

# Implications of the mental models approach for cultivation theory

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## *Abstract*

*Mental models are dynamic mental representations of situations, events, and objects. We argue that the mental models approach can expand our understanding of cultivation theory. We survey the research on mental models, situation models including the event indexing model, and cultural models. Based on this literature, we propose several ways in which cultivation theory can be expanded to provide a richer understanding of how the media influence people's perception of their social reality and understanding of their culture.*

*Keywords: cultivation, mental models, situation models, event indexing models, schemas*

“Television is likely to remain for a long time the chief source of repetitive and ritualized symbol systems cultivating the common consciousness of the most far-flung and heterogenous mass publics in history” (Gerbner and Gross, 1976: 174).

Nearly thirty years have passed since Gerbner and Gross' prediction, and despite technological and cultural revolutions, television, the so-called central storyteller in modern culture, appears to have survived. In the United States, over 98% of all homes owned a television in 2000; the average home possessed 2.4 TVs (U.S. Census Bureau, 2002). In addition, the Census Bureau estimated that the average person watched more than 1,630 hours of TV in 2000. If a person spends an average of 16 hours awake each day, this translates into the average person watching the equivalent of over 102 days of TV. Furthermore, the Census Bureau predicts that the average person in the United States will be watching the equivalent of about three more days of TV in 2005 (U.S. Census Bureau, 2002). It is clear that TV has been and will continue to be a major part of our social reality.

One theory, cultivation theory, states, at its simplest level, that the media cultivates our social reality; what we watch influences how we view the world. The theory has spawned an amazing number of empirical studies testing its various components (Gerbner, 1998). A recent meta-analysis of only the survey research testing cultivation theory included over 75 published studies (Morgan and Shanahan, 1997). The overwhelming amount of evidence supporting cultivation theory elevates it to a class of theories called grand theories.

From our perspective, a question remains about the theory. If television has been cultivating our consciousness for the last thirty years – and for many years before that – how has it managed to do so? There have been attempts to explicate the psychological and sociological mechanisms that account for cultivation effects (for a review, see Shrum, 2002), but our understanding of the mechanisms underlying this phenomenon is embarrassingly inadequate given the number of cultivation studies in the past three decades. In this article we draw upon a growing body of literature in narrative comprehension to provide a new approach to understanding the mechanism underlying cultivation theory: A mental models approach.

### **Overview of cultivation theory**

At a very basic level, cultivation theory focuses on the role of the media in shaping how people perceive their social environment. Research in social psychology has highlighted many variables that can influence how people interpret their social environment, including attitudes (Fazio, Roskos-Ewoldsen, and Powell, 1994), social norms (Cialdini and Trost, 1998), and accessible constructs (Higgins, 1996). So the idea that various psychological and sociological factors influence how people understand their social environment is well-established. However, cultivation theory maintains that TV operates as the primary socializing agent in today's world (Gerbner, Gross, Morgan, Signorielli, and Shanahan, 2002). In other words, the culture that people learn is influenced heavily by the culture portrayed on TV. This is especially so for heavy viewers of TV. Cultivation theory also maintains that culture influences what is shown on TV so that there is a dynamic between TV and culture in that they can be mutually reinforcing (see Gerbner, 1998 for discussion), although this aspect has not been emphasized in previous research. However, it will become more important from a mental models perspective.

Much of the early research on cultivation theory focused on the influence of TV violence on perceptions of social reality. According to cultivation theory, heavy viewers of TV should see the world as a more violent and hostile place than light viewers of TV. Evidence supports this;

heavy viewers of TV perceive the world as a more dangerous and hostile place than light viewers of TV (Gerbner et al., 2002; Morgan and Shanahan, 1997; Signorielli, 1990). Still, a person could argue that people who perceive the world as a dangerous and hostile place may be less likely to engage in activities outside the home and, as a consequence, are more likely to watch TV. Experimental research suggests that this is not the case. It has demonstrated that people who were randomly assigned to watch TV shows containing a lot of violence experienced higher anxiety than people who were assigned to maintain their usual TV habits, particularly if the violent perpetrators were not brought to justice (Bryant, Carveth, and Brown, 1981).

