

Packaging Digital Information for Enhanced Learning and Analysis:

Data Visualization, Spatialization, and Multidimensionality

Shalin Hai-Jew
Kansas State University, U.S.A

A volume in the Advances in Educational
Technologies and Instructional Design
(AETID) Book Series

Information Science
REFERENCE

An Imprint of IGI Global

Managing Director: Lindsay Johnston
Editorial Director: Joel Gamon
Production Manager: Jennifer Yoder
Publishing Systems Analyst: Adrienne Freeland
Development Editor: Brett Snyder
Assistant Acquisitions Editor: Kayla Wolfe
Typesetter: Christina Barkanic
Cover Design: Jason Mull

Published in the United States of America by
Information Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: <http://www.igi-global.com>

Copyright © 2014 by IGI Global. All rights reserved. No part of this publication may be reproduced, stored or distributed in any form or by any means, electronic or mechanical, including photocopying, without written permission from the publisher. Product or company names used in this set are for identification purposes only. Inclusion of the names of the products or companies does not indicate a claim of ownership by IGI Global of the trademark or registered trademark.

Library of Congress Cataloging-in-Publication Data

Packaging digital information for enhanced learning and analysis : data visualization, spatialization, and multidimensionality / Shalin Hai-Jew, editor, Information Science Reference.

pages cm

Includes bibliographical references and index.

Summary: "This book brings together effective practices for the end-to-end capture and web based presentation of information for comprehension, analysis, and decision-making"-- Provided by publisher.

ISBN 978-1-4666-4462-5 (hardcover) -- ISBN 978-1-4666-4463-2 (ebook) -- ISBN 978-1-4666-4464-9 (print & perpetual access) 1. Information visualization. I. Hai-Jew, Shalin.

QA76.9.I52P33 2013

001.4'226--dc23

2013015457

This book is published in the IGI Global book series Advances in Educational Technologies and Instructional Design (AETID) Book Series (ISSN: 2326-8905; eISSN: 2326-8913)

British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

Chapter 1

Making Health Information Personal: How Anecdotes Bring Concepts to Life

Mitch Ricketts
Kansas State University, USA

ABSTRACT

Research suggests people often fail to understand the personal relevance of generalized health information. To make health information more meaningful, communicators can employ anecdotes that take the form of instructive stories about the illnesses or injuries of particular people. Appropriate anecdotes may help audiences internalize health information by triggering insights such as: “I see how that could happen to me...I’d better take action.” Vivid anecdotes appear to activate many of the same neurological pathways that help us extract meaning from direct experience and observation. By eliciting vivid imagery, provoking deep thought, and forging lasting memories, anecdotes may shape beliefs and behaviors to nearly the same extent as a lived event. This chapter explores methods for integrating anecdotes into health messages to increase personal relevance and prompt important changes in health-related behavior.

PREVENTING ILLNESSES AND INJURIES THROUGH THE MODIFICATION OF BEHAVIOR

Unhealthy behaviors represent an important public health problem in the United States and throughout the world. In fact, it is now widely recognized that unhealthy behaviors are among the leading causes of human death and disease (Ford, Zhao, Tsai, & Li, 2011; Mokdad, Marks, Stroup, & Gerberding, 2004; Woolf, & Aron, 2013; World Health Organization [WHO], 2011). Behaviors with the most deleterious impacts include tobacco

use, poor eating habits, physical inactivity, alcohol consumption, unsafe actions that lead to injuries, unsafe sex, and the illicit use of drugs.

Over the years, public health professionals have developed a variety of interventions to influence relevant behaviors—often with positive impacts on human health (e.g., WHO, 2011). Examples of effective behavioral interventions include:

- Laws that require safe, responsible behavior (e.g., statutes prohibiting drunk driving).
- Policies that limit exposure to hazardous products and substances (e.g., the establishment of smoke-free public places).

DOI: 10.4018/978-1-4666-4462-5.ch001

- Built environments that support physical activity (e.g., the construction of safe and convenient walking routes).
- Public health messages that promote voluntary healthful behaviors (e.g., campaigns promoting breast self-examinations).

This chapter focuses on the last category of interventions—messages that promote healthful behaviors—and the realm of scholarship known as health communication.

A “RELEVANCE GAP” IN HEALTH INFORMATION: THE PROBLEM OF RELATING GENERAL INFORMATION TO PARTICULAR EVENTS

Health communication is an interdisciplinary profession committed to disseminating information that promotes safe and healthful decision making. Since health information is typically based on generalized epidemiological data, health communicators face the deceptively difficult task of helping learners comprehend the many ways in which *generalized* health concepts apply to *particular* events in everyday life. As an example, consider the current public health problem of distracted driving: Although drivers are routinely exposed to warnings about the number of deaths caused by inattention, many motorists continue to use cell phones, adjust radios, eat, and study maps while driving. The immense difficulty of applying health-related generalities to daily affairs is reflected in the finding that simply “learning the facts” often fails to trigger changes in peoples’ behavior (e.g., Weare, 1992; Zeitlin, 1994).

One way health communicators can address the gap between generalized information and particular events is by *personalizing* health information through the use of anecdotes about singular health-related experiences in the lives of particular people. The goal of such personalization is to increase the likelihood that message recipients

will internalize the health lessons, change their behavior, and enjoy better health.

A Mental Experiment

Before exploring methods for infusing generalized facts with personal relevance, we’ll consider a brief “thought experiment” that illustrates the difficulty of applying broad generalizations to particular life events. To provide context for this “experiment,” we’ll examine two very different communication strategies for persuading adults to adopt behaviors that protect children from injuries caused by ride-on lawn mowers.

To prepare for our mental experiment, consider that childhood mower injuries comprise a serious public health issue in the United States, where thousands of children are injured by ride-on mowers every year (Hammig, Childers, & Jones, 2009; Smith & Committee on Injury and Poison Prevention, 2001; Vollman & Smith, 2006). Not only are these injuries common, but in some cases they have devastating consequences—particularly when a ride-on mower *runs over* a child. This can happen when a child is playing in an area where grass is being mowed. It can also happen if a child is riding on a mower and falls off—either while operating the machine or while riding as a passenger on an adult’s lap.

Injuries such as these have led health communicators to develop messages aimed at persuading adults to keep children indoors while mowing and to never let children ride as passengers. Many of these messages are based on generalized information about the risks *to children in general*, as illustrated in the U.S. Consumer Product Safety Commission’s (CPSC, n.d.b, p. 4) general warning shown in Figure 1.

Mental Experiment Task 1


As the first task in our mental experiment, take a moment to examine your subjective reaction to the message in Figure 1—a message based

Figure 1. Generalized information explaining that children should be kept out of the mowing area and never allowed to ride as passengers (CPSC, n.d.b, p. 4)

Riding Lawn Mowers and Children

Tragic accidents can occur if the operator of a mower is not alert to the presence of children. Children are often attracted to the machine and the mowing activity. **Never** assume that children will remain where you last saw them.

1. Keep small children out of the mowing area, and in the watchful care of a responsible adult other than the operator.
2. Be alert and turn the machine off if a child enters the area.
3. Before and while backing, look behind and down for small children.
4. Never carry children, even with the blade(s) shut off. They may fall off and be seriously injured or interfere with safe mower operation. Children who have been given rides in the past may suddenly appear in the mowing area for another ride and be run over or backed over by the machine.
5. Never allow children to operate the machine.
6. Use extreme care when approaching blind corners, shrubs, and trees, or other objects that may block your view of a child.



DO NOT CARRY PASSENGERS

entirely on generalized information. Here are some questions to guide your thoughts: How pertinent does the information in Figure 1 seem *with respect to the children you know and care about*? Does the information cause you to reflect on your own experiences (e.g., times when you or someone else was mowing at your home, in your neighborhood, or in a park)? Does the message persuade you to change *your* behavior in any way? For instance, how insistent will you now be about making sure no unsupervised children are present the next time you (or others) are mowing? How certain are you that from now on you will always say “no” if a child asks to ride on your lap or the lap of someone else who is mowing?

After reflecting on the generalized health information in Figure 1, read the health messages in Figures 2 and 3. These messages take an approach

that is very different from that of Figure 1: Whereas Figure 1 emphasized the hazards of mowers to *children in general*, Figures 2 and 3 describe the true, representative cases of *individual children* who were tragically affected in ways discussed more generally by Figure 1.

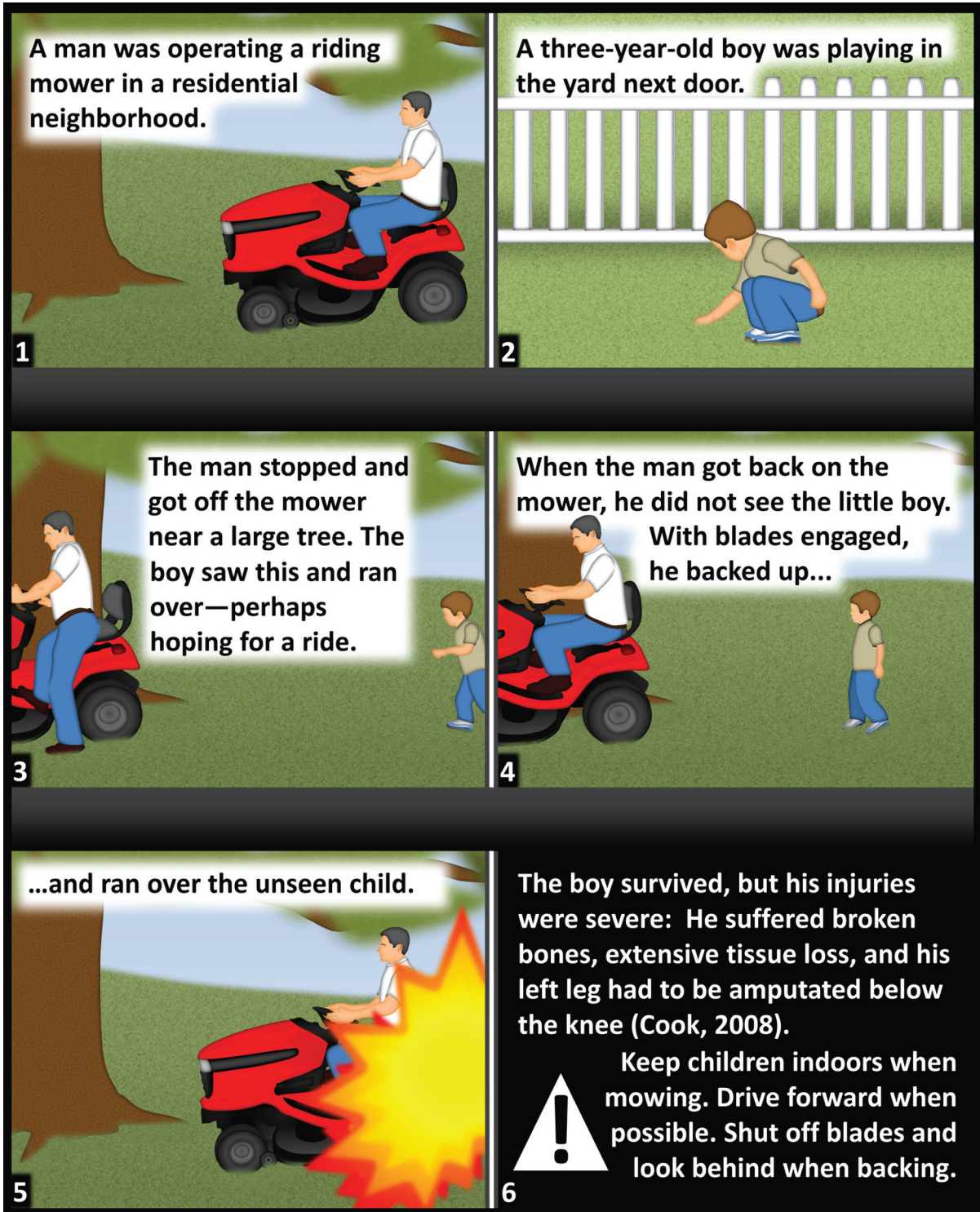
Mental Experiment Task 2

The anecdotal health messages in Figures 2 and 3 are based on singular descriptions of events that happened to particular children. After considering these cases, reflect on the following questions to complete the thought exercise: How pertinent does the health message (keep children indoors during mowing and don’t let them drive) seem now that you have read the anecdotes? Did anecdotes make it easier to imagine how a similar tragedy could

Figure 2. Anecdote used by the author in health interventions to explain why children should never be allowed to ride as passengers on mowers (© 2012 Mitch Ricketts, used with permission)



Figure 3. Anecdote used to explain why children should be kept out of the mowing area (© 2012 Mitch Ricketts, used with permission)



happen to *a child you know* and care about? Will you now give more thought to changing your own behavior when you or others are mowing in your yard, neighborhood, or park? If you found yourself reflecting and understanding more deeply when reading Figures 2 and 3 (compared with Figure 1), then you have just experienced the thought-provoking quality of anecdotes—also known as parables, narratives, and stories.

