

Development and Validation of a Measure of Display Rule Knowledge: The Display Rule Assessment Inventory

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As one component of emotion regulation, display rules, which reflect the regulation of expressive behavior, have been the topic of many studies. Despite their theoretical and empirical importance, however, to date there is no measure of display rules that assesses a full range of behavioral responses that are theoretically possible when emotion is elicited. This article reports the development of a new measure of display rules that surveys 5 expressive modes: expression, deamplification, amplification, qualification, and masking. Two studies provide evidence for its internal and temporal reliability and for its content, convergent, discriminant, external, and concurrent predictive validity. Additionally, Study 1, involving American, Russian, and Japanese participants, demonstrated predictable cultural differences on each of the expressive modes.

Over 30 years ago, Ekman and Friesen coined the term *cultural display rules* to account for cultural differences in facial expressions of emotion (Ekman & Friesen, 1969). These are rules learned early in childhood that help individuals manage and modify their emotional expressions, depending on social circumstances. The first evidence documenting their existence was Friesen's study in which the spontaneous expressions of Americans and Japanese were examined as they viewed highly stressful films in two conditions, first alone and then in the presence of an older male experimenter (Friesen, 1972). In the first condition, the Americans and Japanese were similar in their expressions of disgust, sadness, fear, and anger; in the second condition, however, cultural differences emerged. Whereas the Americans continued to express their negative emotions, the Japanese were more likely to smile. Ekman and Friesen suggested that in the first condition, there was no reason for display rules to modify expressions, because the participants were alone and their display rules were inoperative;¹ in the second condition, display rules dictated that the Japanese mask their negative emotions in the presence of the experimenter (Ekman, 1972; Friesen, 1972).

Since then, display rules have become well accepted as a mechanism that explains emotion expression management. Writings describing the influence of culture or development on emotional expression invariably include descriptions of display rules. Be-

cause of their importance, display rules have been measured in a variety of ways over the years (as reviewed below); among these, a few measures that meet accepted psychometric standards and that assess individual differences in emotional expressivity, emotional control, or emotion regulation have been developed. These invariably focus on a single dimension of expression management: suppression or inhibition. To date, no measure surveys the theoretically possible ways emotional displays can be modified beyond suppression or inhibition.

In this article, we report the development of a new measure of display rule knowledge called the Display Rule Assessment Inventory (DRAI) and two studies that demonstrate its reliability and validity. Because display rules can be conceptually considered a component of the larger concept known as emotion regulation, we begin by describing the relationship between these two concepts and then examine the literature on culture, expression, and display rules. We then survey and evaluate the various ways in which display rule knowledge has been assessed in the past, describing limitations to these previous approaches. On the basis of those limitations, we describe the development of the DRAI. Study 1 reports data from the United States, Japan, and Russia in support of its external and convergent validity and internal reliability. Study 2 reports additional data from the United States in support of its convergent, predictive, and discriminant validity, and its internal and temporal reliability.

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¹ That the display rules were inoperative was Ekman and Friesen's original interpretation of the lack of differences in emotional display in the first condition (Ekman, 1972; Friesen, 1972). The nondifferences may have occurred, however, for different reasons. For example, being alone is itself a social circumstance, and consequently, display rules may very well have been operating; Americans and Japanese may have just had the same display rules for that social circumstance. Also, cognitive representations of others can still influence behavior even when alone (Fridlund, 1997; Fridlund, Ekman, & Oster, 1987).

Display Rules and Emotion Regulation

The concept of emotion regulation has gained widespread importance in recent years (Gross, 1998) and can be roughly defined as the ability to control, manage, and modify one's emotional experiences and expressions. Emotion regulation can be achieved by a variety of mechanisms that can be considered from a framework of understanding emotion. Emotion involves a package of events, including cognitive, experiential, expressive, and physiological changes. Thus, emotion regulation should involve regulatory efforts in all of these components.

In this framework, display rules are related to emotion regulation because they concern the management and modification of the expressive component of emotion. Presumably other rules or similar types of mechanisms exist for other emotion components. Hochschild, for instance, has proposed the concept of feeling rules (Hochschild, 2001), which concern the regulation of the experiential component of emotion. Gross suggests individuals can regulate their emotions by altering the antecedents that bring forth emotion (selecting or modifying situations, altering attention, or changing cognitions) and the behavioral and physiological responses related to emotion (Gross, 1998, 1999a, 1999b, 2002; Gross & Levenson, 1993).

In its entirety, therefore, emotion regulation is a relatively large concept that involves multiple components associated with the process of emotion. Display rules involve regulation of the expressive component of emotion. Although expression regulation (i.e., display rules) may not directly involve attempts at modifying subjective experience, it may indirectly lead to the regulation of the other components of emotion, producing changes in feeling states and physiological responses; for example, the production of certain facial configurations will lead to specific and distinct physiological reactions (Ekman, Levenson, & Friesen, 1983; Levenson, Ekman, & Friesen, 1990; Levenson, Ekman, Heider, & Friesen, 1992). And importantly for this discussion, regulation does not solely involve suppression; like using the accelerator and brakes of a car, regulation at times requires amplification, and at other times deamplification, of one's emotion.

In fact, theoretically there are many ways in which display rules can operate in order to regulate expression. Individuals can amplify (exaggerate) or deamplify (minimize) their expressions; for instance, feelings of sadness may be intensified (amplification) at funerals or minimized (deamplification) at weddings. People can mask or conceal their emotions by expressing something other than what they feel, as when nurses or physicians hide their emotions when speaking with patients with terminal illness, or when employees in service industries (e.g., flight attendants) interact with customers. Individuals may learn to neutralize their expressions, expressing nothing, such as when playing poker (poker face). And individuals may learn to qualify their feelings by expressing emotions in combination with others. All of these behavioral responses reflect the different ways by which emotional expression can be regulated via display rules.

Cultural Differences on Emotional Expression and Display Rules

Although Darwin's work is clearly the root of modern-day science on culture and expression (Darwin, 1872/1998), one of the most influential studies in this area in recent history was Ekman

and Friesen's study of American and Japanese students described above (Ekman, 1972; Friesen, 1972). Since that study, a number of other studies have also examined cultural differences in emotional expression. Gudykunst and Ting-Toomey (1988), for instance, conducted an ecological-level correlational analysis between Hofstede's four cultural dimension scores (Hofstede, 1980) with expressive data from Wallbott and Scherer's large-scale questionnaire study (Wallbott & Scherer, 1986) and reported that individualistic cultures were associated with greater rates of nonverbal nonvocal expressions and verbalization. Gudykunst and Nishida (1984) used the Hofstede dimension of Uncertainty Avoidance to account for American and Japanese differences in nonverbal affiliative expressive behaviors in initial interactions with strangers. Gudykunst also used this concept (Gudykunst & Ting-Toomey, 1988) to reinterpret a previous study examining the appropriateness of displays of anger and distress in Japan, Hong Kong, Italy, and England (Argyle, Henderson, Bond, Iizuka, & Contarello, 1986) and a previous study testing anger expressions between Indonesians and Australians (Noesjirwan, 1978). Waxer (1985) examined American and Canadian cultural differences in spontaneous emotional expressions by participants in TV game shows and found that Americans tended to be judged as more expressive than the Canadians despite there being no differences in actual behaviors. Edelman and colleagues have also documented cross-cultural differences in expression among five European countries (Edelmann et al., 1987).

A number of studies have also examined cultural differences in display rules. Matsumoto (1990), for example, showed faces portraying seven emotions to Americans and Japanese, who rated the appropriateness of each in eight social situations involving people of varying intimacy and status, and reported that Americans rated negative emotions more appropriately than did the Japanese in in-groups, whereas the Japanese rated negative emotions more appropriately than Americans in out-groups; the Japanese also rated negative emotions more appropriately than Americans toward lower status individuals. Matsumoto also tested differences in cultural display rules among four ethnic groups within the United States (Matsumoto, 1993) and across a number of countries (Matsumoto, Takeuchi, Andayani, Kouznetsova, & Krupp, 1998) and used individualism to explain the differences.

The studies conducted to date examining cultural differences in expression and display rules implicate several cultural mechanisms that influence expression. Of these, one consistent finding relates to individualism versus collectivism. On one hand, individualistic cultures appear to foster greater expression compared with collectivistic cultures, and especially of negative emotions to in-group members. On the other hand, collectivistic cultures may foster greater expression of positive emotions toward in-groups and negative emotions toward out-groups. These expectations are addressed in Study 1, which compares the display rules of Americans, Japanese, and Russians.

Previous Measures of Display Rules and Expression Management

Because of their conceptual importance, many previous studies have examined display rules, and Table 1 summarizes the ways in

which display rules and expression management have been measured in the past. (This table does not list all studies that have ever been conducted on this topic; instead, it lists the original studies that describe the development and validation of measures related to display rules, or the first time ad hoc measures were used in single studies.)² Several points are worthy of note.

