CHAPTER

6

Enculturating Agents With Expressive Role Behavior

David R. Heise
Indiana University

Implementations of artificial intelligence (AI) often catalog a system's every state and event and use brute-force searches to find the event that is predefined as optimal for a given configuration of states. The search proceeds as follows: If this configuration of states is manifest, then select this event; if that configuration of states is manifest, then select that event; and so on. This approach—called *production-system modeling*—is remarkably successful with fast computers and well-bounded systems.

The production-system approach is less successful, however, when we move to virtual agents who have to become part of the human social world because social life is an open system of events rather than a bounded system. Humans generate such a large number of distinct events in social interaction that it is impractical to catalog every possible event. Consequently, a virtual agent based solely on production-system modeling would find itself impoverished in understanding and responding to human interaction partners.

An additional problem in employing the production-system approach to virtual agents is that if–then rules get bogged down in an explosion of special cases when states and events are related by nonlinear functions, as is common in social relations. Formulating nonlinear functions in terms of if–then rules requires partitioning each of multiple variables into minute states and setting outcomes for each combination of states on the different variables. The problem is not that modern computers cannot search the mammoth number of rules that results: they can. Rather, turning a nonlin-

ear function into if–then rules raises a daunting engineering problem of accurately specifying rules for many subtle combinations of variables.

I argue that virtual agents must achieve the sophistication required for interaction with humans by incorporating quantitative models of generative processes in social life. The generative approach addresses the bounded-system problem by sectioning social events with an event frame that accepts various kinds of elements (e.g., agent, action, object, setting; Heise & Durig, 1997). An event is generated by filling the event frame with an element of each type. Although this approach still yields a bounded system, it enables consideration of a huge number of social events. For example, a somewhat limited model currently in use employs 713 kinds of agents or objects, 596 kinds of actions, and 344 kinds of settings, permitting the generation of more than a billion social events specified in terms of agent–action–object–setting combinations.

The quantitative modeling approach addresses the nonlinearity problem by retaining the nonlinear equations that describe social-psychological process. For example, a social event produces an impression of the event's agent in part via classic attitude-balance effects that can be represented by multiplying evaluations of the agent, action, and object involved in the event (Gollob, 1968; Heise, 1979). Equations incorporating these multiplicative terms can be applied directly in interpreting social actions, the equations can be manipulated mathematically to derive possible responses, and the equations can be combined with other equations to predict the agent's emotions (Smith-Lovin & Heise, 1988). Although the quantitative results have to be turned into qualitative elements—words or pictures—to be useful, retaining mathematical equations as long as possible provides great power and flexibility in analog modeling of the human mind.

In the remainder of this chapter, I try to illustrate the benefits of equipping virtual agents with a quantitative model of generative processes in social life. The next section provides an overview of the model to be used, discusses its application to creating an emoting face, and considers some problems in using the model as a foundation for virtual agents. The subsequent section offers a detailed illustration of using the model in a simple agent that might be operative at a World Wide Web site. The final section engages the distinctive issue raised in this volume: Do we need to make agents cross-culturally adaptive; if so, how do we do that?

ACT OVERVIEW

More than 25 years of research have established affect control theory (ACT) as a multifaceted basis for understanding microsociological processes. The theory's sociological insights, combined with its mathematical

model, empirical databases from different cultures, and computer simulation program, give ACT considerable promise as one of the tools to be used in constructing multicultural virtual agents.

All aspects of ACT are documented in detail elsewhere (Heise, 1979, 1986, 2002; MacKinnon, 1994; Schneider & Heise, 1995; Smith-Lovin, 1990; Smith-Lovin & Heise, 1988). However, I begin with a précis to provide a shared framework for discussing how the theory might contribute to agent construction.

According to ACT, people construct and interpret social action so as to have important meanings affirmed by manifest experiences. ACT focuses especially on the affective component of meanings—on the sentiments attached to concepts. People cast themselves and others into specific identities during social encounters. They then engage in physical and mental work so that events create impressions that maintain the sentiments attached to their identities, as well as the sentiments attached to other categories of action like individual attributes, behaviors, and settings.

