Comprehension and Memory

Richard Jackson Harris, Elizabeth Tait Cady, and Tuan Quoc Tran
Kansas State University

Imagine that you are in a theater watching the newest horror movie. As the tension mounts onscreen, suddenly a man in the audience yells “look behind the door!” as the main character searches the house for the killer. Although the man has not seen the movie, he guessed where the killer was hiding based on his previous experience with, comprehension of, and memory for similar horror movies.

As media entertain us, we continually comprehend and remember information, and this process begins early in life. Young children often learn new information such as the letters of the alphabet through songs. Cultures pass traditions and other social knowledge to the next generation using songs; and the memory of the melody assists in remembering the words (Rubin, 1995). Before we can learn or be entertained, we must first comprehend something, which may or may not be exactly the meaning the producer had intended. In order to respond to anything for longer than an immediate reaction, we must remember something of what we had comprehended. Comprehension and memory have a long history of study in psychology and are impossible to separate from one another. In fact, memory may be seen as an inevitable—albeit imperfect—by-product of normal comprehension (Craik & Lockhart, 1972). How we comprehend something has implications for how it is remembered, and what is remembered is in large part a function of what was initially understood.

This chapter reviews the major processes of comprehension and memory as they apply to the consumption of entertainment media. For the most part, we limit the discussion to media traditionally considered entertainment, that is, television entertainment programming, cinema, and popular music. Of course, it is also true that many sorts of “non-entertainment media,” such as news, informational articles, and advertising are often consumed as entertainment, and, in fact, the uses and gratifications one has for consuming media may affect how the content is comprehended or remembered (Rubin, 2002). We begin with an overview of research and theory about comprehension and memory from cognitive psychology, then move into particular
cognitive processing issues with particular types of media, and, finally, examine a contemporary comprehension model in terms of its application to entertainment.

The Psychology of Memory and Comprehension

During the comprehension process, memory comes into play as incoming perceptual inputs are connected to past knowledge or experience to construct an understanding of the media event. This constructed memory representation then can be used as a reference for interpreting future experience. This continuing interaction of comprehension and memory impacts many media experiences, including memory for media events, remembering whether something we know came from a movie or real life, and constructing worldviews based on media input. We begin this section with a brief general overview of memory, followed by a discussion of how memory contributes to comprehension and how comprehension contributes to memory.

BRIEF OVERVIEW OF MEMORY

Influenced by the computer metaphor beginning in the 1950s, theorists have for much of the last half century conceptualized memory as consisting of different discrete structural stores, with each stage possessing not only different storage capacity and duration, but also employing different types of processing (Atkinson & Shiffrin, 1968). The earliest memory store is referred to as sensory memory because at this initial stage information is processed by means of its visual, auditory, or other sensory information (e.g., letter features). Sensory memory is believed to be large in capacity but short-lived (lasting only a couple of seconds) and unstable (Bower, 2000). Much media content that enters our sensory memory is not attended to and thus never proceeds any farther or arrives in consciousness—such as TV or radio in the background to which we are paying no attention.

To prevent decay, information in sensory memory must be attended to and transferred to a limited-capacity short-term memory, or what is currently referred to as working memory, which involves the concurrent storage and processing of relevant information while inhibiting or ignoring information irrelevant to the current task (Neath & Surprenant, 2003). In working memory, information is temporarily maintained by a rehearsal mechanism, and information that is directly in the focus of attention is processed primarily on the basis of its visual or verbal code. The resources of working memory are limited, with only finite attentional resources available at any given time (Lang, 2000). Material that is not rehearsed or attended to can decay from working memory within 18 seconds (Peterson & Peterson, 1959).

This storage and processing system allows for the integration of recently presented information with information currently being processed, resulting in the development of an emergent mental model of the current environment, situation, or experiences. Although there are numerous views of working memory, the most recognized and influential is that of Baddeley (1986). In this model, working memory is parsed into three major systems, a central executive—assumed to control attention—and two slave systems, a phonological loop, responsible for storage and processing of verbal information, and a visuo-spatial sketch pad, responsible for storage and processing of visual and spatial information. Although Baddeley's model has been instrumental in accounting for many experimental and neurological phenomena, such as word length effects, phonological suppression, and severe short-term memory deficits in patients with intact long-term memory, a major limitation is that it does not take into consideration the meaningfulness of the stimulus. That is, the model weights different information equivalently, independent of its meaningfulness to the perceiver. According to Neath and Surprenant (2003), stimulus meaningfulness is an important factor in many tasks utilizing working memory, such as the memory span task of repeating them back. To address this shortcoming, a system called the episodic buffer was added to Baddeley's model (Baddeley, 2000). This additional storage compartment is assumed to be large in capacity but short-lived (lasting for about a second) and unstable (Bower, 2000). Much media content that enters our sensory memory is not attended to and thus never proceeds any farther or arrives in consciousness—such as TV or radio in the background to which we are paying no attention.

A problem in classifying memory is the lack of a single general term for a single, unified system. Instead, memory is usually subdivided into a number of different memory stores or systems. In fact, the term memory has been used to refer to at least five different memory stores: sensory memory, short-term memory, long-term memory, episodic memory, and procedural memory. These systems are distinguished in part by their capacity for retaining information, the stability of information over time, and the role of attention in the retention process. There are several different ways that researchers have attempted to classify these systems, but no single consensus has been reached (Roediger & Karpinski, 2006). Despite this lack of consensus, it is generally agreed that the distinction between episodic and procedural memory is the most important. While episodic memory is concerned with the retention of information that is semantically meaningful (i.e., that is connected to past knowledge or experiences), procedural memory is concerned with the retention of information that is not semantically meaningful (i.e., that is not connected to past knowledge or experiences). For example, information that is learned through rote rehearsal, such as a list of words or a sequence of steps, is more likely to be stored in procedural memory than in episodic memory. In contrast, information that is learned through meaningful encoding, such as information that is connected to past knowledge or experiences, is more likely to be stored in episodic memory than in procedural memory. For example, information that is learned through meaningful encoding, such as information that is connected to past knowledge or experiences, is more likely to be stored in episodic memory than in procedural memory.
as the memory span task of holding items in working memory a few seconds and then repeating them back. To address this need, Baddeley (2000) recently postulated an additional system called the episodic buffer, as an attempt to alleviate this limitation and other potential shortcomings of the model. The episodic buffer provides a link to long-term memory, an additional storage compartment, and a forum where visual-spatial and verbal information can be integrated. Unfortunately, to date, little experimental research has been conducted to carefully examine the role of the episodic buffer.

