"AND LO, WE HAVE CONTACT"

The Influence of Digital Communication Technology on the Research Process

By Nicholas David Bowman and Elizabeth Cohen

"LO..."

This was the first digital message transmitted through computing technology, when two nodes in the ARPANET – the U.S. Department of Defense's Advanced Research Projects Agency Network – attempted to send the text message "LOGIN" from a workstation at the University of California-Los Angeles to another station at Stanford University. After an hour or so of troubleshooting, the computer terminal at Stanford registered the complete "LOGIN" message, and the world's first digital communication technology was operational.

From its inception, a core function of digital communication technologies has been to facilitate the sharing of information – literally for the modern-day Internet, for University-based research scientists to share their data. ARPANET was an initiative from the U.S. Department of Defense to speed up scientific discovery in a day of Space Races, Arms Races and other Cold War pressures, yet the goal of these technologies remains the same today.

We suggest that modern digital communication technologies have the potential to greatly enhance the collection and distribution of scientific data. Moreover, as social scientists – and scholars of communication – we are particularly well-positioned to make use of this new research tool given the phenomenon we study: the creation and exchange of information from one another.

Given the immense popularity of digital communication technology, one apparent use from a research standpoint is the collection of data online. Online data can be collected quickly and inexpensively, often with relatively little inconvenience to respondents – many of whom already "live" online and thus are being reached in an increasingly naturalistic environment.

Web-based survey research opens up a world of quick and usually inexpensive sampling possibilities. Discussion boards, listservs, and social network sites can all be used to recruit study volunteers that in the past may have been difficult to locate. Members of NCA who receive e-mails from the association's listserv, CRTNET, are probably not unfamiliar with such practices. NCA members often use the listserv to request help from fellow members in finding survey participants belonging to special subpopulations.

Online discussion boards can be used for study recruitment in a similar fashion. For instance, posting survey volunteer requests to discussion boards or Facebook groups about television shows have given communication researchers access to different fan communities. In a study from our research group, a survey designed for World of Warcraft players was distributed by cluster sampling from every nth WoW server (each server representing different avatar communities). Online sampling of subpopulations is particularly useful for scholars studying communication practices among stigmatized groups (e.g. teenage mothers, drug users, or people suffering from mental illness), working with online group moderators to earn the trust of group members.

Surveys posted as paid advertisements on social network sites can also be targeted to specific groups. For example, advertisements on Facebook

can be targeted precisely to demographic and special interests groups – as broad as "males" and as specific as "male fans of Elton John and Yuengling Beer who have interest in Morgantown pubs." The advantage of using Facebook to target respondents is that researchers potentially have access to the one of the largest and most socially rich online databases (current estimates suggest that Facebook has no less than 1.01 billion monthly users). Yet, a notable downside is the financial cost, as researchers must bid against companies with much deeper advertising budgets potentially targeting the same audiences. Moreover, advertisers pay per click rather than per completed survey, which means that not every penny spent will result in usable data.

Of course, researchers can forego the financial risk by harnessing the connective power of social network sites like Facebook and Twitter for snowball sampling techniques. Researchers can post surveys using their own accounts (or accounts specifically created for research groups, such as Louisiana State University's Media Effects Lab, or @LSUMediaMEL on Twitter; http://twitter.com/LSUMediaMEL) and use the different social networks to distribute the surveys. Although such a technique might do little to overcome potential problems with snowball sampling techniques such as community biases, using social media-driven snowballing techniques can drastically speed up the distribution process. As well, the mechanics of social networks may work to expose the information to a more diverse set of social groups. Researchers using social snowballing techniques can also request research invitations to be shared with specific criteria by placing them in different pages or groups, tagging them with unique information (e.g., using a Twitter hashtag #videogames to target gamers), or merely stating participation requirements in content posts.

Other web tools are being developed to help researchers identify volunteers in specific subpopulations. For instance, ResearchMatch.org (https://www.researchmatch.org) is a National Institutes of Health-funded website that matches researchers with study volunteers. So far, over 30,000 research volunteers belong to this registry. Provided they first meet certain requirements, researchers can access this pool for free and search for volunteers that have certain health backgrounds. Although this site is designed for health research, its development speaks to the potential for other communication-related pools to be developed.