In ACT, sentiments are measured quantitatively on three culturally universal dimensions of affective meaning (Osgood et al., 1975): evaluation (the extent to which things seem good vs. bad), potency (impressions of powerfulness vs. powerlessness), and activity (impressions of activation vs. tranquillity). Measurements on each dimension vary from −4.3 (infinitely bad, powerless, or tranquil) to +4.3 (infinitely good, powerful, or active). Thus, a sentiment is represented by three numbers—evaluation measurement, potency measurement, and activity measurement—known collectively as an *EPA profile*. The same dimensions serve for measuring transient impressions of people, behaviors, and settings, and so transient impressions are also represented as EPA profiles.

ACT proposes specifically that people seek experiences in which transient impressions created by an event match preexisting sentiments about the event elements as much as possible. Impressions generated by an event are highly predictable transformations of feelings that exist before the event (Heise, 1979; Smith et al., 1994; Smith-Lovin, 1987). Therefore, people seek experiences that transform current feelings into new, sentiment-confirming feelings.

People protect their sentiments both through their own conduct and through their interpretations of past events. For example, a father could exonerate a daughter who disobeyed him, and this action by the father would begin to re-affirm fundamental sentiments about fathers and daughters. Alternatively, he could see the daughter who disobeyed him as greedy, manipulative, or mean—reconceptualizations that generate sentiments fitting the girl's behavior. Thus, in ACT, an event that deflects impressions away from sentiments might be repaired by implementing a new event or reinterpreting the interactants or other components of the problematic event.

In ACT, emotions are momentary personal states that reflect how events affect people. The emotion depends on the current impression of the person and on how that impression compares to the sentiment attached to the person's identity. For example, a person might feel anxious if made to seem bad and weak. However, an even more extreme response of feeling ashamed, desperate, or depressed is to be expected if the person has a particularly good and powerful identity in the situation.

ACT's mathematical model and empirical databases of sentiments are implemented in a computer program[1] called Interact, which allows prediction of normative actions, emotions, and interpretations (Schneider & Heise, 1995). For example, suppose we employ a database of U.S. sentiments and set up an analysis where one person is a father and the other a daughter. Interact indicates that the father might educate the daughter—a predicted behavior norm for father interacting with daughter in unexceptional circumstances. Interact also defines the emotion norms (Heise & Calhan, 1995; Heise & Weir, 1999) for the event: While educating his daughter, the father might have emotions like feeling generous, secure, or forgiving, whereas the daughter might feel humble, relaxed, or touched. Unexpected events can be examined with Interact to see what effects they have. For example, if a daughter disobeys her father, Interact predicts that the daughter must be feeling irate or angry and the father feels melancholy, apprehensive, or shocked. Interact additionally suggests that the disobeyed father might turn himself into a disciplinarian or see his daughter as greedy, manipulative, or mean.

The ACT simulation system currently allows analyses to be conducted for U.S., Canadian, Irish, German, Japanese, and Chinese (People's Republic) interactants so cross-cultural variations in interaction can be examined. For example, using the Japanese database of sentiments rather than American sentiments leads to subtly different predictions about a father and daughter. The Japanese father's normative action toward a daughter is less good and less active than the American father's, resulting in potential actions like counseling and reproving even in unexceptional circumstances. Were a Japanese daughter to disobey her father, her appropriate emotion would be feelings of irritation and impatience rather than anger, and the father might feel serene and peaceful in the face of her action, although ready to admonish her.

Graphic Emotion Display

Interact has another interesting feature with regard to virtual agents. It displays a facial expression for every emotion, and it constructs the facial ex-

---

[1]The Java program is available on the World Wide Web at the ACT Web site: www.indiana.edu/~socpsy/ACT/.

pression computationally from a three-number profile representing the pleasantness, vulnerability, and activation of the emotional state.

Paul Ekman's research (1982) indicates that emotional messages are constructed on the face mainly by the action of facial muscles shaping the mouth, eyes, and eyebrows. The brows may be in a neutral relaxed position or may be curved upward (as in surprise), flattened and raised (as in fear), flattened and lowered (as in sadness), or pulled down and inward (as in anger). The opened eyes may be neutral or wide open (as in surprise), have raised lower lids (as in disgust), have raised and tensed lower lids (as in fear), be squinting (as in anger), or have upper lids drooping and sloped (as in sadness). Aside from neutral, the mouth may be dropped open (as in surprise), corners pulled horizontal (as in fear), lips pressed tight (as in anger), squared outthrust lips baring teeth (as in anger), upper lip pulled up (as in disgust), corners down (as in sadness), or corners raised (as in happiness, with extra stretching for smiles, grins, or laughs). Blends can be formed by combining signs of two emotions; for example, arched eyebrows and a smile indicate surprised happiness. Other features of the face can be affected by these facial actions. The end of the nose may be raised by pressure from the upper lip, and the upper nose may get crinkled. Cheeks may get raised during laughter. The forehead may be wrinkled by pressures from the eyebrows.