Other facets of the social world that have been explored from a cultivation perspective include perceptions of women and how materialistic people are. In the former case, men are characters in TV shows at about a 2 to 1 ratio to women, and women are portrayed in a more stereotypical manner than men (Gerbner et al., 2002). As a result, people who are heavy viewers of TV tend to have more sexist views of women (Gerbner et al., 2002; Morgan, 1990). In the latter case, people in both the U.S. and Korea who watch more TV, and consequently more commercials that promote material products, had higher perceptions of societal materialism than those who watch less TV (Kwak, Zinkhan, and Dominick, 2002).

More recent research has investigated both the specificity of TV viewing and the social cognitive mechanisms responsible for cultivation effects. Both aspects are important from a mental models perspective. Previously, research has focused on overall viewing of TV rather than on watching particular types of shows. However, scholars now maintain that heavy viewing of particular genres of TV has stronger and more specific effects than overall TV viewing (Hawkins and Pingree, 1981; Romer, Jamieson, and Aday, 2003; Segrin and Nabi, 2002; Shrum, 2002). For example, the show that depicts the most excessive amounts of realistic violence is the evening news. It probably has the heaviest concentration of realistic violence of any TV programming. The *local* evening news should be particularly frightening because the violence occurs where the viewer lives. The research bears this out. Parents report that their children are scared by the local news (Cantor and Nathanson, 1996). Likewise, about 25% of children who were in grades 4 to 6 spontaneously reported that the local news was scary, and over half of the children who were interviewed could identify news stories from the local news that had scared them (Smith and Wilson, 2002). In fact, children who watch more evening news gave higher estimates of the number of murders that would occur in a nearby city than children who watch less evening news (Smith and Wilson, 2002). The local news creates a scary world for these

children. Research among adults also finds that heavier viewers of the local news are more likely to experience fear and to be concerned about crime rates in their community than lighter viewers (Romer, Jamieson, and Aday, 2003).

Regarding the social cognitive mechanisms of cultivation theory, probably the most important work that has been done has focused on the influence of TV depictions on the accessibility of related constructs and attitudes from memory (Busselle, 2001; Busselle and Shrum, 2003; Shrum, 1995, 1996, 1999, 2003; Shrum and O'Guinn, 1993; Tapper, 1995). Numerous studies have demonstrated that heavy viewing of particular genres of TV increases the accessibility of related constructs from memory. Constructs that are accessible from memory bias our judgments about and perceptions of our social environment (Higgins, 1996; Sherman and Corty, 1984). In particular, the accessibility of these constructs at least partially mediates the influence of TV on perceptions of social reality (Shrum, 2002). Thus, the cultivation effect of the media appears to operate, at least in part, by increasing the accessibility of constructs that are related to what heavy viewers are watching. For example, if a person watches a lot of crime dramas, then crime and related constructs (e. g., guns, police, etc.) would be more accessible from memory than unrelated constructs. In turn, when that person walks around their neighborhood, that person would be more likely to interpret various elements of the social environment as involving violence (e. g., two boys wrestling will be interpreted as a fight). Although focusing on construct accessibility provides an explanation for individual level cultivation effects, it does not adequately account for the dynamic relationship between TV and culture. Nevertheless, it provides a valuable starting point for understanding cultivation effects.

At a broader level, cultivation theory has been and continues to be useful in understanding the influence of the media metaphorically. The very name of the theory – cultivation – is a metaphor drawing upon agriculture to help highlight the basic idea of the theory – that the media help to create an ordered homogenous reality instead of a disorganized random weed patch reality. There are other metaphors used to understand media's influence. Gravity has been used to highlight the nonlinear nature of the theory; heavy uses of TV are drawn to the 'TV reality' as if TV had a gravitational force. Perhaps the most famous is the metaphor of story telling; TV is the great 'story teller' of the current era. Of course, metaphors are used to make certain characteristics of something more salient and often more can be learned about the object of a metaphor by exploring the metaphor in more detail (Collins and Gentner, 1987). We particularly like the storyteller metaphor because it

captures the situational interplay between the teller and the listeners. The storyteller creates a mental world in which characters, situations, and events unfold to convey some truth about human existence.