CHAPTER OVERVIEW

As demonstrated by the thought experiment, generalized information such as that shown in Figure 1 may be broadly applicable, yet it often seems unimportant and pedantic—perhaps because it fails to link general principles (e.g., keep children away) to an actual concrete experience (the injury of a particular child). In contrast, anecdotes trigger reflection and insight by relating abstract ideas to the tangible context of human events. The purpose of this chapter is to explore how anecdotes bring concepts to life by imparting personal meaning to generalized information. Chapter topics will include:

1. How learning from anecdotes relates to learning through personal experience and observation.
2. How anecdotes can trigger changes in behavior.
3. How to create effective health messages based on relevant anecdotes.

A Brief Word about Theory

The use of stories and anecdotes is not unique to any particular theory of health communication. In fact, anecdotal messages have been used in interventions based on a wide variety of theories and models, including the health belief model (Greene & Brinn, 2003), transtheoretical model (Jamner, Wolitski, & Corby, 1997), entertainment-

education (Slater 2002); theory of planned behavior (Ashton, Houston, Williams, Larkin, Trobaugh, Crenshaw, & Wray, 2010), social cognitive theory (Houston, Cherrington, Coley, Robinson, Trobaugh, Williams, et al., 2011), and many others. Since anecdotal messages are not exclusively associated any theory or model of health behavior, the conceptual foundations of this chapter rest for the most part in the vast empirical literature of social learning and narrative communication.

THREE WAYS OF LEARNING FROM PARTICULAR EVENTS

To better understand the role of anecdotes in teaching and learning, it is helpful to consider some common ways people acquire knowledge in everyday life. First, we will explore learning that results from direct experience and observation. Then, we will discuss how learning from anecdotes relates to these forms of knowledge.

Learning from Personal Experience

As we will see, anecdotal learning shares many qualities with learning from direct experience. Therefore, we will briefly consider some ways in which personal experience affects behavior.

Much of what we know about the educational value of direct experience comes from research in the field of judgment and decision making. *In laboratory settings*, researchers often study experience-based decisions using a card game known as the Iowa Gambling Task, or IGT (Bechara, Damasio, Damasio, & Anderson, 1994). In the IGT, research participants win and lose money by drawing cards from various decks. Unknown to participants, some decks are designed to produce occasional large gains—but these gains are more than offset by persistent long-term losses. Other decks offer gains that are small but consistent, leading to long-term profit. Over a lengthy IGT session, a research participant draws about a hun-

dred cards by choosing freely among the decks. Since participants are not told the decks differ, choosing profitably over time implies an ability to learn from experience. Researchers employing the IGT have confirmed that most adults do learn to choose from the better decks. In other words, experimental evidence suggests people do learn from experience—as long as they are not suffering from limitations such as neurological impairment, mental illness, or the influence of drugs (e.g., Buelow, & Suhr, 2009).

Outside the laboratory, learning from experience is often studied by asking people how their behavior has changed after major life events. Many of these studies have demonstrated that personal experience can trigger behavior change even when generalized information does not. In an investigation that mirrors the theme of our mental experiment, researchers in Ohio examined the causes and consequences of lawn mower injuries treated at Children’s Hospital in Columbus (Vollman, Khosla, Shields, Beeghly, Bonsu, & Smith, 2005). Despite longstanding government warnings to keep children away from mowers, the hospital treated 85 youngsters for mower-related injuries during the investigation’s four-and-a-half-year duration. Many of the injured children were quite young; in fact, the median age was 5 years, and some children were as young as 22 months. Injuries were often severe, with 40 percent of victims requiring inpatient treatment.

In line with the notion that people have trouble relating generalized information to particular events, Vollman and colleagues found clear evidence that prior to the children’s injuries, their parents knew about, but were unaffected by, warnings similar to those shown in Figure 1. In fact, 100 percent of parents who responded to researchers’ questions said they knew the risks prior to injury but allowed their children to participate in mowing activities anyway—even though many of these children were not yet old enough to attend school.

Most relevant for the purposes of our discussion is the finding by Vollman and colleagues that

parents of the injured children *did* change their behavior after the injuries occurred—in other words, they learned from experience. Among parents who responded to researchers’ inquiries, 86 percent said they adopted safety practices similar to those shown in Figure 1 after their children were injured. This included parents who stated they had begun keeping children inside while mowing and parents who no longer allowed children to ride as passengers on mowers.

Along with the findings noted above, research in a variety of settings supports three important conclusions:

1. People may not comprehend the personal relevance of information when concepts are presented in a general and abstract manner (e.g., Brickman, 1978, Myers, Iscoe, Jennings, Lenox, Minsky, & Sacks, 1981).
2. Personal relevance is more easily learned when people experience consequences directly, and this learning often triggers changes in behavior (e.g., Ezingard, & Bowen-Schrire, 2007; Grothmann & Reusswig, 2006; McBride, Emmons, & Lipkus, 2003; Perry & Lindell, 2008; Weinstein, 1989).
3. When faced with novel situations or difficult choices, people often make decisions based on lessons remembered from past events (e.g., Pillemer, 2001, 2003). Even when experiences are not fully remembered, they may trigger “gut feelings” that affect decisions in ways that remain outside our awareness (e.g., Damasio, Tranel, & Damasio, 1991).

Learning by Watching Others

Personal experience is a powerful teacher, but we can also learn by watching others. This is fortunate, because the consequences of some mistakes are so costly that we might not survive the learning process if we all had to discover everything on our own.

Among researchers in the field of social learning, terms such as *social influence*, *imitation*, and *observational learning* have rigorous—and sometimes disputed—definitions (Zentall, 2011, 2012). Rather than focusing on distinctions among these various types of learning, we will broadly consider any purposeful change in behavior that appears to be triggered, at least in part, by observing others. We will refer to this phenomenon informally as *learning-by-watching*.

More than a century ago, researchers sought evidence for learning-by-watching, often by examining the behavior of animals (e.g. Thorndike, 1898). Although researchers encountered many obstacles, Herbert and Harsh (1944) eventually reported convincing results in which house cats appeared to learn—or at least change their behavior—after watching others. Herbert and Harsh created a laboratory environment in which cats could gain access to food by manipulating levers, strings, turn tables, and foot pedals in particular ways. When naïve cats had to learn these tasks through personal trial and error, their skills developed slowly. In contrast, cats learned quickly when they watched other cats complete the tasks first, demonstrating a form of learning-by-watching that is now referred to as social influence.

Similar research in humans has demonstrated how *children* learn by watching adults and by observing each other. For instance, Bandura, Ross, and Ross (1961) demonstrated that children quickly copied the aggressive behaviors of a grownup, who famously pummeled and yelled at an inflatable clown doll named Bobo. With respect to learning-by-watching in *adults*, Santiesteban and Koran (1977) demonstrated that preservice teachers learned important instructional skills better if they first observed those skills being modeled by an experienced educator.

Studies such as these have established that when people learn new behaviors or refine existing skills, they often do so by watching others. A related issue involves the extent to which people learn to *avoid* certain behaviors if they witness

others suffering adverse consequences as a result. Some early evidence on this issue came from an elaborate experiment reported by Heisler (1974). Briefly, Heisler found that college students were less likely to cheat on an exam if they saw another student being punished for dishonesty. The effect was greater when students *saw* a supposed classmate being punished, rather than merely being warned that there would be severe consequences for cheating. In other words, the experience of witnessing a single person's punishment led to greater internalization of consequences, compared with merely hearing how those consequences would apply to everyone. A recent meta-analysis including this and 20 similar studies confirmed that in a variety of contexts learning-by-watching does help people avoid behaviors that are likely to result in adverse outcomes—a phenomenon known as vicarious punishment (Malouff, Thorsteinsson, Schutte, & Rooke, 2009).

The Mirror Neuron System

For health educators, the concept of learning-by-watching implies that people's health-related habits are influenced by behaviors and consequences observed in others. The neurological mechanisms behind this process are far from clear; however, some scholars believe clues may be found in the growing body of literature on specialized brain cells known as "mirror neurons."

Mirror neurons were discovered by chance as researchers in Parma Italy monitored neurological activity in macaque monkeys (di Pellegrino, Fadiga, Fogassi, Gallese, & Rizzolatti, 1992). The original purpose of the Parma study was to identify neurons that became active in the brain's premotor cortex when monkeys engaged in goal-directed behavior such as grasping food or manipulating objects. Unexpectedly, researchers noticed that many of these same neurons also became active when monkeys *saw* a researcher perform a similar action. In other words, the neurons behaved in comparable ways regardless of whether a mon-

key performed the action itself or saw the action performed by someone else. The essence of the finding was that mirror neurons “reflect” others’ actions within the brain.

The discovery of mirror neurons in monkeys triggered a cascade of research, and an analogous mirror neuron system was eventually confirmed in humans (Mukamel, Ekstrom, Kaplan, Iacoboni, & Fried, 2010). Many scholars now believe mirror neurons are at least partly responsible for our ability to understand the actions, intentions, and experiences of others—without which, observational learning would be impossible. A number of findings from this growing body of research are relevant to our discussion:

1. Mirror neurons fire in motor-related areas of the brain when we perform a particular goal-directed act *and* when we witness someone else engaging in a similar behavior. As a result, we understand others’ behavior because their actions are mirrored in areas of our brains that represent our own body parts. By linking behaviors we see in others to internal representations of those same acts in ourselves, the mirror neuron system may help us understand others’ actions “from the inside,” giving us a “first-person grasp of the motor goals and intentions of other individuals” (Rizzolatti & Sinigaglia, 2010, p. 264).
2. Mirror neurons (or systems analogous to them) also fire in *pain*-related areas of the brain. These neurons fire not only when we experience pain (e.g., by a needle plunged into the hand), but also when we see someone else being injured in a similar way (Bastiaansen, Thioux, & Keysers, 2009; Keysers, Kaas, & Gazzola, 2010; Morrison, Lloyd, Pellegrino, & Roberts, 2004; Morrison, Tipper, Fenton-Adams, & Bach, 2012).
3. Additionally, mirror neurons (or analogous systems) fire in *emotion*-related areas of

the brain when we experience emotions (e.g., disgust, joy, anger) and when we see someone else experiencing those emotions (Bastiaansen, et al. 2009; Chaminade, Zecca, Blakemore, Takanishi, Frith, et al. 2010; Jabbi, Bastiaansen, & Keysers, 2008; Keysers & Gazzola, 2009; Molenberghs, Cunnington, & Mattingley, 2012; Rizzolatti & Fabbri-Destro, 2009; Wicker, Keysers, Plailly, Royet, Gallese, & Rizzolatti, 2003).

This evidence has led many researchers to conclude that mirror neurons (or comparable systems) help us create empathetic mental representations of the experiences, actions, intentions, and emotions of others (e.g., Baird, Scheffer, & Wilson, 2011; Iacoboni, 2009; Keysers & Gazzola, 2009). Thus, the mirror neuron system may help explain observational learning by identifying neurological circuits through which we vicariously experience other people’s successes and failures.

Learning From Anecdotes and Stories

Besides learning from direct experience and by watching others, we also benefit from hearing or reading about events we have not witnessed firsthand. For instance, researchers have found that women’s decisions to schedule mammograms are often triggered by hearing about friends, family members, or others who have been diagnosed with breast cancer (Drossaert, Boer, & Seydel, 1996; Glanz, Resch, Lerman, Blake, Gorchov, & Rimer, 1992; King, Balshem, Ross, Rimer, & Seay, 1995; Vogel, Graves, Vernon, Lord, Winn, Peters, et al. 1990). As another example, Denscombe (2001) found that teenagers learn about alcohol, tobacco, and other drugs in part by listening to anecdotes told by friends and family members. Thus, some (but clearly not all) teenagers may be persuaded not to smoke by hearing about a friend’s mother who suffers from smoking-related cancer.

Stronger evidence of learning-from-stories comes from formal experiments in which participants are systematically exposed to anecdote-based health messages. For instance, O'Donnell, O'Donnell, San Doval, Duran, and Labes (1998) conducted a study among patients attending a clinic for Sexually Transmitted Diseases (STDs). Some of the study's participants watched a video that conveyed health information through stories about people who used condoms to avoid exposure to STDs. Other participants did not see the video, but they did receive regular clinic services. Researchers found that participants were more likely to protect themselves from STDs if they had been shown the story-based health video. In fact, patients who saw the video contracted significantly fewer new STD infections during the study period, compared with patients who did not see the film.




Although patients in the STD study did appear to change their behavior, the study's design made it impossible to determine what components of the video-based treatment were responsible for that change. For instance, behavior could have changed because of exposure to health-related anecdotes in the film, or alternatively, because of factors unrelated to the anecdotes (including the extra generalized information and experimental attention received by participants who watched the video). To create a clearer test of anecdotal learning, Chang (2008) conducted a study in which all participants received similar amounts of information and attention. The only difference between treatments in Chang's study was that some participants received information through anecdote-based messages, while others received information without anecdotes. Health messages in this study were designed to inform participants about emotional depression. Some participants read messages that consisted entirely of generalized (non-anecdotal) content. Others read messages with identical content *and* a story about the struggles of a college student who suffered from depression. The major finding was that participants became more willing to seek profes-

sional help for depression if they read messages containing a personal anecdote.

Chang's study demonstrated that anecdotal health information prompted an internalization of the message and a willingness to seek professional help. However, it could be argued that *willingness* is not the same as actually *seeking* help (an overt behavior). To test the impact of stories on overt behavior, Ricketts, Shanteau, McSpadden, and Fernandez-Medina (2010) observed participants' actions after exposure to health messages. In separate experimental sessions, 54 teams of participants assembled a child's swing set according to instructions in a step-by-step manual. The manual contained safety messages and warnings related to common assembly mistakes that have caused serious injuries to children in the past. For instance, improperly installed bolts and S-hooks can snag clothing and cause children to be strangled. Other mistakes can result in structural weakness, causing the frames of swings to collapse on top of children (Tinsworth & McDonald, 2001; CPSC, 2010).