After the original inception and documentation of display rules, research centering on their development in children, and especially knowledge and understanding of them, blossomed. The typical manner in which these studies have been conducted has been to read or show children stories designed to elicit emotion in various social situations, to ask them what the protagonist would display, and then to ask why (Banerjee, 1997; Banerjee & Yuill, 1999; Gnepp & Hess, 1986; Hosie, Russell, Gray, Scott, & Hunter, 2000; Jones, Abbey, & Cumberland, 1998; Josephs, 1994; Saarni, 1979; Taylor & Harris, 1982; Zeman & Garber, 1996; Zeman & Penza, 1997; Zeman & Shipman, 1996). Although most studies provided interrater reliability data on the coding of the justifications, no study provided any psychometric support of the display rule task itself. In fact, only recently have two reports emerged documenting the psychometric properties of measures of children's expressivity (Penza-Clyve & Zeman, 2002; Zeman, Shipman, & Penza-Clyve, 2001).

In addition, a few scales related to display rules and expression management have been validated in various adult samples, including the Courtald Emotional Control Scale (Watson & Greer, 1983), the Emotional Expressiveness Questionnaire (EEQ; King & Emmons, 1990), the Emotional Expressivity Scale (EES; Kring, Smith, & Neale, 1994), the Berkeley Expressivity Questionnaire (BEQ; Gross & John, 1995, 1997), and the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). Their reliability and validity data appear more than adequate, and each has provided interesting information about the nature, processes, and correlates of expression management. The Suppression subscale of the ERQ, for instance, has been associated with gender and ethnic differences, coping and cognitive styles, moods and emotional experiences, interpersonal functioning, and well-being (Gross & John, 2003).³

In all measures for which there is adequate psychometric evidence, expression management has been invariably operationalized according to a simple dimension of suppression (or control or inhibition). The three subscales of the EEQ, for example, measure Expression of Positive Emotion, Expression of Intimacy, and Expression of Negative Emotion. The EES produces a single score of expressivity. The BEQ scales related to expression are General Expressivity, Positive Expressivity, and Negative Expressivity. The two scales of the Children's Sadness Management Scale (Zeman et al., 2001) related to expression are Inhibition of Sadness Expression and Dysregulated Expression. The one scale of the Emotion Expression Scale for Children (Penza-Clyve & Zeman, 2002) related to expression is Expressive Reluctance. And the one scale of the ERQ related to expression is Suppression.

Reconceptualizing Display Rules: Going Beyond Suppression

Without a doubt, the measures created to date have contributed to the development of a fairly impressive literature about display rules and expressivity. Still, one limitation is their operationalization of display rules along a single dimension of expression-

suppression. Although suppressing or inhibiting emotional responses is certainly one way in which expressions can be managed, there are other ways as well. In fact, when the concept of display rules was originally proposed as a mechanism of expression management, Ekman and Friesen noted six ways in which expressions may be managed when emotion is aroused (Ekman & Friesen, 1969, 1975):

1. Express the feeling as is with *no inhibitions*.
2. Express the feeling, but with *less* intensity than one's true feelings (deamplifying).
3. Express the feeling, but with *more* intensity than one's true feelings (amplifying).
4. Express nothing (neutralizing).
5. Express the feeling, but together with a *smile* to qualify one's feelings (qualifying).
6. Smile only in order to hide one's true feelings (masking).

That these types of expressive behaviors actually occur has been documented in research to date (Ekman & Rosenberg, 1998). Children even as young as 4 years of age will not only suppress the display of their negative feelings but also mask them with smiles (Cole, 1986). This suggests that a more comprehensive assessment of expression management would need to survey this wider range of behavioral responses. Unfortunately no measure does so, and it may be worthwhile to the field for such a measure to be available.

One may argue that the expression-suppression dimension adequately represents the range of expressive modes, or that the expressive modes are essentially reducible to the suppression dimension. We

² This review does not include studies of actual emotional expressions; we argue below that display rules should be considered separately from the actual expressive behaviors they supposedly modulate. In addition, our review does not include measures involving participants rating the expression management of others (e.g., mothers rating their children; Shipman & Zeman, 2001), measures of alexithymia, or measures of emotion regulation that do not have a component of expression management.

³ There are some conceptual similarities among all of the scales produced to date, regardless of whether the target is a child or an adult. For example, all assume that expression is a behavioral response to an emotion-eliciting stimulus; that is, the theoretical model underlying the scales is that expressive behaviors are reflective of an underlying emotional feeling state. Further, all scales to date make distinctions between internal feelings and external displays of emotion that need to be regulated. Indeed, different scales exist for the regulation of feelings and the regulation of expressions. There are, however, conceptual differences among the scales as well. For instance, some lump expressivity into one dimension that glosses over emotions (Gross & John, 2003; Kring et al., 1994). Some scales differentiate only between positive and negative emotions (Gross & John, 1995, 1997; King & Emmons, 1990). Some scales are specific to certain emotions such as anger or sadness (Shipman & Zeman, 2001; Spielberger & Sydeman, 1994; Watson & Greer, 1983; Zeman et al., 2001). Some focus on expressivity, whereas others focus on suppression, and there appears to be an underlying assumption of these concepts being opposite poles of the same construct (i.e., higher expressivity = less suppression and vice versa).

Table 1
Previous Measures of Display Rules and Emotional Expressivity

Measure	Citation	Brief description	Psychometric data reported
N/A	(Saarni, 1979)	Children were shown four comic strip-like frames of four scenarios involving a child and either a familiar or unfamiliar peer in a stressful situation. The final frame showed the child facing away. Children were asked what they thought the child in the scenario was expressing by selecting one of four photographs provided as expressive modes. Children were then interviewed about their justifications underlying their choices.	Interrater reliability of the justifications
N/A	(Taylor & Harris, 1982)	Children were asked to show what they would look like if they received a present from a favorite relative but didn't like it at all by selecting one of six facial drawings and giving a justification for their choice.	None
Courtald Emotional Control Scale	(Watson & Greer, 1983)	A 21-item scale that assesses emotional control. It includes 3 subscales: Anger, Depressed Mood, and Anxiety.	Internal and temporal reliabilities; content, convergent, and predictive validities
N/A	(Gnepp & Hess, 1986)	Children were read 8 stories designed to elicit prosocial or self-protective display rules, with 3 audience conditions, and were asked to tell what kind of face the protagonist in the story would make by choosing 1 facial drawing from 5 alternatives. They were then questioned about the protagonist's verbal and facial responses.	Interrater reliability of the justifications
Family Expressiveness Questionnaire (FEQ)	(Halberstadt, 1986)	The FEQ consists of 40 items that are designed to measure a family's overall expressive environment. It includes items not only related to nonverbal expressiveness but also to emotionally expressive content.	Internal and temporal reliabilities; content, convergent, discriminant, and concurrent predictive validities
Emotion Control Questionnaire (ECQ)	(Roger & Najarian, 1989; Roger & Neshhoever, 1987)	The ECQ is a 56-item scale measuring the tendency to inhibit the expression of emotional responses. Scales related to expression are Emotional Inhibition, Aggression Control, and Benign Control.	Internal and temporal reliabilities; content, convergent, discriminant, and concurrent predictive validities
N/A	(Fuchs & Thelen, 1988)	Anger was induced in children by having them recall an anger-eliciting event with a good friend and to concentrate on their feelings of anger for 30 s. They rated the likelihood that they would express their emotion to their mother or father.	None
State-Trait Anger Expression Inventory (STAXI)	(Spielberger & Sydeman, 1994)	The STAXI is a 44-item scale that measures anger expression. Its items range from strong inhibition or suppression of angry feelings (anger in) to extreme expressions of anger (anger out). Various studies provide different factor scores, but all are consistent on the anger-in/anger-out distinction.	Internal and temporal reliabilities; content, convergent, discriminant, and predictive validities
Pediatric Anger Expression Scale (PAES)	(Hagglund et al., 1994; Jacobs, Phelps, & Rohrs, 1989)	The PAES includes 3 scales that measure Anger Turned Inward, Anger Expressed Outwardly, and Anger Controlled Cognitively or Behaviorally.	Internal reliability; content, convergent, and concurrent predictive validities
Emotional Expressiveness Questionnaire (EEQ)	(King & Emmons, 1990)	Sixteen-item scale designed to assess emotional expressiveness. Items are rated on a 7-point scale. Three factors are scored: Expression of Positive Emotion, Expression of Intimacy, and Expression of Negative Emotion.	Internal reliability, content, convergent, discriminant, and concurrent predictive validities
N/A	(Matsumoto, 1990)	Participants were shown universal facial expressions of emotion and were asked to rate the appropriateness of displaying each in eight different social situations.	None
N/A	(Josephs, 1994)	Children were read 18 combinations of 6 story themes (3 positive and 3 negative) and 3 motivations (prosocial, self-centered, and discrepant) and were asked to identify what the protagonist would feel and show on their faces.	None
Emotional Expressivity Scale (EES)	(Kring et al., 1994)	Seventeen-item scale that was designed to assess emotional expressiveness specifically. Response format is a 6-point Likert scale.	Internal and temporal reliabilities; content, convergent, discriminant, and concurrent predictive validities
Berkeley Expressivity Questionnaire (BEQ)	(Gross & John, 1995, 1997)	Sixteen-item scale designed to assess emotional expressivity. Items are rated on a 7-point Likert scale. It measures General Expressivity, Impulse Strength, Positive Expressivity, and Negative Expressivity.	Internal reliability; content, convergent, discriminant, and concurrent predictive validities