### *Overview of mental models*

On the surface, comprehending a narrative, listening to a storyteller, reading a book, having a conversation, or watching a movie appear to be relatively simple matters. We see an image, hear or read words, and retrieve meanings from memory. However, each of these processes is complex and is only part of the mental work of comprehension. Many cognitive psychologists maintain that a basic component of the comprehension process involves the construction of a mental model (e. g., Johnson-Laird, 1983; van Dijk and Kintsch, 1983).

A mental model is a dynamic mental representation of a situation, event or object (van Dijk and Kintsch, 1983). We can use these mental models as a way to process, organize, and comprehend incoming information (Radvansky, Zwann, Federico, and Franklin, 1998; Zwann and Radvansky, 1998), make social judgments (Wyer and Radvansky, 1999), formulate predictions and inferences (Magliano, Dijkstra, and Zwann, 1996), or generate descriptions and explanations of how a system operates (Rickheit and Sichelschmidt, 1999). A key notion of the mental model approach is that there is some correspondence between an external entity and our constructed mental representations of that entity (van Dijk and Kintsch, 1983; Johnson-Laird, 1989). However, psychologists disagree on the degree of association, and which aspects of an entity are incorporated into a model. Differences in opinion, such as these, make it difficult to provide an exact definition of mental models. Indeed, psychologists have yet to reach a consensus on the definition.

The lack of a clear definition of mental models may be due to the fact that mental models capture a broad and diverse range of phenomena. Richeit and Sichelschmidt (1999) identify at least four phenomena that are explained by 'mental models'. One focuses primarily on spatial relationships in the environment and permits a person to navigate familiar and unfamiliar territory. These mental models are often referred to as cognitive maps (e. g., Taylor and Tversky, 1992). A second type of phenomena focuses on our understanding of complex, natural or technical systems, as a means of predicting how these systems operate (e. g., McCloskey, 1983). For example, we have mental models of how gravity, calculators, VCRs, and computers work. A third type of phenomena focuses on deductive reasoning. In this case, mental models function to help a person formulate conclusions relative to some premise (e. g., Johnson-Laird, 1983, 1989). Finally, a fourth type of phenomena focuses on

the mental representations of real or imagined situations. According to van Dijk (1995), these situation models are memory constructs that represent what a situation or event described in a text is *about*, rather than a literal representation of the text itself.

One question that is often raised about mental models is how they differ from schemas, or more generally, how mental models differ from one another. This is an important question because mental models and schemas are highly related. We and others have argued that mental models exist at many different levels (Roskos-Ewoldsen, Roskos-Ewoldsen, and Carpentier, 2002; Wyer and Radvansky, 1999; Zwaan and Radvansky, 1998). However, here we would argue that there is a continuum of abstractness along which mental representations exist, from a situation model to a mental model to a schema.

A situation model is a representation of a specific story or episode that has specific temporal and spatial constraints (Wyer, 2004). For example, a situation model of Stout's (1948) story, *And be a villian*, takes place in 1949 in New York City and features the characters of Nero Wolfe, Archie Goodwin, Fritz, Madeline Fraser, Deborah Koppel, among others. A mental model is a more abstract representation of a series of related stories. Like a situation model, a mental model has temporal and spatial constraints, but these constraints will typically be looser. A mental model of a series of Rex Stout's Nero Wolfe stories would take place throughout the middle part of the 1900s and would be set primarily in and around New York City, but includes other parts of New York state, Washington, DC, and so forth. Importantly, situation and mental models represent knowledge *about* some event or events. A schema is a more abstract representation that is knowledge *of* something (D'Andrade, 1995; Markman, 1999; Shore, 1996). For example, a schema for 'mysteries' would include no temporal or spatial information. Rather, the schema would include information about what the important elements of a typical mystery are (e. g., a crime, an unknown perpetrator, someone trying to solve the crime, the possibility the crime will not be solved, etc.). Of course, astute readers will note that one of the classic examples of a schema – the restaurant schema – includes temporal information such as you pay for the food *after* you order it. However, although there may be temporal or spatial information about events within a schema, the schema itself is not contextualized within a specific time or place.