Interact computes an EPA profile for the emotion of each interactant during an event from the sentiment attached to the interactant's identity and from the impression of the interactant being created by the event. That profile is converted into a facial expression by the following principles, which were surmised from Ekman's descriptions of facial expressions and his photographs of primary emotions:

- Curve the interactant's lips up when the interactant's emotion is positively evaluated, and curve the lips downward with negatively evaluated emotion.
- Increase the upward arching of the interactant's brows when the interactant's emotion is positive evaluated, and reduce the upward arching with negative evaluated emotion.
- Raise and separate the interactant's brows when the interactant's emotion has negative potency, and lower and close the brows with positive emotion potency.
- Move the interactant's lips—especially the upper lip—higher when the interactant's emotion registers positive potency, and move the lips downward with negative emotion potency.
- Widen the separation between the interactant's eyelids when the emotion is defined by positive activity, and reduce the separation with negative activity.

- Drop the interactant's lower lip and narrow the lips when the interactant's emotion involves positive activity, and raise the lower lip and draw the lips outward for negative emotion activity.

The adjustments of brows, eyelids, and lips are computed from formulas that correlate the amount of each movement to the size of the corresponding number in the EPA profile. For example, an emotion that has an evaluation of +1 causes upward curvature of the lips, and an emotion with an evaluation of +2 causes more pronounced upward curvature of the lips.

Each graphic head used in Interact is derived from a photograph of an actual person. Parameters in the formulas for computing motion of brows, eyelids, and lips are set artfully for different faces so that the computed expressions appear realistic. Some examples of Interact's virtual displays of emotions appear later in this chapter.

Design of an ACT Agent

ACT can contribute to the construction of a virtual agent in several ways. ACT defines behavior norms applying in a situation, with adjustments for the significance of recent happenings. Incorporating such understanding in a virtual agent would allow the agent to be socially intelligent in sequences of interaction with humans, even to the point of responding appropriately to a human's deviance. ACT also defines the emotions that individuals might have as they participate in events, and incorporating this facility into an agent allows the agent to seem emotionally responsive to ongoing events. Additionally, ACT indicates how people might change their minds about the identities of self and others as a result of happenings. Incorporating this facility into an agent would give the agent an apparent capacity for making judgments about human morality and character.

At the same time, ACT has limitations in serving as the infrastructure of an agent. ACT computes norms from interactants' definitions of the situation, but ACT does not furnish the definitions of situations. Thus, interactants (or a knowledgeable informant) must tell us what the situation is in terms of the identities being taken—for example, that the situation consists of an employer with an employee as opposed to a woman with a man. ACT predicts responses to events, but ACT does not recognize what events are occurring. Interactants (or an informant) must tell us the way in which each event is to be understood—for example, that one person is disciplining another as opposed to battering the other. ACT suggests what actions an individual might take to advance an interaction, but ACT does not specify how an action is elaborated into a hierarchy of subgoals and how those subgoals are unfolded instrumentally into specific verbal and nonverbal behaviors.

Despite its limitations, ACT can be used when building a virtual agent. The enabling principles for an ACT-based agent are as follows:

- Deal with a set of situations involving a limited number of reciprocal role identities. Have the human interactant select a starting identity at the beginning of the human–agent interaction, whereupon the agent's identity is set reciprocally.
- Deal with a set of potential events involving a limited number of behaviors. Have the human interactant behave by choosing among options that identify the human's intended action.
- Use production-system models to convert the human's actions or virtual agent's affectively generated responses to computer representations.

Having enabled an ACT agent in these ways, the steps in applying ACT are as follows:

- Create a database of empirically based sentiments—measured as EPA profiles—for the identities and behaviors.
- In the computer program that represents the virtual agent, implement ACT's impression formation equations to compute the impressions generated by events. Implement ACT's mathematically derived equations to compute normative behaviors, emotions, and reconceptualizations in emerging situations.
- Implement Interact's on-screen face to show the human interactant the virtual agent's emotional responses to events as they occur.