Table 1 (continued)

Measure	Citation	Brief description	Psychometric data reported
Affect Regulation Interview	(Zeman & Garber, 1996)	Twelve vignettes depicting 4 scenarios that elicit sadness, anger, or pain were read to children, who were asked whether he or she would express that emotion to 1 of 4 different audience members using a 4-point scale. Children were also interviewed about their choices.	Interrater reliability of the justifications
N/A	(Zeman & Shipman, 1996)	Same 12 stories used above (Zeman & Garber, 1996). Method of affect expression was assessed by children's ratings on a 4-point scale on 5 dimensions: verbal expression, facial expression, crying, passive behavior, and aggressive behavior.	None
N/A	(Banerjee, 1997)	Using dolls, children were told stories about experiencing a specific positive or negative emotion in a <i>restrictive</i> or <i>permissive</i> situation and were asked whether the story character should express the emotion, and why.	Interrater reliability of the justifications
N/A	(Zeman & Penza, 1997)	Children were read 3 stories that elicited an emotion in a protagonist with 3 different audiences and were asked a series of questions about their feelings, how they would express them, and their understanding of their display rules.	None
N/A	(Jones et al., 1998)	Children were read 7 stories (4 from Gnepp & Hess, 1986, 3 new to this study) and were asked to indicate what the child protagonist in the story felt and what he or she expressed by pointing to cards that depicted 1 of 4 emotions. Display rule knowledge was scored by comparing the responses with norm data.	Internal reliabilities of the derived scores. The ability of the stories to elicit the intended emotions was confirmed by a separate sample.
N/A	(Banerjee & Yuill, 1999)	Children were presented with 6 stories in 4 cartoon-style pictures in which the story characters had to hide their feelings for either prosocial or self-presentational reasons and were asked what the character would truly feel, and then what the character would express by selecting either a happy or sad face provided. They were then asked to justify their selection.	Interrater reliability of justifications
N/A	(Hosie et al., 2000)	Prelingually deaf children were shown vignettes depicting anger, fear, or happiness, with 3 frames depicting the main characters, the main event of the story, and the outcome with the protagonist's face turned away from the viewer. Children were asked whether they would show their emotion or conceal it and to give reasons for their choices.	Interrater reliabilities for coding choices and justifications
Children's Sadness Management Scale	(Zeman et al., 2001)	Twelve-item scale that scores 3 scales: Inhibition of Sadness Expression, Emotion Regulation Coping, and Dysregulated Expression.	Internal and temporal reliabilities: convergent and predictive validities
Emotion Management Interview-Child Version	(Shipman & Zeman, 2001; Shipman, Zeman, Penza, & Champion, 2000)	Children were read 9 vignettes involving mothers and children that elicit anger, sadness, and happiness and were asked whether they would express their emotions using a 4-point scale, the consequences of their expressions, and strategies they would use to alter their feelings.	Interrater reliabilities for coding responses
Emotion Expression Scale for Children	(Penza-Clyve & Zeman, 2002)	Sixteen-item scale designed to examine 2 aspects of deficient emotion expression: lack of emotion awareness and lack of motivation to express negative emotion. Two scales are scored: Poor Awareness and Expressive Reluctance.	Internal and temporal reliabilities; convergent and concurrent predictive validities
Emotion Regulation Questionnaire	(Gross & John, 2003)	Ten-item scale that assesses 2 subscales: Reappraisal and Suppression	Internal and temporal reliabilities; content, convergent, and concurrent predictive validities

Note. N/A = not applicable.

feel, however, that it would be premature to make such assumptions, for several reasons. First, the justifications typically used to explain why some responses are more preferable than others often involve qualitative, not quantitative, differences among them. For instance, whereas masking may be considered a form of suppression, the rationale underlying it would lead one to infer that it is qualitatively different from deamplification, neutralization, or qualification, even though these may also be considered forms of suppression. Second, lumping masking, qualifying, deamplifying, and neutralizing into a single category eliminates the possibility of finding correlates that are specific to each of these processes. Third, the expression–suppression assessments typically do not allow for the possibility that expressions may be exaggerated (amplification). Fourth, whether the range of behavioral responses is reducible to the expression–suppression dimension is an empirical question that should be addressed by data, not a priori by researchers. Assessing the range of behavioral responses involved in expression management as above and *empirically* demonstrating that they reduce to a single expressivity dimension would be a better rationale for using such a dimension to assess expression management. To our knowledge, no such test has ever been conducted.

A more comprehensive assessment of the expressive modes associated with expression management is important theoretically and pragmatically. Recent research, for example, has documented that suppression is negatively correlated with social sharing of emotions, close relationships, social support, life satisfaction, well-being, self-esteem, and optimism, and positively correlated with avoidant attachment and depression (Gross & John, 2003). Given that suppression as an overall dimension of expressivity overlooks the various ways that expression management may occur, it may be possible that these correlations are carried by some behavioral responses and not others. Without such a measurement technique, however, it is impossible to address this possibility.

Entertaining a more comprehensive perspective on expression management is also important for theories of emotion regulation. Emotion regulation has increasingly gained attention as an important psychological process. It is conceptually and empirically related to the concept of emotional intelligence (Mayer & Geher, 1996; Mayer & Salovey, 1993; Mayer, Salovey, Caruso, & Sitarenios, 2001; Salovey & Mayer, 1990) and has its roots in earlier studies of coping (Gross, 1998, 1999a, 1999b, 2002; Lazarus, 1991) and display rules. As we discussed above, the concept of emotion regulation refers to the management and modification of all aspects of emotion, including not only expression but also the management of subjective experience, physiological reactions, and cognitive processes. Thus, fleshing out a more comprehensive conceptual understanding of the ways in which expression management occurs through display rules beyond suppression or inhibition extends our conceptual understanding of the larger concept of emotion regulation as well. Further developing valid and reliable ways of measuring display rules and expression management response alternatives in a broad manner would represent an important empirical advance. It would, for example, allow researchers to survey the display rules and expression management techniques of peoples around the world, a project that to date has not been conducted, despite the initial emergence of the concept over 30 years ago.

The DRAI

Development of the DRAI

To address this gap and to complement previous measures of display rules and expression management, we created the DRAI, in which participants choose a behavioral response when they experience different emotions in different social situations. The emotions were seven that previous research has shown to be universally expressed and recognized (Ekman, 1992a, 1993, 1999; Izard, 1992; Matsumoto, 2001)—anger, contempt, disgust, fear, happiness, sadness, and surprise; these were selected because universality served as a basis by which to examine display rules initially and by which comparisons across cultures would be meaningful. To build internal consistency, we included a synonym for each emotion label—hostility, defiance, aversion, worry, joy, gloomy, and shock, respectively—resulting in a total of 14 emotion terms. Participants are asked to consider what they would do if they felt each emotion in four social situations: with family members, close friends, colleagues, and strangers. These categories were chosen because they represent a broad range of social categories with which people interact and because previous research has demonstrated considerable variability in cultural values and attitudes across these social situations (Brewer & Kramer, 1985; Tajfel, 1982; Triandis, 1994). This would allow for an initial assessment of display rules across contexts that are likely to evoke different displays. Finally, participants are asked to complete the measure for two rating domains, once responding as to what they believe people *should* do and a second time responding to what they *actually* do.⁴

For each emotion, social situation, and domain, participants select a response from a list of possible behavioral responses. This list is based on Ekman and Friesen's theoretical delineations of the possible ways in which expressions are modified (Ekman & Friesen, 1969, 1975) and includes the same list of six expressive modes listed earlier (i.e., expression, deamplification, amplification, neutralization, qualifying, and masking). Participants are also given an *other* response, in which they can write in a different behavioral response if their choice is not listed. The Appendix