Throughout the rest of this article, we will use the term situation model to refer to a model of a specific story or situation and mental models to refer to more abstract representations of stories or situations. Schema will refer to abstract representations that are not about a specific, contextualized event or events.

Despite their differences, situation and mental models have some similarities. First, they are malleable. Norman (1983) has observed that mental models are incomplete, lack clearly defined boundaries, and even contain errors. Similarly, Wyer and Radvansky (1999) argue that the components of a situation or mental model are interchangeable – much like building blocks can be used to construct various shapes. This characteristic of models distinguishes them from other approaches to cognition, such as network models, or even schemas. Semantic networks, for instance, are static and rigid. Network models posit that knowledge is stored in nodes and, when stimulated, they activate closely related nodes. This results in the heightened accessibility of related exemplars. A mental model or situation model may be activated by similar processes, but once brought to mind, these models interface with other knowledge structures in a much more dynamic way. Thus, the second similarity is that they are dynamic. That is, they are subject to user-control and may be manipulated to generate inferences, test different scenarios, or draw conclusions about information that may or may not be contained in a text or situation. For example, when engaged in conversation, people construct a model of the communication situation and make online inferences about what they think others believe and intend; only a portion of these inferences are transferred to longer-term memory (Dickinson and Givon, 1997). Another example would be how movie viewers may use cinematic features – editing techniques, costumes, music, dialogue, etc. – as cues to make predictions about future events or to make inferences about previous events. When anomalous information is emphasized by filmmakers, viewers attempt to find out why such information is presented. These predictions are generated through the manipulation of situation models that viewers create as they watch a film (Magliano, Dijkstra, and Zwann, 1996).

A third similarity is that the models draw upon real world knowledge. Indeed, real world experiences are essential in constructing situation and mental models (Lakoff and Johnson, 1980; van Dijk and Kintsch, 1983). Long-term knowledge structures such as schemas, which are based on our experience, may be used to fill in the details of situation models. In the absence of first-hand experience with a particular situation, we may draw upon our observations, others' explanations, analogous models, or components from analogous models, all of which we have experienced (Johnson-Laird, 1989).

We believe that the mental models approach provides a useful perspective for understanding cultivation effects. In particular, we draw upon the situation models that are used in the narrative comprehension literature. The basic idea is that people construct situation models of TV programs as they watch them. These situation models are stored in memory and, if activated, can be used to interpret new situations.

### Situation models of comprehension

Situation models play a critical role in the comprehension of stories (Magliano, Miller, and Zwaan, 2001; Magliano, Zwaan, and Graesser, 1999; van Dijk and Kintsch, 1983; Zwaan, 1999; Zwaan and Radvansky, 1998). When a person views a TV show, s/he constructs a situation model of the story. If the person watches more TV shows about the same general events (e.g., shows in a series), s/he would construct a situation model of each episode of the series. In addition, s/he would construct a mental model of the series. For example, we might construct a situation model of each particular episode of the BBC's *Sherlock Holmes* series that we had watched. Likewise, we could have a situation model of each of Arthur Conan Doyle's Sherlock Holmes stories that was read. In addition, we could abstract a mental model that encompasses the relevant knowledge we have about Sherlock Holmes, Dr. Watson, Victorian London, and so on. Thus, these models would be used to comprehend not only the current story, but also future stories.

Situation models are hypothesized to exist alongside other types of mental representations such as semantic networks and schemas. Situation models are not mental pictures, though the models can include mental imagery. Rather, they are abstract representations where mental tokens represent objects, goals, locations and other components of the situation. For example, when watching the movie *Ishtar*, the situation model for the movie may have tokens for Dustin Hoffman and Warren Beatty. These tokens would be linked to specific information about Dustin Hoffman and Warren Beatty in semantic memory. Tokens would also be used in mental models. The use of tokens in situation models and mental models is important because it allows for a more economical representation of a story in memory, because not all of the information about an individual or place in a situation or mental model will be stored in the model.