In contrast to working memory, information in long-term memory is primarily encoded semantically and is more or less permanently stored, with retrieval failure due to passive memory decay, insufficient retrieval cues, or interference from other material. Although there is no general consensus among memory theorists as to the types of long-term memory, several classifications do exist (Roediger, Marsh, & Lee, 2002). One popular classification is to divide memory into procedural memory, "knowing how," and declarative memory, "knowing that." (Squire, 1987). Procedural memory consists of both motor and cognitive skills that often lack ready verbal descriptions (e.g., how to ride a bike, how to program your VCR), while declarative memory can be further divided into two main categories, semantic memory and episodic memory. Whereas semantic memory can be thought of as a "mental dictionary" of facts about the world (e.g., Herbert Hoover was the 31st President of the United States), episodic memory can be thought of as experience that is tagged with a particular moment in time and place, for instance, the word "sleep" on the list just heard or last summer's vacation to Yosemite National Park (Roediger et al., 2002).

A problem in classifying different kinds of memory arises from the overlapping and multifaceted nature of memories (Roediger et al., 2002). Episodic memory over time can lose its distinctive tag of time and place and become part of semantic memory, such as when you forget the context of when you first learned your multiplication tables, but yet you still know that \( 8 \times 7 = 56 \). Semantic memory can play an influential and sometimes misleading role in episodic memories. For example, former U.S. President Ronald Reagan would sometimes tell movie plots as true stories (e.g., a heroic story about a plane captain who stayed with a wounded man as the plane crashed after being hit by anti-aircraft fire). Although told as a true story, the details were taken from both a movie and a story in a magazine (Lofthus & Ketcham, 1994). This confusion of the source of information is called source amnesia and is not uncommon.

**AUTOBIOGRAPHICAL MEMORY**

Autobiographical memory consists of knowledge about events or experiences that have occurred in one's life (Conway, 2001). These memories are most often comprised of episodic memories, such as one's senior prom or the long bike rides in the park with Grandma, although elements from semantic or procedural memory may also be a part of the memory representation (Roediger et al., 2003).

The structure of autobiographical memory describes three levels of specificity of individual memories: lifetime period, general event, and event-specific knowledge (Conway & Pleydell-Pearce, 2000). The most general level is defined by a period of one's life, such as college years, or living in a certain town. Knowledge at this level includes the start and end points as well as the important people and events of that time. Media events may be integrally connected to a particular lifetime period, as in remembering the song "Ice Ice Baby" by Vanilla Ice from your grade-school life, or watching Titanic while in middle school. The knowledge base of a certain lifetime period may include an evaluative component, and those attitudes may be used to construct memories at a later time, as when hearing a certain song induces good.
feelings because of the pleasant lifetime period it evokes, not because of the tune or the lyrics of the song.

The second level of the structure of autobiographical memory is the general event, which could include repeated or single events, or thematic sequences of events. This level of memory is both highly organized and focused on goal-directed and other types of self-discovery behavior. When people try to think of a memory, the general events are usually the easiest to recall (Conway, 2001).

The final level of the structure of autobiographical memory is the event-specific knowledge (ESK), which leads to imagery and other details of the memory itself. As a person recalls a memory, his/her sensory-perceptual experiences during the recalled event lead to vivid memories. Media information may be a part of either the ESK or the context in which it is remembered. Although the presence or absence of the ESK is usually an indicator of the reality of a memory (we do not tend to remember as many supporting details from events that did not occur), times people do have vivid but false memories of events that never happened (Garry, Manning, Loftus, & Sherman, 1996; Sharman, Manning, & Garry, 2005). In some cases, the memories may be perceptually or temporally clear, but may in fact contain a memory of the cognitions involved in generating that memory. These attributions of reality can be influenced by the motivation; biases, and experiences, as well as metacognitive skills, of the person recalling the event (Mitchell & Johnson, 2000).

Autobiographical memory can be studied by presenting some type of cue and asking for a memory related to that cue. In media research, the cues given relate to autobiographical memories of events, characters, or programs watched at some point in one's life. This method allows research into the effects on children of antisocial media, such as sex or violence (Harrison & Cantor, 1999; Hoekstra, Harris, & Helmick, 1999; Cantor, Mares, & Hyde, 2003), without exposing young participants to it. Although there is an inherent problem of being unable to verify the memories of the media event, the variable of interest is how the memories affect people's perceptions of the media and the world, so the objective accuracy of the memories is of less concern than the participant's perception of them.

The general method of this research involves asking participants to think of a specific event, when they watched it, and the circumstances or people involved (Harris, Bonds-Raacke, & Cady, 2005). For example, the participant might be instructed to think of the overall experience of watching a frightening or sexual-themed movie in their childhood, or they could be asked to think of one certain character from a specific minority group that they saw on television or in the movies. Once the experience or character has been recalled, the participant rates various aspects of the event or character on several dimensions. For example, the experience of the frightening movie might be rated based on the negative effects (e.g., insomnia) or positive effects (e.g., enjoyment) experienced, while the character might be evaluated in terms of personality dimensions (e.g., likeable, healthy) as well as typicality of the character within his/her minority group. Using the autobiographical memory technique in this way allows research on the perceptions of characters or events seen under normal viewing circumstances, rather than in a short segment viewed in more artificial situations.

