HermanMiller

All Thumbs:

The Ergonomic Implications of Text Messaging

People are on the move, and they want their information to move with them. They're sending short text messages from one handheld device to another to keep them—and their businesses or social relationships—moving.

Making information move fast is the premise behind Short Message Service (SMS), the transmission of text messages to and from a personal digital assistant (PDA), mobile phone, fax machine, or Internet protocol address. The speed of text messaging is one reason why it's becoming so popular with business people because it lets them respond to colleagues and customers at lightning speed across multiple time zones.

Ergonomists warn, however, that thumb typing lots of text messages on a tiny keyboard can put people at risk for musculoskeletal disorders (MSDs). Overuse of the thumbs among children text messaging and playing video games has already prompted the American Society of Hand Therapists to issue a national alert.[1]

WebMD recently noted that some people can get up to 40 words-per-minute out of their thumbs when sending text messages on wireless devices but they're increasingly reporting pain and discomfort as a result.[2] Text messaging, as with any tool, will require a balance between using it to further business goals and using it wisely to avoid potential health risks.

Communication under the thumbs

The more portable the devices people use to communicate—cell phones, PDAs, handheld computers—the more mobile these people can be. In a development not unlike Moore's Law, in which the number of transistors per square inch on integrated circuits doubles every 18 months, the size of these devices goes from small to smaller every few years in response to the continuing pressure for portability.

SMS, which relies on a handheld device to send and receive text messages, gets an A+ for portability. However, inputting text messages requires holding the device like a video-game control and using the thumbs to tap out words on a keyboard that's usually

a cross between a cell-phone keypad and a QWERTY keyboard. Messages can't be longer than 160 alphanumeric characters and can't contain images or graphics. (The close cousin of SMS, instant messaging is essentially a private chat room that lets individuals send text messages in real time over the Internet. It is less portable but easier on the thumbs since IM texters usually type on a laptop's full-size keyboard.)

However, people's thumbs haven't been shrinking, although many early adopters of SMS messaging have had the advantage of smaller fingertips. According to a study by the Pew Internet & American Life Project, the most likely cell-phone texters belong to Generation Y (ages 18 to 27).[3] Initially intended to be a paging system, texting caught on first with students in Sweden (who found it was a highly efficient way to pass notes in class) and later with teenagers in Europe and Asia (who used texting as a cheap, fast, discreet way to stay in touch with their friends).

Speed is one reason why text messaging has taken off so dramatically since the first message was sent in 1992.[4] By 2004, the number of text messages sent worldwide reached 960 billion. Experts predict that number will reach 1.36 trillion in 2005.[5] Many of them will be business people. Several factors, including the merging of cell-phone technology with traditional PDA capabilities, have fueled the shift in the demographic profile of the typical texter to one who's older and who communicates as much for work as for fun.

SMS for business purposes began in Europe and worked its way into Asia, Australia, the Middle East, and the United States, where it is gaining momentum. According to the research and analysis company Gartner Group, 80 percent of mobile workers (defined as tele-commuters, multi-site and non-office workers, and frequent business travelers) will use wireless e-mail to send text messages by 2008.[6] This remote access is rapidly becoming essential to businesses.

Corporate executives find text messaging invaluable for keeping in touch with colleagues and customers based in other time zones. "I need to stay connected," says Mike Saccone, global account director for the international Domino's Pizza division of The Coca-Cola Company. "I'll keep my BlackBerry[7] on before and after work hours. If it's 6:00 AM in Michigan, and I'm communicating with someone in Sydney, it's 8:00 AM the next morning in Australia. It increases the response time significantly."[8]

Other executives have seized on the technology simply because it allows them greater flexibility (and a lot less paper) when traveling. John FitzRandolph, vice president of engineering at Beck Associates (a television broadcast company based in Austin, Texas) keeps his complete travel itinerary, including car rental information, calendar, and flight schedule, as well as his corporate address book, on a handheld device.

Efficiency in communication is another reason executives are turning to text messaging. A long conversation can be condensed into a quick e-mail. "I do very short text messaging on my BlackBerry," says FitzRandolph, "such as 'I'll call you,' 'Got it,' 'I understand.' It's excellent for that, but I do my detailed work (long responses) on my computer in the evening. I use my BlackBerry to tell me what's on fire, but that's about all."[9]

Handheld devices, which the BlackBerry embodies, are increasingly finding their way into business life. Many people use them during meetings to check e-mail or "send a berry." Others check e-mail before boarding an airplane or while waiting for take-off. And it's common for many workers to keep their BlackBerry with them at all times so they remain in contact with the office and their customers around the clock.

Healthcare workers are also turning to text messaging as a way to stay in touch with patients and help them manage diabetes,[10] asthma,[11] and even improve vaccination rates in travelers.[12] Doctors respond to patients' questions while away from the office, access the latest antibiotic databases, and send prescriptions to a local pharmacy. Many medical schools are requiring students to purchase a handheld device before starting classes.