⁴ There are several theoretical assumptions underlying the development of the DRAI, the first concerning the existence of a set of universal emotions. We assume that a set of emotions exists universally and thus forms the basis for a comparison of the regulation of these emotions' expressive components. Indeed, without the assumption of a pancultural set of emotions, comparison of regulatory mechanisms involving their expressions (or other components) is meaningless. We do acknowledge that the existence of universal emotions is a perspective that has been challenged in the past (Russell, 1991, 1994; Wierzbicka, 1994, 1995); however, these challenges have been addressed by both argument and data (Alvarado, 1996; Ekman, 1992a, 1992b, 1994, 1999; Frank & Stennett, 2001; Izard, 2001). Moreover, we believe that at least some of the controversy surrounding universality has been in the claims concerning their biological innateness. We contend that the source of pancultural similarity in emotion, whether in biology or culture-constant learning, is less relevant to examinations of display rules because it probably does not matter whether the source is biological or in learning; what matters is that there is enough similarity in emotion processes to allow comparisons of their associated regulatory mechanisms to be meaningful.

provides an example of the rating format for one of the domains of the DRAI.⁵

Previous Research Using the DRAI

We used the DRAI in a study examining cultural differences in display rules across the United States, Japan, South Korea, and Russia (Matsumoto et al., 1998). Participants completed it along with an individual-level measure of individualism–collectivism. We performed a multidimensional scaling (MDS) on similarity ratings of all possible pairs of the expressive modes given by a separate group of U.S. and Japanese participants. A single dimension fit the ratings for both the United States and Japan and was labeled *Control*, corresponding with the expression–suppression dimension that previous measures have used, thus providing some initial empirical support for the notion that the various expressive modes may be reducible to this dimension. (We discuss below, however, how the composition of this Control dimension derived from the MDS does not correspond to deamplification, as one would predict.) The nominal alternatives were recorded to each alternative’s MDS scale score. Russians exerted the highest control over their expressions, followed by South Koreans and Japanese; Americans had the lowest scores. These cultural differences were found across all rating domains, emotions, and social situations, as well as within both rating domains and each of the four social situations. Significant gender differences were also found, with women exerting more control on anger, contempt, and disgust and with family members and men exerting more control on fear and surprise (Matsumoto et al., 1998).

The DRAI has also been used in a study examining the relationship between display rules and judgments of the emotions of others. In this study, American and Japanese participants completed the DRAI and viewed a series of facial expressions of emotion portrayed at high and low intensities (Matsumoto, Choi, Hirayama, Domae, & Yamaguchi, 2003). They made three judgments for each face: a categorical judgment of which emotion was portrayed and intensity ratings of the strength of the external display and the presumed subjective experience of the expressor. Both American and Japanese judges thought that the expressors of high-intensity expressions displayed the emotions more strongly than they felt them. When judging the low-intensity expressions, Americans and Japanese both rated the expressors’ internal experience higher than they did the external display, but the effect was significantly larger for the Japanese. Moreover, all of these differences were mediated by display rules as assessed by the DRAI, suggesting that one’s own rules for expression management influence one’s judgments of expression management in others.

Concepts and Limitations Underlying the DRAI and Similar Measures

Whereas Ekman and Friesen used display rules to explain the behavioral differences between Americans and Japanese in their study (Ekman & Friesen, 1969), we have contended that emotional expressions are not display rules per se; rather, display rules are cognitive representations of social conventions about emotional displays (Matsumoto, 1990, 1993). Display rules must exist separately from (but interrelated with) the behaviors they are designed to regulate. Moreover, display rules may not be directly observable, although the behaviors they regulate may be. And because display rules represent social convention, there may be discrepan-

cies between people’s display rules and their behaviors. As cognitive representations of social conventions about emotional displays, one way to measure display rules is to ask people about them, which is what the DRAI and other measures do.

This approach to understanding display rules is, in fact, consonant with the approaches of other writers who have developed paper-and-pencil measures of individual differences in expression management (see Table 1). In this sense, these measures, including the DRAI, assess *display rule knowledge*. There are at least two components of that knowledge: expression-regulation knowledge and knowledge of the goals underlying display rules (e.g., why it is important not to show your true feelings in some situations; Jones et al., 1998). The DRAI extends the existing literature by offering a more comprehensive assessment of expression-regulation knowledge by surveying a broader range of theoretically possible expressive modes that go beyond suppression or inhibition.

This approach is not without limitation. For example, whereas some display rules are verbalized and agreed on by a cultural group (e.g., big boys don’t cry), many may not be. When display rules are asked about in measures such as the DRAI (and others), the verbalization process itself may influence the responses given so that the responses may or may not reflect the actual social conventions that display rules are supposed to represent. There is an assumption that, regardless of whether the display rules are consciously accessible, asking about them will provide accurate data about them. This is an assumption, and all such measures should be interpreted with this caveat.

Also, in reality, display rules may influence emotional behaviors through conscious, volitional actions or from automatic, unconscious processing. That is, the relationship between display rules and actual expressive behavior most likely involves varying degrees of cognitive influence, depending on the nature of the emotion, display rules, situation, and previous history. There are times when one consciously manages one’s expressions and other times when one’s expressions are unconsciously managed automatically because of practice and repetition. Display rules may operate in both situations. The distinction between conscious, volitional influences on emotional expression and unconscious, automatic influences is supported by work in the neuropsychology of emotional expression (Matsumoto & Lee, 1993). Because some display rules are learned so well as to be automatic and outside of conscious awareness, they may be inaccessible to verbal response. The DRAI and other similar measures of expressivity make the further assumption that asking about them will validly capture the display rules as they truly exist. The DRAI and all such measures should be interpreted with this caveat.

Overview of the Present Studies

Findings from the first studies to use the DRAI have suggested its promise as a measure of display rules. Still, to date no studies have examined its psychometric properties to demonstrate its

⁵ Given the importance of display rules, expression, and emotion regulation in the developmental literature, it would be important to identify theoretically and empirically the developmental trajectories of these responses. Where do they begin developmentally, and what developmental milestones are necessary for them to occur? These are, of course, important questions. In this article, however, we make no assumption about the developmental emergence or course of the factors at work in this version of the instrument.

reliability and validity, and no attempt has been made to determine whether other scoring procedures are available. In particular it would be important to determine whether the six theoretically derived behavioral responses really do reduce to a single dimension of control or suppression, or whether they provide discriminating information. The purpose of the studies described here, therefore, is to provide the first evidence documenting the psychometric properties of the DRAI and to determine whether assessment of individual differences in expressivity can and should be reduced to a single dimension. If those responses are not reducible, then the DRAI would provide the only alternative to assessing display rules that measures the theoretically possible responses.

The purpose of Study 1 was to examine the issue of scoring, to develop a scoring procedure for the DRAI that was valid and equivalent across multiple cultures, and to explore cultural differences on the DRAI in order to provide further evidence of its external validity. Study 1 also assessed the internal reliability of the scores derived from it and its convergent validity through an examination of their intercorrelations. In Study 2 we examined other psychometric properties of the DRAI, including its temporal and internal reliability and its convergent and predictive validity.

Study 1

Method

Participants. A total of 402 individuals participated in this study. Of these, 151 were Americans born and raised in the United States (112 women, 39 men; mean age = 24.82, $SD = 6.73$; first language, English), 173 were Russians born and raised in Russia (86 men, 87 women), and 78 were Japanese born and raised in Japan (33 women, 45 men; mean age = 20.95, $SD = 1.67$; first language, Japanese).⁶ Although we had no demographic data other than gender for the Russians, we do know that all participants were university students in their respective countries in urban areas (San Francisco, United States; Osaka and Kobe, Japan; Archangelsk and Vologda, Russia) and that they participated voluntarily.⁷ In the American sample, 24 participants identified themselves as Asian, 64 as European/Caucasian, 14 as African/Black, 17 as Hispanic/Latino, and 25 as a mix of two or more ethnicities; 7 did not respond.

Instruments. The DRAI (described above) was used and is the focus of this report. Participants made their 112 ratings (7 emotions \times 2 synonyms \times 4 social situations \times 2 rating domains) by selecting one of the seven behavioral responses provided to them (described above). Participants were instructed to imagine that they feel each of the emotions toward the person with whom they are interacting. In the instructions, participants were provided the following definitions for each of the social situations and were asked to consider the social situations as “general categories of social relationships in their natural or common place of context”:

FAMILY. By *family*, we mean only the core nuclear family that was present during your growing years, such as your mother, father, and any brothers or sisters. Do *not* consider other relatives such as aunts, uncles, grandparents, cousins, and so forth, as your family here unless they actually lived with you for most of your growing years.

