

“Friend Me”: The Impacts of Technology on Human Interaction

By

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Abstract

In the past thirty years humanity has moved into a digital era where billions of people are connected via an ever advancing technology boom. Technological growth has led to changes in the ways in which humans communicate with one another and we are connecting in new ways on both physiological and emotional levels. New neural pathways are created as a result of using the internet and new relationships are being formed more quickly and by different avenues. Recent research suggests that the brain may interpret this digital interaction as the same as in person interaction while others maintain that differences are growing between how we perceive one another online as opposed to in reality. This a concern due to the potential loss of our ability to partake in face-to-face communication, although there are certainly advantages to new modes of interaction as well. Certainly, the ways humans are interacting with each other are changing, and this is changing us. Inevitably, as technology shows no signs of slowing its expansion into every facet of our lives, these changes will become more pronounced. Still, while little is yet known about the extent and implications of these changes, this paper attempts to highlight a couple of them.

Introduction

A man sits down at a table in his living room, passes his fingertip over a scanner and a display materializes in front of him showing his vital signs. He thinks, "Daily headlines" and the screen changes to show the most recent world news. After thinking his way through cyber space he goes to the store where he again simply scans his fingertip to pay for his food. He then remembers that he forgot to make an appointment and so pulls a collapsible screen out of his pocket. It instantly connects with his fingertip chip and without him having to say a word makes the appointment. The people around him are all doing similar things. They hardly glance at each

other, preferring instead to constantly check their screens to communicate with the outside world. Technology like this is not science fiction, and is very close to becoming reality.

Humanity has changed dramatically from the Stone Age to the Dark Ages through the Enlightenment and the Industrial Revolution. This evolution is marked by advances in technologies that appear to make people's lives better. The ability to control fire gave man the ability to warm himself and cook food. The invention of the wheel has paved the way for transportation and industry, while the ability to make energy from coal and oil has shaped entire societies. Now however, we are in the midst of a new digital era, where cell phones, Facebook, and twitter have dominion. Technology has made leaps and bounds in recent history and shows no signs of slowing down. With this exponential evolution occurring at a pace so fast that it takes constant attention to keep up, the fundamental questions arise: What implications will this new era have on society and how will it shape the future?

One of the most dominant features of technology has become its evolution of the way in which we communicate with one another. Human communication has remained fairly constant, and limited, for the vast majority of our time on earth. Face to face and interpersonal communication had been the status quo for thousands of years. Charisma and oratorical skills as well as social cues and eye contact have been keystones in our abilities to interact, get what we want, and make progress as a society. This, however, is all changing. It has become commonplace to send an email instead of writing a letter, a text message instead of calling, and adding someone on Facebook instead of inviting them to coffee.

We are in a different era and the technologies that we have developed are changing us physically and emotionally. The neural circuitry of our brains is rapidly evolving before our eyes to accommodate our propensity to check our twitter accounts multiple times a day, surf the

internet relentlessly, and blog about our every thought and action. Similarly, our emotional responses have evolved to accommodate our new perception of interaction. The issue of dating and relationships has become particularly important because it has the potential to have dramatic consequences for society. Digital communication is leading to unprecedented manipulation of our traditional methods of interaction. This is potentially dangerous, though not necessarily entirely detrimental. Indeed, there are positive aspects of modern communication as well. As technology advances, humans will adjust and while we cannot anticipate the consequences of these changes, we need to study them in order to understand the direction in which humanity is inevitably moving.

Changing Physiology and the iBrain

It has not escaped the notice of researchers from a variety of disciplines that digital communication is quickly becoming the norm. With this observation has come the natural curiosity to understand what effects this might have on us. One aspect of these effects is the physiological response that our brains have to this new mode of interacting with one another. While this phenomenon is still new and thus research is limited, it is becoming clear that our constant exposure to digital media, and especially the internet, is literally rewiring our brains. According to Dr. Gary Small and Gigi Vorgan, "Daily exposure to high technology- computers, smart phones, video games, search engines such as Google and Yahoo- stimulates brain cell alteration and neurotransmitter release, gradually strengthening new neural pathways in our brains while weakening old ones." Our brains are changing because of technology, and at a remarkably rapid pace.

In their study Small and Vorgan used magnetic resonance imaging (MRI) to examine the brain activity of two groups of people while they performed a series of internet searches. The

first group consisted of people who were almost completely unfamiliar with the technology at hand and the second group was made of people who had extensive experience with searching and using the internet. What Small and Vorgan discovered was that the computer literate group exhibited significant increase in brain activity in the dorsolateral prefrontal cortex during internet searching, whereas the computer illiterate group showed little to no brain activity increase in this region. Each group was then given five days with which to spend an hour each day searching the internet before repeating the experiment. After the second round of testing the computer illiterate group now showed similar upregulation of activity in the same brain area as the computer literate group. This means that after just five hours of time on the internet those people's brains had formed entirely new neurological connections.

The dorsolateral prefrontal cortex is responsible for our ability to integrate sensations and thoughts as well as complex information. It also plays a role in our working memory, or our ability to retain information just long enough to determine if it is important-exactly the task necessary in web searching. An offshoot of this is that with continual and increased activity in our short-term memory we may be losing our ability to maintain focus on one thing or individual for any significant amount of time.