Music also plays a large role in autobiographical memory. One study provided adults ages 37–76 with a song title and a segment performed on a piano. Results showed better song recall after hearing the melody, and better time estimates of when the song had been popular if they used associated autobiographical memories as cues (Bartlett & Snelus, 1980). Another study (Schulkind, Hennis, & Rubin, 1999) tested both college students and adults ages 66–71. Both groups were more likely to remember and prefer music that had been popular when they were adolescents, although the older adults did not remember the early songs as well, unless the song evoked a strong emotional response (Schulkind et al., 1999).

Traditional views of memory retrieving information from long-term memory, and, finally, long-term memory (e.g., Cowan, 1995) have argued that memory is formed by a temporarily activated portion of long-term memory, which leads to imagery and other details of the memory itself. As a person recalls a memory from long-term memory, his/her sensory-perceptual experiences during the event or character have been recalled, and the participant rates various aspects of the event or character on several dimensions. For example, the experience of the frightening movie might be rated based on the negative effects (e.g., insomnia) or positive effects (e.g., enjoyment) experienced, while the character might be evaluated in terms of personality dimensions (e.g., likeable, healthy) as well as typicality of the character within his/her minority group. Using the autobiographical memory technique in this way allows research on the perceptions of characters or events seen under normal viewing circumstances, rather than in a short segment viewed in more artificial situations.

Music also plays a large role in autobiographical memory. One study provided adults ages 37–76 with a song title and a segment performed on a piano. Results showed better song recall after hearing the melody, and better time estimates of when the song had been popular if they used associated autobiographical memories as cues (Bartlett & Snelus, 1980). Another study (Schulkind, Hennis, & Rubin, 1999) tested both college students and adults ages 66–71. Both groups were more likely to remember and prefer music that had been popular when they were adolescents, although the older adults did not remember the early songs as well, unless the song evoked a strong emotional response (Schulkind et al., 1999).

Traditional views of memory retrieving information from long-term memory, and, finally, long-term memory (e.g., Cowan, 1995) have argued that memory is formed by a temporarily activated portion of long-term memory, which leads to imagery and other details of the memory itself. As a person recalls a memory from long-term memory, his/her sensory-perceptual experiences during the event or character have been recalled, and the participant rates various aspects of the event or character on several dimensions. For example, the experience of the frightening movie might be rated based on the negative effects (e.g., insomnia) or positive effects (e.g., enjoyment) experienced, while the character might be evaluated in terms of personality dimensions (e.g., likeable, healthy) as well as typicality of the character within his/her minority group. Using the autobiographical memory technique in this way allows research on the perceptions of characters or events seen under normal viewing circumstances, rather than in a short segment viewed in more artificial situations.

Music also plays a large role in autobiographical memory. One study provided adults ages 37–76 with a song title and a segment performed on a piano. Results showed better song recall after hearing the melody, and better time estimates of when the song had been popular if they used associated autobiographical memories as cues (Bartlett & Snelus, 1980). Another study (Schulkind, Hennis, & Rubin, 1999) tested both college students and adults ages 66–71. Both groups were more likely to remember and prefer music that had been popular when they were adolescents, although the older adults did not remember the early songs as well, unless the song evoked a strong emotional response (Schulkind et al., 1999).

Traditional views of memory retrieving information from long-term memory, and, finally, long-term memory (e.g., Cowan, 1995) have argued that memory is formed by a temporarily activated portion of long-term memory, which leads to imagery and other details of the memory itself. As a person recalls a memory from long-term memory, his/her sensory-perceptual experiences during the event or character have been recalled, and the participant rates various aspects of the event or character on several dimensions. For example, the experience of the frightening movie might be rated based on the negative effects (e.g., insomnia) or positive effects (e.g., enjoyment) experienced, while the character might be evaluated in terms of personality dimensions (e.g., likeable, healthy) as well as typicality of the character within his/her minority group. Using the autobiographical memory technique in this way allows research on the perceptions of characters or events seen under normal viewing circumstances, rather than in a short segment viewed in more artificial situations.

Music also plays a large role in autobiographical memory. One study provided adults ages 37–76 with a song title and a segment performed on a piano. Results showed better song recall after hearing the melody, and better time estimates of when the song had been popular if they used associated autobiographical memories as cues (Bartlett & Snelus, 1980). Another study (Schulkind, Hennis, & Rubin, 1999) tested both college students and adults ages 66–71. Both groups were more likely to remember and prefer music that had been popular when they were adolescents, although the older adults did not remember the early songs as well, unless the song evoked a strong emotional response (Schulkind et al., 1999).
because of the tune or the lyrics of events. This level of memory is types of self-discovery behavior. are usually the easiest to recall is the event-specific knowledge of the reality of a memory itself. As a person recalls a particular event lead to vivid memo­
ry as sex or violence (Harrison, 1998; Cowan, 1995; Shiffrin & Schneider, 1977) have reconceptualized working memory as a temporarily activated portion of long-term memory. In this case, incoming information, say, stimulus A, enters sensory memory and is matched with a long-term memory representation to form a temporary mental representation of stimulus A in working memory. While stimulus A is maintained or stored by a rehearsal mechanism in working memory, stimulus B is encoded in sensory memory and is referenced to a different long-term memory. In working memory, stimuli A and B can be linked together to form new associations that can be recorded and stored as a new long-term episodic memory (Cowan, 1995). The view of working memory as an activated portion of long-term memory proposes the following temporal flow of information processing: Incoming information enters sensory memory, is matched and interpreted based on a long-term memory representation, and then is temporarily stored in working memory where different information can form newly established links. Finally, these newly formed associations are stored in long-term memory. Hence, this process explicitly states that long-term memory plays a primary role in interpreting or extracting meaning from incoming information. In other words, long-term memory plays a primary role in comprehension. Applied to media events, this means that our previous experiences with a media event affect how we interpret a current media event. For example, having previously seen a horror film in which a victim was lured into a bedroom and killed by an assassin hiding behind a door, an audience currently watching a horror film will expect that something harmful is about to happen when a movie character walks into an empty bedroom.