Participants were not aware that the true purpose of the study was to test the effectiveness of the safety messages and warnings. Instead, they knew only that their job was to assemble a swing set as though a child they cared about was going to use it. Participants were randomly assigned so that 18 teams used an assembly manual that contained traditional safety warnings written in a terse, authoritarian style (see Figure 4a). Another 18 teams used an assembly manual with the terse warnings *and* a generalized explanation of injuries that have happened to children (Figure 4b). The remaining 18 teams used an assembly manual with terse warnings *and* anecdotes about injuries that have happened to particular children (Figure 4c). To control for the effects of informational content, concreteness, and other factors, the generalized explanations (Figure 4b) and anecdotal messages (Figure 4c) were designed to be equivalent with respect to causal details, reading levels, the use

Figure 4. Examples of non-anecdotal and anecdotal safety messages: a) terse authoritarian warning; b) warning plus non-anecdotal message; c) warning plus anecdotal message. Ricketts et al. (2010) found that assemblers built safer swings when product manuals contained anecdotal messages similar to c.

a.		WARNING: This product must be assembled according to the instructions in this manual. Failure to follow all instructions could result in collapse of the swing set during use.
b.		WARNING: This product must be assembled according to the instructions in this manual. Failure to follow all instructions could result in collapse of the swing set during use.
		<u>Collapsing Swing Sets Can Injure Children.</u> If a swing set collapses while a child is playing, the child may fall and the frame of the swing may even crash down on her. The child may suffer broken bones, internal injuries, and disfigurement. She may require extensive medical treatment. Death is even possible. Follow all instructions in the assembly manual. Swing sets may collapse if not assembled properly. Source: CPSC Recommendation #50711237.
c.		WARNING: This product must be assembled according to the instructions in this manual. Failure to follow all instructions could result in collapse of the swing set during use.
		<u>Girl Seriously Injured in Swing Set Collapse.</u> On July 4, 2005, a young girl was sitting on a swing in a park. Without warning, the entire swing set collapsed. The frame of the swing set crashed down, breaking her nose and several other bones in her face. Her injuries required extensive medical treatment. An investigation found that the swing set had not been assembled properly. Source: Consumer Product Safety Commission Case #50711237.

of personal pronouns, authoritative reference citations, etc.

After each team assembled the swing, researchers inspected it to identify preventable mistakes discussed in the safety messages. In support of the notion that anecdotes affect behavior, participants made about 20 percent fewer safety-related assembly errors when they used the assembly manual containing anecdote-based safety messages (compared with either of the other manuals). Interestingly, messages with generalized

information (Figure 4b) were no more effective than terse warnings alone (Figure 4a)—a finding that once again suggests people may fail to comprehend the personal relevance of facts when they do not have the benefit of learning by experience, watching others, or exposure to anecdotes.

Many other researchers have found that health-related knowledge, attitudes, intentions, and behaviors can be influenced by relevant anecdotes (see Ricketts, 2007 for a review). Still, qualities that make anecdotes effective are far from clear.

One possibility is that we simply pay better attention to stories, perhaps because they are more interesting than generalized information. Support for this notion was found by Hastall and Knobloch-Westerwick (2012). These researchers created online magazines that included articles about health issues such as air quality, glaucoma, stress, and tainted food. Some articles included personal accounts of victims, while others were based entirely on generalized data. Research participants were free to browse the magazines at their own pace. Consistent with the notion that anecdotes are intrinsically interesting, participants in the study were more likely to read articles containing anecdotes, compared with those based entirely on generalized data. This is important, because health messages are unlikely to have an impact unless the audience pays attention.

Some researchers have suggested other reasons why stories may be effective; for instance, it has been demonstrated that stories have a tendency to trigger deep thought and to produce strong, coherent memories. Cox (2001) emphasized the thought-provoking quality of stories in connection with anecdotal medical cases used to train doctors: “Each local situation provides relevance, context and circumstantial detail... The listener pays close attention and is vicariously involved with working out what is wrong...” (p. 862). As learners work through challenging cases and anecdotes, strong memories may be forged, potentially affecting related decisions for years to come. In fact, researchers in many fields have argued that we often make decisions more or less automatically based on conscious and nonconscious memories of past cases (e.g., Norman & Brooks, 1997; Pliske & Klein, 2003; Schank & Abelson, 1977).

Stories can stimulate deep cognitive processing, trigger powerful mental images, affect perceptions of new situations, and influence behavior—qualities that have led some scholars to argue that a gripping story may have nearly as much personal impact as an actual event (De Young & Monroe, 1996; Mar & Oatley, 2008;

Polichak & Gerrig, 2002; Stapel & Velthuisen, 1996). In fact, researchers have found that when we read or hear about the experiences of others, we comprehend in part because our brains activate many of the same visual and motor circuits that would be engaged if we were experiencing events in the story first-hand (Speer, Reynolds, Swallow, & Zacks, 2009; Willems & Casasanto, 2011). Findings such as these seem to corroborate the claims of Green and Brock (2000, 2002, 2005), who argued that stories are powerful because they often seem as real as episodes from our own lives. In the words of Green and Brock, readers and listeners are subjectively *transported* into the story’s setting. While immersed in the narrative, images may seem so vivid and emotions so strong that lines between story and personal experience become blurred. As a result, audiences may automatically incorporate the story’s central message into their own beliefs and values.

Researchers have discovered many other qualities that make anecdotes effective for triggering behavior change. For instance, the natural structure of a story makes anecdotes easier to read, comprehend, and remember (e.g., Graesser, Hauff-Smith, Cohen, & Pyles, 1980; Zabrocky & Moore, 1999; Zabrocky & Ratner, 1992). Furthermore, vicarious engagement in a vivid story seems to break down resistance to persuasion, making audience members less likely to reject the central theme of a message and more confident in their own ability to overcome barriers and adopt healthful behaviors (e.g., Chang, 2008; Dillard, Fagerlin, Cin, Zikmund-Fisher, & Ubel, 2010; Kreuter, Holmes, Alcaraz, Kalesan, Rath, Richert, et al., 2010; McQueen, Kreuter, Kalesan, & Alcaraz, 2011).

In short, there appear to be many reasons why stories are effective. These include the intrinsically interesting nature of stories, the propensity of stories for triggering complex problem solving, the depth of memories forged by stories, the ability of stories to promote learning in ways that are reminiscent of direct experience and learning-by-watching, the ease with which we comprehend

information in the context of a story, and the persuasive impact of hearing about a singular event that did (or could) happen.

USING ANECDOTES EFFECTIVELY IN SAFETY AND HEALTH MESSAGES

Although anecdotes can be compelling, effective communicators seldom rely on stories to the complete exclusion of other forms of information. A balanced mix of generalized facts, sprinkled with occasional anecdotes, is likely to be more effective than a purely one-dimensional approach. As noted by Sadoski (2001), “Knowledge includes particular examples and instances as well as the general definitions and principles that organize them. Learning concrete examples without abstract principles is piecemeal; learning abstract principles without concrete examples is empty...” (pp. 268-269). Generalized information *is* critical for understanding the facts surrounding complex issues. Rather than arguing against all use of abstract generalizations, this chapter recommends using anecdotes *in addition to* generalities so the broader implications of data will take on more personal meaning.

General Considerations for Message Development

Communicators must consider a variety of factors when developing health messages. In this section, we will consider how message effectiveness can be affected by audience characteristics and the presence of illustrations.

Audience Characteristics

Receptiveness to anecdotal messages may depend in part on an audience’s prior level of awareness about a health issue. In this regard, anecdotes are well suited for raising consciousness among people

who do not yet understand the personal relevance of a health topic. Generalized information, on the other hand, becomes more helpful once people have developed an interest in the issue (Braverman, 2008).

The impact of prior audience awareness was evident in a series of studies reported by Rook (1986, 1987). Participants in these studies were women, ranging in age from 34 to 79 years. Rook exposed the women to health messages about osteoporosis—a bone disorder that is most common in people over the age of 50. Some of the messages in Rook’s studies were based on generalized information, while others were based on anecdotes about the experiences of particular women. Rook found that anecdotal osteoporosis messages were more persuasive among younger women, but not among those who were older. Rook explained this finding as follows: For *young* women, the risk of osteoporosis seems remote because it is unlikely to affect them until a time in the distant future. Among these women, anecdotes help personalize the risk, making an otherwise obscure topic seem relevant. For *older* women, the prospect of developing osteoporosis is more immediate and the risk already seems personal. As a result, these women are able to benefit from generalized health information without need for the personalizing effect of anecdotes.

Rook’s studies demonstrated that anecdotal messages are especially useful when audiences do not yet understand the personal relevance of an issue. Other researchers have found anecdotal health messages to be particularly effective among certain cultural groups—especially if cultural relevance is woven into the central theme of the message. As an example, health communicators have successfully used culturally relevant stories to reach low-income Latinos with messages about early detection and prevention of colorectal cancer (Larkey & Gonzalez, 2007; Larkey, Lopez, Minnal, & Gonzalez, 2009). Culturally relevant anecdotal messages have also been used successfully to convey information about detection and prevention

of breast cancer to low-income African American women (Erwin, Ivory, Stayton, Willis, Jandorf, Thompson, et al., 2003; Kreuter, et al., 2010).

To sum up, anecdotal messages can be effective in many situations, but they appear particularly well suited for triggering a sense of personal relevance and for creating culturally-appropriate interventions.

The Benefit of Illustrations

Messages that include both words *and* images belong to a general class of communications known as multimedia presentations. Extensive research has shown that audiences often understand complex information better when it is presented using a combination of words and images, rather than words or images alone (Mayer, 2009). In the context of multimedia learning, words may include spoken or written text, and images may include drawings, photographs, videos, animations, or other instructive artwork.

One example of beneficial illustrations was reported by Austin, Matlack, Dunn, Kesler, and Brown (1995). These researchers found that medical patients understood discharge instructions better when those instructions included both text and illustrations. Similarly, Delp and Jones (2008) found that patients released from an emergency department were more likely to read, understand, and follow wound care instructions when the text was illustrated with relevant cartoons. Finally, Houts, Doak, Doak, and Loscalzo (2006) reviewed a broad range of research and concluded that pictures can increase the effectiveness of health messages, particularly among low-literacy populations. Houts et al. further suggested that images should be free of unnecessary or distracting details, they should depict people who are similar to the intended audience, and they should relate to the main points of the message.

Features of Effective Anecdotes

In the previous section, we considered how audience characteristics and the presence of illustrations relate to message effectiveness. Here, we will examine particular features of narratives that make certain anecdotes more effective than others. These features include relevance, freedom from distracting content, a sense of chronology, clear cause-and-effect relationships, story characters with whom audiences can identify, an element of surprise, a sense that events in the story are subject to human control, and the possibility of alternative outcomes for the story's main characters.

Relevance

As discussed to this point, research demonstrates that relevant, representative anecdotes can increase the impact of health and safety messages. Here, we will consider evidence demonstrating an opposing effect; namely, that message impact may be undermined if anecdotes are irrelevant or distracting. A simple demonstration of this effect was reported by Harp and Mayer (1998), who asked research participants to read brief passages of text that described how lightning is created in thunderstorms. Some participants read passages in which all of the text and illustrations were directly related to the formation of lightning. Other participants read materials that contained additional anecdotes and illustrations that were *unrelated* to lightning formation. After reading the passages, participants were tested over their understanding of processes involved in the development of lightning. As might be expected, irrelevant anecdotes and illustrations detracted from learning and resulted in poor test performance.

The findings of Harp and Mayer represent an instance of a broader phenomenon known as the *seductive detail effect*. Seductive details consist of information that is interesting, but unrelated to the central purpose of a message (see Rey, 2012 for a recent review). Seductive details may divert

attention or otherwise interfere with comprehension of the main lesson. To avoid the seductive detail effect, anecdotes must be carefully selected to reinforce or illustrate important points, and not detract from them.

As an example of distracting content that may inadvertently find its way into health messages, consider a series of experiments reported by Kyes, Brown, and Pollack (1991) and Wright and Kyes (1996). In this series of studies, research participants read health messages promoting the use of condoms as a method of safer sex. Overall, the researchers found that anecdotal messages could promote positive attitudes toward condom use—as long as the anecdotes did not distract audiences with sexual content that was unnecessarily erotic. For instance, attitudes toward condom use improved consistently when participants read non-erotic stories about a man and women *discussing* condoms. In contrast, improvement in attitudes was less consistent when participants read a story about an actual *sexual encounter* in which condoms were used. Apparently, the erotic content of the sexual-encounter story distracted some participants and prevented them from grasping the main point of the message.

In sum, anecdotes must be chosen and edited to focus attention on the main themes of a message. As illustrated in the condom study, pilot testing may be necessary to identify unanticipated distractions in anecdote-based messages.

