownership of Estonia and perceive the removal of the statue as an insult and a sign of disrespect. Based on the information available about the spread of instructions to attack and increasing participation in the attacks, it appears that the incident started as a grassroots movement promoted by individuals who were incensed about the statue's removal. Furthermore, existing evidence indicates that Estonians of Russian descent along with Russians living elsewhere were active participants in the Internet attacks.^{1-3,6}

Social Psychological Analysis of the Incident

From a social psychological perspective, we analyze why the Russian protestors attacked the Estonian Internet infrastructure. We argue that Russians, both residing in and outside of Estonia, perceived the removal of the statue as an insult and sign of disrespect, and they quickly mobilized an online response to this insult that took the form of the attacks on Estonian Internet infrastructure. Specifically, we believe that the psychological principles of loss, the relative anonymity of online interaction, group membership and adherence to group norms, social validation, and contagion all contributed to the success of the attacks. We selected these processes because we believe they are the most important components necessary to understand the social dynamics that both produced the Internet attacks as a response to the statue's relocation and facilitated the escalation of attacks as news of their success grew.

Loss

From the change in the balance of power as Estonia gained independence after the fall of the Soviet Union, we posit that Estonia's ethnic Russian minority reacted to the removal of the war memorial as a symbolic statement of their loss in status. Loss—having something taken away—has been shown to be especially powerful in human responding⁷⁻⁹ and has historically been at the root of many social and political uprisings.^{10,11} Specifically, according to prospect theory,^{7,9}

individuals make different decisions when their options are presented as gains versus losses such that losses are perceived as costlier than gains. Empirical examinations of this *loss aversion*—wherein people attempt to avoid experiencing loss—reveal that individuals are often unwilling to give up things that they possess and they will value such possessions more highly than markets would dictate.⁸ As such, individuals experience losses as more intensely unpleasant relative to the pleasure they would experience from commensurate gains.¹²

One such study illustrating loss aversion demonstrated this by giving participants either a lottery ticket or \$2. Shortly after this gift, participants were offered the opportunity to trade in their ticket or cash for the other item. Results indicated that few participants wanted to trade in their gift for the other item and they reported liking their gift better.¹³ Other research on loss aversion has reported similar findings on the unwillingness of individuals to give up that which they already own. For instance, one study reported that perceived ownership moderated the initial offers made by participants in a negotiation paradigm.¹⁴ Participants who were given more ownership by being asked to give their chips to another participant made lower initial offers than participants who were instructed to allow the other participant to take chips. Additionally, Thaler¹⁵ argued that the reason companies that charge different prices for cash purchases than for credit card purchases refer to this discrepancy as a “cash discount” instead of a credit card surplus charge is that perceivers view the discount as a gain and the surcharge a loss. Another study illustrated that perceivers judged a 7% cut in real wages as fairer when it was presented as 5% salary increases with 12% inflation than when it was presented as a 7% decrease in salary when both options are monetarily identical.⁸ Research on loss also indicates that when information is perceived as a loss, individuals are more likely to engage in unethical behavior.¹⁶

Davies^{10,11} argued that the most likely time for revolt is under conditions of loss. He examined numerous uprisings and found that people were most likely to revolt when individuals were once prosperous and lost some of their freedoms. Davies called this tendency to rebel after loss the J-curve theory of social upheaval. For instance, historical evidence indicates that the economic conditions in the colonies just prior to the American Revolution were prosperous as measured by a high standard of living and low taxes. It was when the British threatened American prosperity by raising taxes that Americans protested and the American Revolution began.¹⁷ Similar economic conditions were present at the start of the civil rights movement in the 1960s. Specifically, Davies^{10,11} reviewed data indicating that after nearly 20 years of progress toward equality made by legislation that improved housing, education, employment, and incomes for African American families, social change was harder to implement than a change in the laws. As schools became integrated, there was an increase in aggression against African Americans. The salary gains made in prior years started to slip. Davies argues, that the hard-earned freedoms started becoming once again restricted, is what led to incidents that started the civil rights movement in the United States. Additional evidence for the J-curve theory of social upheaval occurred shortly before the fall of the Soviet Union. Then Soviet Chairman Mikhail Gorbachev was arrested by members of the KGB as a response to the increasing freedoms that Gor-

bachev was granting Soviet citizens. The traditionally passive citizens of the Soviet Union responded to Gorbachev’s arrest by crowding into the streets in protest and rejecting military rule. Gorbachev was soon released by the KGB operatives who had staged the coup.¹⁸