**CONTRIBUTION OF MEMORY TO COMPREHENSION**

Traditionally, information was believed to temporally flow in linear fashion from one memory store to the next; that is, information was first thought to enter sensory memory, then working memory, and, finally, long-term memory (Atkinson & Shiffrin, 1968). More current views (e.g., Cowan, 1995) have argued that encoding both, old and new information that share similar features with existing memory concepts uses long-term memory knowledge to create a temporary representation in working memory. In fact, some theorists (e.g., Anderson & Lebiere, 1998; Cowan, 1995; Shiffrin & Schneider, 1977) have reconceptualized working memory as a temporarily activated portion of long-term memory. In this case, incoming information, say, stimulus A, enters sensory memory and is matched with a long-term memory representation to form a temporary mental representation of stimulus A in working memory. While stimulus A is maintained or stored by a rehearsal mechanism in working memory, stimulus B is encoded in sensory memory and is referenced to a different long-term memory. In working memory, stimuli A and B can be linked together to form new associations that can be recorded and stored as a new long-term episodic memory (Cowan, 1995). The view of working memory as an activated portion of long-term memory proposes the following temporal flow of information processing: Incoming information enters sensory memory, is matched and interpreted based on a long-term memory representation, and then is temporarily stored in working memory where different information can form newly established links. Finally, these newly formed associations are stored in long-term memory. Hence, this process explicitly states that long-term memory plays a primary role in interpreting or extracting meaning from incoming information. In other words, long-term memory plays a primary role in comprehension. Applied to media events, this means that our previous experiences with a media event affect how we interpret a current media event. For example, having previously seen a horror film in which a victim was lured into a bedroom and killed by an assassin hiding behind a door, an audience currently watching a horror film will expect that something harmful is about to happen when a movie character walks into an empty bedroom.

**CONTRIBUTION OF COMPREHENSION TO MEMORY**

Traditional views of memory (i.e.; Atkinson & Shiffrin, 1968) assume that the probability of retrieving information from long-term memory depends on how much that information was rehearsed in working memory; with increased rehearsal comes improved retrieval (Bower, 2000). However, Craik and Lockhart (1972) found that simple repetitive maintenance rehearsal does not necessarily lead to a more durable memory. Instead, retrieval is dependent on how the information is initially processed—the deeper the processing, the more durable the memory. The depth of processing is determined by the degree to which one understands and extracts the sense of the information to form meaningful associations and elaborations with existing knowledge (Bower, 2000). For example, an event that occurs in a TV show may remind you of an event from your own life. To deeply process the show, you would think of aspects relevant to your life and compare your experience with that of the character. Thus, our ability to comprehend materials affects the durability and accessibility of such materials in long-term memory (Craik & Tulving, 1975). If we concentrate very carefully on a TV documentary, we will probably remember the content quite well; if it is only on the background with our primary attention elsewhere, we probably will not.
How does information from entertainment media come to play such a large role in our comprehension and memory processes? Some findings from communication and cognitive psychology research can help us answer that question.

Exemplification Theory and Cognitive Heuristics

It is a natural part of human thinking that the rich sensory experience of our world must somehow be organized into meaningful categories for interpretation and storage in memory. Indeed, if it were not, sensory input would merely be a disorganized kaleidoscope of stimulation, or at best a set of unorganized exemplars.

Implicit in this categorization process is the fact that specific exemplars or instances of particular categories, classes of events, genres of entertainment, and so forth, will come to represent the entire category, regardless of whether they are, in fact, truly representative. Which exemplars will prevail in mentally defining the category depend on two major factors: 1) frequency; and 2) vividness. The more often an instance occurs, the more representative it will seem. For example, if a disproportionate number of African-American men in movies are criminals or drug dealers, many viewers (especially those with limited life experience with African-American men) will come to see that stereotype as typical of black men.

Secondly, a particularly vivid example is highly memorable and thus is very readily called to mind when thinking of that category. For example, in the 1-2 years after the 1975 blockbuster movie classic *Jaws*, which portrayed numerous shark attacks on swimmers at ocean beaches in New England, coastal beach resorts nationwide reported a significant loss in business and many brave souls who did visit spent little time in the water. The highly vivid fictional attacks from *Jaws*, though extremely rare in real life, were readily remembered and taken to be far more typical beach experiences than was in fact the case. Vivid cases that arouse high levels of emotion (such as a shark attack) are especially memorable, as are vivid cases that are frequently repeated.

Two cognitive heuristics can help describe these processes (Kahneman & Tversky, 1972, 1973; Tversky & Kahneman, 1973). The *representativeness heuristic* says that we evaluate how representative of its class an event is by the extent to which it appears to reflect (a) all the members of that class, and (b) the process by which it was generated. For example, many see a coin-tossing sequence of HHHHHH as much less likely than a sequence of HTTHTH, even though any given sequence of six coin tosses is equally likely as any other. The sequence that has both possible outcomes represented in an order that does not appear systematic will be taken as more representative. Sometimes judging representativeness comes along with ignoring critical base-rate information. For example, if we hear that Robert likes to read French literature and go to wine-tasting parties, we might think he is more likely a philosopher than a truck driver. While those interests appear more representative of the stereotype of philosophers than truck drivers, there are many more truck drivers than philosophers and thus Robert is still more likely to be a truck driver.