Chronological Order and Cause-Effect Relationships

Although there are exceptions, people tend to comprehend stories better when events unfold in chronological order and when there are clear connections between causes and effects (e.g., Bower, Black, & Turner, 1979; De Young & Monroe, 1996; Pennington & Hastie, 1991). The importance of narrative order and causality has been examined frequently in the context of jury decisions. For instance, Voss, Wiley, and Sandak

(1999) examined judgments by mock jurors, with the goal of identifying story components that must be present if evidence is to be perceived as convincing. Participants in this study read stories (summaries of evidence) that had been manipulated to (a) make the evidence less complete, (b) make cause-and-effect relationships less certain (e.g., by replacing the word *must* with *probably*), and (c) by scrambling the chronological order of events. An important finding was that mock jurors lost confidence in evidence when there were disruptions in chronological order or cause-and-effect relationships. (Interestingly, incompleteness—the absence of some information—did not impair the perceived quality of evidence.) The results of this and many other studies strongly suggest stories are most credible when they include a chain of causal events that unfolds in a natural order.

Applying this notion to health communication, it is important to consider that cause-and-effect relationships may be clearest when anecdotes involve *acute exposures* and *traumatic injuries*. For instance, Figures 2, 3, and 5 tell the stories of traumatic injuries caused by acute exposures (one-time events). These anecdotes leave little doubt as to causes, effects, and methods of prevention. In Figure 2, for example, the injury was clearly caused by the blade of the mower. Furthermore, the injury would certainly have been prevented if the child had been kept away and not allowed to ride on her father's lap. In Figure 3, the injury obviously would not have happened if the child had been kept out of the mowing area. In Figure 5, a properly-constructed railing would almost certainly have prevented the man's fall and his resulting death.

Cause-and-effect relationships may be somewhat less clear when cases involve *illnesses*—especially those caused by chronic exposures. Figures 6 and 7 describe illnesses for which there is strong (but not irrefutable) evidence of cause-and-effect. Figure 6 relates the story of an illness seemingly caused by an *acute* exposure (a single needle-stick), while Figure 7 describes an illness

apparently caused by a *chronic* exposure (repeated low doses of a pesticide). Although there is reasonable evidence in both cases, it is possible to imagine alternative explanations for either illness. When audiences are not convinced that clear cause-and-effect relationships exist, messages will lack credibility and may be ineffective. To enhance credibility, it may be necessary to add some generalized data. For instance, Figure 6 states, “many healthcare workers have suffered diseases due to punctures from contaminated needles.” Likewise, Figure 7 notes, “...research has shown that 2,4-D can damage the liver.”

Some types of illnesses may have so many competing explanations that anecdotes should be minimized so attention can be focused almost exclusively on more convincing generalized data. Findings in line with this notion were obtained by Thrasher, Arillo-Santillán, Villalobos, Pérez-Hernández, Hammond, Carter, et al. (2012), who studied audience reactions to anti-smoking messages. Some messages in the study were non-anecdotal and discussed health effects as they apply to smokers in general. Other messages were anecdotal and discussed the experiences of particular smoking victims. An important finding of this study was that participants often rated the *non-anecdotal* messages as more credible, relevant, and powerful, compared with messages based on anecdotes. One possible interpretation of these findings is that anecdotes may have failed because there are simply too many competing explanations for any particular smoker’s illness: Although there is clear statistical evidence that lung cancer, heart disease, and a variety of other maladies are more common among those who smoke, these same illnesses can also be caused by factors unrelated to smoking, including genetics, environmental exposures, and general physical condition. It is therefore practically impossible to state that any particular disease would definitely have been avoided if the person didn’t smoke. For illnesses with many contributing factors, then, generalized (non-anecdotal) information may have

greater veracity, simply because it is more compatible with the probabilistic nature of the evidence.

In short, anecdotal evidence is most credible when it includes a convincing sequence of cause-and-effect relationships. When cause-and-effect cannot be established, generalized information should be added to support the argument. In the most extreme examples, where illnesses have many potential causes, it may be necessary to minimize the use anecdotes and rely mainly on generalized information. Again, pilot testing with the target audience is important.

Attributes of Story Characters

It has been argued that stories are most persuasive when message recipients identify with, or experience a connection to, one or more characters within the story (e.g., Dal Cin, Zanna, & Fong, 2004; De Young & Monroe, 1996; Slater, 2002). Identification with story characters is a complex process that is not fully understood; nevertheless, research suggests audiences are more likely to identify with characters under the following circumstances:

1. Characters share demographic similarities with the audience; for instance, they are similar with respect to age, race, ethnicity, or gender (e.g., Jose & Brewer, 1984).
2. Characters are perceived as similar to the audience with respect to important values, beliefs, and life experiences (e.g., Oatley & Gholamain, 1997).
3. Characters are likeable, and the audience can imagine having a personal relationship with them (e.g., Slater, & Rouner, 2002).

Some research suggests audience members may be influenced even by seemingly minor similarities between themselves and story characters. For instance, Stapel, Reicher, and Spears (1994) reported the results of a study in which university

Figure 5. Traumatic injury with clear causation (© 2012 Mitch Ricketts, used with permission)

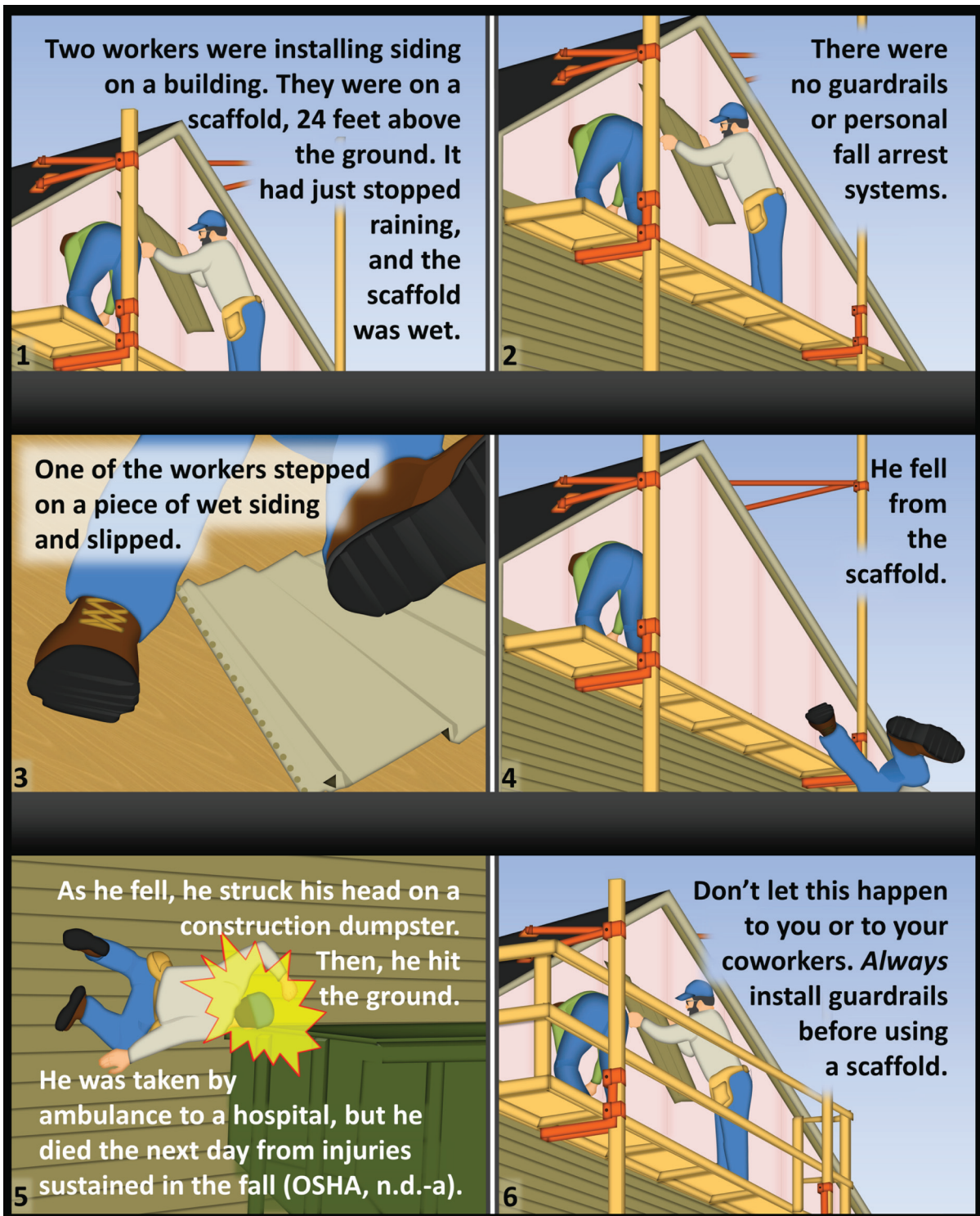


Figure 6. Illness with a probable causal link to an acute exposure (© 2012 Mitch Ricketts, used with permission)

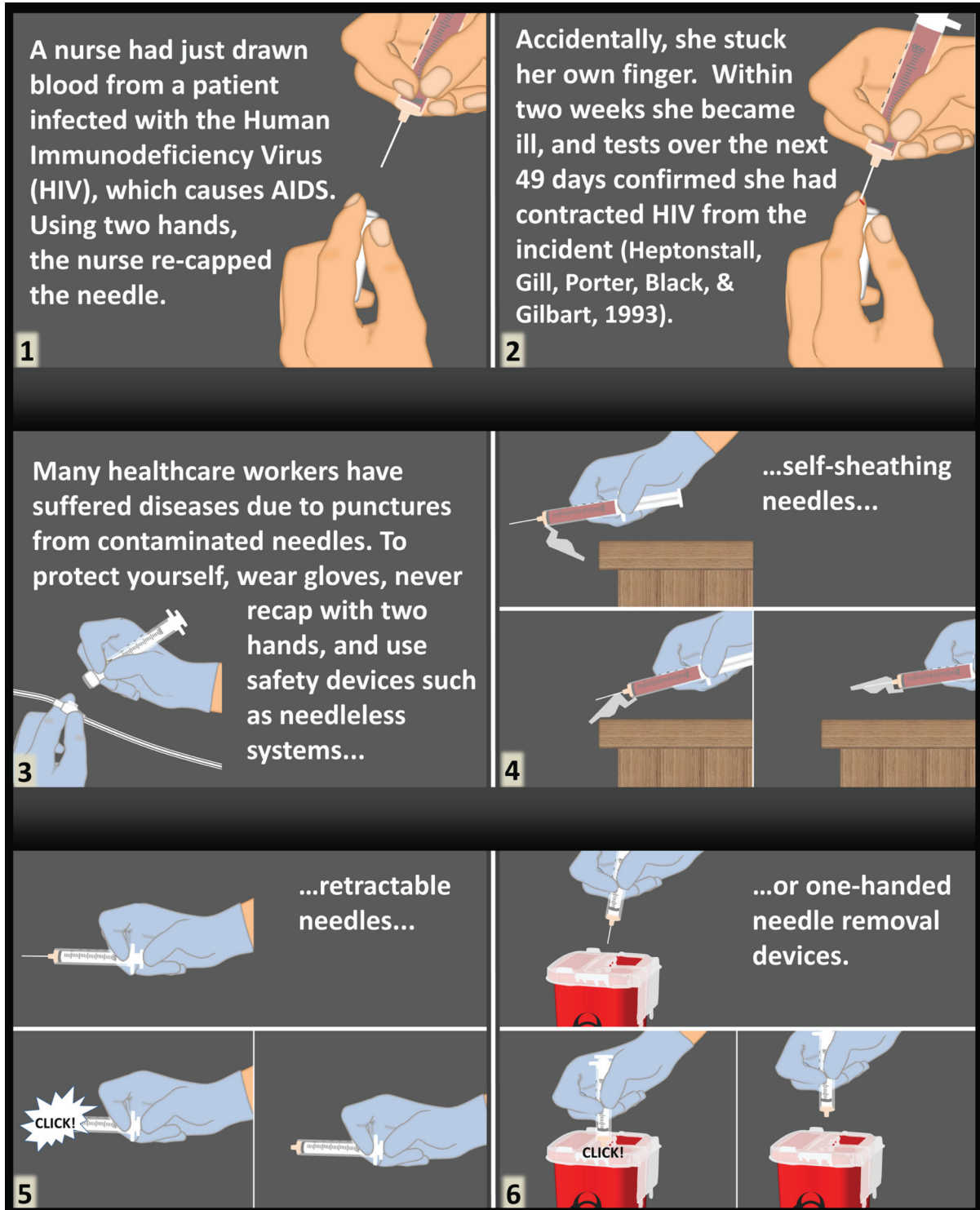



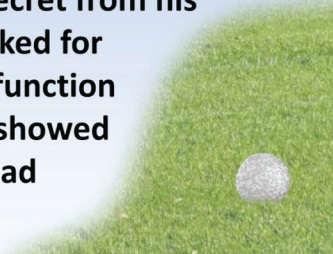



Figure 7. Illness with probable causal link to chronic exposure (© 2012 Mitch Ricketts, used with permission)

<p>A 65 year old man was hospitalized with extreme fatigue, dark urine, upper abdominal discomfort, and jaundice. Medical tests confirmed acute hepatitis—an inflammation of the liver.</p>  <p>1</p>	<p>The man's medical history indicated no known risk factors for hepatitis, so doctors told him his condition might have been caused by toxic chemicals. After some thought, the man reported that he played golf every day and often licked the golf balls to keep them clean.</p> <p>2</p>
<p>The herbicide 2,4-D was used at the golf course, and there were signs warning golfers not to lick golf balls. Doctors suspected this was the cause of his hepatitis because research has shown that 2,4-D can damage the liver.</p>  <p>3</p>	<p>At his doctors' urging, the man stopped licking the golf balls. Within two months, he felt well again and his liver function tests returned to normal.</p>  <p>4</p> <p>However...</p>
<p>...the man was a skeptic, and after a few months he resumed licking the golf balls. Keeping this information secret from his doctors, he asked for another liver function test. The test showed his hepatitis had reappeared.</p>  <p>5</p>	<p>Finally convinced, the man stopped licking golf balls. His liver tests were soon back to normal, and his illness did not return (Leonard, Burke, O'Keane, & Doyle, 1997).</p>  <p>6</p> <p>When golfing, carry a damp cloth to clean golf balls. Never use your tongue.</p>

physics students read a story about a highway accident. Some participants read a story in which the victim was described as a physicist (similar to them). Others read a story that was identical in every respect, except the victim was described as either a construction worker or psychologist. Still others read a story with no clear description of the victim. Researchers found that participants judged the risk of highway accidents to be greater when they read stories in which the victim was described as more similar to themselves (i.e., a physicist). Comparable results were obtained in a separate study reported by Stapel and Velthuisen (1996).