Overall, these historical examples support the J-curve theory of social upheaval^{10,11} by illustrating that individuals find things more desirable when they lose their ability to obtain them. This phenomenon is also exemplified by research on parenting styles. That indicates that rebellious children are usually the product of parents who are inconsistent in their discipline style.^{19,20}

Applied to the attacks on Estonia’s Internet infrastructure, the literature on loss and social upheaval suggests that the ethnic Russian minority in Estonia may have perceived the removal of the statue as one final indication of the loss of Estonia as part of the Soviet Union, and this may have also reflected the loss of Russian power over its former provinces. That the statue served as a regular meeting ground for Russian Estonians who perceived injustices by the Estonian government is also relevant.²¹ And, as the relevant theories suggest, loss under such circumstances increases the probability of an uprising. This is indeed what may have happened in terms of both the riots in Tallinn and the attacks on Estonia’s Internet infrastructure, which succeeded in part because of widespread participation of members of the Russian-language Internet. The fact that individuals online were more incensed about the relocation of the statue than of the graves of fallen Russian soldiers supports the notion that individuals were reacting to the symbolic loss that moving the statue to a site outside the city represented.

Anonymity online

Another important aspect of the attacks on Estonia’s Internet infrastructure is that it took place *online* (i.e., over the Internet). Participants in the attacks both transmitted instructions on how to participate and took part in the DDoS attacks themselves from the privacy of their offices, Internet cafés, and homes. One of the many ways in which communication via the Internet differs from face-to-face communication is the relative anonymity afforded by the communication mode.²² When interacting online, individuals’ readily visible characteristics, such as their appearance, are not their most salient features. They may choose what others know about them—name, age, appearance, sex, and many other pieces of information can be concealed or revealed (or misrepresented) at will. For instance, if an individual chooses a username such as “Lovescats” while interacting online, she will be anonymous unless someone goes through unusual lengths to find out who she is or she chooses to reveal more details of her identity. The ability to be completely anonymous while in cyberspace has been related to a decrease in self-focus on internal standards for behavior.^{23–25}

The anonymity afforded by online interaction may explain why individuals are far more likely to engage in aggressive behavior, such as “flaming” or making rude or derogatory statements to others, during a computer-mediated interaction than in a face-to-face interaction.²⁶ Regardless of the level of anonymity associated with a chosen online identity, research on anonymity in computer-mediated communication indicates that individuals experience a sense of depersonalization

when interacting with others who are not physically present.²⁷ Anonymity and the resulting depersonalization in this context can lead to deindividuation, which decreases the impact of an individual's internal standards for behavior and increases the salience of situational cues. It follows that the relative anonymity afforded by communication via the Internet makes people more likely to engage in behavior that is atypical for them but consistent with norms established by the behavior of others.²⁸

Thus, when interacting with others online, an individual can create an e-mail address or message board identity that matches his or her real name or is completely unrelated or even deliberately misleading and can choose to provide as much or as little accurate or fabricated personal information as he or she desires. Anonymity may have facilitated the transmission of instructions on how to participate in the attacks and increased people's comfort with joining in. Individuals may have perceived this as an opportunity to engage in an aggressive act without any accountability as a result of their relative anonymity.

Group membership and adherence to group norms

In conjunction with the effects of anonymity, a social norm concerning participation in the attacks emerged as more individuals began to participate in the attacks. Research on social validation—a phenomenon wherein people are more likely to engage in a behavior if they see others doing it—indicates that as more people engage in a behavior, the more observers receive the information that the behavior in question is normative.²⁹ This suggests that as more members of the Russian-language Internet posted messages about their participation in the attacks and urged others to join, a norm emerged that participation was the appropriate course of action.

Existing evidence indicates that the individual participants of the attacks against Estonia's cyber infrastructure were ethnic Russians, some of whom were living in Estonia.^{1-3,6} Research indicates that one of the factors that determine whether an individual will adhere to the descriptive norms of a group is the perceived importance of that group to the individual.³⁰⁻³² The work of Terry et al. indicated that perception of ingroup descriptive norms for recycling predicted recycling behavior (either pro vs. con) but only for individuals who were highly identified with their reference group.³² These results were demonstrated with ingroup norms for exercise and sunscreen use but, again, only for individuals who were highly identified with the ingroups.