Upon extrapolating this to the realm of online communication and particularly social networking Small and Vorgan claim that "we risk losing personal touch with our real-life relationships and may experience an artificial sense of intimacy as compared with when we shut down our devices and devote our attention to one individual at a time." They warn against the transition into an era where the iBrain dominates and people no longer know how to interact with one another on a personal level that is not mediated by some type of technology. If we continue to use media as our primary, and sometimes only form of communication, how long will it be

before we lose the social skills of distinguishing between tones of voice or facial expressions? It is quite possible that this is where we are heading.

Our exposure to digital media is only increasing. In fact, a 2005 Kaiser family Foundation study revealed that children 8 to 18 years old receive about eight and a half hours of digital stimulation a day. This ranges from TV and video to music and using the computer. This means that as children are growing up in this digital era they are living in a state of “continuous partial attention” where their dorsolateral prefrontal cortex is stimulated and short-term memory is dominating. This can result in a state of stress that can also have very serious physiological consequences for the body. As the brain is forced to constantly review and analyze new information, whether it be a Google search or scanning Facebook for what the viewer deems important, it can enter what Small and Vorgan call “techno-brain burnout.”

At first this phenomenon causes an addictive feeling of power and self-worth. People actually feel more confident and connected, which makes them want to persist on the path of continuous partial attention. Short-term, there is a boost of energy and memory can actually increase. The problem comes when the brain can no longer handle the overload of information. At this stage the stress hormones cortisol and adrenaline are released into the body and long-term or chronic exposure to these can be very detrimental to mental and physical health. There is even some evidence supporting the idea that this may actually alter the neural pathways in the hippocampus, amygdala and the prefrontal cortex, changing brain physiology (Small & Vorgan, 2008). This means that some of the brain centers in control of mood and thought are being altered and we have no way of knowing the long-term effects of this change.

In an article written by Richard Woods, he highlights an interview with a young woman who says, “First thing every morning I wake up, check my mobile for messages, have a cup of

tea and check my e-mails...Technology is an essential part of my everyday social and academic life.” She grew up with technology and thus, he calls her a “digital native.” Conversely, Woods calls her mother a “digital immigrant,” or someone who can still remember a time when no one had cell phones and e-mail was almost unheard of. Woods uses these two women as examples of how the proliferation of technology in our lives is only growing. More and more is becoming possible, as we are now able to connect human brain cells to computers. This would be the ultimate, and unnatural, change in our physiology and it may get more and more difficult to determine where the human user stops and the technology begins. Once we start literally linking ourselves physically to computers, how much of us is really still human? That would be an evolutionary change on a scale that mother nature has never seen before, and at a much faster pace. We can only imagine the implications that would have for our future physiology and communication, even though that image is quickly becoming a reality.

Relationship Formation and Social Networking

One of the most fundamental reasons that humans have evolved to communicate with one another is to facilitate the formation of lasting relationships. We are a species defined by our close knit communities and have long relied on tight bonds of friendship and love to provide the framework and support of our societies. As such it is very interesting and crucial to try to determine what the digital era will do to these interactions.

Social networking sites like Facebook and twitter are quickly becoming the dominant form of communication between those people Woods calls digital natives. Even the digital immigrants are joining the trend as more and more of the older generations are striving to keep up with changing technology. In 2005, 85% of college students had a Facebook account (Arrington, 2005) and today the site has over 500 million users (Facebook.com, 2011). This

ever-growing number of users begs the examination of what potential impacts this new form of interaction is having on the way people communicate and form relationships.

In contrast to Small and Vorgan's largely pessimistic view of digital media's influence on our physiology, there are a couple researchers who see this technology in a different light- particularly when it comes to our emotional interactions. Natalie Pennington maintains that while social networking sites like Facebook are drastically changing the way we interact, this change is not necessarily a bad thing.

In her study, Pennington combined data from the Facebook profiles of the study group as well as interviews with the subjects about their activity on Facebook and how they viewed their interactions. She highlights one of the main concerns for the subjects involved in her study, which was how to connect with new people, particularly a roommate, as they went to college. The ability of people to learn about a person they are about to be living with from afar is potentially valuable. She asserts, "You can learn a lot more about a person from their Facebook profile than the questionnaire they filled out to get a dorm room" (Pennington, 2008). This opens up opportunities to form a connection with someone before actually having to cohabitate with each other and this has its definite advantages.

New bonds like this- the formation of social capital- are advantages of social networking. It is still relatively unknown however, what impact this is having on how people form bonds with one another. The most drastic difference that Pennington found is a shift in our concepts of public and private information, and how much we share with our Facebook "friends". Facebook allows users to share a variety of information, and with privacy settings this is fairly simple to control. Still, many people are sharing some of the most intimate details of their lives with people that they may or may not know very well. Pennington found that, "When participants

were asked what was the most personal thing they'd seen on any profiles, many responded relationship status. Interesting in light of the content analysis that showed 85% of users list their relationship status" (Pennington, 2008). Further, Pennington found that every person who said that relationship status was the most personal of information put on Facebook had his or her own status posted. This means that people are either developing new concepts of what we perceive as personal or that people are simply growing more comfortable with sharing any kind of information about themselves online.