The Interact computer program for simulating social interaction can be used to build a rough mockup of an ACT agent. The following simple example is offered as feasibility demonstration.

ILLUSTRATION OF AN ACT AGENT

Imagine a commercial Web site[2] with a virtual agent who has the identity of host. Humans arriving at the Web site are assigned the identity of visitor,

---

[2]The available dictionary of EPA profiles in the United States does not permit much subtlety in describing business relations—normal or deviant—so I have to use "gratify" rather than "buy from," "escape" rather than "leave the premises of," and "shoplifter" rather than a more appropriate label for deviants in Internet transactions. Work already is in progress that will improve this situation.

and a visitor can place an order—interpreted as gratifying the host—or the visitor can escape the host. The host can advise the visitor.

Additional role relations could be enabled by letting the visitor click buttons on the welcoming page—for example, a button to obtain information, invoking identities of novice for the human and expert for the agent, plus the behaviors of query and educate. I forgo additional normal relations in this illustration. I do want to include a deviant role relation, however, to show the agent's emotional capabilities. It allows the human to take the role of shoplifter and cheat the host, and the host can evict the shoplifter.

Immediately on the human's arrival, the host advises the visitor, say, by printing a table on the screen listing products and prices. The implementation of advising the visitor at different points of the interaction is a standard kind of programming problem that would be handled with flow-control structures and production-system models, and the procedures are not elaborated here.

After being advised, the visitor can escape or place an order. For this illustration, we suppose that the visitor places an order implemented via the familiar shopping cart paradigm. Now imagine that the shopping cart routine is so stupidly implemented that the visitor is able to change products' prices. The visitor notices this and does so, thereby cheating the host. Finally, imagine for the sake of illustration that, although the shopping cart is stupidly programmed, the programming of the agent is sophisticated enough to detect the felonious behavior. The host—realizing that the visitor is cheating—ejects the visitor from the Web site.

Interact Analysis

Simulating this interaction in Interact allows us to see how ACT contributes to implementation of an agent. First, we limit Interact to the required identities and behaviors, shown in Table 6.1 along with EPA profiles from males and females. (Interact contains hundreds of identities and behaviors beyond those in Table 6.1, but I pruned away all the others to simplify the analysis.[3])

---

[3]*Interact* setup:

1) Change "Basic Functions" to "Expert Functions".
2) Go to the "Find concepts" form. Enter 100.00 as maximum distance.
3) Go to the "Import entries" form. Check "Erase current entries". Leave the "Identities" radio button checked.
4) Enter the rows of text and numbers for each identity in Table 6.1, and then click the "Import entries below" button.
5) Check the "Behaviors" radio button, enter the rows of text and numbers for each behavior in Table 6.1, and then click the "Import entries below" button.

TABLE 6.1
EPA Profiles for Identities and Behaviors

	Males			Females		
	E	P	A	E	P	A
Host	1.20	1.10	0.28	1.51	1.18	0.45
Shoplifter	−2.02	−1.28	1.55	−1.93	−0.78	1.46
Visitor	1.39	0.44	−0.08	1.07	−0.22	0.01
Advise	1.12	1.32	−0.42	1.38	1.15	−0.66
Cheat	−2.13	0.02	0.77	−2.61	0.07	0.09
Evict	−1.64	1.41	0.83	−1.47	1.60	0.42
Gratify	1.49	1.56	0.17	1.25	0.94	−0.15
Escape	0.07	0.75	1.61	−0.48	0.46	1.33

Next we implement the sequence of events in the illustration.[4] Table 6.2 provides information printed by Interact about normative actions at each stage of the interaction. Figure 6.1 shows Interact's predictions about the agent's facial expressions of emotion as each event occurs.

When the human arrives at the Web site, the agent assigns the human the identity of visitor and assigns self the identity of host. Table 6.1 shows that these both are positively evaluated identities, but the host identity is substantially more potent and active than the visitor identity.

The agent initiates interaction by advising the visitor. The first numerical column in Table 6.2 shows that advising is a motivated behavior for the agent in the sense that it has a short distance (0.56) from the EPA profile for the agent's optimal behavior (1.55, 0.76, −0.18 as computed by Interact). Thus, advising the visitor is an action that confirms the meanings of the host and visitor identities, along with the meaning of the behavior, and the agent implements the event. Note that evicting the visitor—the other behav-

---

6) Go to the "Define situation" form. For viewer "Person 1" set: "Person 1" is "host" and "Person 2" is "visitor".