The risks of staying in touch

"In the 1980s, video games were introduced and in the 1990s, we called injuries from these games Nintendo Thumb," says Professor Alan Hedge of Cornell University's Department of Design and Environmental Analysis. "Now in the UK, kids who are messaging their friends are beginning to complain about soreness in the thumbs."[13] Text Messaging Injury, or TMI, is the term currently used to describe injuries caused by text messaging. And because the injury

develops over time, it is an MSD, or musculoskeletal disorder.

Since injuries to the thumb caused by text messaging are relatively new—there has only been one documented case, a 13-year old girl in Italy diagnosed with acute tendonitis after sending at least 100 messages a day—data on precisely how many people are afflicted isn't available.

What is well known is that typing with the thumbs on a handheld device involves three elements that can lead to MSDs.

- Repetition—repeated exertions or movements of the body performed for long durations.
- Force—using exaggerated force in performing an activity. (It's not uncommon for people to use three times the force required to press a keypad versus a key on a keyboard.)
- Awkward position—habitually sitting in awkward positions for long durations, which increases muscle stress and strain. (People using a PDA often hold their wrists in awkward positions while hunching over, crane their necks to see the small script, and scrunch up their shoulders as they concentrate; some call it "turtle-necking.")

There is also anecdotal evidence of TMI. Doris Mosblech, a 53-year-old network manager at Embarcadero Systems, is typical of those who have begun to complain about TMI. She uses a BlackBerry to respond to any of the company's 2,500 employees who might contact her about a network problem. Mosblech torques her wrists and curls her fingers to clutch the 4.69-inch handheld device while scrunching her thumbs to type 50 to 100 e-mails a day on the keyboard's popcorn kernel-size buttons. "My fingers get crampy, my hands hurt, and I have problems grasping things," she says in a San Jose Mercury news article. "Sometimes it will hurt all the way up to my neck."[14]

Ergonomists warn that many more texters may experience pain and discomfort in their thumbs or hands. They base this warning on the fact that text messaging is strikingly similar to pipetting.

A familiar activity in laboratories, pipetting bears a slight resemblance to basting a turkey. Gripping the pipette, a small device with a fine tube for suctioning fluids, the lab technician repeatedly applies force with the thumb to a plunger to draw up a liquid and then releases the pressure to eject the liquid.

Symptoms of pipetting injuries, and by extension TMI, include "muscle fatigue in the thumb and forearm...and pain, inflammation, weakness, and rigidity in the thumb, wrist, forearm, or elbow." "Numbness, tingling, burning sensations, and sharp pains in the thumb, fingers, elbow, neck, or shoulder" may also characterize the disorder.[15]

TMI has been associated with De Quervain's Tenosynovitis (closely related to Trigger Finger and Trigger Thumb, when the flexor tendon and its sheath in a finger or thumb thicken or swell to the point of locking). Symptoms may include pain on the side of the wrist and forearm just above the thumb. De Quervain's Disease is caused by repetitive rubbing of the two tendons that run through a tunnel on the side of the wrist above the thumb. When the tendons are inflamed, they often swell, which reduces their ability to glide through the tunnel smoothly.

As with many MSDs, TMI manifests itself in various stages over the development of the injury. In the earliest stage, individuals may experience minor discomfort while texting, but the pain goes away when the activity is stopped. In the next stage, symptoms appear before the activity begins, and last well after the activity is stopped (even at night while sleeping). In the final stage, symptoms are omnipresent and even nonrepetitive movements inflict pain. Experts recommend consulting a doctor at the first signs of discomfort in order to head off more serious problems. By the final stage, medical intervention is critical to prevent long-term damage.

Taking the pain out of texting

Researchers have concluded that laboratory personnel who pipette more than 300 hours per year—about 1.3 hours per 8-hour shift—are at an elevated risk of injury.[16] Since texting is so closely related to pipetting, it is reasonable to assume that one shouldn't text message for more than about an hour and a half every 24 hours.

Ergonomists encourage people to use their PDA as an information-retrieval tool and limit typing whenever possible. "Think of these things as Post-It Notes: Use just a few words.

They're not for writing *War and Peace*," says ergonomist Hedge.[17]

When text messaging, keep these guidelines in mind.

- **Type fewer letters**—Use a restricted language (such as ASAP, L8R).
- **Keep your text messages short**—"OK," "I understand," "I'll call you."
- **Use your PDA primarily as a reading tool**—Save your long responses for your desktop computer.
- **Be aware of your posture**—Keep wrists in a neutral position, keep hands and arms close to your torso. Bring the device into your field of vision and keep it 90 degrees perpendicular to your fingers when you press the buttons. Hold the device below your heart and with one hand. Use the index finger of the other hand to type.
- **Shop around**—Ira Janowitz, a senior ergonomics consultant at the University of California, suggests finding a PDA that is light and comfortable to use. The weight can vary significantly (from about four to eight ounces), which will have a considerable impact over the course of a day. "Look for a Coke-bottle shape instead of a brick shape so that it's more comfortable," says Janowitz.[18]
- **When it hurts, stop texting**—Listen to the warning signs.

As with any repeated use of a work tool, stretching before and after the activity is very important. The endurance runs out in the smaller muscles faster, say experts, and when those muscles grow exhausted, the body compensates by tightening the tendons, which connect muscles to bones. That can result in injury.