As an example of the influence of more important attributes, such as story characters' identified values and experiences, consider an experiment reported by Sherer and Rogers (1984) in which university undergraduates read messages about alcohol abuse. Some participants read messages that focused on statistical facts about problem drinking and its effects. Other participants read messages that included anecdotes about two problem drinkers. Overall, participants who read anecdotal messages reported greater intentions to moderate their alcohol use—but only if the anecdotes' central characters (the problem drinkers) were described as similar to participants *and* as being very upset about the personal consequences of their drinking.

Reports such as these suggest that whenever possible, anecdotal health messages should be designed so the story's central character appears to have something in common with readers. On this basis, we might expect the message in Figure 5 to resonate most strongly with male construction workers, while the message in Figure 6 is likely to be taken most seriously by female nurses. In any case, audiences are *unlikely* to identify with characters who are portrayed as clearly different in ways audience members consider relevant. For instance, highly-skilled workers may fail to internalize a message if the central character is described as "young," "untrained," a "new worker," or otherwise less competent than the audience.

Since these adjectives suggest the character is dissimilar (and perhaps defective), experienced workers might dismiss the anecdotal incident as something that could never happen to them.

Familiar Settings, Surprising Events

According to Schank and Abelson (1977), stories are most effective when they are familiar enough to be understood, but surprising enough to be interesting. *Familiar* contexts are important because they relate new information to prior knowledge—which often makes learning easier (e.g., Novak 2009). *Unexpected* events are powerful because they capture attention, elicit careful consideration, and create strong memories (e.g., Gendolla & Koller, 2001; Stangor & McMillan, 1992).

Brain-imaging studies confirm the notion that people take special note when something unexpected happens in a familiar context. For instance, when we see someone perform a familiar task (e.g., pouring wine), the occurrence of an unexpected event (spilling the wine) triggers an interaction between our mirror neuron system and other parts of the brain, signaling the action was unintentional, strange, or a mistake (Buccino, Baumgaertner, Colle, Buechel, Rizzolatti, & Binkofski, 2007; Malfait, Valyear, Culham, Anton, Brown, and Gribble, 2010; Rizzolatti & Fabbri-Destro, 2009). Distinctive neurological responses have also been identified when people read about story characters behaving in unexpected ways (Deen & McCarthy, 2010).

To sum up, research suggests anecdotes are most compelling when they portray events and contexts with enough familiarity that audience members can predict the intended outcome—thus ensuring their surprise at any unusual ending. Anecdotes with these characteristics apparently promote learning by challenging our prior beliefs and experiences. For instance, when reading Figure 3, parents and mower operators might be surprised to learn that small children are likely to run up behind mowers without being noticed. Like-

wise, golfers who read Figure 7 may be surprised to learn that golf balls can become contaminated with pesticide residues to the extent that they may cause serious illness if licked on a regular basis.

Personal Control and Responsibility for Events

There is considerable evidence that people are more inclined to change their health-related behaviors when outcomes are perceived as important and fully under their own control (e.g., Glanz, Rimer, & Viswanath, 2008). This means health messages should encourage preventive measures that can be implemented effectively *by message recipients*; otherwise, those recipients may not be able to identify clear courses of action.

To illustrate, the message in Figure 5 was developed for an audience consisting of construction *workers*. The message therefore encourages workers to take responsibility for their own safety and that of their coworkers by never working from a scaffold unless guardrails are in place. Had the message been developed for construction *supervisors*, on the other hand, it would advise them to take actions for which they are responsible, such as establishing and enforcing rules about guardrails on scaffolds. As another example, the message in Figure 7 was developed for *golfers*; thus, the final paragraph advises them to carry a damp cloth and refrain from using their tongues to clean golf balls—preventive measures that are fully under their own control. A parallel message for *golf course managers* would emphasize administrative responsibilities, such as reducing the use of pesticides, installing mechanical ball washing stations, and clearly communicating risks to golfers.

Personal responsibility can be highly motivating—especially when audience members believe they are accountable for the welfare of others. As an example, consider the sense of obligation for child safety that parents, property owners, and mower operators are likely to feel when they read

the messages in Figures 2 and 3. The impact of personal responsibility for others was convincingly demonstrated in an experiment during which Solomon and DeJong (1988) showed a gonorrhea prevention video to male patients being treated for the disease at a clinic. The video included an anecdotal account of a man named Bob telling his girlfriend about his infection while also encouraging her to visit a doctor for testing and treatment. Later in the video, Bob related a separate incident he deeply regretted, in which he re-infected a woman because he didn't return to the clinic for a required test-of-cure after his symptoms disappeared. The video proved to be effective: Patients who watched it demonstrated greater knowledge about gonorrhea and were more likely to return to the clinic for a test-of-cure. The video's success was attributed in part to its emphasis on the harm that would come to women if men didn't follow the recommendations. This emphasis was included because pilot research with the audience indicated men who used the clinic felt a strong altruistic sense of responsibility to protect women.

Possibility of Alternative Outcomes

Researchers have found that health messages can be especially persuasive if they stimulate audiences to think about how people could have acted differently to avoid a tragedy (Gleicher, Boninger, Strathman, Armor, Hetts, & Ahn, 1995; Tal-Or, Boninger, Poran, & Gleicher, 2004). For instance, the message in Figure 2 is designed to elicit thoughts about how the injury would have been avoided if the father had refused to let his daughter ride along, as he had always done before: “He only gave her one ride, but once was all it took.”

Contemplating alternative outcomes (i.e., “what might have been”) is a phenomenon known as counterfactual thinking (Tal-Or et al. 2004). Counterfactual thinking may promote learning by triggering deep thought and mental rehearsal of actions that could prevent an adverse outcome.

Counterfactual thinking may also help us imagine the regret we would experience if a similar tragedy were to befall us. This is important because anticipated regret can have a powerful impact on current and future decisions (Connolly & Reb, 2005)

Sources of Health and Safety Anecdotes

Health communicators can obtain illness and injury stories from a variety of sources including news reports, medical journals, and health surveillance databases. The anecdotes in Figures 2 and 3 were adapted from news reports found with the help of ordinary Internet search engines. Reports such as these can also be located through commercial news clipping services. Since news reports may not be the most reliable sources for safety and health information, they should be used only when the facts of a case are obvious and undisputed.

Medical journals represent a more authoritative source of injury and illness anecdotes. As an example, the story in Figure 7 was summarized from a case that was reported in great detail in a medical journal. Similarly, the anecdote in Figure 6 is from a well-known case first reported in the early 1980s (Anonymous, 1984) and expanded upon in later reports. Since the byline “Anonymous” is unlikely to engender trust, a later citation was used in the health message (Heptonstall et al. 1993).

Searchable databases operated by government agencies often contain large numbers of injury and illness case reports. One of the largest publicly-accessible databases is the National Electronic Injury Surveillance System (NEISS), run by the CPSC (n.d.a). NEISS compiles hundreds of thousands of new case reports each year from hospital emergency rooms throughout the United States. The anecdote in Figure 4c is based on a report from this database.

Other publicly-accessible databases are operated by the Occupational Safety and Health

Administration (OSHA, n.d.-b) and the National Institute for Occupational Safety and Health (NIOSH, n.d.). The OSHA database includes a large number and variety of reports involving workplace incidents. The anecdote in Figure 5 is based on an OSHA report. By comparison, the NIOSH database is smaller and less diverse, but NIOSH reports tend to include more detail. Finally, the American Association of Poison Control Centers (n.d.) publishes an annual report, with an appendix that includes anecdotal details for a number of representative poisoning cases.

Regardless of the source, illness and injury reports must usually be re-written to eliminate unnecessary details, minimize technical language, and to clarify cause-and-effect relationships. Furthermore, some reports may need to be purged of personal information to avoid disclosing the identities of victims, family members, and others who have suffered tragic consequences.

FUTURE DIRECTIONS

Anecdote-based interventions can be adapted to a variety of contexts, making these messages especially promising for future health communication efforts. As an example, illustrated anecdotes (such as those shown in this chapter) can be incorporated into presentational slides or printed handouts to stimulate discussion in face-to-face informational sessions. Illustrated anecdotes can also serve as the basis for animated instructional video sequences in Web-based interventions and distance education. As a final example, printed health messages based on illustrated anecdotes can be mailed to households or made available as “pickups” at community meeting places.

Interventions based on anecdotes are likely to become more commonplace as health communicators focus increasingly on the most vulnerable segments of society. For instance, American researchers have demonstrated that culturally-relevant story-based interventions can be particularly

effective among vulnerable minority populations such as low-income African-Americans and Latinos (e.g., Erwin et al., 2003; Larkey & Gonzalez, 2007). Other vulnerable populations have been reached with a variety of story-based interventions worldwide. One example is the approach known as entertainment-education, which employs culturally-appropriate stories of fictional characters in popular television series, radio programs, and comic books. Entertainment-education has been used to promote important public health goals such as safer-sex behavior and cancer screening in developed and developing nations across the globe (Singhal, Cody, Rogers, & Sabido, 2004).

As anecdote-based health interventions proliferate, scholars will need to develop ever more effective methods of evaluating their impact. In that respect, past research findings have sometimes seemed contradictory, particularly with respect to anecdotes having markedly different characteristics. For instance, some scholars have noted that anecdotal messages may lead either to improved *or* impaired decision making, depending on how the messages are designed. Some of this apparent inconsistency can be resolved by considering the obviously different purposes of certain research laboratories. As a case in point, researchers in the *heuristics and biases* tradition often probe the limits of human reason by using anecdotes that are intentionally designed to confuse or promote bad choices. In these cases, impaired learning and poor decision making *should* be the expected outcome (e.g., Dennis & Babrow, 2005; Gibson, & Zillmann, 1994; Ubel, Jepson, & Baron, 2001). In contrast, when anecdotes are designed to clarify and focus attention on important health concepts, we should expect improvements in learning, motivation, decision quality, behavior, illness rates, or similar measures (e.g., de Wit, Das, & Vet, 2008; Hong, 2011; Larkey & Gonzalez, 2007; Larkey, et al. 2009; Ricketts et al. 2010).

Other seeming inconsistencies in research may be due in part to the wide range of narrative structures that are included under such broad head-

ings as anecdotes, exemplars, stories, narratives, mental simulations, and entertainment-education. At one extreme, researchers may study the impacts of minimalist forms of anecdotes that consist only of single sentences or quotations with little or no contextual background. Researchers at the opposite extreme may study the more powerful impacts of classic novels, feature-length movies, and long-running soap operas.

Some apparent inconsistencies in research may also be due to methodological differences in the extent to which researchers engage participants in narrative events. The least engaging protocols merely require participants to passively read, watch, or listen to a story. The most engaging procedures require participants to create their own stories through mental simulation, story-writing, story-telling, stage-acting, or singing. Given the wide variety of narratives that have been studied, it seems unlikely that consistent findings will be obtained until results are grouped according to some well-defined taxonomy of story forms.

Still more seemingly inconsistent findings may relate to the variety of outcome variables that are typically evaluated. Educational researchers, for instance, are likely to examine recall of information, using objective tests that probe declarative knowledge. Public health researchers, in contrast, are likely to measure changes in behavior or changes in illness and injury rates. Persuasion and marketing scholars may examine still other outcomes, including changes in attitudes and purchasing intentions. When considering research results, it is important to distinguish among different categories of outcome variables because results with one type of outcome may not carry over to others. As a case in point, consider that anecdotal messages sometimes trigger important changes in behavior *without* being accompanied by corresponding gains in declarative knowledge (e.g., Ricketts et al, 2010; Solomon & DeJong, 1988; Solomon, DeJong, & Jodrie, 1988).

Worldwide, research has shed considerable light on methods for using anecdotes effectively

in health messages. Nevertheless, results must always be interpreted in the context of research methodologies—particularly with respect to differences in narrative structures, audience engagement, and measured outcomes.

CONCLUSION

Anecdotes bring concepts to life by giving context and personal relevance to generalized information—apparently through many of the same neurological pathways that help us extract meaning from direct experience and observation. Although anecdote-based interventions can be effective in a variety of contexts, they have proven especially useful for reaching socially vulnerable populations throughout the world.