7) Go to the "Define events" form. Replace "No repeated behaviors" with "Behaviors retain meaning". Click the "Insert this event" button to generate an action of Person 1 toward Person 2 with behavior unspecified.

8) Go to the "Analyze events" form. Click the event to define the actor's optimal act. Click "advise" to implement the actor's optimal act.

9) Select behaviors and identities as needed to complete the transaction.

[4]Computations are based on male EPA profiles. Assume that male–female meaning differences are worth noting only if the mean ratings of males and females are greater than 0.5. Then Table 6.1 shows that males and females share essentially the same meanings for all of the identities and behaviors, with the following exceptions. The visitor identity is somewhat less potent for females than for males, cheating is somewhat more active for males, and escaping is somewhat more displeasing for females.

TABLE 6.2
Distances Between Actor's Ideal Behavior Toward Object and Available Behaviors

Prior Event	New Situation	After Host Advised Visitor	After Visitor Gratified Host		After Shoplifter Cheated Host
Actor–Object	Host–Visitor	Visitor–Host	Visitor–Host	Shoplifter–Host	Host–Shoplifter
Advise	0.56	1.01	3.02	25.54	3.20
Gratify	0.77	1.67	3.95	26.02	3.55
Escape	5.42	9.07	10.65	9.57	6.82
Evict	11.66	15.48	18.88	11.97	5.32
Cheat	15.03	19.20	20.46	6.00	12.59

Note. Implemented behavior underlined.

ior available to the agent—is far from the optimal behavior, with a distance of 11.66, and consequently the agent is unmotivated to perform this action.

Advising the newly arrived visitor generates a pleasurable, confident emotion in the host, although not one with much activation (EPA profile of 1.28, 1.24, 0.15 according to Interact calculations). Interact suggests some verbal labels, including feeling satisfied or appreciative. Interact additionally draws the facial expression for this emotional state as shown in the topmost image in Fig. 6.1. Such an emoting face presumably would be displayed on the Web page while advising the visitor, thereby personalizing the agent for the visitor.

The second numerical column of Table 6.2 gives information on the visitor's motivation for different acts following being advised by the host. The assumption is that the human also defines the first event as a visitor being advised by a host. The likelihood of this might be increased by a callout from the face saying something like, "Hi, visitor! I'm your host. Take a look at these special prices we're offering!"

The listed behavior that is closest to the visitor's ideal behavior at this point is advising, but that is a behavior in the host's repertoire, not the visitor's. The next smallest distance is for gratifying (a stand-in here for purchasing from). Gratifying the host is much closer to the visitor's ideal behavior than either of the other visitor's options—escaping or cheating—and so the visitor carries out computer activities for gratifying the host.

The visitor gratifying the host produces a new emotion for the host. Interact's descriptive words for the emotion include feeling at ease or contented. Interact's drawing of the facial expression for this emotion is the second from top in Fig. 6.1. This new expression would be displayed on screen as soon as the visitor begins placing an order. Note that this face can be viewed as politely attentive as you would expect from someone receiving your order.

Host *advises visitor.*

Visitor *gratifies* host.

Visitor *cheats* host.
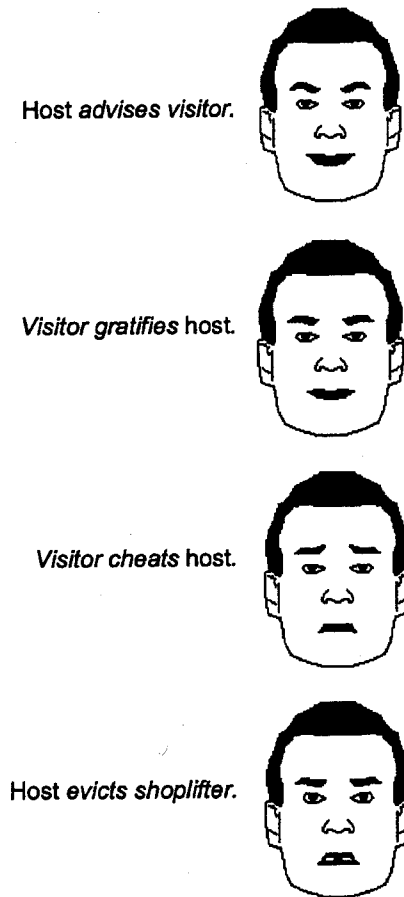
Host *evicts shoplifter.*

FIG. 6.1. Agent's facial expressions at each stage of the interaction.