The second heuristic, *availability*, posits that we draw conclusions about the frequency or typicality of an event or instance based on how readily we can retrieve examples from memory. Easily retrieved examples are then seen as highly typical, when, in fact, they may not be so. If the first examples of Arabs that come to mind are the villains on TV and film entertainment and terrorists in the news, we will come to think a far larger proportion of Arabs are criminals or drug dealers, many viewers (especially those with limited life experience with African-American men) will come to see that stereotype as typical of black men.

Content analyses investigating the media do not tell the whole story of those minorities. Specifically, portrayals in entertainment media may "drench" the viewer with the stereotype of minorities, especially in those viewers with little exposure to real-life exemplars (Greenberg, Mastro, & Brand, 2001).

Content analyses investigating the role of particular exemplars, such as the portrayal of Arabs, identifies that media over time gradually shape worldviews happen through the world from observing the world relatively automatically (Sharon, Gross, Morgan, Signorielli, & Bischak, 2001). The more worldviews presented on television, the more the world is seen to be similar in the real world.

MINORITY REPRESENTATION

Although the number of African-Americans portrayed in media over time gradually shape worldviews happen through the world from observing the world relatively automatically (Sharon, Gross, Morgan, Signorielli, & Bischak, 2001). The more worldviews presented on television, the more the world is seen to be similar in the real world.
Experience of our world must somehow be organized and storage in memory. Indeed, if we had an unorganized kaleidoscope of stimulation, or a film reel with no specific exemplars or instances of entertainment, and so forth, come to know what they are, in fact, truly representative. But category depend on two major factors: the first, stereotype of philosophers than generated. For example, many see opera as typical black men, and thus is very readily called to mind. As are vivid cases that are frequently remembered and taken to be far more representative; and as vivid cases that are frequently retrieved from memory, Indeed, "less heuristic" says that we evaluate knowledge which it appears to reflect (a) all the information generated. For example, many see opera as more representative than a sequence of HTTHTH, even when they are likely a philosopher than a truck driver, Native Americans used to be stereotypical portrayal of minorities in the media can lead to prejudiced views of these groups, especially in those viewers with limited life experience with members of the group in question (Greenberg, Mastro, & Brand, 2002).

The frequency of violent TV belief people who watch a lot of violent TV believe viewing with a large role in presents numerous vivid and memorable exemplars of diverse people and situations; when the distribution of these exemplars deviates strongly from the real-world distribution, the risk of viewers having a skewed view of the world markedly increases. For a good recent discussion of exemplification theory, see Zillmann (2002).

MINORITY GROUP PORTRAYALS

Although the number of African-Americans on U.S. television has greatly increased since the 1960s and now approximates the proportion in the general population, they tend to disproportionately appear in situation comedies or police dramas, and the recent increase in roles for males has not carried over to African-American females (Greenberg, Mastro, & Brand, 2002). In contrast, Hispanics, although even greater in number than African-Americans in the general population, only comprise 2% of prime-time TV characters (Poniewozik, 1991) and are concentrated in humorous, criminal, or police roles. Native Americans used to be almost entirely Plains Indians from TV and movie Westerns and recently have almost entirely disappeared from entertainment media. The small number of characters combined with the stereotypical portrayal of minorities in the media can lead to prejudiced views of these groups, especially in those viewers with limited life experience with members of the group in question (Greenberg, Mastro, & Brand, 2002).

Content analyses investigating the proportion and quality of minority roles on television and film do not tell the whole story of how those portrayals might affect the audience’s perception of those minorities. Specifically, a strong character in an immensely popular show or series might "drench" the viewer with an image of the minority that remains strong despite other portrayals the viewer might see, for instance, Bill Cosby’s Cliff Huxtable from The Cosby Show or Eric McCormack’s Will Truman from Will and Grace. In this way, certain actors and characters will exert more influence on the perceptions of the group being portrayed than the many other stereotypical portrayals the audience views (Greenberg, 1988).

Sometimes an unusually attractive or respected person or character can greatly influence behavior in positive ways. For example, after a sexy "hunk" actor in a popular Brazilian soap opera in the 1980s played a deaf character, interest in learning sign language soared. Similarly, when NBC news anchor Katie Couric invited Today show viewers to watch her colon exam in 2000, requests for colonoscopies to check for colon cancer rose 20%, almost surely saving numerous lives (Bjerklie, 2003).

CULTIVATION THEORY

Attending to and recalling these types of portrayals can have long-term effects. One theory that describes how knowledge is skewed by comprehending and remembering media experiences is Cultivation Theory, which looks at the way that extensive repeated exposure to entertainment media over time gradually shapes our view of the world and our social reality. See Gerbner, Gross, Morgan, Signorielli, and Shanahan (2002) for an overview of the theory. Cultivation of worldviews happens through a process of construction, whereby viewers learn about the real world from observing the world of television. Memory traces from watching TV are stored relatively automatically (Shapiro, 1991). We then use this stored information to formulate beliefs about the real world (Hawkins & Pingree: 1990; Potter, 1991a, 1991b, 1993; Shrum & Bischak, 2001). The more television one watches, the more one’s worldview resembles the world presented on television. For example, people who watch a lot of violent TV believe the world to be a more violent place than it really is (mean world syndrome) (Signorielli,
1990). The cultivated social reality includes many types of knowledge, including gender roles (Morgan & Shanahan, 1995), political attitudes (Morgan, 1989), estimations of crime risk (Shrum, 2001; Shrum & Bischak, 2001), understanding of science and scientists (Potts & Martinez, 1994), attitudes toward the environment (Shanahan & McComas, 1999; Shanahan, Morgan, & Stenbjerre, 1997), adolescent career choices (Morgan & Shanahan, 1995), and effects of prolonged viewing of talk shows (Rössler & Brosius, 2001).