CLOSE FRIENDS. By *close friends*, we mean those individuals whom you consider *close*; that is, with whom you spend a lot of time and/or

have known for a long time. Do *not* consider people who are just acquaintances, colleagues, or others whom you would not consider as your close friends. Also, do *not* consider intimate partners (e.g., boyfriend, girlfriend) here, either.

COLLEAGUES. By *colleagues*, we mean those people with whom you interact on a regular basis, but with whom you may not be particularly close (e.g., people at work, school, or a social group). Do *not* consider close friends on the one hand, or total strangers on the other.

STRANGERS. By *strangers*, we mean those people with whom you do not interact on a regular basis, and whom you do not know (i.e., total strangers such as in the subway, on the street, at public events, etc.). Do *not* consider friends, acquaintances, or family.

Participants were also instructed to consider each emotion, situation, and rating domain as separate from all others and that they occur in no particular order. The DRAI made no specific statement about facial expressions; its behavioral responses could be interpreted as being conveyed through multiple channels.⁸

The DRAI was originally developed in English and translated into Japanese and Russian by fluent, native born individuals. Accuracy of the translations was verified by back translation. There were no problems with either the translations or the back translations.

⁶ Although there was a statistically significant difference in age between the Americans and the Japanese that may have confounded the results, correlational analyses between age and the DRAI scores indicated that age was not correlated with display rules. Thus, individual differences in age could not account for the group differences in display rules that were observed.

⁷ The American and Japanese data were collected as part of a project examining the relationship between display rules and emotion judgments, which have been reported elsewhere (Matsumoto, Choi, et al., 2003); that paper, however, did not use any of the new scoring procedures reported below, nor did it report any cultural differences in display rules. The analyses reported in this article are all new and have never been reported elsewhere. The Russian data are entirely new.

⁸ We acknowledge that the four social categories above are general categories of social relationships and that there are many finer distinctions within each. For example, some cultures minimize differences between mothers and fathers; others, however, make large differentiations between them. Some treat younger and older siblings alike; others make a large differentiation on the age of siblings and their gender. The same could be said about each of the other social relationships we tested (i.e., colleagues, friends, and strangers). For that reason, the instructions specifically state the following:

We know that your responses can differ *within* each of these groups, depending on exactly with whom you may be interacting. Also, your responses may differ according to *where* you may be, or the context in which you are interacting (e.g., at work, at home, in a public place, on a bus, etc.). Try not to be too concerned with specific individuals within the four groups, nor with specific contexts in which you may interact. Rather, try to respond to what you believe about these groups as *general categories of social relationships in their natural or common place of context*.

The possibility that participants can make finer distinctions within each of the general social categories is an acceptable increase in Type II error to us. The strong findings with regard to social category below, however, mitigate such concerns.

Procedures. The American and Japanese participants completed the DRAI and made judgments of facial expressions; the Russians completed the DRAI as part of a battery of other instruments. Across all three cultural groups, the DRAI was the common instrument that is the focus of this report. When completing the DRAI, participants were told that they could complete it at their leisure and were given as much time as needed to complete the task. All of the participants completed the measures in a group in class, and there were no questions about the instrument or problems with the data collection. Data collection on the DRAI generally took approximately 30 min.

Results

Preliminary analyses: One dimension of expressivity or several? To examine whether the scores on the DRAI were reducible to a single dimension related to suppression, and to develop a scoring procedure for the DRAI that was applicable across all the cultures tested and would enable us to convert the nominal data into scalar data, we first tallied the number of times each of the seven expressive modes were used for each participant and then computed an exploratory factor analysis on the data after the seven scores were standardized within each participant and then within each country.⁹ Factor analysis on such doubly standardized data produces factor structures that eliminate the influence of culture- or individual-level patterning or positioning effects in the inter-correlation matrix that is used in the factor analysis (Leung, 1989). The resulting structure produces factors that are universally applicable to all cultures tested and allows for the creation of factor or scale scores that are empirically equivalent across the cultures.

The factor analysis on the doubly standardized tallies of the expressive modes produced five factors using the eigenvalues-greater-than-1 criterion. Inspection of the scree plot confirmed the existence of five factors. R^2 was used as a communality estimate, and it ranged from .75 to .95, with a mean of .87. Cumulatively, the five factors accounted for 87.25% of the total variance. Normal varimax rotation was performed on the factor solution. Factor 1 included Items 1 and 4 (negatively) and was labeled *Express*. Factor 2 included Items 2 and 7 (negatively) and was labeled *Deamplify*. Factors 3, 4, and 5 included the single items 3, 6, and 5, respectively, and were labeled *Amplify*, *Mask*, and *Qualify*.¹⁰

These results suggested that the seven nominal expressive modes could be considered generally orthogonal to each other, with overlap between Items 1 and 4 and Items 2 and 7. This finding provides the first empirical validation of Ekman and Friesen's delineation of these different expressive modes for facial expressions since their original conception of it almost 30 years ago (Ekman & Friesen, 1969). That the five expressive modes were essentially orthogonal to each other also suggested that they were qualitatively, not quantitatively, different from each other and could not be reduced to a single dimension of suppression.

We then recoded each participant's response to each of the DRAI items into a score on each of the five expressive modes by tallying whether each response had occurred. Thus, if participants selected the Amplify, Mask, or Qualify responses, they were recoded 1 on these dimensions; else they were recoded into 0. If participants selected Express or Deamplify, they were recoded 1 on these dimensions; if they selected Neutralize or Other, they were recoded -1 on these dimensions, respectively; else they were

recoded into 0.¹¹ For comparison purposes in the following analyses, we also computed a score labeled *Control* on the basis of the results of the previous MDS reported in Matsumoto et al. (1998).¹²

Overall analyses. For each of the six expressive modes, we averaged the scores for both synonyms within each emotion, social situation, and rating domain.¹³ This resulted in the production of 56 scores (7 emotions \times 4 social situations \times 2 rating domains). We then computed an overall analysis of variance on these scores using culture (3) and gender (2) as between-subjects factors and rating domain (2), emotion (7), and social situation (4) as within-subject factors, separately for the six expressive modes. The results reported below follow the findings from the overall analysis for

⁹ That is, all scores for a participant were first standardized to his or her mean and standard deviation across all 112 items, and then those scores were standardized again to each participant's country mean and standard deviation. As mentioned in text, these double standardization procedures eliminate pattern or positioning effects due to individuals or cultures that may confound the results of a factor analysis (or any statistical technique based on correlation). The results of factor analyses on such data are theoretically universal to the samples because sample differences have been eliminated prior to the analyses. There is argument, however, that those individual and sample differences are precisely what we want represented in the data to produce factors.

¹⁰ Because of the concerns with using doubly standardized data, we recomputed the factor analyses using the raw data, and there were no differences in the findings. Results of both analyses are available from David Matsumoto.

¹¹ The results of the factor analyses indicated that these expressive modes should be treated as unique to each other. Because they are essentially nominal data, we adopted this coding scheme so as to create counts of the frequencies within each participant to produce scalar data that can be used in the analyses. In the factor analyses, Express loaded positively on Factor 1, whereas Neutralize loaded negatively, indicating a bipolar scale. Thus, Express was coded as 1 and Neutralize was coded as -1, with all other response alternatives as 0. The same was true for Factor 2, which included a positive loading for Deamplify and a negative loading for Other.

¹² In actuality, we attempted to replicate the MDS findings on the DRAI expressive modes reported in Matsumoto et al. (1998) that produced a single Control dimension. However, MDS of the data from Study 1 produced a two-dimensional solution that was not interpretable and therefore did not replicate the previous findings. We believe that the factor analysis on doubly standardized data provides an empirically stronger solution.

¹³ The synonym names came from standard thesauruses and are corroborated by studies examining the hierarchical clustering of emotion lexicons in multiple languages (Shaver, Murdaya, & Fraley, 2001; Shaver, Schwartz, Kirson, & O'Connor, 1987; Shaver, Wu, & Schwartz, 1992). These were included in the instrument to build internal consistency, and we view them as entirely analogous to multiple items on a paper-and-pencil test. We believe that their content validity provides ample justification to average the scores across the synonyms, at the same time producing a psychometrically more reliable score for that emotion. For good measure we also computed contingency coefficients between all 56 pairs of synonyms across the scoring methods. All were very high and statistically significant. The mean contingency coefficient in Study 1 was .66 (range = .50-.81); for Study 2 it was .71 (range = .57-.88). To examine differences in agreement across emotion pairs, we averaged the contingency coefficients separately for each emotion. The mean contingency coefficient for contempt-defiance was .62; for shock-surprise, fear-worry, and anger-hostility, .66; for sadness-gloomy, .67; for disgust-aversion, .70; and for happiness-joy, .83. These statistics provide further empirical justification for their averaging.

each separately, highlighting some of the main findings; a detailed report of the results is available from David Matsumoto.