According to Table 6.2, the visitor's next action should be gratifying the host again, and cheating the host would be the least likely of all available actions. However, seeing an opportunity for successful deviance, the visitor might switch to the shoplifter identity, whereupon cheating the host becomes the most likely possibility, as shown in the fourth numerical column of Table 6.2.

Assume that the visitor does change into a shoplifter and cheat the host. The host's emotion changes dramatically as soon as he realizes that the visitor is cheating him. Interact suggests that the host's new emotion might be called self-pity or perhaps embarrassment. The third face in Fig. 6.1 is the expression that Interact draws to represent this emotion, and this is the

face that would appear on the screen when the visitor-shoplifter begins changing prices of items. This emotion continues almost unchanged until the host reidentifies the visitor as a shoplifter by asking, "What kind of person would cheat a host?"

The host's ideal next action is to advise the shoplifter, which would leave the host feeling apprehensive and uneasy. Advice perhaps would take the form of a dialog box appearing on the screen with information about the punishments for cheating the host. However, our illustration takes a different turn.

The host forgoes the opportunity for advising the shoplifter and instead implements the procedures for evicting the shoplifter from the Web site. Although the act of evicting previously was an unlikely behavior for the host, the last column of Table 6.2 shows that evicting now is fairly close to the host's ideal behavior because the host is dealing with a shoplifter who has just cheated him.

Evicting the shoplifter changes the host's emotion to feeling tense and aggravated. The bottom face in Fig. 6.1 is Interact's rendering of the expression that the agent would have while evicting the shoplifter.

CROSS-CULTURAL CONSIDERATIONS

Animating agents with ACT permits relatively easy adjustment of the agent's norms and emotions to fit local cultures. Sentiments attached to key roles like host and visitor and to behaviors like advise and cheat can be set to reflect the local culture. Additionally, coefficients in equations that model impression-formation processes can be changed to reflect local thought processes. Empirical procedures for both kinds of adjustments are well established (Smith-Lovin, 1987).

Heise (2001) analyzed sentiment measurements from six cultures—United States, Canada, Ireland, Germany, Japan, and People's Republic of China—to assess overall patterns of similarity. He found that sentiments about various kinds of people have surprisingly high correlations across cultures, implying that the cultures largely agree about what kind of people are relatively good or bad, relatively powerful or powerless, and relatively active or passive. At the same time, cultures diverge in absolute levels of sentiments. For example, mothers are evaluated higher than children in both Japan and China, reflecting the high correlation in sentiments. In China, however, mothers and children are both evaluated positively, whereas in Japan, mothers are rated as good, but children are rated as neither good nor bad. The nuclear family roles are more esteemed in China than in Japan.

Heise (2001) also found that sentiments associated with behaviors have high cross-cultural correlations on the evaluation dimension, implying that

people around the world agree about what behaviors are relatively good and relatively bad. Notwithstanding the high correlations, cultures do vary in absolute evaluations of behaviors. For example, assisting someone is evaluated more highly than reprimanding someone in both Canada and Germany, but assisting is a much nicer act in Canada than in Germany, and reprimanding is a much nastier act in Germany than in Canada.

Heise (2001) found less cross-cultural agreement regarding the potency and activity of behaviors. Cross-cultural correlations of behavior potencies ranged from 0.74 down to 0.06. Cross-cultural correlations of behavior activities ranged from 0.81 down to −0.14. Thus, the major arena of cross-cultural diversity is not in the meanings of identities or the moralities of behaviors, but in perceptions of the strengths and activity levels of behaviors. This results in subtle cross-cultural differences in norms and emotions. For instance, behavioral norms attached to a particular identity might be different in different cultures because different behaviors are required to confirm the identity's potency and activity. Additionally, variations in behavior potency and activity could make an event with particular interactants and a specific behavior generate different emotions in different cultures—perhaps satisfaction and contentment in one place and excitement or even lustfulness in another place, or anger in one society and depression in another society.