Entertainment as Education

One increasingly popular way to communicate socially positive information to the public is through entertainment media. Over 75 such entertainment-education (E-E) campaigns have been implemented in at least 40 nations worldwide and are especially common in developing countries (Sherry, 2002; Singhal & Rogers, 1999). In many countries, radio and television have long been seen as legitimate tools for development and positive social change, rather than merely vehicles for entertainment. Thus many popular entertainment series are explicitly produced to promote gender equality, adult literacy, sexual responsibility, and family planning.

Sometimes these entertainment programs can be wildly popular but also lead to considerable knowledge and behavior change. For example, the Tanzanian radio soap opera Tewade na Wakati (“Let’s Go with the Times”) reached 55% of the nation’s population from 1993–98, with 82% of viewers saying they had changed behavior to reduce the chance of HIV infection (Rogers, Vaughan, Swalehe, Rao, Svenkerud, & Sood, 1999). The South African TV, radio, and public health campaign Soul City (Singhal & Rogers, 1999) dealt with HIV prevention, maternal and child health, domestic violence, and alcohol abuse, and it became South Africa’s top-rated television show. It elicited discussion and further information-seeking. Before Soul City, only 3% agreed with a statement that one’s HIV-positive status should be communicated to one’s partner, but afterward 75% agreed the partner should be told.

Although no broad-based popular E-E campaigns have been promulgated in the United States, elements of E-E increasingly appear on American entertainment TV. One of the earliest was the designated driver campaign of the late 1980s, where the Harvard School of Public Health worked with 250 NBC writers and producers to incorporate the new idea of a “designated driver” in TV plotlines. By 1994, the designated driver message had appeared on 160 prime-time shows and been the main topic of 25. Two-thirds of the public had noted the mention of designated drivers in TV shows and just over half of young adults reported they had served as a designated driver. By the late 1990s, the drunk-driving fatality rate had fallen by one-third from ten years earlier, in part due to greater use of designated drivers (Rosenzweig, 1999). Since 1998 the Center for Disease Control has assisted teleplay writers in placing positive health messages in their entertainment scripts for popular TV shows. On Beverly Hills 90210, Steve bragged about his flawless tan, but his girlfriend noticed a suspicious mole on the back of his neck. Concerned about skin cancer, he later took a megaphone to the beach and shouted about the benefits of using sunscreen. An episode of ER used a plot line about morning-after contraception; 6 million of the show’s 34 million viewers reported learning about morning-after contraception from watching the show (Rosenzweig, 1999). A Kaiser Family Foundation study found that one third of ER viewers reported learning something from the show that had been helpful in making health care decisions in their own families. (Stolberg, 2001). Other embedded health messages have included AIDS awareness themes on soap operas and condom messages on the sitcom Friends (Brown & Walsh-Chidlers, 2002) and the teen-oriented shows Felicity and Dawson’s Creek (Rosenzweig, 1999).

5. COMPREHENSION AND MEMORY

Developmental Issues

The comprehension and memory of an audience are functions of age, or, more specifically, the development stages of the audience. One area where cognitive development and understanding of the difference between entertainment and educational television programming is clear is in children. However, very young children cannot process complex content and do not understand social messages. They view a steady uninterrupted stream of information as its proper purpose (see Martin, 1999). The relationship between program and content requires a child to have an understanding of the difference between entertainment and education. Preschool children have little understanding of the difference between entertainment and education. School children show various degrees of understanding of the difference.

In the preschool age (up to 5 years), children do not comprehend or retain complex content. They may absorb aspects of the story on a literal level (e.g., the story on wife-battering gathered censure, a behavior seen in the media; see Singhal & Rogers, 1999).

A second area where the confusion between entertainment and education occurs is in different age groups. Children and older children elicit different responses to violent entertainment content and do not differentiate the content from other forms (e.g., monsters and mutated objects). Depictions of danger may either reflect or heighten a child’s fear of reality. Children may be afraid during the scenes where the characters are in danger, but the child may not understand why his or her life is in peril. Depictions of danger may either reflect or heighten a child’s fear of reality. Children may be afraid during the scenes where the characters are in danger, but the child may not understand why his or her life is in peril.

Consider two brothers watching TV. The preschooler may be afraid of the evil character in the scenes but is afraid during the scenes where the characters are in danger, but the child may not understand why his or her life is in peril. Depictions of danger may either reflect or heighten a child’s fear of reality. Children may be afraid during the scenes where the characters are in danger, but the child may not understand why his or her life is in peril.

Instances of media fear in children's lives include several studies (Cantor & Oliv, 1999) found that practically all children have had media-generated fear responses to violent entertainment content and do not differentiate the content from other forms (e.g., monsters and mutated objects). Depictions of danger may either reflect or heighten a child’s fear of reality. Children may be afraid during the scenes where the characters are in danger, but the child may not understand why his or her life is in peril. Depictions of danger may either reflect or heighten a child’s fear of reality. Children may be afraid during the scenes where the characters are in danger, but the child may not understand why his or her life is in peril.

A third area where the confusion between entertainment and education occurs is in different age groups. Children and older children elicit different responses to violent entertainment content and do not differentiate the content from other forms (e.g., monsters and mutated objects). Depictions of danger may either reflect or heighten a child’s fear of reality. Children may be afraid during the scenes where the characters are in danger, but the child may not understand why his or her life is in peril.
of knowledge, including gender roles (Morgan, 1990), estimations of crime risk (Cantor, 1989), and alcohol abuse, and it became clear that the HIV-positive status should be brought to the public's attention (Shanahan et al., 1999). A Kajser Family Foundation report noted that the morning-after pill, used to delay or prevent pregnancy, had appeared on 160 prime-time TV shows. (Beverly Hills 90210 and other entertainment series are explicitly employed to reduce the chance of HIV transmission, and positive social change, rather than entertainment series are explicitly employed.)