Express. The emotion main effect was significant, $F(6, 2124) = 206.05, p < .001, \eta^2 = .37$. We computed the marginal means of emotion, rank ordered them, and tested adjacent pairs using t tests to determine significant differences among the emotions for all participants as a group (see Table 2). Across all participants, happiness received the highest scores, whereas contempt, disgust, and anger received the lowest. These effects were qualified by a significant Culture \times Emotion interaction, $F(12, 2124) = 5.08, p < .001, \eta^2 = .03$. We thus tested the simple effects of culture separately for each emotion and tested pairwise differences between cultures using Tukey's post hoc comparisons. Americans expressed surprise more than Russians, who in turn expressed surprise more than Japanese. Americans and Russians both expressed anger and contempt more than Japanese. Americans expressed fear and disgust more than Russians. And Americans expressed happiness more than Russians and Japanese.

The situation main effect was significant, $F(3, 1062) = 347.91, p < .001, \eta^2 = .50$; we thus computed the marginal means of situation, rank ordered them, and then tested adjacent pairs of means using t tests (see Table 2). Across all participants, Express scores were highest for family members, then friends, colleagues, and strangers. This effect was qualified by a Culture \times Situation interaction, $F(6, 1062) = 8.99, p < .001, \eta^2 = .05$. Simple effects tests of culture with Tukey's post hoc comparisons indicated that Americans had higher Express scores with family than did Russians and Japanese; that Americans had higher Express scores with friends than did Russians, who in turn had higher scores than Japanese; and that Americans and Russians had higher Express scores than Japanese with strangers.

Deamplify. The main effect of culture was significant, $F(2, 354) = 21.94, p < .001, \eta^2 = .11$, and Tukey's post hoc comparisons indicated that the Japanese had higher Deamplify scores than both Americans and Russians. These effects were moderated by a Culture \times Emotion interaction, $F(12, 2124) = 2.06, p < .05, \eta^2 = .01$. Simple effects analyses indicated that the same pattern

of results as the main effect occurred on all emotions except fear, where the Japanese had higher Deamplify scores than Russians but not Americans.

In addition, the main effect of emotion was significant, $F(6, 2124) = 12.91, p < .001, \eta^2 = .04$; for all participants anger was the most minimized emotion, followed by disgust, sadness, contempt, and fear as a group. Surprise and happiness were the least minimized emotions (see Table 2). The main effect of situation was also significant, $F(3, 1062) = 58.27, p < .001, \eta^2 = .14$; there were no significant differences between friends, colleagues, and family (see Table 2), but emotions were least minimized with strangers.

Amplify. The main effect of emotion was significant, $F(6, 2124) = 23.95, p < .001, \eta^2 = .06$, indicating that for all participants happiness received the highest scores, followed by surprise and fear; anger, contempt, disgust, and sadness received the lowest scores (see Table 2). These effects were moderated by a Culture \times Emotion interaction, $F(12, 2124) = 6.30, p < .001, \eta^2 = .03$. Americans had higher scores than Russians on sadness and disgust, whereas Japanese had higher scores than Russians on surprise and fear. The situation main effect was also significant, $F(3, 1062) = 29.71, p < .001, \eta^2 = .08$; friends received the highest scores, followed by family members, colleagues, and then strangers.

Mask. The emotion main effect was significant, $F(6, 2124) = 16.95, p < .001, \eta^2 = .05$. Sadness received the highest scores; there were no differences among contempt, anger, fear, and disgust; and surprise and happiness received the lowest Mask scores (see Table 2). The Culture \times Emotion interaction was not significant, $F(12, 2124) = 1.64, p < .10, \eta^2 = .01$. The situation main effect was significant, $F(3, 1062) = 52.54, p < .001, \eta^2 = .13$; strangers received the highest Mask scores, followed by colleagues, friends, and family. The Culture \times Situation interaction was not significant, $F(6, 1062) = 1.13, ns$.

Qualify. The Culture \times Emotion interaction was significant, $F(12, 2124) = 3.88, p < .001, \eta^2 = .02$; Japanese had higher scores than Russians on sadness, whereas Russians had higher scores than both Japanese and Americans on happiness. Also, the Culture \times Situation interaction was significant, $F(18, 6372) = 5.15, p < .001, \eta^2 = .01$; Tukey's tests indicated that the Japanese had higher scores than did Russians with colleagues. The situation main effect was significant, $F(3, 1062) = 30.21, p < .001, \eta^2 = .08$. Across all participants, colleagues received the highest Qualify scores, followed by strangers, friends, and family members.

Control. The main effect of emotion was significant, $F(6, 2124) = 234.99, p < .001, \eta^2 = .40$ (see Table 2); disgust, anger, and contempt were the most controlled emotions, whereas happiness was the least controlled. These effects were qualified by a significant Culture \times Emotion interaction, $F(12, 2124) = 5.47, p < .001, \eta^2 = .03$. Simple effects analyses indicated that Russians and Japanese controlled surprise more than Americans; Russians controlled fear and disgust more than Japanese, who in turn controlled these emotions more than Americans; Japanese controlled contempt more than both Americans and Russians; and Russians controlled happiness more than Americans.

The main effect of situation was significant, $F(3, 1062) = 484.37, p < .001, \eta^2 = .58$ (see Table 2); Control scores were greatest for strangers, followed by colleagues, then friends, then family members. These results were qualified by a significant

Table 2
Emotion and Situation Differences as a Function of Type of Display Rules (Study 1)

Expressive mode	Findings
Express	Happiness > surprise > sadness = fear > contempt = disgust = anger
Deamplify	Family > friends > colleagues > strangers Anger > disgust = sadness = contempt = fear > surprise > happiness
Amplify	Friend = colleague = family > stranger Happiness > surprise = fear > anger = contempt = disgust = sadness
Mask	Friend > family > colleague > stranger Sadness > contempt = anger = fear = disgust > surprise > happiness
Qualify	Stranger > colleague > friend > family Colleague > stranger > friend > family
Control	Disgust = anger = contempt > sadness = fear > surprise > happiness Strangers > colleagues > friends > family

Culture \times Situation interaction, $F(6, 1062) = 11.92, p < .001, \eta^2 = .06$. Russians had higher Control scores than both Japanese and Americans with family, and Japanese in turn had higher Control scores than Americans. With friends there were no differences between Russians and Japanese, and both cultures had higher Control scores than Americans. There were no significant cultural differences on colleagues or strangers.

The Emotion \times Situation interaction was also significant, $F(18, 6372) = 22.81, p < .001, \eta^2 = .06$. For family and friends, the emotions were generally differentiated in the same manner as described earlier; disgust, anger, and contempt were controlled most, followed by sadness or fear, with surprise and happiness controlled least. For colleagues and strangers, however, the negative emotions were not significantly different from each other, but they were significantly different from surprise and happiness. These findings suggest that for these social relationships, all negative emotions were controlled, whereas they were differentially controlled for family members and friends. The Culture \times Emotion \times Situation interaction qualified these effects, $F(36, 6372) = 7.42, p < .001, \eta^2 = .04$. The interaction appeared to be carried by the Japanese data. With family, the negative emotions were not differentiated from each other. With strangers, the negative emotions and surprise were not differentiated from each other.

Alphas and intercorrelation matrices. To assess the reliability of the scoring procedures, we computed scores for each of the seven emotions and four situations, computed a total score separately for each of the six expressive modes, and computed Cronbach's alphas on these scores. (We chose to compute separate scores for emotions and situations because of the large emotion and situation main effects reported above.) For the entire sample the mean alpha across 72 scores (12 scores \times 6 expressive modes) was .81 (range = .65-.95). The alphas computed separately for each of the three cultures were comparable (a detailed table of these findings is available from David Matsumoto). These results provide support for the internal reliability of the scoring procedures.

To test the convergent validity of the scoring procedures, we computed an intercorrelation matrix among the six expressive modes separately for each of the 12 scores, once using the entire sample and again for each of the three cultures. The results for the total score across the entire sample (see Table 3) indicated that the Control scores were negatively correlated with the three expression scores (Express, Deamplify, and Amplify) and positively correlated with Mask. Express was negatively correlated with

Deamplify and Amplify. Deamplify was negatively correlated with Amplify and Mask. Mask was positively correlated with Qualify. These correlations are what one would expect among these expression types and provide some evidence for the convergent validity of the scoring procedures (detailed results of the matrices for the other scores and separately for each culture are available from David Matsumoto).

We also computed intercorrelation matrices among the seven emotions and total score and among the four situations and total score, separately for each of the six expressive modes, again for the entire sample and for each of the three cultures. The correlations were generally high and positive, indicating some degree of consistency in individual expressive style across emotions and situations (mean correlations and 95% confidence intervals for emotion and situation were .55, .52-.57, and .58, .52-.64, respectively). Detailed tables can be obtained from David Matsumoto.