Similar findings have been observed in computer-mediated interactions. The above analysis is consistent with the social identity mode of deindividuation effects (SIDE),³³⁻³⁴ which proposes that under conditions of anonymity, individuals may shift their focus from themselves to their group memberships (e.g., Russian vs. Greg) and that this shift can also focus them on group rather than individual concerns. Research on the SIDE model illustrates that under conditions of anonymity, individuals are more likely to behave in a manner consistent with the salient group norm. One such study indicated that participants who interacted with group members anonymously via computer-mediated communication were significantly more likely to make decisions consistent with a primed group norm than were participants who saw their group members' pictures.³⁵

Thus, the research on group membership and adherence to group norms in both online and offline contexts suggests that participation in the attacks against Estonia's Internet infrastructure was high among individuals of Russian descent for whom membership in this group was important and that the anonymity afforded by online communication strengthened adherence to the salient group norm on the Russian-language Internet: to participate in the attack on Estonian Internet infrastructure and to spread the instructions on participation. Few individuals on the various Russian-language message boards openly expressed their disapproval of this action, but many posters responded to calls for participation by posting a message expressing their anger and/or indicating that they were participating.⁶

Contagion and social validation

Since participation in the attacks increased as their success was publicized by blog and message board postings, we have inferred that a social norm formed indicating that most Russian-language Internet users were participating in or endorsing the attacks. One aspect of the success of the attacks against Estonia's Internet infrastructure that we have not yet addressed is the rapid spread of the instructions for participation in the attacks as a contributing factor to the success of the attackers. The information spread as a form of contagion—a rapid communication of influential information. Contagion, which has been the cause of a variety of sprees, manias, and panics throughout history,³⁶ is another component of social validation.²⁹

When people see others engaging in an action, they begin to perceive these behaviors as valid, particularly as the number of those acting the same way increases. One specialized case of social validation is mass hysteria. When mass hysteria occurs, the social validation information people receive indicates that acts that would ordinarily be perceived as irrational are instead perceived as the correct course of action.

We posit that information on how to participate in the attacks spread much as various panics, manias, and sprees have in times past. Charles MacKay³⁶ recounted many such instances in his book on the "madness of crowds." One characteristic each example of mass hysteria had in common was contagiousness. An individual or group would adopt a new behavior or belief and then it would rapidly spread. Examples of this kind of mass hysteria can be found throughout history. For instance, MacKay³⁶ presents the tulip frenzy that started in 1559. The price of tulips gradually increased over the course of years, and ownership of a tulip garden became a sign of good taste among wealthy Europeans. Eventually, the rage for tulips spread to members of the middle class, the price of tulips skyrocketed, and tulips became scarce. Eventually, the tulip craze ended, although not before fortunes were lost in the pursuit of the flower.

Other research on contagion provides empirical evidence for contagion via peer influence in various kinds of undesirable behavior. One study reported that college students' estimates of the likelihood that they would engage in minor moral and ethical violations (downloading copyrighted files from the Internet, parking in a no parking zone, etc.) varied as a function of how common they believed the violation to be among college students in general.³⁷ Other work indicates that among adolescents, materialistic values and compulsive

buying behavior are influenced by perceptions of normative shopping behavior among their peers.³⁸ Evidence also shows that adolescent eating disordered behaviors and adult smoking prevalence and cessation rates are impacted by the extent to which other members an individual's peer group engage in the behavior.³⁹⁻⁴⁰

Contagion may also explain why the protest of the statue's removal spread from unlawful rioting and looting in the streets of Tallinn to unlawful protest online in the form of the attacks on Estonia's Internet infrastructure. There is evidence that legal violations spread not just across populations but also across types of violations. That is, particular kinds of criminal activity may stimulate other kinds of criminal activity in observers. This was illustrated by a series of studies demonstrating that individuals are more likely to engage in unlawful behavior when they are in a disordered environment.⁴¹ Across six studies, the authors examined unlawful behavior in the form of littering, theft, and trespassing and found that participants were more likely to engage in this behavior when the environment was disordered with litter or graffiti or contained cues that other individuals were not following the rules.