Situation and mental models are also consistent with the extensive research on realism and cultivation effects (Busselle, 2001; Potter, 1986). Specifically, whether the situation or mental model influences a person's perception of social reality depends on the overlap between the current situation and the situation/mental models in memory (Wyer, 2004). If there is a high degree of overlap between the current situation and situation models stored in memory, the situation model is likely to be activated and, consequently, to influence how the current situation is interpreted. For example, if people have seen *The Matrix*, the situation model of *The Matrix* should be activated from memory when watching *The Matrix Reloaded*, which would influence how people comprehend *The Matrix Reloaded*. If, for example, a person watches violent cowboy mov-

ies, the person would develop mental models of westerns just as a person who watches a lot of crime dramas would develop a mental model of crime dramas. However, the features of mental models of different types of westerns probably do not overlap with the features of most people's day-to-day environments and consequently they are less likely to be activated and less likely to guide people's interpretation of day-to-day settings. Thus, the mental models perspective on cultivation effects predicts that TV should have greater cultivation effects to the extent that what people watch matches their day-to-day environment.

Other researchers have argued the same. Wyer and Radvansky (1999) argued that the influence of the media on perceptions of a mean world may result from the use of situation models of violent TV programs or movies that are activated and used to interpret events in a person's environment (cf. Wyer, 2004). When a person walks in a park that happens to look like a park where a murder occurred in a drama show, the situation model of that drama show would be activated and may result in the person interpreting the park as a sinister place and one to be fearful of walking through. Of course, this process could work with a mental model that is abstracted from a number of shows. Again, if a person watches a lot of crime dramas set in the contemporary time, that person probably has several situation and mental models related to crime dramas in memory (e. g., a model for each episode plus a more general crime drama mental model). These models may function like mental models of physics (e. g., how gravity works), and guide the person's interactions in a broader range of settings, given their abstract nature.

Finally, situation and mental models are consistent with the research on construct accessibility. As discussed earlier, extensive research has demonstrated that heavy viewing of TV increases the accessibility of related constructs from memory (Busselle, 2001; Busselle and Shrum, 2003; Shrum, 1995, 1996, 1999, 2002; Shrum and O'Guinn, 1993). Furthermore, the accessibility of these constructs at least partly mediates the influence of heavy TV viewing on perceptions of reality. The proposed use of situation and mental models to explain cultivation effects expands on this theorizing. At a very basic level, the simple activation of a concept does not dictate one's social reality. The activation of a concept from memory influences how a person interprets a situation. In other words, the activation of the concept from memory either influences the situation model that is constructed for comprehending the situation or the situation or mental model that is activated from memory (Roskos-Ewoldsen, Roskos-Ewoldsen, and Carpentier, 2002). The more accessible a model is from memory, the more likely it will be used to comprehend the situation.

In summary, we are proposing to use the mental models approach in general, and the situation model in particular, as an explanatory mechanism for cultivation effects. Building on the work on construct accessibility, we believe that heavy TV viewing increases the accessibility of constructs related to the content of the TV programming. The activation of these constructs in memory in turn influences which situation or mental model is activated from memory to aid in the comprehension of the current situation. We believe that this is an important contribution to cultivation theory. However, we also believe that the mental models approach offers broader insights into our understanding of cultivation than this. To exemplify this, we introduce a specific situation model, the event indexing model.

### **The event-indexing situation model**

Situation models incorporate information about an entity and the various relations that the entity has with other entities within the same situation and are capable of simultaneously keeping track of several different dimensions of a single situation (Zwann, 1999; Zwann, Langston, and Graesser, 1995; Zwann and Radvansky, 1998). These dimensions include time (Radvansky, Zwann, Federico, and Franklin, 1998); space (e.g., Magliano, Miller, and Zwann, 2001); causality (e.g., Trabasso and Suh, 1993); intentionality (e.g., Langston and Trabasso, 1999); and the agents or entities involved in the situation (e.g., O'Brien and Albrecht, 1992).