Right from the beginning, researchers in the ACT tradition wondered whether processes involved in impression formation were the same across cultures. Smith-Lovin (1987) reported results of a meta-analysis based on studies of subjects from the United States, Ireland, and the Middle East. She found that basic processes in impression formation significantly influence evaluation of an actor in all of the subject groups she considered. Overall Smith-Lovin found considerable cross-cultural similarity in the equations predicting assessment of an actor's goodness and activity. The universality of core processes affecting evaluation of actors also has been confirmed in Canada by MacKinnon (1985/1988/1998) and in Japan by Smith, Matsuno, and Umino (1994).

However, Smith-Lovin and Heise (1988) reported interesting differences in how Arabic speakers assess an actor's potency as compared with English speakers. Subjects in the United States and Ireland (and also it turns out in Canada and Japan) feel that actors are especially powerful when they engage in potent actions, whereas the powerfulness of the object of action has little impact. For Arabs, however, resorting to strong actions implies that an actor is powerless. Meanwhile, object potency influences how potent an actor seems for Arabic speakers: Engaging powerful others makes an actor seem more potent, and acting on weak others costs an actor potency. Smith-Lovin forwent speculation about this difference because of methodological limitations in the studies she considered, but it is interesting to em-

ploy the technology of ACT to work out what such a difference could mean for international relations.

Here is an example.[5] Among people in the non-Arabic world, it is reasonable for a master nation like the United States to overwhelm a villain nation, like Iraq or Afghanistan. Doing so would make the winners feel satisfied and think of themselves as shrewd, whereas people in the overwhelmed villain nation should feel shocked and should start being more agreeable. However, this may not be how the same event plays for Arabic speakers even if they accept the same identifications of winner and villain nations. For Arabs, a winner overwhelming a villain is feeling anxiety, and such an actor could be labeled as cowardly, whereas the object of action is viewed as brave, although shocked by the action. Such an interpretation perhaps resonates with some rhetoric that comes out of the Middle East and might help explain why East–West disagreements are so intractable in the Middle East. At least the simulation result motivates research to confirm or disconfirm Arab differences in impression-formation processes.

Herman Smith has been exploring impression-formation processes in Japan and China. As I just mentioned, Smith, Matsuno, and Umino (1994) found that Japanese are actually similar to Americans in how they construct outcome evaluations about an event's actor, behavior, and object. However, Smith, Matsuno, and Ike (2000) found Japanese–American differences in interpreting an individual's state of being as designated by phrases like "angry admiral," "tactless doctor," or "rich professor." Overall, Americans seem to process states of being more simply than Japanese. First of all, Americans employ the same principles to assess how an identity combines with an emotion, as opposed to a trait, as opposed to a status characteristic. For example, Americans feel about the same whether encountering an angry admiral or a suspicious admiral. This is not so in Japan, where the admiral with a negative emotion would be evaluated more negatively than the admiral with a negative trait. Second, Americans average feelings about the modifier and identity to arrive at an evaluation of a modifier–identity combination and additionally employ a consistency principle in their assessment of the combination. Japanese also average and employ consistency. In addition, however, Japanese attend to intricate considerations, such as whether a potent or impotent modifier is describing a good, weak

---

[5]This paragraph reports results of Interact analyses (Schneider & Heise, 1995) using U.S. dictionaries with averaged male and female profiles. Simulation of the non-Arabic view was obtained with U.S. equations. Simulation of the Arabic view used the same materials except the equation for predicting actor potency was modified as follows. The coefficient for the effect of preevent behavior potency was changed from +0.47 to –0.47, and the coefficient for the effect of preevent object potency was changed from –0.04 to +0.20.

person as opposed to a bad, strong person. For example, this consideration leads Japanese to feel that a meek daughter is better than just a daughter and a meek gangster is more contemptible than just a gangster.

Smith's work in China is still in progress, so it is too early to review how Chinese impression-formation processes differ from processes in other cultures or how China's major regional cultures differ from one another. However, Smith's preliminary analyses suggest that Chinese impression-formation processes may differ from both Japanese and American processes.

CONCLUSION

Research by King (2001) suggests that an Internet subculture is evolving, such that only small differences exist among Internet users in sentiments regarding Internet concepts. This finding might encourage a hypothesis that no cultural adjustments are needed at all when virtual agents interact with humans on the Internet, the reasoning going like this. As an individual begins participating in Internet activities—e-mail, newsgroups, World Wide Web, and so on—that individual quickly acquires the standard sentiments attached to behaviors like spamming, cross-posting, and surfing; to identities like hacker, newbie, and Webmaster; and to settings like newsgroup, chatroom, or the World Wide Web. The individual gets socialized with essentially the same feelings about these entities as other people using the Internet. Consequently, a virtual agent need only implement the same subcultural sentiments to interpret the actions of experienced Internet users, act normatively with them, and display appropriate emotions.