Research suggests anecdotal health messages may have the greatest impact when crafted according to the following principles:

1. Anecdotes and generalized information should be combined in a balanced manner to capitalize on the respective strengths of these two forms of communication. Initially, anecdotes can be used to capture attention and trigger deep reflection. Once an audience understands the personal relevance of the message, generalized information can be incorporated to provide a more thorough understanding of hazards, risk factors, and preventive measures.
2. Often, the most effective messages are multimedia communications—meaning they include a combination of words and images. Words in multimedia messages may include written or spoken language, and images may include drawings, photographs, videos, animations, and other instructive artwork.
3. It is important to select anecdotes carefully so they explain and highlight the most important points of a message, without creating distractions.
4. When composing anecdotal messages, it is usually best to describe story events in chronological order, with clear connections between causes and effects.
5. The best anecdotes have at least one important character with whom audience members can identify—either because of similarities with the audience or because the character is portrayed as someone with whom audience members can imagine having a personal relationship.
6. The best anecdotes describe events and settings that are familiar enough to be understood, and outcomes that are surprising enough to spark interest and trigger deep thought.
7. Anecdotes should emphasize preventive measures that fall within the control and responsibility of audience members.
8. To elicit deep reflection, anecdotes should imply alternative outcomes that would be possible if story characters had chosen different courses of action.

Although scholars have learned much about the use of anecdotes in health and safety messages, plenty of unanswered questions remain. In particular, more research is needed to better understand how diverse narrative structures and levels of audience engagement affect relevant outcomes including attitudes, intentions, knowledge, behavior, illnesses, and injuries.

REFERENCES

American Association of Poison Control Centers. (n.d.). *Annual reports*. Retrieved December 18, 2012, from <http://www.aapcc.org/annual-reports/>

Anonymous, . (1984). Needlestick transmission of HTLV-III from a patient infected in Africa. *Lancet*, 2(8146), 1376–1377. PMID:6150372.

- Ashton, C. M., Houston, T. K., Williams, J. H., Larkin, D., Trobaugh, J., Crenshaw, K., & Wray, N. P. (2010). A stories-based interactive DVD intended to help people with hypertension achieve blood pressure control through improved communication with their doctors. *Patient Education and Counseling*, 79(2), 245–250. doi:10.1016/j.pec.2009.09.021 PMID:19833472.
- Austin, P. E., Dunn, K. A., Kesler, C., & Brown, C. K. (1995). Discharge instructions: Do illustrations help our patients understand them? *Annals of Emergency Medicine*, 25(3), 317–320. doi:10.1016/S0196-0644(95)70286-5 PMID:7532382.
- Baird, A. D., Scheffer, I. E., & Wilson, S. J. (2011). Mirror neuron system involvement in empathy: A critical look at the evidence. *Social Neuroscience*, 6(4), 327–335. doi:10.1080/17470919.2010.547085 PMID:21229470.
- Bandura, A., Ross, D., & Ross, S. A. (1961). Transmission of aggression through imitation of aggressive models. *Journal of Abnormal and Social Psychology*, 63(3), 575–582. doi:10.1037/h0045925 PMID:13864605.
- Bastiaansen, J. A. C. J., Thioux, M., & Keysers, C. (2009). Evidence for mirror systems in emotions. *Philosophical Transactions of the Royal Society B. Biological Sciences*, 364(1528), 2391–2404. doi:10.1098/rstb.2009.0058 PMID:19620110.
- Bechara, A., Damasio, A. R., Damasio, H., & Anderson, S. W. (1994). Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition*, 50(1), 7–15. doi:10.1016/0010-0277(94)90018-3 PMID:8039375.
- Bower, G. H., Black, J. B., & Turner, T. J. (1979). Scripts in memory for text. *Cognitive Psychology*, 11(2), 177–220. doi:10.1016/0010-0285(79)90009-4.
- Braverman, J. (2008). Testimonials versus informational persuasive messages: The moderating effect of delivery mode and personal involvement. *Communication Research*, 35(5), 666–694. doi:10.1177/0093650208321785.
- Brickman, P. (1978). Is it real? In Harvey, J. H., Ickes, W., & Kidd, R. F. (Eds.), *New directions in attributional research (Vol. 2, pp. 5–34)*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Buccino, G., Baumgaertner, A., Colle, L., Buechel, C., Rizzolatti, G., & Binkofski, F. (2007). The neural basis for understanding non-intended actions. *NeuroImage*, 36, T119–T127. doi:10.1016/j.neuroimage.2007.03.036 PMID:17499159.
- Buelow, M. T., & Suhr, J. A. (2009). Construct validity of the Iowa gambling task. *Neuropsychology Review*, 19(1), 102–114. doi:10.1007/s11065-009-9083-4 PMID:19194801.
- Chaminade, T., Zecca, M., Blakemore, S. J., Takanishi, A., Frith, C. D., & Micera, S. et al. (2010). Brain response to a humanoid robot in areas implicated in the perception of human emotional gestures. *PLoS ONE*, 5(7), e11577. doi:10.1371/journal.pone.0011577 PMID:20657777.
- Chang, C. (2008). Increasing mental health literacy via narrative advertising. *Journal of Health Communication*, 13(1), 37–55. doi:10.1080/10810730701807027 PMID:18307135.
- Connolly, T., & Reb, J. (2005). Regret in cancer-related decisions. *Health Psychology*, 24(4S), S29–S34. doi:10.1037/0278-6133.24.4.S29 PMID:16045415.
- Cook, T. (2008). Saskatchewan child nearly killed by riding mower. *The Canadian Press*. Retrieved November 28, 2012, from: <http://www.thestar.com/News/Canada/article/427950>

- Cox, K. (2001). Stories as case knowledge: Case knowledge as stories. *Medical Education*, 35(9), 862–866. doi:10.1046/j.1365-2923.2001.01016.x PMID:11555224.
- Dal Cin, S., Zanna, M. P., & Fong, G. T. (2004). Narrative persuasion and overcoming resistance. In Knowles, E. S., & Linn, J. A. (Eds.), *Resistance and persuasion* (pp. 175–191). Mahwah, NJ: Lawrence Erlbaum Associates.
- Damasio, A. R., Tranel, D., & Damasio, H. (1991). Somatic markers and the guidance of behavior: Theory and preliminary testing. In Levine, H. S., Eisenberg, H. M., & Benton, A. L. (Eds.), *Frontal lobe function and dysfunction* (pp. 217–229). New York: University Press.
- de Wit, J. B. F., Das, E., & Vet, R. (2008). What works best: Objective statistics or a personal testimonial? An assessment of the persuasive effects of different types of message evidence on risk perception. *Health Psychology*, 27(1), 110–115. doi:10.1037/0278-6133.27.1.110 PMID:18230021.
- De Young, R., & Monroe, M. C. (1996). Some fundamentals of engaging stories. *Environmental Education Research*, 2(2), 171–187. doi:10.1080/1350462960020204.
- Deen, B., & McCarthy, G. (2010). Reading about the actions of others: Biological motion imagery and action congruency influence brain activity. *Neuropsychologia*, 48(6), 1607–1615. doi:10.1016/j.neuropsychologia.2010.01.028 PMID:20138900.
- Delp, C., & Jones, J. (2008). Communicating information to patients: The use of cartoon illustrations to improve comprehension of instructions. *Academic Emergency Medicine*, 3(3), 264–270. doi:10.1111/j.1553-2712.1996.tb03431.x PMID:8673784.
- Dennis, M. R., & Babrow, A. S. (2005). Effects of narrative and paradigmatic judgmental orientations on the use of qualitative and quantitative evidence in health-related inference. *Journal of Applied Communication Research*, 33(4), 328–347. doi:10.1080/00909880500278137.
- Denscombe, M. (2001). Critical incidents and the perception of health risks: The experiences of young people in relation to their use of alcohol and tobacco. *Health Risk & Society*, 3(3), 293–306. doi:10.1080/13698570120079895.
- di Pellegrino, G., Fadiga, L., Fogassi, L., Gallese, V., & Rizzolatti, G. (1992). Understanding motor events: A neurophysiological study. *Experimental Brain Research*, 91(1), 176–180. doi:10.1007/BF00230027 PMID:1301372.
- Dillard, A. J., Fagerlin, A., Cin, S. D., Zikmund-Fisher, B. J., & Ubel, P. A. (2010). Narratives that address affective forecasting errors reduce perceived barriers to colorectal cancer screening. *Social Science & Medicine*, 71(1), 45–52. doi:10.1016/j.socscimed.2010.02.038 PMID:20417005.
- Drossaert, C., Boer, H., & Seydel, E. (1996). Perceived risk, anxiety, mammogram uptake, and breast self-examination of women with a family history of breast cancer: The role of knowing to be at increased risk. *Cancer Detection and Prevention*, 20(1), 76–85. PMID:8907207.
- Erwin, D. O., Ivory, J., Stayton, C., Willis, M., Jandorf, I., & Thompson, H. et al. (2003). Replication and dissemination of a cancer education model for African American women. *Cancer Control*, 10(5), 13–21. PMID:14581900.
- Ezingard, J., & Bowen-Schrire, M. (2007). Triggers of change in information security management practices. *Journal of General Management*, 32(4), 53–72.

- Ford, E. S., Zhao, G., Tsai, J., & Li, C. (2011). Low-risk lifestyle behaviors and all-cause mortality: Findings from the national health and nutrition examination survey III mortality study. *American Journal of Public Health, 101*(10), 1922–1929. doi:10.2105/AJPH.2011.300167 PMID:21852630.
- Gendolla, G. H. E., & Koller, M. (2001). Surprise and motivation of causal search: How are they affected by outcome valence and importance? *Motivation and Emotion, 25*(4), 327–349. doi:10.1023/A:1014867700547.
- Gibson, R., & Zillmann, D. (1994). Exaggerated versus representative exemplification in news reports. *Communication Research, 21*(5), 603–624. doi:10.1177/009365094021005003.
- Glanz, K., Resch, N., Lerman, C., Blake, A., Gorchov, P., & Rimer, B. (1992). Factors associated with adherence to breast-cancer screening among working women. *Journal of Occupational and Environmental Medicine, 34*(11), 1071–1078. doi:10.1097/00043764-199211000-00008 PMID:1432296.
- Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). (2008). *Health behavior and health education: Theory, research, and practice*. San Francisco, CA: Jossey-Bass.
- Gleicher, F., Boninger, D. S., Strathman, A., Armor, D. A., Hetts, J. J., & Ahn, M. (1995). With an eye toward the future: The impact of counterfactual thinking on affect, attitudes and behavior. In Roese, N. J., & Olson, J. M. (Eds.), *What might have been: The social psychology of counterfactual thinking* (pp. 283–304). Mahwah, NJ: Lawrence Erlbaum Associates.
- Graesser, A. C., Hauff-Smith, K., Cohen, A. D., & Pyles, L. D. (1980). Advanced outlines, familiarity, and text genre on retention of prose. *Journal of Experimental Education, 48*(4), 281–290.
- Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology, 79*(5), 701–721. doi:10.1037/0022-3514.79.5.701 PMID:11079236.
- Green, M. C., & Brock, T. C. (2002). In the mind's eye: Transportation-imagery model of narrative persuasion. In Green, M. C., Strange, J. J., & Brock, T. C. (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 315–341). Mahwah, NJ: Lawrence Erlbaum Associates.
- Green, M. C., & Brock, T. C. (2005). Persuasiveness of narratives. In Brock, T. C., & Green, M. C. (Eds.), *Persuasion: Psychological insights and perspectives* (2nd ed., pp. 117–142). Thousand Oaks, CA: Sage Publications.
- Greene, K., & Brinn, L. (2003). Messages influencing college women's tanning bed use: Statistical versus narrative evidence format and a self-assessment to increase perceived susceptibility. *Journal of Health Communication, 8*(5), 443–461. doi:10.1080/713852118 PMID:14530147.
- Grothmann, T., & Reusswig, F. (2006). People at risk of flooding: Why some residents take precautionary action while others do not. *Natural Hazards, 38*(1), 101–120. doi:10.1007/s11069-005-8604-6.
- Hammig, B., Childers, E., & Jones, C. (2009). Injuries associated with the use of riding mowers in the United States, 2002-2007. *Journal of Safety Research, 40*(5), 371–375. doi:10.1016/j.jsr.2009.07.005 PMID:19932318.
- Harp, S. F., & Mayer, R. E. (1998). How seductive details do their damage: A theory of cognitive interest in science learning. *Journal of Educational Psychology, 90*(3), 414–433. doi:10.1037/0022-0663.90.3.414.