Online communication can facilitate contagion because of the rapidity and broad reach of transmission. Contagious beliefs have also been called *Internet memes* after Richard Dawkins⁴² introduced the concept of a meme as a self-propagating idea. Knobel and Lankshear⁴³ documented many recent Internet memes, most of which are humorous, or created by pranksters or fans, or are focused on social commentary. For instance, a photograph of the *Sesame Street* character Bert was added to the background of a picture of Osama Bin Laden. The image was uploaded to a Web site on photograph editing. It was then used in signs at a rally supporting Osama Bin Laden in Bangladesh. Once photographs of protestors carrying signs with pictures of Bert and Osama Bin Laden, appeared a "Bert is Evil" meme formed and new images of Bert emerged showing Bert engaged in a wide variety of evil acts.

Research on the spread of a different kind of meme, the urban legend, indicates that individuals are more likely to spread urban legends that evoke an emotional response. In three studies, Heath et al.⁴⁴ examined the transmission of urban legends. Their first study revealed that people were more likely to pass on the story if the story evoked interest, surprise, or disgust. Stories that were plausible, had simple plots, and were realistic were also more likely to be spread. The researchers conducted a second study in which they varied the emotional intensity of the urban legend in terms of disgust and found that the legends that evoked the highest levels of disgust were more likely to be passed on to others. Finally, a third study examined the transmission of urban legends on Web sites and found again that urban legends most likely to produce a disgust reaction were also most likely to spread. Thus, the results of this research suggest that memes with an emotional component are likely to be more contagious.

The research reviewed here suggests that contagion played a role in the First Internet War. It suggests that the rioting and looting in the streets of Tallinn may have spread to online protests, and no matter the source of the initial call for participation in the online attacks, this call spread quickly throughout the Russian-language Internet. As word of the success of the attacks spread online, further calls for participation and instructions on how to participate rapidly prop-

agated throughout the Russian-language Internet until participation was perceived by members of this group as the normative behavior among their peers. Furthermore, the emotional reaction in terms of what the relocation of the statue symbolized to Russians, both Estonian and foreign, may have accelerated the spread of this meme.

Discussion and Implications

Eventually, the Estonians, under the leadership of the Estonian Computer Emergency Response Team (CERT), with the help of computer security experts worldwide, were able to mount a defense against the attacks. Over time, the contagion slowed and the number of attacks decreased and eventually stopped.²⁻³ Based on the social psychological literature reviewed here, we argue that several factors contributed to the success of these attacks. The relocation of the statue was a catalyst for the incident because the relocation was symbolic of the loss of stature and a sign of disrespect for ethnic Russians in Estonia since the fall of the Soviet Union. Social validation was also relevant to the success of the attacks as members of the Russian-language Internet read messages encouraging participation and touting the success of the attacks from members of their ingroup. Participation in the attacks and spread of the message were also fueled by the relative anonymity of online communication, which can influence individuals to behave in a manner consistent with group norms and to become aggressive due to deindividuation. Finally, like most Internet memes, the message spread rapidly through the process of contagion.

These processes did not necessarily function alone but together produced the outcome of the incident in Estonia. Of particular note, the relative anonymity afforded by online social interaction and the corresponding deindividuation processes that occur under these circumstances increase the likelihood of spontaneously organized, mass antisocial acts such as the First Internet War, particularly under conditions of loss. Additionally, the social validation and contagion processes that helped spread information about and recruit individuals to participate in the attacks along with their peer group may also increase the likelihood of future Internet wars as a normative reaction to an upheaval, particularly among individuals who are highly identified with their ingroups. In an illustration of this last point, the 2008 Russian-Georgian conflict played out both online and offline, and some view the online attacks on Georgian Internet infrastructure as a replication of what transpired in Estonia.⁴⁵ It is conceivable that similar acts could occur between rivals and competitors in domains other than international affairs. Therefore, psychologists (as well as security experts, computer scientists, and defense planners) should be aware of the conditions under which such events are likely to occur.