Discussion

The preliminary analyses provide empirical support for the notion that the expressive modes Express, Deamplify, Amplify, Mask, and Qualify are not only theoretically different but statistically independent of each other. This suggests that a comprehensive measurement of an individual's display rules requires the assessment of these expressive modes. That each alternative led to different findings according to culture, emotion, and situation and that they are intercorrelated with each other to some extent but not largely lend further credence to this notion.

The intercorrelations reported in Table 3 also suggest that the Control score based on a previous MDS of the expressive modes is not easily interpreted. Its highest correlation was with Express (negative), which would suggest that it did indeed measure a form of suppression. Yet it was also positively correlated with Mask, which is a form of suppression of an original emotion but expression of a substitute (smile). It was negatively correlated with Amplify, which makes sense in relation to its negative correlation with Express, but it was also negatively correlated with Deamplify, which refers to the opposite behavioral response. Clearly if Control did measure suppression, it did so by ignoring the differences among these various management techniques.

The analyses of variance on the various expressive modes provide some evidence for the external validity of the scores. Although there were many statistically significant findings, in general the largest effects involved the emotion and situation main

Table 3
Intercorrelations Among the DRAI Scales

Variable	1	2	3	4	5	6
1. Control	—	-.874***	-.156***	-.109*	.300***	.022
2. Express	-.848***	—	-.140***	-.134**	-.012	-.020
3. Deamplify	-.281***	-.020	—	-.136**	-.230***	-.051
4. Amplify	.034	-.303***	-.254***	—	.041	.075
5. Mask	.383***	-.090	-.255***	.001	—	.101*
6. Qualify	.029	-.088	-.078	.150*	.009	—

Note. Study 1 results appear above the diagonal; Study 2 results appear below the diagonal. DRAI = Display Rule Assessment Inventory.
* $p < .05$. ** $p < .01$. *** $p < .001$.

effects. The differences among the emotions reported separately for each expressive mode are the first such evidence to our knowledge to be reported in the literature. Across all cultures studied, the emotion most expressed as is was happiness; the least were contempt, disgust, and anger. The most deamplified emotion was anger; the least was happiness. The most amplified emotion was happiness; the least were anger, contempt, disgust, and sadness. The most masked emotion was sadness; the least was happiness. These data are important because they can now be linked to theories of emotion and communication. For example, we can explore what it is about contempt, disgust, and anger that lend them to be the least expressed emotions as is, or why the most masked emotion is sadness.

Differences among the situations were also interesting. Participants reported that they expressed their emotions as is most to family, then to friends, colleagues, and strangers in that order. For deamplification, however, they did not differentiate among friends, colleagues, and family. They reported amplifying their emotions most to friends but qualifying their emotions most to colleagues and masking their emotions most to strangers. Thus, participants clearly reported different behavioral strategies depending on the social situation. This finding is interesting in its own right and should lead to further work on explicating the reason why this is so. Also, it would not have been possible to obtain these findings had the various expressive modes not been sampled.

Although culture effects, when they occurred, were generally small, they were mainly consistent with previous studies.¹⁴ For instance, Americans had higher expression and amplification scores than Russians and Japanese; Japanese had higher deamplification and qualification scores than Americans and Russians; and Russians had higher qualification scores than Americans. The Japanese and Russians also had higher control scores than the Americans. These findings provide further support for the external validity of the DRAI.

The intercorrelations among the emotion and situation scores provide evidence for their convergent validity, as the correlations were positive and statistically significant but not so large as to suggest that the scores were empirically redundant. The mean correlations reported in the results indicate that there was approximately a 30%–33% overlap among the scores, which suggests that an average of 67%–70% of the variance among the scores was independent. These data provide initial support for the reliability and validity of the DRAI.

In Study 2 we sought additional evidence for the psychometric properties of the DRAI by examining its relationships with two existing scales of expressivity and two scales of personality. In addition, we attempted to replicate the alphas and intercorrelations and tested the temporal reliability of the scale.

Study 2

Method

Participants. The participants were 230 university undergraduates participating voluntarily (172 women, 58 men; mean age = 24.72, $SD = 6.26$). Sixty-eight percent of the sample were Americans born and raised in the United States; the remainder were either born or raised elsewhere. The participants were recruited in psychology classes at San Francisco State University that fulfilled

general education requirements and thus represented multiple majors.¹⁵

Instruments. The DRAI was administered, and 12 scores (7 emotions, 4 situations, 1 total) were generated for each of the six expressive modes: Control, Express, Deamplify, Amplify, Mask, and Qualify. To test the convergent and predictive validity of the DRAI, we also used four other measures: the EES, the ERQ, the Intercultural Adjustment Potential Scale (ICAPS), and the NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992).

The EES is a 17-item scale that assesses individual differences in the extent to which people outwardly display their emotions (Kring et al., 1994). Previous research has demonstrated its temporal and internal reliability and convergent and discriminant validity. Participants respond using a 6-point Likert scale from *never true* to *always true*. After reverse coding negatively loading items, a total score is computed by averaging all items ($\alpha = .92$); higher scores reflect greater expressivity.

The ERQ is a 10-item scale that assesses the extent to which individuals typically try to change the emotional impact of the emotion-eliciting situation cognitively or inhibit their emotion-expressive behavior (Gross & John, 2003). Previous research has demonstrated its reliability and validity. It is composed of two subscales: Reappraisal and Suppression. Participants rate each item using a 7-point scale ranging from *strongly disagree* to *strongly agree*. The six reappraisal items and four suppression items are averaged to create a score for each ($\alpha = .80$ and $.72$, respectively), with higher scores indicating greater reappraisal and suppression.

The ICAPS is a 55-item scale that assesses four psychological skills relevant to intercultural adjustment. Previous studies have demonstrated the reliability and validity of this measure to predict intra- and intercultural adjustment in a variety of populations (Matsumoto, LeRoux, et al., 2003; Matsumoto, LeRoux, Ratzlaff, et al., 2001). Five scores are derived: a total score, Emotion Regulation, Openness, Flexibility, and Critical Thinking. The alpha for the total score was $.57$; although low, it is consistent with alphas reported in previous studies and with what would be expected from a multifactor scale instrument (Matsumoto, LeRoux, et al., 2003; Matsumoto, LeRoux, Ratzlaff, et al., 2001). Previous studies have shown convincingly that the ICAPS Emotion Regulation scale is the best predictor of intercultural and intracultural adjustment in a wide variety of samples (Matsumoto & LeRoux, 2003; Matsumoto, LeRoux, Bernhard, & Gray, 2001; Matsumoto, LeRoux, et al., 2003; Matsumoto, LeRoux, Ratzlaff, et al.,

¹⁴ This overall pattern of findings replicates that reported in previous large-scale cross-cultural studies of emotion antecedents and reactions (Scherer, 1997a, 1997b), which also showed that the largest effects were associated with emotion, not culture, differences. These previous findings suggest that there were considerably more cross-cultural similarities than differences in emotion processes. The current set of findings supports that notion as well, as there were more differences across emotions and situations independent of culture, and when cultural differences existed, they were relatively small.

¹⁵ The convergent validity data for 81 of these participants and one score (Total) of one scoring method (Control) were previously reported elsewhere (Matsumoto, Choi, et al., 2003).

Table 4
Convergent and Predictive Validity Coefficients Between DRAI Scales and the ERQ, EES, ICAPS-ER, and NEO-FFI Neuroticism

Variable	DRAI scores					
	Control	Express	Deamplify	Amplify	Mask	Qualify
ERQ Reappraisal	-.079	.037	.107†	-.072	-.128*	.063
ERQ Suppression	.250***	-.296***	-.040	.113*	.130*	.069
EES	-.203***	.214***	.046	-.034	-.121*	-.051
ICAPS-ER	-.195**	.248***	.060	-.166**	-.102†	-.105†
NEO-FFI Neuroticism	.023	-.021	.019	.003	.086†	.096†
ICAPS Total	-.179**	.207***	.122*	-.182**	-.117*	-.102†
ICAPS-OP	-.121*	.152*	.154*	-.208***	-.018	.007
ICAPS-FL	-.048	.099†	.002	-.065	-.043	-.004
ICAPS-CT	-.092†	.056	.032	.016	-.094†	-.007
NEO-FFI Extraversion	-.194**	.222***	.011	-.047	-.011	.039
NEO-FFI Openness	-.068	.093†	.191**	-.218***	-.052	-.056
NEO-FFI Agreeableness	-.106†	.160**	.116*	-.227***	-.020	-.060
NEO-FFI Conscientiousness	-.082	.108†	.037	-.123*	-.061	-.075

Note. DRAI = Display Rule Assessment Inventory; ERQ = Emotion Regulation Questionnaire; EES = Emotional Expressivity Scale; ICAPS-ER = Intercultural Adjustment Potential Scale-Emotion Regulation; NEO-FFI = NEO Five-Factor Inventory; OP = Openness; FL = Flexibility; CT = Critical Thinking.
 † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

2001).¹⁶ In addition, similar findings have been obtained using other measures of emotion regulation (Gross & John, 2003; Moi, Van Oudenhoven, & Van der Zee, 2001; Van der Zee & Van Oudenhoven, 2000, 2001). We reckoned that the inclusion of the ICAPS Emotion Regulation scale was justified because of the close conceptual link between expression and emotion regulation described in the introduction.