Positive information to the public is often promoted through education (E-E) campaigns have been especially common in developing countries, radio and television and positive social change, rather than entertainment series are explicitly employed. The Tanzania radio soap opera, one of the earliest radio and television series to explicitly promote positive information to the public is the Tanzanian radio soap opera. If the nation's population from ages 5 to 7-year-olds understand the selling purpose of ads, but almost all do by age 11 (Wilson & Weiss, 1992). Typical explanations of middle elementary children center on the truth or lack thereof of the material; not until late elementary school is the distrust based on perceived intent and an understanding of the advertiser's motivation to sell.

The comprehension and memory of information from the media sometimes varies as a function of age, or more specifically, the level of cognitive development of the viewer.

One area where cognitive development is extremely critical concerns young children's understanding of the difference between programs and commercials. From the adult point of view, television programming is clearly entertainment, while the advertising is something else altogether. However, very young children do not discriminate between commercial and program content and do not understand the persuasive intent of ads; to them television provides a steady uninterrupted stream of entertainment. Although children identify commercials at a very early age, this identification is based on superficial audio and video aspects rather than an understanding of the difference between programs and commercials (Raju & Lonial, 1990). Preschool children have little understanding that commercials are meant to sell. Elementary school children show various intermediate stages of development of the understanding of the purpose of ads (see Martin, 1997, for a meta-analysis). The insertion of video and audio separators between program and commercials has not made this discrimination much easier. Only about a third of 5- to 7-year-olds understand the selling purpose of ads, but almost all do by age 11 (Wilson & Weiss, 1992). Typical explanations of middle elementary children center on the truth (or lack thereof) of the material; not until late elementary school is the distrust based on perceived intent and an understanding of the advertiser's motivation to sell.

A second area where the comprehension of media varies hugely with age is the issue of fear responses to violent entertainment (Cantor, 1996, 1998b, 2002). Different stimuli and events differentially elicit fear responses in viewers of different ages. Distortions of natural forms (e.g., monsters and mutants) are very scary to preschoolers but typically less so to older children. Depictions of dangers and injuries (e.g., attacks, natural disasters) are scarier to upper elementary school children than to preschoolers; in part because the older children are cognitively able to anticipate danger and its possible consequences and thus be fearful before the actual event occurs. Only a teen or adult is likely to be very scared of an abstract threat, which may have to be imagined by the viewer from dialogue in the film. The older the child, the more able he or she is to think abstractly and be frightened by seeing situations of endangerment to others.

Consider two brothers watching a movie about a benevolent alien visiting from outer space. The preschooler may be afraid of the fantastic form of the alien, while the older child may be afraid during the scenes where he recognizes that the friendly alien or sympathetic humans may be in potential danger from others. Furthermore, the younger child may not be afraid at all — in fact, he may love the cute little alien — and may not be able to think abstractly enough to understand why his brother is afraid of the potential endangerment to the kind creature. How much each is entertained — and why — will clearly vary as a function of the child's age and how they comprehend fear-inducing stimuli.

Instances of media fear in childhood may often be long-lasting, even traumatic memories. Several studies (Cantor & Oliver, 1996; Harrison & Cantor, 1999; Hoekstra, Harris, & Helmick, 1999) found that practically all young adults were able to readily remember an incident of being
extremely scared by a movie as a child or teen. At least the memories, and perhaps some of the effects as well, are long lasting. Some effects reported are general fear/anxiety, specific fear (e.g., fear of swimming after seeing *Jaws*; fear of clowns after seeing *It*), sleep disturbances, and nightmares.

Sometimes, self-report may not be a completely adequate measure of comprehension or memory, however. For example, Sparks, Pellechia, and Irvine (1999) found that some people reported low levels of negative affect in response to a 25-minute segment from a horror film but high levels of physiological arousal, as measured by skin conductance. Peck (1999, cited in Cantor, 2002) found that women's reports of fear in response to watching scary scenes from *Nightmare on Elm Street* were more intense than men's, but in some cases men's physiological responses were more intense than women's, if the victim in the scene was male.

Adults of different ages may comprehend media differently. For example, many older women viewers of the hugely successful Indian TV drama *Hum Log (We People)* identified more with the traditional family matriarch character than with her more independent daughters (Brown & Cody, 1991). Similarly, with the 1970s U.S. sitcom *All in the Family*, older and more traditional viewers identified with the bigoted Archie Bunker and found him to be a more positive figure than the producers had envisioned or than the younger audience saw him (Vidmar & Rokeach, 1974). This phenomenon, of some viewers unexpectedly identifying with the negative models, has been observed in several nations and has come to be known as the "Archie Bunker effect."

**A MODEL OF COMPREHENSION AND MEMORY FOR ENTERTAINMENT**

We now conclude this paper with a proposed application of the comprehension model of Walter Kintsch (1988, 1998) to the cognition of entertainment. Because memory contributes to comprehension, and the degree of comprehension contributes to memory, a picture of an interactive process between comprehension and memory emerges. The process of comprehending or understanding a media event can be described as involving the existence of knowledge from memory to interpret or extract meaning of perceptual inputs, while simultaneously integrating those inputs to construct a coherent holistic internal mental model of the media event in working memory. This mental model will then be transferred and stored in long-term memory for aiding interpretation of future experiences or events (Kintsch, 1988). According to Kintsch's (1988, 1998) construction-integration (CI) theory, the comprehension process consists of creating three levels of mental representation within two major phases: a construction phase and an integration phase. Both of these take place in working memory, more specifically, in the long-term working memory described in Ericsson and Kintsch (1995) or Baddeley (2000). Although Kintsch's CI theory was originally formulated in the context of text comprehension, the CI theory can be generalized to other contexts such as comprehending media events.

According to Kintsch, understanding something requires building a mental model. This mental model is built up sequentially and in cycles. The three levels of mental representation that act as a unitary whole in the CI model, from lowest to highest, are surface level, textbase level, and situational model. Generalizing to entertainment like television, cinema, and popular music, the construction phase of the CI theory involves the surface and textbase level. The surface level is the actual minimally processed information that the person perceives and encodes from the media. In reading text, this is represented by the exact words or phrases of the text. In media entertainment, this can reflect the actual visual images and sounds that a person encodes from a TV program or listening to music. At the textbase level, information from the surface level is transformed into propositional representation (e.g., adjectives, or adverbs), again to construct a coherent mental model.