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Even when no specific subpopulations are of interest, discussion boards can aid researchers in collecting quick data among more general online populations. One study we were involved with posted invitations to participate in the study on 29 different Yahoo Groups pages. To increase diversity, groups were randomly selected from each of 14 main interest areas on the Yahoo site (e.g., Entertainment & Arts, Science, Business and Finance) with links posted to no more than three user groups within each area.

Researchers who wish to conduct an online experiment with a nationally representative population can submit a proposal to Time-Sharing Experiments for the Social Sciences (TESS, www.tessexperiments.org). For those with successful proposals, TESS will conduct web-based experiments for free with their random, probability-based subject pool free of charge.

Online survey services such as SocialSci (https://www.socialsci.com) and SurveyMonkey (https://www.surveymonkey.com) are developing their own subject pools to help researchers obtain both general and more specific samples. These pools usually consist of volunteers who get some sort of incentive for taking surveys such as money, donations to charities, or sweepstakes entries. The prices to access these subject pools vary, but are cheaper when fewer constraints with less specific samples are requested. Amazon.com's Mechanical Turk (MTurk, https://www.mturk.com/mturk/welcome) offers perhaps one of the most affordable subject pool options for researchers. MTurk allows organizations to hire individuals to complete different web-based tasks, such as writing, file sorting and content posting – as well as survey completion. Researchers set the price they are willing to pay respondents for completed surveys, and to get a large sample in a short amount of time researchers should probably expect to spend at least one cent for every minute that a survey is expected to take (i.e., $0.15 for a completed 15-minute survey). Studies on the use of MTurk as a research recruitment service have found it to provide more representative of the general population when compared to other Internet-based samples.

Finally, with the increase in mobile technology use, researchers conducting web-based research should become more concerned with how and where respondents are completing online surveys. Respondents may use mobile devices such as tablets or smartphones to access online information now (including our studies) and to this end, many survey programs such as Checkbox (www.checkbox.com), Qualtrics (https://www.qualtrics.com), and SurveyGizmo (www.surveygizmo.com) use survey software

compatible with most mobile devices.

Mobile technologies also provide new opportunities for collecting data that can enhance retrospective self-report measures that communication researchers commonly rely on. Specifically, the use of mobile devices as data collection tools can allow researchers to capture people's real time experiences, attitudes, and routines. For instance, our team recently conducted an experience sampling study of college students' media use habits using text message surveys. Respondents texted information about any media they were using when prompted throughout a week-long period. Because the students normally carried their cell phones with them, this method helped us collect moment-to-moment information about their media activities. A number of smartphone applications have also been developed to help researchers collect ethnographic information about research participants. Platforms such as Over the Shoulder (http://overtheshoulder.com), the Andriod application MyInsights (https://play.google.com/store/apps/details?id=nl.appcoders.myinsights&hl=en), and the iPad-native Ethnocorder (www.ethnocorder.com) help researchers collect data by capturing pictures, recording consumed media, scanning purchases, and tagging people's geo-location. These technologies hold the promise of giving researchers a more complete picture of the communication processes we study by granting access to the process in the moment.

Tenure and promotion decisions are largely rooted in ability to make meaningful contributions to the academy and in this vein we often save the sharing of our research results for journal publications where it "counts" most. Yet, most all of us recognize that much of the conceptual and theoretical heavy lifting comes not from perusing journal articles, but from engaging in conference discussions and – for many of us – talking with colleagues over a morning coffee or evening beer.