- Hastall, M. R., & Knobloch-Westerwick, S. (2012). Severity, efficacy, and evidence type as determinants of health message exposure. *Health Communication*. doi:10.1080/10410236.2012.690175 PMID:22809248.
- Heisler, G. (1974). Ways to deter law violators: Effects of levels of threat and vicarious punishment on cheating. *Journal of Consulting and Clinical Psychology*, 42(4), 577–582. doi:10.1037/h0036709.
- Heptonstall, J., Gill, O. N., Porter, K., Black, M. B., & Gilbert, V. L. (1993). Health care workers and HIV: Surveillance of occupationally acquired infection in the United Kingdom. *CDR Review*, 3(11), R147–R158. PMID:7694732.
- Herbert, M. J., & Harsh, C. M. (1944). Observational learning by cats. *Journal of Comparative Psychology*, 37(2), 81–95. doi:10.1037/h0062414.
- Hong, Y. (2011). *Narrative and frame in health communication: The influence of narrative transportation to promote detection behavior*. (Unpublished masters thesis). University of Alabama, Tuscaloosa, AL.
- Houston, T. K., Cherrington, A., Coley, H. L., Robinson, K. M., Trobaugh, J. A., & Williams, J. H. et al. (2011). The art and science of patient storytelling—Harnessing narrative communication for behavioral interventions: The ACCE project. *Journal of Health Communication*, 16(7), 686–697. doi:10.1080/10810730.2011.551997 PMID:21541875.
- Houts, P. S., Doak, C. C., Doak, L. G., & Loscalzo, M. J. (2006). The role of pictures in improving health communication: A review of research on attention, comprehension, recall, and adherence. *Patient Education and Counseling*, 61(2), 173–190. doi:10.1016/j.pec.2005.05.004 PMID:16122896.
- Iacoboni, M. (2009). Imitation, empathy, and mirror neurons. *Annual Review of Psychology*, 60, 653–670. doi:10.1146/annurev.psych.60.110707.163604 PMID:18793090.
- Jabbi, M., Bastiaansen, J., & Keysers, C. (2008). A common anterior insula representation of disgust observation, experience and imagination shows divergent functional connectivity pathways. *PLoS ONE*, 3(8), e2939. doi:10.1371/journal.pone.0002939 PMID:18698355.
- Jamner, M. S., Wolitski, R. J., & Corby, N. H. (1997). Impact of a longitudinal community HIV intervention targeting injecting drug users' stage of change for condom and bleach use. *American Journal of Health Promotion*, 12(1), 15–24. doi:10.4278/0890-1171-12.1.15 PMID:10170430.
- Jose, P. E., & Brewer, W. F. (1984). Development of story liking: Character identification, suspense and outcome resolution. *Developmental Psychology*, 20(5), 911–924. doi:10.1037/0012-1649.20.5.911.
- Keysers, C., & Gazzola, V. (2009). Expanding the mirror: Vicarious activity for actions, emotions, and sensations. *Current Opinion in Neurobiology*, 19(6), 666–671. doi:10.1016/j.conb.2009.10.006 PMID:19880311.
- Keysers, C., Kaas, J. H., & Gazzola, V. (2010). Somatosensation in social perception. *Nature Reviews. Neuroscience*, 11(6), 417–428. doi:10.1038/nrn2833 PMID:20445542.
- King, E. S., Balshem, A., Ross, E., Rimer, B., & Seay, J. (1995). Mammography interventions for 65- to 74-year-old HMO women: Program effectiveness and predictors of use. *Journal of Aging and Health*, 7(4), 529–551. doi:10.1177/089826439500700404 PMID:10165968.

- Kreuter, M. W., Holmes, K., Alcaraz, K., Kalesan, B., Rath, S., & Richert, M. et al. (2010). Comparing narrative and informational videos to increase mammography in low-income African American women. *Patient Education and Counseling*, 81(Suppl), S6–S14. doi:10.1016/j.pec.2010.09.008 PMID:21071167.
- Kyes, K. B., Brown, I. S., & Pollack, R. H. (1991). The effect of exposure to a condom script on attitudes toward condoms. *Journal of Psychology & Human Sexuality*, 4(1), 21–36. doi:10.1300/J056v04n01_04 PMID:12317687.
- Larkey, L. K., & Gonzalez, J. (2007). Storytelling for promoting colorectal cancer prevention and early detection among Latinos. *Patient Education and Counseling*, 67(3), 272–278. doi:10.1016/j.pec.2007.04.003 PMID:17524595.
- Larkey, L. K., Lopez, A. M., Minnal, A., & Gonzalez, J. (2009). Storytelling for promoting colorectal cancer screening among underserved Latina women: A randomized pilot study. *Cancer, Culture and Literacy*, 16(1), 79–87. PMID:19078934.
- Lau, A. (2006). *Family warns of lawn mower dangers after girl loses foot*. Retrieved November 28, 2012, from <http://www.newsnet5.com/dpp/news/Family-Warns-Of-Lawn-Mower-Dangers-After-Girl-Loses-Foot>
- Leonard, C., Burke, C. M., O'Keane, C., & Doyle, J. S. (1997). Golf ball liver: Agent orange hepatitis. *Gut*, 40(5), 687–688. PMID:9203952.
- Malfait, N., Valyear, K. F., Culham, J. C., Anton, J. L., Brown, L. E., & Gribble, P. L. (2010). fMRI activation during observation of others' reach errors. *Journal of Cognitive Neuroscience*, 22(7), 1493–1503. doi:10.1162/jocn.2009.21281 PMID:19580392.
- Malouff, J., Thorsteinsson, E., Schutte, N., & Rooke, S. E. (2009). Effects of vicarious punishment: A meta-analysis. *The Journal of General Psychology*, 136(3), 271–286. doi:10.3200/GENP.136.3.271-286 PMID:19650522.
- Mar, R. A., & Oatley, K. (2008). The function of fiction is the abstraction and simulation of social experience. *Perspectives on Psychological Science*, 3(3), 173–192. doi:10.1111/j.1745-6924.2008.00073.x.
- Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). New York: Cambridge University Press. doi:10.1017/CBO9780511811678.
- McBride, C. M., Emmons, K. M., & Lipkus, I. M. (2003). Understanding the potential of teachable moments: The case of smoking cessation. *Health Education Research*, 18(2), 156–170. doi:10.1093/her/18.2.156 PMID:12729175.
- McQueen, A., Kreuter, M. W., Kalesan, B., & Alcaraz, K. I. (2011). Understanding narrative effects: The impact of breast cancer survivor stories on message processing, attitudes, and beliefs among African American women. *Health Psychology*, 30(6), 674–682. doi:10.1037/a0025395 PMID:21895370.
- Mokdad, A. H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2004). Actual causes of death in the United States, 2000. *Journal of the American Medical Association*, 291(10), 1238–1245. doi:10.1001/jama.291.10.1238 PMID:15010446.
- Molenberghs, P., Cunnington, R., & Mattingley, J. B. (2012). Brain regions with mirror properties: A meta-analysis of 125 human fMRI studies. *Neuroscience and Biobehavioral Reviews*, 36(1), 341–349. doi:10.1016/j.neubiorev.2011.07.004 PMID:21782846.

- Morrison, I., Lloyd, D., Di Pellegrino, G., & Roberts, N. (2004). Vicarious responses to pain in anterior cingulate cortex: Is empathy a multisensory issue? *Cognitive, Affective & Behavioral Neuroscience*, 4(2), 270–278. doi:10.3758/CABN.4.2.270 PMID:15460933.
- Morrison, I., Tipper, S. P., Fenton-Adams, W. L., & Bach, P. (2012). Feeling others' painful actions: The sensorimotor integration of pain and action information. *Human Brain Mapping*. doi:10.1002/hbm.22040 PMID:22451259.
- Mukamel, R., Ekstrom, A. D., Kaplan, J., Iacoboni, M., & Fried, I. (2010). Single-neuron responses in humans during execution and observation of actions. *Current Biology*, 20(8), 750–756. doi:10.1016/j.cub.2010.02.045 PMID:20381353.
- Myers, M. L., Iscoe, C., Jennings, C., Lenox, W., Minsky, E., & Sacks, A. (1981). *Public version: Federal trade commission staff report on the cigarette advertising investigation*. Washington, DC: Federal Trade Commission. Retrieved October 12, 2012, from <http://legacy.library.ucsf.edu/tid/jdr92d00/pdf>
- National Institute for Occupational Safety and Health. (n.d.). *Fatality assessment and control evaluation (FACE) program*. Retrieved December 12, 2012, from <http://www.cdc.gov/niosh/face/default.html>
- Norman, G. R., & Brooks, L. R. (1997). The non-analytical basis of clinical reasoning. *Advances in Health Sciences Education: Theory and Practice*, 2(2), 173–184. doi:10.1023/A:1009784330364 PMID:12386407.
- Novak, J. D. (2009). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah, NJ: Taylor and Francis.
- O'Donnell, C. R., O'Donnell, L., San Doval, A., Duran, R., & Labes, K. (1998). Reductions in STD infections subsequent to an STD clinic visit: Using video-based patient education to supplement provider interactions. *Sexually Transmitted Diseases*, 25(3), 161–168. doi:10.1097/00007435-199803000-00010 PMID:9524995.
- Oatley, K., & Gholamain, M. (1997). Emotions and identification: Connections between readers and fiction. In Hjort, M., & Laver, S. (Eds.), *Emotion and the arts* (pp. 263–298). New York: Oxford University Press.
- Occupational Safety and Health Administration. (n.d.a). *Accident inspection number 311958839*. Retrieved May 15, 2012, from http://www.osha.gov/pls/imis/establishment.inspection_detail?id=311958839
- Occupational Safety and Health Administration. (n.d.b). *Fatality and catastrophe investigation summaries*. Retrieved December 12, 2012, from <http://www.osha.gov/pls/imis/accidentsearch.html>
- Pennington, N., & Hastie, R. (1991). A cognitive theory of juror decision making: The story model. *Cardozo Law Review*, 13, 519–557.
- Perry, R. W., & Lindell, M. K. (2008). Volcanic risk perception and adjustment in a multi-hazard environment. *Journal of Volcanology and Geothermal Research*, 172(3), 170–178. doi:10.1016/j.jvolgeores.2007.12.006.
- Pillemer, D. (2003). Directive functions of autobiographical memory: The guiding power of the specific episode. *Memory (Hove, England)*, 11(2), 193–202. doi:10.1080/741938208 PMID:12820831.
- Pillemer, D. B. (2001). Momentous events and the life story. *Review of General Psychology*, 5(2), 123–134. doi:10.1037/1089-2680.5.2.123.

- Pliske, R., & Klein, G. (2003). The naturalistic decision-making perspective. In Schneider, S. L., & Shanteau, J. (Eds.), *Emerging perspectives on judgment and decision research* (pp. 559–585). New York: Cambridge University Press. doi:10.1017/CBO9780511609978.019.
- Polichak, J. W., & Gerrig, R. J. (2002). Get up and win! Participatory responses to narrative. In Green, M. C., Strange, J. J., & Brock, T. C. (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 71–95). Mahwah, NJ: Lawrence Erlbaum and Associates.
- Rey, G. D. (2012). A review of research and a meta-analysis of the seductive detail effect. *Educational Research Review*, 7, 216–237. doi:10.1016/j.edurev.2012.05.003.
- Ricketts, M. (2007). *The use of narratives in safety and health communication*. (Unpublished doctoral dissertation). Kansas State University, Manhattan, KS.
- Ricketts, M., Shanteau, J., McSpadden, B., & Fernandez-Medina, K. M. (2010). Using stories to battle unintentional injuries: Narratives in safety and health communication. *Social Science & Medicine*, 70(9), 1441–1449. doi:10.1016/j.socscimed.2009.12.036 PMID:20176428.
- Rizzolatti, G., & Fabbri-Destro, M. (2009). The mirror neuron system. In Bernston, G. G., & Cacioppo, J. T. (Eds.), *Handbook of neuroscience for the behavioral sciences (Vol. 1)*, pp. 337–357. Hoboken, NJ: John Wiley and Sons, Inc. doi:10.1002/9780470478509.neubb001017.
- Rizzolatti, G., & Sinigaglia, C. (2010). The functional role of the parieto-frontal mirror circuit: Interpretations and misinterpretations. *Nature Reviews. Neuroscience*, 11(4), 264–274. doi:10.1038/nrn2805 PMID:20216547.
- Rook, K. S. (1986). Encouraging preventive behavior for distant and proximal health threats: Effects of vivid versus abstract information. *Journal of Gerontology*, 41(4), 526–534. doi:10.1093/geronj/41.4.526 PMID:3722739.
- Rook, K. S. (1987). Effects of case history versus abstract information on health attitudes and behaviors. *Journal of Applied Social Psychology*, 17(6), 533–553. doi:10.1111/j.1559-1816.1987.tb00329.x.
- Sadoski, M. (2001). Resolving the effects of concreteness on interest, comprehension, and learning important ideas from text. *Educational Psychology Review*, 13(3), 263–281. doi:10.1023/A:1016675822931.
- Santiesteban, A. J., & Koran, J. J. (1977). Acquisition of science teaching skills through psychological modeling and concomitant student learning. *Journal of Research in Science Teaching*, 14(3), 199–207. doi:10.1002/tea.3660140304.
- Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals, and understanding*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Sherer, M., & Rogers, R. W. (1984). The role of vivid information in fear appeals and attitude change. *Journal of Research in Personality*, 18(3), 321–334. doi:10.1016/0092-6566(84)90016-3.
- Singhal, A., Cody, M. J., Rogers, E. M., & Sabido, M. (Eds.). (2004). *Entertainment education and social change: History, research, and practice*. Mahwah, NJ: Lawrence Erlbaum.
- Slater, M. D. (2002). Entertainment education and the persuasive impact of narratives. In Green, M. C., Strange, J. J., & Brock, T. C. (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 157–181). Mahwah, NJ: Lawrence Erlbaum Associates.