In an effort to understand how people comprehend narratives in text, Zwann and his colleagues have incorporated these relations in their event-indexing model (Zwann, Langston, and Graesser, 1995; Zwann, 1999). The model posits that the process of comprehension necessarily involves the mental representation of narrated events. They argue that when readers encounter a narrative they automatically keep track of characters, the goals and desires of the characters, and the characters' location within a spatial-temporal context. These mental representations, and connections among them, form along the five dimensions stated above: Temporal, spatial, causal, motivational (i.e., intentionality), and antagonist/protagonists (i.e., agents involved in the situation).

More specifically, the model assumes that events are the central units of situation models and that events can be linked on each of these five dimensions. The model further assumes that readers continuously monitor the five posited dimensions, and any discontinuity along any one of these dimensions requires a person to update his or her situation model at a cost to cognitive processing (Magliano, Zwann, and Graesser, 1999). For example, when the location of a story shifts from one place to another, a reader must update their situation model to reflect this change.

This updating requires cognitive resources and will manifest itself in longer processing (e. g., reading times). Magliano, Zwann, and Graesser (1999; also Zwann, Radvansky, Hilliard, and Curiel, 1998) argued that the processing time of a situation is facilitated to the degree there is an overlap of dimensions between a current situation and one immediately preceding it. Overlap in the dimensions between two events also means that those events will be highly associated in long-term memory representations (Zwann et al., 1995). Furthermore, any discontinuity in dimensions elicits effortful, knowledge-based inferences as readers attempt to understand that discontinuity within a story's context. On the other hand, continuity along dimensions affords backward, text-connecting inferences that are less effortful than when there is discontinuity (Magliano et al., 1999).

Support for this model was reported by Zwann et al. (1995). They presented readers with a set of verbs from a text and asked them to group related verbs together. They found that each of the five dimensions noted above were significant predictors of how participants clustered the verbs. In later research, Zwann et al. (1998) used a reading time paradigm to test the event-indexing model. They found that reading time for sentences increased when discontinuities occurred along the five dimensions. For example, the introduction of a new character into a story represents a discontinuity in a situation, and presumably readers would have to construct a new situation model and reading times should increase. This is precisely the pattern of results they obtained.

Although the event-indexing model was initially developed to explain how readers comprehend texts, the model has been successfully applied to other media. Zwann and Radvansky (1998) argue that the monitoring of situational indices is a chronic function of narrative comprehension, independent of mode of presentation. Thus, we might expect that the model could be applied to understand how viewers perceive events portrayed on television, or how they comprehend the same events in real life. In fact, Magliano et al. (2001) demonstrated that movie viewers index events along multiple dimensions in much the same way that readers do when processing reading material.

We discuss the event-indexing model because, as a more specific theory of situation models, the event-indexing model allows us to make more precise predictions about the effects of heavy TV viewing on perceptions of social reality. By focusing on the five dimensions of a story that are indexed during comprehension, the event indexing model identifies what types of information will be stored in situation models and in more abstract mental models. Specifically, we assert that dimensions such as time, space, causality, intentionality, and agents/events are stored in memory as part of a situation model, and that it is the continuity or

discontinuity of these dimensions that will guide our judgments about these dimensions in the situations we are perceiving.

Most of the research on cultivation theory has almost exclusively focused on agents or events. For example, heavy viewers of TV often overestimate the occurrence of certain types of events such as violence, divorce and so forth (Diefenbach and West, 2001; Hawkins and Pingree, 1981; Hawkins, Pingree, and Adler, 1987; Nabi and Sullivan, 2001; Potter, 1986; Shrum and Bischak, 2001). Likewise, heavy viewers of TV are likely to overestimate certain types of agents such as law enforcement officers or doctors (Buerkel-Rothfuss and Mayes, 1981; Gerbner et al., 2002; Hawkins et al., 1987; Perse, 1986). However, the event indexing model suggests that heavy viewing of TV should influence additional judgments of people's social reality. For example, as we argued earlier, the time that the viewed actions occurred should influence people's perceptions of their social world. The heavy viewer of TV westerns will probably perceive the old west as more scary and violent than people who do not watch westerns. But, the heavy viewer of TV westerns should not view the contemporary world as violently as the heavy viewer of crime dramas placed in New York City. Likewise, the location of events (space) should influence heavy TV viewers' perceptions of their world such that their perceptions are tied to the locations where the events occur. Returning to our heavy viewer of crime dramas, this individual should perceive large metropolitan areas, and maybe even specific cities, as more violent and dangerous. Indeed, Shrum and Bischak (2001) found that heavy viewers of TV perceived New York City as a more dangerous place than did light viewers of TV.