At least one counterargument seems compelling.[6] The Internet subculture, like any other subculture, sets sentiments only for concepts that are directly related to the subculture, and Internet-related concepts may be too few to matter in building virtual agents who will serve commercial, medical, educational, political, and other functions. Virtual agents of these diverse types have to have the proper sentiments for non-Internet identities like salesperson, doctor, teacher, politician, and so on, and for non-Internet behaviors like guarantee, diagnose, flunk, vote for, and so on. Sentiments attached to these kinds of concepts are set by individuals' outside cultures. Thus, meaningful social interaction by an agent on the Internet depends on giving the agent sentiments that derive from the human interaction partner's locale and culture.

---

[6]Another counterargument is that individuals from different societies might process affective meanings differently, requiring that their mental processes be represented by different equations. However, it is not clear yet how important variations in mental processing are or whether socialization into a subculture homogenizes mental processes as well as sentiments.

REFERENCES

Ekman, P. (1982). *Emotion in the human face* (2nd ed.). New York: Cambridge University Press.

Gollob, H. F. (1968). Impression formation and word combination in sentences. *Journal of Personality and Social Psychology, 10*, 341–353.

Heise, D. R. (1979). *Understanding events: Affect and the construction of social action.* New York: Cambridge University Press.

Heise, D. R. (1986). Modeling symbolic interaction. In S. Lindenberg, J. S. Coleman, & S. Nowak (Eds.), *Approaches to social theory* (pp. 291–309). New York: Russell Sage Foundation.

Heise, D. R. (2001). Project Magellan: Collecting cross-cultural affective meanings via the Internet. *Electronic Journal of Sociology, 5*(3). (http://www.sociology.org/content/vol005.003/mag.html.)

Heise, D. R. (2002). Understanding social interaction with Affect Control Theory. In J. Berger & M. Zelditch (Eds.), *New directions in contemporary sociological theory* (pp. 17–40). Boulder, CO: Rowman & Littlefield.

Heise, D. R., & Calhan, C. (1995). Emotion norms in interpersonal events. *Social Psychology Quarterly, 58*, 223–240.

Heise, D. R., & Durig, A. (1997). A frame for organizational actions and macroactions. *Journal of Mathematical Sociology, 22*, 95–123.

Heise, D. R., & Weir, B. (1999). A test of symbolic interactionist predictions about emotions in imagined situations. *Symbolic Interaction, 22*, 129–161.

King, A. B. (2001). Affective dimensions of internet culture. *Social Science Computer Review, 19*, 414–430.

MacKinnon, N. J. (1985/1988/1998). *Final reports to Social Sciences and Humanities Research Council of Canada on Projects 410-81-0089, 410-86-0794, and 410-94-0087.* Guelph, Ontario: Department of Sociology and Anthropology, University of Guelph.

MacKinnon, N. J. (1994). *Symbolic interactionism as affect control.* Albany: State University of New York Press.

Osgood, C. E., May, W. H., & Miron, M. S. (1975). *Cross-cultural universals of affective meaning.* Urbana: University of Illinois Press.

Schneider, A., & Heise, D. R. (1995). Simulating symbolic interaction. *Journal of Mathematical Sociology, 20*, 271–287.

Smith, H. W., Matsuno, T., & Ike, S. (2000). The affective basis of attributional processes among Japanese and Americans. *Social Psychology Quarterly, 64*, 180–194.

Smith, H. W., Matsuno, T., & Umino, M. (1994). How similar are impression-formation processes among Japanese and Americans? *Social Psychology Quarterly, 57*, 124–139.

Smith-Lovin, L. (1987). Impressions from events. *Journal of Mathematical Sociology, 13*, 35–70. (Reprinted in Smith-Lovin & Heise, 1988.)

Smith-Lovin, L. (1990). Emotion as the confirmation and disconfirmation of identity: An affect control model. In T. D. Kemper (Ed.), *Research agendas in the sociology of emotions* (pp.). Albany: State University of New York Press.

Smith-Lovin, L., & Heise, D. R. (Eds.). (1988). *Analyzing social interaction: Advances in Affect Control Theory.* New York: Gordon & Breach.