- Slater, M. D., & Rouner, D. (2002). Entertainment-education and elaboration likelihood: Understanding the processing of narrative persuasion. *Communication Theory, 12*(2), 173–191.
- Smith, G. A., & Committee on Injury and Poison Prevention. (2001). Technical report: Lawn mower-related injuries to children. *Pediatrics, 107*(6), e106. doi:10.1542/peds.107.6.e106 PMID:11389304.
- Solomon, M. Z., & DeJong, W. (1988). The impact of a clinic-based educational videotape on knowledge and treatment behavior of men with gonorrhea. *Sexually Transmitted Diseases, 15*(3), 127–132. doi:10.1097/00007435-198807000-00001 PMID:2465581.
- Solomon, M. Z., DeJong, W., & Jodrie, T. (1988). Improving drug-regimen adherence among patients with sexually transmitted disease. *The Journal of Compliance in Health Care, 3*(1), 41–56.
- Speer, N. K., Reynolds, J. R., Swallow, K. M., & Zacks, J. M. (2009). Reading stories activates neural representations of visual and motor experiences. *Psychological Science, 20*(8), 989–999. doi:10.1111/j.1467-9280.2009.02397.x PMID:19572969.
- Stangor, C., & McMillan, D. (1992). Memory for expectancy-congruent and expectancy-incongruent information: A review of the social and social developmental literatures. *Psychological Bulletin, 111*(1), 42–61. doi:10.1037/0033-2909.111.1.42.
- Stapel, D. A., Reicher, S. D., & Spears, R. (1994). Social identity, availability and the perception of risk. *Social Cognition, 12*(1), 1–17. doi:10.1521/soco.1994.12.1.1.
- Stapel, D. A., & Velthuisen, A. S. (1996). Just as if it happened to me: The impact of vivid and self-relevant information on risk judgments. *Journal of Social and Clinical Psychology, 15*(1), 102–111. doi:10.1521/jsocp.1996.15.1.102.
- Tal-Or, N., Boninger, D. S., Poran, A., & Gleicher, F. (2004). Counterfactual thinking as a mechanism in narrative persuasion. *Human Communication Research, 30*(3), 301–328. doi:10.1111/j.1468-2958.2004.tb00734.x.
- Thorndike, E. L. (1898). Animal intelligence: An experimental study of the associative processes in animals. *Psychological Monographs, 2*(4), 1–109. doi:10.1037/h0092987.
- Thrasher, J. F., Arillo-Santillán, E., Villalobos, V., Pérez-Hernández, R., Hammond, D., & Carter, J. et al. (2012). Can pictorial warning labels on cigarette packages address smoking-related health disparities? Field experiments in Mexico to assess pictorial warning label content. *Cancer Causes & Control, 23*(S1), 69–80. doi:10.1007/s10552-012-9899-8 PMID:22350859.
- Tinsworth, D. K., & McDonald, J. E. (2001). *Special study: Injuries and deaths associated with children's playground equipment*. Washington, DC: U.S. Consumer Product Safety Commission.
- U. S. Consumer Product Safety Commission. (2010). *Public playground safety handbook (CPSC Publication No. 325)*. Washington, DC: Author.
- U. S. Consumer Product Safety Commission. (n.d.a). *National electronic injury surveillance system (NEISS) on-line*. Retrieved November 15, 2012, from <http://www.cpsc.gov/library/neiss.html>
- U. S. Consumer Product Safety Commission. (n.d.b). *Riding lawn mowers: Document no. 588*. Retrieved November 15, 2012, from <http://www.cpsc.gov/cpsc/pub/pubs/588.pdf>
- Ubel, P. A., Jepson, & Baron, J. (2001). The inclusion of patient testimonials in decision aids: Effects of treatment choices. *Medical Decision Making, 21*(1), 60–68. doi:10.1177/0272989X0102100108 PMID:11206948.

- Vogel, V. G., Graves, D. S., Vernon, S. W., Lord, J. A., Winn, R. J., & Peters, G. N. et al. (1990). Mammographic screening of women with increased risk of breast cancer. *Cancer*, 66(7), 1613–1620. doi:10.1002/1097-0142(19901001)66:7<1613::AID-CNCR2820660728>3.0.CO;2-E PMID:2208012.
- Vollman, D., Khosla, K., Shields, B. J., Beeghly, B. C., Bonsu, B., & Smith, G. A. (2005). Lawn mower-related injuries to children. *The Journal of Trauma*, 59(3), 724–728. PMID:16361919.
- Vollman, D., & Smith, G. A. (2006). Epidemiology of lawn mower-related injuries to children in the United States, 1990-2004. *Pediatrics*, 118(2), 273–278. doi:10.1542/peds.2006-0056.
- Voss, J. F., Wiley, J., & Sandak, R. (1999). On the use of narrative as argument. In Goldman, S. R., Graesser, A. C., & Vandenbroek, P. (Eds.), *Narrative comprehension, causality, and coherence: Essays in honor of Tom Trabasso* (pp. 235–252). Mahwah, NJ: Lawrence Erlbaum and Associates.
- Weare, K. (1992). The contribution of education to health promotion. In Bunton, R., & Macdonald, G. (Eds.), *Health promotion: Disciplines, diversity and developments* (pp. 102–125). New York: Routledge.
- Weinstein, N. D. (1989). Effects of personal experience on self-protective behavior. *Psychological Bulletin*, 105(1), 31–51. doi:10.1037/0033-2909.105.1.31 PMID:2648439.
- Wicker, B., Keysers, C., Plailly, J., Royet, J. P., Gallese, V., & Rizzolatti, G. (2003). Both of us disgusted in my insula: The common neural basis of seeing and feeling disgust. *Neuron*, 40(3), 655–664. doi:10.1016/S0896-6273(03)00679-2 PMID:14642287.
- Willems, R. M., & Casasanto, D. (2011). Flexibility in embodied language understanding. *Frontiers in Psychology*, 2(116), 1–11. PMID:21713130.
- Woolf, S. H., & Aron, L. (Eds.). (2013). *U.S. health in international perspective: Shorter lives, poorer health*. Washington, DC: National Academies Press.
- World Health Organization. (2011). *Global status report on noncommunicable diseases 2010*. Geneva, Switzerland: WHO.
- Wright, S. S., & Kyes, K. B. (1996). The effects of safer-sex stories on college students' attitudes toward condoms. *Journal of Psychology & Human Sexuality*, 8(4), 1–18. doi:10.1300/J056v08n04_01 PMID:12347910.
- Zabrucky, K., & Ratner, H. H. (1992). Effects of passage type on comprehension monitoring and recall in good and poor readers. *Journal of Literacy Research*, 24(3), 373–391. doi:10.1080/10862969209547782.
- Zabrucky, K. M., & Moore, D. (1999). Influence of text genre on adults' monitoring of understanding and recall. *Educational Gerontology*, 25(8), 691–710. doi:10.1080/036012799267440.
- Zeitlin, L. R. (1994). Failure to follow safety instructions: Faulty communications or risky decisions? *Human Factors*, 36(1), 172–181. PMID:8026839.
- Zentall, T. R. (2011). Social learning mechanisms: Implications for a cognitive theory of imitation. *Interaction Studies: Social Behaviour and Communication in Biological and Artificial Systems*, 12(2), 233–261. doi:10.1075/is.12.2.03zen.
- Zentall, T. R. (2012). Perspectives on observational learning in animals. *Journal of Comparative Psychology*, 126(2), 114–128. doi:10.1037/a0025381 PMID:21895354.

ADDITIONAL READING

- Abbott, H. P. (2008). *The Cambridge introduction to narrative*. New York: Cambridge University Press.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior*, 31, 143–164. doi:10.1177/1090198104263660 PMID:15090118.
- Brock, T. C., & Green, M. C. (Eds.). (2005). *Persuasion: Psychological insights and perspectives* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Bruner, J. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University Press.
- Bruner, J. (2002). *Making stories: Law, literature, life*. Cambridge, MA: Harvard University Press.
- Cole, H. P. (1997). Stories to live by: A narrative approach to health behavior research and injury prevention. In Gochman, D. S. (Ed.), *Handbook of health behavior research IV: Relevance for professionals and issues for the future* (pp. 325–349). New York: Plenum Press. doi:10.1007/978-1-4899-0484-3_17.
- Cole, H. P., Wiehagen, W. J., Vaught, C., & Mills, B. S. (2001). *Use of simulation exercises for safety training in the U.S. mining industry*. DHHS (NIOSH) Publication No. 2001-141. Cincinnati, OH: National Institute for Occupational Safety and Health.
- Cullen, E. T., & Fein, A. H. (2005). *Tell me a story: Why stories are essential to effective safety training*. Cincinnati, OH: National Institute for Occupational Safety and Health.
- De Young, R., & Monroe, M. C. (1996). Some fundamentals of engaging stories. *Environmental Education Research*, 2, 171–187. doi:10.1080/1350462960020204.
- DiClemente, R. J., Salazar, L. F., & Crosby, R. A. (2013). *Health behavior theory for public health: Principles, foundations, and applications*. Burlington, MA: Jones and Bartlett Publishers.
- Gerrig, R. J. (1993). *Experiencing narrative worlds*. New Haven, CT: Yale University Press.
- Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). (2008). *Health behavior and health education: Theory, research, and practice*. San Francisco, CA: Jossey-Bass.
- Goldman, S. R., Graesser, A. C., & Vandebroek, P. (Eds.). (1999). *Narrative comprehension, causality, and coherence: Essays in honor of Tom Trabasso*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Green, M. C. (2006). Narratives and cancer communication. *The Journal of Communication*, 56(Suppl. 1), S163–S183. doi:10.1111/j.1460-2466.2006.00288.x.
- Green, M. C., Strange, J. J., & Brock, T. C. (Eds.). (2002). *Narrative impact: Social and cognitive foundations*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Hastie, R., & Pennington, N. (2000). Explanation-based decision making. In Connolly, T., Arkes, H. R., & Hammond, K. R. (Eds.), *Judgment and decision making: An interdisciplinary reader* (2nd ed., pp. 212–228). New York: Cambridge University Press.
- Knowles, E. S., & Linn, J. A. (Eds.). (2004). *Resistance and persuasion*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Kogut, T., & Ritov, I. (2011). The identifiable victim effect: causes and boundary conditions. In Oppenheimer, D. M., & Olivola, C. Y. (Eds.), *The science of giving: Experimental approaches to the study of charity* (pp. 133–148). New York: Psychology Press.

Schank, R. C. (1990). *Tell me a story: Narrative and intelligence*. Evanston, IL: Northwestern University Press.

Schank, R. C. (1999). *Dynamic memory revisited*. New York: Cambridge University Press. doi:10.1017/CBO9780511527920.

Singhal, A., & Rogers, E. M. (1999). *Entertainment-education: A communication strategy for social change*. Mahwah, NJ: Lawrence Erlbaum Associates.

Spieholz, P., Clark, R., & Sjostrom, T. (2007). Fatality narratives: An effective way to convey hazard information. *Professional Safety*, 52(4), 22–25.

(1995). In Wyer, R. S. (Ed.). *Advances in social cognition: Vol. 8. Knowledge and memory: The real story*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Zillmann, D., & Brosius, H. B. (2000). *Exemplification in communication: The influence of case reports on the perception of issues*. Mahwah, NJ: Lawrence Erlbaum Associates.

KEY TERMS AND DEFINITIONS

Anecdote: An account of at least one character involved in a sequence of events, with explicit or implied causal connections among those events. Characters can be people, animals, objects, or phenomena. In other words, an anecdote can involve human events *or* nonhuman occurrences (such as the decay of a radioactive atom, the development of a lightning bolt that strikes a tree, or the cannibalistic feeding of one star upon another, triggering a supernova explosion). Experimental findings can also be conveyed in the form of stories, with researchers and study participants as characters, and with causal relationships implied between events that are represented as independent and

dependent variables. When described anecdotally, experiments can vividly illustrate particular instances of broader scientific concepts.

Counterfactual Thinking: The act of considering how a situation might have turned out differently. Anecdotal health messages may be more effective when they stimulate audience members to consider how story characters could have acted to prevent an adverse event.

Health Communication: The theory and practice of informing and influencing people about important health issues—ultimately leading to changes in behavior and improved health.

Health Education: See health communication.

Identification: The phenomenon of experiencing a personal connection with a character in a story. Some scholars believe audience members are more likely to internalize anecdotal information if they can easily identify with at least one of the story characters.

Mirror Neuron: A neuron (nerve cell) that fires when an animal (including humans) performs a particular goal-directed action *and* when the animal observes a similar action performed by another. Evidence suggests mirror neurons (or their analogues) may also exist in systems that are responsive to sensations and emotions. Mirror neurons apparently help us understand the intentions and experiences of others through an intuitive process that does not require conscious deliberation.

Multimedia Learning: The acquisition of knowledge from media that include a combination of words (printed or spoken) *and* images (still or moving). Evidence suggests people often learn better from a combination of words and images than from either words or images alone.

Narrative: See anecdote.

Parable: An anecdote with a clear lesson to be learned.

Story: See anecdote.

Transportation: The experience of being immersed or caught up in a story. Anecdotal messages are especially persuasive when audience members experience a narrative so vividly that it seems nearly as real as a lived event.

Vicarious Learning: The acquisition of knowledge, skills, or behaviors as a result of observing the consequences of another individual's actions. Vicarious learning is one mechanism by which anecdotes may trigger behavior change.