To conclude, the event indexing model predicts that heavy viewing of TV should influence more than just people's judgments of agents and events. Heavy viewing of TV should influence judgments concerning the causality of events such as why people commit violent crimes, where the events occur, and when the events are likely to occur.

Although we believe that a social cognitive approach such as mental models has much to offer cultivation theory, we also believe that a broader approach – namely, a cognitive anthropological approach – has much to offer cultivation theory.

### **Cultural models: Making the cognitive social**

Cultivation theory was originally proposed to explain the relationship between the media and culture. As the theory developed, the focus on the dynamic relationship between media and culture was eventually replaced with a focus on how the media influence a person's perceptions of his or her own social reality. Our mental models approach is no excep-

tion. We acknowledge that one of the dangers of a purely psychological explanation of cultivation theory is that its original culture may be lost. However, a mental models approach can be broader than this. We believe that it can encompass models at a cultural level, as well as at an individual level.

Within cognitive anthropology, culture is defined as the knowledge that one must possess to function adequately as a member of that society (Dressler, in press). The knowledge that is necessary to function effectively resides in *cultural models*, which are intersubjectively shared mental models (D'Andrade, 1995; Holland and Quinn, 1987; Keesing, 1974; Romney and Moore, 1998; Shore, 1996).

Research in cognitive anthropology has demonstrated a remarkable degree of sharedness in cultural models (D'Andrade, 1996; Minoura, 1992; Quinn, 1987; Shore, 1996). For example, Quinn (1987) found a high degree of consensus concerning the cultural model of marriage in the United States, based on 300 hours of interviews on marriage. Specifically, in the cultural model of marriage in the U.S. there are eight elements: Marriages are enduring, mutually beneficial, unknown at the outset, difficult, effortful, a joint endeavor, may succeed or fail, and risky. Metaphors used to talk about marriage almost invariably include at least some of these elements. For example, a common metaphor for marriage is that it is a manufactured product (e. g., "we worked hard at making this marriage work"). This metaphor reflects the effortful and joint endeavor components of the marriage model. Not only are these cultural models shared, they also serve as the foundation on which people reason about marriage (Quinn, 1987). In other words, cultural models can shape how we view cultural phenomena such as marriage.

From a mental models perspective, if the media can shape one's mental model at a situational level, it should also be able to shape an intersubjectively shared mental model at a cultural level. Recent research suggests that this may be true. Segrin and Nabi (2002) found that heavy viewing of the romance genre of TV (e. g., romantic comedies, soap operas, daytime talk shows, and reality-based shows about relationships) can influence people's expectations about marriage. Although the research did not specifically test cultural models of marriage, it is clear that there was a relation between heavy viewing of romantic programming and a distorted cultural model of marriage. For example, heavy viewers with idealized expectations of marriage did not seem to share several components of the cultural model of marriage: They did not see marriage as effortful, difficult, unknown at the outset, or risky.