There is speculation that the attacks against Estonia's Internet infrastructure did not originate as a spontaneous reaction to the relocation of the Soviet war memorial in Tallinn but that the Russian government was behind the attacks.¹ More recent news indicates that members of the Kremlin-backed youth group Nashi have claimed credit for some of the attacks.⁴⁶ However, from a psychological perspective, it is not the origin but the spread of participation that is most interesting. That is, regardless of whether the calls to participate in the attacks were planted by operatives of the Russian

government or started as a grassroots movement, the outcome would not have changed. Specifically, what made individuals decide to participate in such large numbers that they succeeded in overwhelming the Internet infrastructure of a nation is the question we have addressed and that should be examined empirically so that future incidents can be better understood from a psychological perspective.

Disclosure Statement

No competing financial interests exist.

References

- Davis J. (2007, Aug. 21) Hackers take down the most wired country in Europe. *Wired Magazine*. www.wired.com/print/politics/security/magazine/15-09/ff_estonia (accessed Feb. 3, 2009).
- Evron G. Battling botnets and online mobs. *Georgetown Journal of International Affairs* 2008; Winter/Spring:121–6.
- Landler M, Markoff J. (2007, May 29) Digital fears emerge after data siege in Estonia. *New York Times*. www.nytimes.com/2007/05/29/technology/29estonia.html (accessed Aug. 12, 2008).
- Peach G. (2008, April 22) Tiny Estonia still suffering from Russia's pinch a year after Soviet monument row. *International Herald Tribune*. www.iht.com/bin/printfriendly.php?id=12227088 (accessed Oct. 21, 2008).
- Estonia. (2008). *Encyclopedia Britannica Online*. <http://search.eb.com/eb/article-9109851> (accessed Aug. 24, 2008).
- Guadagno RE. (2008) [Userid information on individuals who spread the message to join the attacks on Estonian Internet Infrastructure]. Unpublished data.
- Kahneman D, Tversky A. Prospect theory: an analysis of decision under risk. *Econometrica* 1979; 263–92.
- Kahneman D, Knetsch JL, Thaler RH. Anomalies: the endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives* 1991; 5:193–206.
- Tversky A, Kahneman D. Advances in prospect theory: cumulative representation of uncertainty. *Journal of Risk & Uncertainty* 1992; 5:297–323.
- Davies JC. Toward a theory of revolution. *American Sociological Review* 1962; 27:5–19.
- Davies JC. (1969) The J-curve of rising and declining satisfactions as a cause of some great revolutions and a contained rebellion. In Graham HD, Gurr TR, eds. *Violence in America*. New York: Signet Books.
- Kahneman D, Tversky A. Choices, values, and frames. *American Psychologist* 1984; 39:341–50.
- Knetsch JL, Sinden JA. Willingness to pay and compensation demanded: experimental evidence of an unexpected disparity in measures of value. *The Quarterly Journal of Economics* 1984; 99:507–21.
- Leliveld MC, Van Dijk E, Van Beest I. Initial ownership in bargaining: introducing the giving, splitting, and taking ultimatum bargaining game. *Personality & Social Psychology Bulletin* 2008; 34:1214–25.
- Thaler R. Toward a positive theory of consumer choice. *Journal of Economic Behavior & Organization* 1980; 1:39–60.
- Kern MC, Chugh D. Bounded ethicality: the perils of loss framing. *Psychological Science* 2009; 20:378–84.
- Fleming T. 13 things you never knew about the American Revolution. *Parade* 1997 (Nov. 23):14–15.
- Morrow L. The Russian revolution. *Time* 1991 (Sept. 2): 20.
- Lytton J. Correlates of compliance and the rudiments of conscience in two-year-old boys. *Canadian Journal of Behavioral Science* 1979; 9:242–51.
- O'Leary SG. Parental discipline mistakes. *Current Directions in Psychological Science* 1995; 4:11–13.
- Connelly T. (2007, May 11) New Europe—old divisions. *RTÉ News*. www.rte.ie/news/2007/0511/estonia.html (accessed March 11, 2009).
- Bargh JA, McKenna KYA. The Internet and social life. *Annual Review of Psychology* 2004; 55:573–90.
- Joinson AN. Self-disclosure in computer-mediated communication: the role of self-awareness and visual anonymity. *European Journal of Social Psychology* 2001; 31:177–92.
- Matheson K, Zanna MP. Persuasion as a function of self-awareness in computer-mediated communication. *Social Behaviour* 1989; 4:99–111.
- Sassenberg K, Boos M, Rabung S. Attitude change in face-to-face and computer-mediated communication: private self-awareness as mediator and moderator. *European Journal of Social Psychology* 2005; 35:361–74.
- Siegel J, Dubrovsky V, Kiesler S, et al. Group processes in computer-mediated communication. *Organizational Behavior & Human Decision Processes* 1986; 37:157–87.
- Postmes T, Spears R, Lea M. Intergroup differentiation in computer mediated communication: effects of depersonalization. *Group Dynamics* 2002; 6:3–15.
- Zimbardo P. (1970) The human choice: individuation, reasons, and order versus deindividuation, impulse, and chaos. In Arnold WJ, Levine D, eds. *Nebraska symposium on motivation*, vol. 17. Lincoln: University of Nebraska Press, pp. 237–307.
- Cialdini RB. (2001) *Influence: science and practice*, 4th ed. New York: HarperCollins.
- Goldstein NJ, Cialdini RB, Griskevicius V. A room with a viewpoint: using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research* 2008; 35:472–82.
- Terry DJ, Hogg MA. Group norms and the attitude-behavior relationship: a role for group identification. *Personality and Social Psychology Bulletin* 1996; 22:776–93.
- Terry DJ, Hogg MA, White KM. The theory of planned behaviour: self-identity, social identity, and group norms. *British Journal of Social Psychology* 1999; 38:225–44.
- Reicher S, Spears R, Postmes T. (1995) A social identity model of deindividuation phenomena. In Stroebe W, Hewstone M, eds. *European review of social psychology*, vol. 6. Chichester: Wiley.
- Spears R, Lea M. (1992) Social influence and the influence of the social in computer-mediated communication. In Lea M, ed. *Contexts of computer-mediated communication*. Hemel Hempstead: Harvester Wheatsheaf, pp. 30–65.
- Postmes T, Spears R, Sakhel K, de Groot D. Social influence in computer-mediated communication: the effects of anonymity on group behavior. *Personality and Social Psychology Bulletin* 2001; 7:1243–54.
- MacKay C. (1841/1932) *Popular delusions and the madness of crowds*. New York: Farrar, Straus, & Giroux.
- Barnett MA, Sanborn FW, Shane AC. Factors associated with individuals' likelihood of engaging in various minor moral and legal violations. *Basic & Applied Social Psychology* 2005; 27:77–84.
- Roberts JA, Manolis C, Tanner JF Jr. Interpersonal influence and adolescent materialism and compulsive buying. *Social Influence* 2008; 3:114–31.