Getting ready to text message, and stretching afterwards, doesn't have to be involved. The British Chiropractic Association (BCA) recommends several exercises to reduce the risk of injuries.[19] These stretches should never be painful. Should you experience pain, consult a doctor.

- **Shoulder Shrug**—Shrug your shoulders toward your ears, hold for two to three seconds. Then relax. Repeat three times.
- **Make a Fist**—Hold your arm at a right angle at the elbow and make a fist. Tense your fist and your arm and hold for two to three seconds. Then relax and let your arm fall to your side. Repeat three times.
- **Wrist Stretch**—Stretch your wrist backward, hold for two to three seconds. Then stretch it forward and hold for two to three seconds.
- **Finger Spread**—Spread your fingers as wide apart as you can, hold for two to three seconds. Then bunch them into a fist and hold for two to three seconds. Repeat three times.
- **Neck Muscle Stretch**—Try to make a double chin, to stretch the muscles at the base of your neck. Hold this position for two to three seconds. Repeat three times. Always stretch very slowly.

The future of texting

It is likely that there will be one million wireless access points worldwide (in businesses, retail establishments, and public places) by 2008. This development, coupled with greatly improved processing power for PDAs, is sure to increase text messaging.

Industry analysts believe communication capabilities will advance rapidly as messaging technology becomes integrated into the business environment. Already a phone is available that works with voice commands, letting the sender dictate a text message, use spoken commands to control the address and delivery, and even select pre-defined messages from a list for ultra-quick delivery. From an injury-prevention perspective, a voice-controlled text messaging system could help relieve some of the pressure on the thumbs.[20]

The next generation of handheld devices will introduce Multi-Media Messaging (MMS), allowing networks to send pictures and video clips between subscribers. Music players and scanning technology will be integrated as well.

As video-messaging becomes commonplace, one ergonomist has speculated that text messaging will disappear entirely. "Cell phones are getting so many features, we may just forget the texting. It's so much faster to send a video message to someone than to type out a message."[21]

Notes

1 Jeanie Croasmun, "Are Ergonomists Really Consulted in Mobile Phone Design?" ergoweb 16 July 2004. Available from http://www.ergoweb.com/news/detail.cfm?id=961 (Accessed 29 June 2005).

2 Jeanie Croasmun, "New Phone Takes Talking Text Messages?" ergoweb 31 January 2005. Available from http://www.ergoweb.com/news/detail.cfm?id=1052 (Accessed 29 June 2005).

3 Pew Internet & American Life Project, "34 Million American Adults Send Text Messages On Their Cell Phones," March 14, 2005. Available from http://www.pewinternet.org/press_release.asp?r=99 (Accessed May 27, 2005).

4 "A Brief History of Text" Media Centre, Database online. Available from text.it/mediacentre (Accessed March 21, 2005).

5 Mike Grenville, "SMS Set For Growth in 2005" 160Characters, 11 February 2005. Database online. Available from 160characters.org (Accessed February 16, 2005).

6 "'Smartphone' Era To Start Next Year, Research Predicts" *InformationWeek,* November 24, 2004. Available from informationweek.com, Article ID 54200479 (Accessed February 11, 2005).

7 BlackBerry is a line of mobile e-mail devices and services from Research In Motion (RIM) that includes a complete package of airtime, software, and choice of BlackBerry mobile device. While BlackBerry is a registered trademark of RIM, its popularity (perhaps because of its comparatively easy-to-use interface and keyboard) has led many to use the term BlackBerry interchangeably with the class of handheld devices designed for Short Message Service communication.

8 Mike Saccone, phone interview, February 18, 2005.

9 John FitzRandolph, phone interview, February 28, 2005.

10 Ferrer-Roca O, Cardenas A, Diaz-Cardama A. Pulido P "Mobile Phone Text Messaging In The Management of Diabetes" *J Telemed Telecare*, (2004): 10.

11 "Mobile Phone Text Messaging Can Help Young People Manage Asthma" *BMJ* (2002): 325.

12 Vilella A, Bayas JM, Diaz MT, Guinovart C, Diez C, Simo D, Munoz A, Cerezo J., "The Role Of Mobile Phones In Improving Vaccination Rates In Travelers" *Prev Med* (2004 Apr): 38.

13 Professor Alan Hedge, phone interview, March 1, 2005.

14 Nicole C. Wong, "Handheld Hurt," *San Jose Mercury News*, February 28, 2005.

15 "Pipetting, Ergonomics, And You" Rainin Publication. 2001. Available from rainin-global.com.

16 *Ibid.*

17 *Ibid.*

18 Ira Janowitz, phone interview, February 28, 2005.

19 "Too Much Text Could Be Bad For You Warns British Chiropractic Association" 10 March 2003, Press Release, British Chiropractic Association. Available at chiropractic-uk.co.uk.

20 Jeanie Croasmun, "New Phone Takes Talking Text Messages?" ergoweb 31 January 2005.

21 "Text Messaging As A Cause Of Sleep Interruption in Adolescents, Evidence From A Cross-Sectional Study," *J Sleep Res* (2003): 12.