Discussing preliminary research ideas through blogging and sharing has the potential to help us identify and address areas of strength and weakness in our scholarship. For example, our research team has first-hand experience of this with the use of the blog *On Media Theory...* (http://onmediatheory.blogspot.com). Since launching as a graduate school project in 2006, the blog has received over 250,000 individual page hits across nearly 200 individual research and theory posts from dozens of colleagues. The use of blogs to publically incubate research ideas exposes our earliest conceptual research development to our peers – relying on the mechanics of crowdsourcing to expose ourselves and our thoughts to our contemporaries. This might sound equally daunting and terrifying on first pass, yet such a system of open-source research (and open-source thinking) forces us to write and craft our ideas before sharing, reading and responding to criticisms of the same. Rarely in our work are we able to expose colleagues to the thinking behind our theory, and open-access blog systems might prove to be a valuable step in this direction.

For sharing completed work, websites such as Academia.edu (http://academia.edu), ResearchGate (www.researchgate.net), and Mendeley (www.mendeley.com) provide convenient and increasingly robust methods of sharing research presentations and reports – everything from unpublished laboratory notes to peer-reviewed journal articles. While

issues of copyright and knowledge ownership are still vague for some of these services, many researchers have chosen to share research documents with the larger academic community – benefitting from increased exposure through paper downloads, increased citations and increased conversations and collaborations with like-minded colleagues. In addition to these academic-themed services, subscription services such as SlideShare.net (www.slideshare.net) can be used to share conference presentation and colloquia content (e.g., WVU's Department of Communication Studies SlideShare, www.slideshare.net/bowmanspartan1). All of these platforms, as with most social media programs, give feedback such as page views and document download statistics.

An emerging platform for managing and tracking academic citations is Google Scholar (http://scholar.google.com). Although Google's scholarship-specific search engine has been in operation since 2004, recent additions to Google Scholar now include scholarship profiles that automatically populate with any articles authored or co-authored by an individual as they appear in Google Scholar searches. In addition to links to articles and other documents, the program also collects information on the number of times a given articles has been cited (by other articles appearing in Google Scholar searches) and even provides basic citation indices for individual authors, such as a cumulative citations count and an h-index, or "the largest number h such that h publications have at least h citations." Anne-Wil Harzing's popular Publish or Perish citation management software (www.harzing.com/pop.htm) draws its data from Google Scholar searches. Notably, while academics cannot directly alter or edit their Google Scholar search results (that is, without publishing or otherwise posting and sharing their research online), they can make use of scholarship profiles by creating and sharing them through other social media platforms (e.g., linking one's Google Scholar profile to their Twitter or Facebook page, or through their University profile page).

An August 2012 article in *The Chronicle of Higher Education* (www.chronicle.com/article/Social-Networks-for-Academics/131726) quoted one scientist as referring to the sites mentioned above as "social networks for nerds" – which also suggests that even the social networks du jour such as Facebook and Twitter might serve a similar function. Indeed, many scholarly organizations such as NCA's Mass Communication Division (https://www.facebook.com/groups/NCAMCD) and the journal *Media Psychology* (https://www.facebook.com/MediaPsychology) have created Facebook pages to discussion trends and publications related to the study of media, and NCA has launched its own Twitter account (@NatComm, https://twitter.com/NatComm) to share information about the organization and its members.

The research process involves a pairing of concept and operation: finding the right tools to answer the burning questions that drive our scholarly interests. For the study of human communication – the art and science of stimulating meaning in the mind of others – we suggest digital communication technology to be an increasingly integral component of the communication research process. Digital communication technologies can be harnessed to collect and distribute data more specifically and more quickly, and they can facilitate communication among researchers leaving the field as a whole more well-informed.

Moving forward, research on the influence of digital communication technologies on the quality of our research is greatly needed. At the same time, we suggest that their usage in the research should not be dismissed but rather analyzed and considered in comparison with alternatives. As with all research tools, there are strengths and limitations and digital communication technology is no different in this regard – after all, the first digital message was only 40% effective in stating its point. Yet, rather than shoot the process down as being flawed, we should continue to study and troubleshoot it so that the entire message can be received in its highest fidelity. ■

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Cohen's work focuses on the "the bright side" of media uses and effects, or the prosocial outcomes of involvement with media and technology. Her research has recently appeared in *Journal of Media & Electronic Broadcasting; Health Communication;* and *Howard Journal of Communications.* She recently served as an editorial assistant with *Media Psychology.*