According to Kintsch, the textbase level is the actual minimally processed information that the person perceives and encodes from the media. At the textbase level, information from the surface level is transformed into propositional representation (e.g., adjectives, or adverbs), again to construct a coherent mental model.

This comprehension model provides a general framework for how some effects of the media could be observed. For example, when a minority character on one's favorite TV show is suddenly killed off, this may lead to cultivation of an opposing worldview, and memory for the media event.
...and perhaps some of the general fear/anxiety, specific fears (e.g., after seeing It), sleep disturbances, inadequate measure of comprehension or Vine (1999) found that some people 3-minute segment from a horror film in conductions. Peck (1999, cited in case to watching scary scenes from A in some cases men's physiological in the scene was male. differentl. For example, many older from The Sixth Sense, where the lead character Malcolm, played by Bruce Willis, was shot, what we understand about what happens when a person is shot (e.g., serious injury, paralysis, death) comes from seeing previous similar movies involving shootings, which become activated in our memory. In addition, knowledge of prior Bruce Willis characters becomes activated at the textbase level. Not until the second phase (integration) of the CI theory does the mental model becomes context-specific (e.g., de-activating previous Willis roles while maintaining the concept of injury or death) through the use of our knowledge of the genre of the current media event (i.e., The Sixth Sense is a thriller). Ideas or concepts that remain activated after the integration phase become embedded into our mental model or situation model in the form of a knowledge network of what we understand of our current environment (i.e., character is shot, he is likely going to die). The mental model is built and lies on the foundation of our interpretation based on the encoded information and our previous knowledge and experiences; hence, our mental model may not always be accurate.

Inaccuracies in our mental model can be due to our misinterpretation or misunderstanding of the perceived event. Sometimes, screenwriters intentionally induce such misunderstandings, as in the case of The Sixth Sense, where the script purposely leads us to construct an incorrect situation model of the action. Immediately following the scene where Malcolm was shot, we see him sitting on a bench, leading many viewers to interpret and construct a mental model that he recovered from his injury. It is not until near the end of the movie when the movie writers provide the viewers with cues to make them realize that their mental model of the initial shooting scene and its outcome was incorrect (i.e., he did not survive the attack).

In the CI theory, our mental model consists of information that remains activated and embedded within the knowledge net. This information is used to interpret subsequent information about the media event; that is, subsequent information that is consistent with our mental model remains activated and possibly integrated in the knowledge structure, while subsequent information that is not consistent with the mental model tends to be de-activated. This can explain why many watching The Sixth Sense were not aware of the subtle cues that the lead character was dead embedded in the movie by the screenwriter but rather continued to accept information consistent with the mental model that he had survived serious injury. Besides being influential in guiding our interpretation of entertainment media, our mental model is also an important construct that affects many other aspects of our entertainment experiences discussed earlier, such as providing a context for use of cognitive heuristics, reality monitoring, cultivating worldviews, and memory for music.

CONCLUSION

This comprehension model applied to media entertainment leads to a better understanding of how some effects of the media may arise. For example, integrating the information about a minority character on one show with information about a similar character on another show may lead to cultivation of an opinion about all members of that particular social group. This process, along with forming exemplars from the media and other processes discussed here,
repeats itself many times as people seek out and enjoy media entertainment. In addition, the memories of these media experiences may affect viewers over the course of a lifetime. In this way, comprehending and remembering media events play an important role in our lives.

REFERENCES


media entertainment. In addition, the media content can have a lasting influence over the course of a lifetime. In this chapter we will consider the role of the media in our lives.

5. COMPREHENSION AND MEMORY

5.1. AUTOBIOGRAPHICAL MEMORIES


5.2. ERP STUDIES ON MEMORIES OF EXPOSURE TO MEDIA CONTENT


5.3. FRIGHTENING MOVIES IN CHILDHOOD


5.4. DIVERGENT PSYCHOLOGICAL PROCESSES IN CONSTRUCTING SOCIAL REALITY FROM MASS MEDIA CONTENT


5.5. TALK SHOWS,CULTIVATION ANALYSIS, AND THE CULTIVATION OF POLITICAL ATTITUDES


5.6. THE REPRESENTATION OF MEANING OF MEMORY


5.7. TELEVISION AND DEMOCRACY


5.8. TELEVISION AND THE CULTIVATION OF POLITICAL ATTITUDES IN ARGENTINA


5.9. COMPARATIVE CULTIVATION ANALYSIS


5.10. TELEVISION AND DEMOCRACY IN ARGENTINA


5.11. TELEVISION AND THE CULTIVATION OF POLITICAL ATTITUDES IN ARGENTINA


5.12. COMPARATIVE CULTIVATION ANALYSIS


5.13. TELEVISION AND DEMOCRACY IN ARGENTINA


5.14. TELEVISION AND THE CULTIVATION OF POLITICAL ATTITUDES IN ARGENTINA


5.15. COMPARATIVE CULTIVATION ANALYSIS


5.16. TELEVISION AND DEMOCRACY IN ARGENTINA


5.17. TELEVISION AND THE CULTIVATION OF POLITICAL ATTITUDES IN ARGENTINA


5.18. COMPARATIVE CULTIVATION ANALYSIS


5.19. TELEVISION AND DEMOCRACY IN ARGENTINA


5.20. TELEVISION AND THE CULTIVATION OF POLITICAL ATTITUDES IN ARGENTINA


5.21. COMPARATIVE CULTIVATION ANALYSIS


5.22. TELEVISION AND DEMOCRACY IN ARGENTINA