It has become very socially acceptable to display one's life via a computer screen. This is likely largely due to the perceived anonymity that sites like Facebook supply. In discussing the potential for an anonymous dating service provided by Facebook, one of Pennington's subjects stated, "...Because you said it's anonymous...that's probably the reason most people don't pursue real life relationships, is that fear of failure." This is a huge shift in the way people are now choosing to pursue potential romances. Relationships are relying more and more on technology to mediate and nurture them. In the future we may see couples that communicate almost exclusively via digital avenues and while it seems unlikely that intercourse will go by the way-side, that may be the only time they actually see each other.

Giovanni Frazzetto came to a similar conclusion in his article *The Science of Online Dating*, where he states, "There is a kind of irony in online dating in that courtship and romantic love are profoundly physical experiences that manifest with symptoms including sweaty palms, reddened cheeks or tied tongues; but internet dating, owing to its virtual nature, is utterly disembodied." The number of online dating sites as well as the number of people that subscribe to them has continued to grow in the United States despite economic troubles (DatingSiteReviews.com, 2010). This means that more and more people are relying on the

internet to make connections to the people around them. While this is likely due to a multitude of factors, a large one is that people are becoming increasingly comfortable with beginning relationships online to decrease the risk of disappointment often felt in real life.

This doesn't necessarily have to be as bad as some people might see it. Pennington makes the point that while computer mediated communication may initiate many relationships and friendships today, it is still face-to-face interaction that solidifies and gives a deeper layer of meaning to those interactions. That is why she is less concerned about the fact that people are sharing more and more personal information online, at least when it comes to communication. The truth of the matter is that, still only so much of a person's personality and character can be gleaned from a couple paragraphs of information online. She saw many examples of roommates who said they had reservations about compatibility upon first viewing their new companion's profile, but were then pleasantly surprised to discover that they were able to get along fine in person.

Pennington's take home message is that yes, the way we are forming relationships is changing, and even happening at a faster rate, and that this is due largely to social networking and technology's advances in communication. It is also important to note that while research on this subject is still fairly limited, much of this can be observed in our daily lives and this alone is a testament to its growing importance.

Physiology and Relationships Converge

With the increasing prevalence of digital modes of communication in our lives there is the necessity to connect the previously discussed ideas of physiological and emotional changes these digital media cause. There are undoubtedly links between how we are shifting our interactions and why this shift is occurring. In his article *Social Networking Affects the Brain*

Like Falling in Love Adam Penenberg teams up with Paul J. Zak, a professor at Claremont Graduate University, to look for this link.

Zak's research centers on the neurotransmitter oxytocin, which is largely responsible for the human emotions of empathy, generosity, and trust. This chemical is released into the blood after sexual climax or when a newborn nurses for the first time. It is fundamental in the formation of lasting bonds between individuals. Penenberg's work deals with social media and people's seemingly insatiable appetite for technology made him wonder, "What explains the need of our Blackberry-bearing, twitter-tweeting Facebook friends for constant connectivity? Are we biologically hardwired to do it?" (Penenberg, 2010). Thus, he found Zak and they decided to see if they could connect their disciplines.

Zak has performed a variety of experiments involving oxytocin over the last nine years. He found that people are more generous when they have elevated levels of the chemical and they trust more easily. Men given a dose of oxytocin are more likely to let someone else control their investments. Zak even tested levels at a wedding to see which of the party had the highest amount.

With this knowledge, Penenberg decided to participate in one of Zak's experiments in which he was given ten minutes on Twitter to post, chat, and communicate with both people he knew and strangers. He gave blood samples both immediately before and after to test his body's fluctuations in oxytocin levels. They had spiked 13.2% in those 10 Twitter minutes, which is on par with the groom at a wedding. Further, his cortisol levels dropped 10.8% and ACTH levels dropped 14.9% (both are stress hormones that are negatively regulated by oxytocin). To Zak this meant that, "Your brain interpreted tweeting as if you were directly interacting with people you cared about of had empathy for" (Penenberg, 2010).

The upshot of this is that the brain can potentially interpret digital communication in the same way it processes in person communication. Both Zak and Penenberg admit that this evidence is by no means conclusive since Penenberg is just one individual and not necessarily representative of a large group of people, but it is a start.

The implications of this are huge if further research determines this to really be the case. Remember the man with the computer chip in his finger. His brain may not realize that what he is doing is bizarre, but that is where we are heading. When people start interpreting their digital interactions as real, how long will it be until we reach the point that Small and Vorgan fear where we lose all ability to functionally interact in person? Natalie Pennington would say that this concern is unnecessary since people are still exhibiting the need to interact face-to-face to form meaningful relationships. Though, as the presence of technology in our lives becomes more pervasive, the greater the changes in our interactions will be. With the ability of our brains to form new and break down old neurological pathways it is likely that the evolutionary path of the human brain will be increasingly driven by this new digital era and the ever growing technologies we are using to communicate.

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