There is more to cultural models than is described here. Nevertheless, we want to highlight three important insights from the work on cultural models that can be used to inform cultivation theory. First, although

cultural models are shared, there can be varying degrees of consensus concerning a cultural model. For example, Segrin and Nabi's (2002) study on expectations concerning marriage suggests that heavy viewers of romantic TV may not share major components of the cultural model of marriage. To test whether there is a consensus concerning a cultural model one can draw upon the cultural consensus model (Romney, Weller, and Batchelder, 1986; see also Handwerker, 2002). While providing the complete details for conducting an analysis of cultural consensus is beyond the scope of this essay, the basic idea is to use principle components analysis to determine the extent to which participants are responding to measures of a cultural model in the same manner. The participants are the unit of analysis, rather than the items in a survey, for example, and the question is whether the respondents, not the items, form a single factor. If there is a high degree of cultural consensus, then the respondents should answer the questions similarly and would form a single factor in a principle components analysis. If there is not, then participants would form multiple factors. In this manner, one can obtain a measure of the degree of cultural consensus. Using this methodology, cultivation researchers can test the relation between TV viewing and culture. For example, cultivation theory suggests that heavy TV viewers should have a high degree of consensus concerning the cultural model found on TV whereas light TV viewers may not have the same degree of consensus concerning the TV cultural model. Likewise, heavy viewers of a particular genre of TV might share a distortion of the cultural model, as Segrin and Nabi's research suggests.

A second insight that the research on cultural models provides concerns the time frame for cultivation effects. Cultivation theory research typically measures people's current viewing patterns (e. g., how much TV do you watch in a typical week?). However, research on the development of cultural models suggests that the development of cultural models takes time. For example, Minoura (1992) found that Japanese students who had moved to the United States with their parents took between 3 and 4 years to learn the United States' cultural model of peer interpersonal behavior. Cultivation researchers would probably find stronger effects of heavy TV viewing if they measured viewing patterns across years instead of weeks. A college sophomore who has watched romance programming all of her life is bound to have stronger cultivation effects than a college sophomore who began heavy viewing of romance programming when she moved into her sorority home.

A third insight is that there may be a critical period for developing at least some types of cultural models. Minoura (1992) found that Japanese students who moved to the U.S. prior to age 9 had not completely formed the Japanese cultural model of peer interpersonal behavior, sug-

gesting that age 9 was the approximate lower limit for acquiring this cultural model. Moreover, Japanese students who embraced the U.S. cultural model of peer interpersonal behavior had difficulties readjusting to the Japanese cultural model if they moved back to Japan after age 15. Minoura interpreted these results as suggesting that there is a critical period between the ages of 9 to 15 for acquiring the cultural model concerning peer interpersonal behaviors. Although these results need to be accepted with some caution because they are the first of their kind, they suggest that cultivation researchers may need to focus on TV exposure during childhood and early adolescence. TV exposure during this time period may have stronger cultivation effects than exposure during other time periods.

In conclusion, research on cultural models clearly indicates that a mental models approach can be useful in understanding the relation between the media and culture. Research suggests that heavy TV viewing can influence the nature of the cultural models and, as a consequence, influence the degree of consensus for a specific cultural model. As discussed in the section on mental models, we believe that cultural models influence how the media are understood, although no research has investigated this yet.

#### *Implications for the study of cultivation theory*

We believe that the research on mental models, situation models including the event indexing model, and cultural models expands our understanding of cultivation effects. The mental models perspective provides a psychological explanation of cultivation theory, as well as an avenue for exploring the relation between media and culture.

There are six specific implications of our analysis for future research on cultivation theory. First, the degree of overlap between the situation and mental models will determine the degree of cultivation effect from TV viewing. Second, the accessibility of situation and mental models from memory will determine the extent to which TV viewing influences perceptions of social reality. Models that are more accessible from memory will have a stronger influence on perceptions of social reality. Third, research drawing upon cultivation theory needs to consider more than the event or the agents. Heavy viewing of TV should influence perceptions of locations and time periods as well. Fourth, cultural consensus models should prove to be a valuable way to understand the relation between TV and culture. Fifth, cultural models take time to develop. The longer a person is a heavy watcher of TV, or of particular genres of TV, the stronger the cultivation effects should be. Sixth, there may be

critical periods in which heavy TV viewing has stronger effects on perceptions of social reality than other periods.

Cultivation theory has had a long history in the study of mass media. We believe that it will continue to inform our understanding of the media, perceptions of social reality, and culture. However, we also believe that the mental models approach, including situation, mental, and cultural models, will become increasingly important in that understanding.

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