39. Christakis NA, Fowler JH. The collective dynamics of smoking in a large social network. *New England Journal of Medicine* 2008; 358:2249–58.
40. Forman-Hoffman VL, Cunningham CL. Geographical clustering of eating disordered behaviors in U.S. high school students. *International Journal of Eating Disorders* 2008; 41:209–14.
41. Keizer K, Lindberg S, Steg L. The spreading of disorder. *Science* 2008; 322:1681–85.
42. Dawkins RR. (1976) *The selfish gene*. Oxford: Oxford University Press.
43. Knobel M, Lankshear C. (2007) Online memes, affinities, and cultural production. In Lankshear C, Knobel M, Bigum C, et al., eds. *A new literacies sampler*. New York: Peter Lang Publishing, pp. 199–227.
44. Heath C, Bell C, Sternberg E. Emotional selection in memes: the case of urban legends. *Journal of Personality & Social Psychology* 2001; 81:1028–41.
45. Markoff J. (2008, Aug. 11). Georgia takes a beating in cyberwar with Russia. *New York Times*. <http://bits.blogs.nytimes.com/2008/08/11/georgia-takes-a-beating-in-the-cyberwar-with-russia/?scp=1&sq=georgian%20cyberwar&st=cse> (accessed Sept. 21, 2008).
46. Clover C. (2009, March 11). Kremlin-backed group behind Estonia cyber blitz. *Financial Times*. www.ft.com/cms/s/0/57536d5a-0ddc-11de-8ea3-0000779fd2ac.html?ncklick_check=1 (accessed March 13, 2009).

Address correspondence to:
Dr. Rosanna E. Guadagno
Department of Psychology
University of Alabama
Box 870348
Tuscaloosa, AL 35487-0348
E-mail: rosanna@ua.edu