The NEO-FFI is a 60-item version of Form S of the Revised NEO Personality Inventory that provides a brief, comprehensive measure of the Big Five domains of personality: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (Costa & McCrae, 1992). Convergent and discriminant validity are excellent and indicate that the NEO-FFI accurately measures the intended constructs. The alphas for each of the scales were .81, .67, .70, .61, and .77, respectively.

Procedures. The measures were assembled in packets in random orders and distributed to participants at the end of a class session. They were asked to complete the packets at their leisure and return the completed packets 1 week later. To examine the temporal reliability of the DRAI, we asked a smaller sample of participants ($n = 40$) to complete the DRAI again 2.5 months after the initial collection.

Results

Convergent validity. We computed product-moment correlations between each of the DRAI scores and the ERQ Reappraisal, ERQ Suppression, EES, ICAPS Emotion Regulation, and NEO-FFI Neuroticism Scales (Table 4, top, shows the results for the DRAI total scores only; detailed results on all of the findings can be obtained from David Matsumoto). Control was positively correlated with ERQ Suppression and negatively correlated with the EES and ICAPS Emotion Regulation. Amplify was also positively correlated with ERQ Suppression and negatively with ICAPS Emotion Regulation. Mask was positively correlated with ERQ

Suppression and negatively correlated with ERQ Reappraisal and EES. Express was correlated in the opposite direction—negatively with ERQ Suppression and positively with EES and ICAPS Emotion Regulation. The pattern of correlations provides support for the convergent validity of the DRAI scores.

Predictive validity. We also computed correlations between the DRAI scores and the other scales of the ICAPS and the NEO-FFI (see Table 4, bottom). DRAI Control was negatively correlated with ICAPS Total, ICAPS Openness, and NEO-FFI Extraversion. Express was positively correlated with ICAPS Total and Openness and with NEO-FFI Extraversion and Agreeableness. Deamplify was positively correlated with ICAPS Total and Openness and with NEO-FFI Openness and Agreeableness. Amplify was negatively correlated with ICAPS Total and Openness and with NEO-FFI Openness and Agreeableness. Mask was negatively correlated with ICAPS Total. These findings provide support for the predictive validity of the DRAI scores.

Because the DRAI scores were correlated with the ERQ and EES, it was possible that the correlations between the DRAI and ICAPS or the NEO-FFI were confounded by the ERQ and EES. We thus recomputed the correlations between DRAI and ICAPS and NEO-FFI, partialing out the ERQ Suppression and EES scales. Of the 17 significant correlations reported in the bottom of Table 4, 16 were still statistically significant. These results provide strong support for the predictive and discriminant validity of the DRAI.

Because a large proportion of participants were not born and raised in the United States, we recomputed these correlations

¹⁶ In these studies, adjustment has been measured in a variety of ways, including standardized paper-and-pencil measures of depression, anxiety, and subjective well-being; objective indices such as GPA (for students) and income (for businesspersons); peer ratings; and interviewer ratings based on focus groups.

separately for those individuals. The results mirrored those reported in Table 4 almost in their entirety (a detailed table of results is available from David Matsumoto upon request). These findings suggest that the convergent and predictive validity of the DRAI extended beyond U.S. born and raised American participants.

Alphas and intercorrelation matrices. We again computed Cronbach's alphas on the 72 scores. For the entire sample the mean alpha was .80 (range = .59–.95). The alphas for the six DRAI total scores were .94, .94, .95, .95, .92, and .87, for Control, Express, Deamplify, Amplify, Mask, and Qualify, respectively. As in Study 1, these results provide support for the internal reliability of the scoring procedures.

We also computed intercorrelations among the six DRAI scores separately for each of the 12 different scores. The results for the total score are presented in the bottom half of Table 3 and largely replicated those of Study 1. Control was negatively correlated with Express and Deamplify and positively correlated with Mask. Express was negatively correlated with Amplify. Deamplify was negatively correlated with Amplify and Mask, and Amplify was positively correlated with Qualify. These results once again provide evidence for the convergent validity of the DRAI scores.

As in Study 1, we also computed intercorrelation matrices among the seven emotions and total score and among the four situations and total score, separately for each of the six expressive modes. Once again the correlations were generally high and positive, indicating some degree of consistency in individual expressive style across emotions and situations (mean correlations and 95% confidence intervals for emotion and situation were .57, .54–.60, and .51, .44–.58, respectively). Detailed tables can be obtained from David Matsumoto.

Test-retest reliability. We computed the test-retest reliability of the 12 scores separately for each of the six expressive modes. The reliabilities were positive and statistically significant for all six total scores: $rs(40) = .67, p < .01$; $.69, p < .001$; $.49, p < .01$; $.46, p < .01$; $.57, p < .01$; and $.41, p < .01$, for Control, Express, Deamplify, Amplify, Mask, and Qualify, respectively. Of the 66 remaining correlations, 56 were also positive and statistically significant (a detailed table of findings is available from David Matsumoto). These results provide strong support for the temporal reliability of the DRAI.

Discussion

The results from Study 2 extended the findings from Study 1 by providing further evidence for the reliability and validity of the DRAI. Alphas replicated its internal reliability, and test-retest correlations provided evidence for its temporal reliability, which is new to this study. The intercorrelations among the scores replicated those of Study 1, showing that the Control score derived from the previous MDS essentially measures expressivity while glossing over deamplification and amplification. Differential intercorrelations for Deamplify, Amplify, Mask, and Qualify lend further credence to the notion that these scores measure different psychological processes.

The results of Study 2 extended the findings of Study 1 by providing evidence for the convergent validity of the DRAI with other validated measures. Expression was negatively correlated with ERQ Suppression and positively correlated with the EES and the ICAPS Emotion Regulation scale. These correlations are expected, as ERQ

Suppression, EES, and ICAPS Emotion Regulation all measure some aspect of the regulation of expressivity. That masking is negatively correlated with EES and that amplification is negatively correlated with ICAPS Emotion Regulation are also what one would predict. That amplification and masking were also correlated with ERQ Suppression is interesting and makes sense if one notes that both amplifying and masking require modification of the original emotional response, as would be required in suppression. Whereas masking may involve a suppression of an emotional response, however, amplification refers to modifying it via exaggeration, which clearly is not suppression and highlights further the need to delineate among expression-regulation processes beyond mere suppression. (It is also interesting to note that amplification and masking are not correlated with each other; see Table 3.)

Masking was negatively correlated with ERQ Reappraisal, which is interesting for several reasons. Given that ERQ Suppression is not correlated with ERQ Reappraisal (Gross & John, 2003), this finding suggests that reappraisal may be associated with masking but that this correlation is not detected by simple scores of suppression or expressivity. The lack of correlations between ERQ Reappraisal and the other DRAI scores, especially with Express or Control, would lend further support for this notion. Once again, this finding would not be obtainable had masking not been measured as a separate dimension of expression management.

That a number of DRAI scales were correlated with ICAPS Emotion Regulation and ICAPS Total suggests its relationship with psychological adjustment. Previous studies have indicated that the ICAPS can reliably predict psychological and sociocultural adjustment both in intercultural sojourners and within cultures (Matsumoto & LeRoux, 2003; Matsumoto, LeRoux, Bernhard, et al., 2001; Matsumoto, LeRoux, et al., 2003; Matsumoto, LeRoux, Ratzlaff, et al., 2001). Moreover, the ICAPS Total and Emotion Regulation scores can predict adjustment concurrently and in the future. The results from Study 2 suggest that both expressing emotions as is and deamplifying them are associated with positive adjustment potentials, whereas amplifying, masking, and qualifying them are associated with negative adjustment potentials.

Both expressing and amplifying emotions as is were related to Extraversion, which makes sense; expression may be part of the need for activity and attention getting that are associated with high scores on Extraversion. Deamplifying one's emotional expressions was correlated with Openness, which may reflect the ability of people high on Openness to put their emotions on hold while they listen to others and reflect. That Express, Amplify, and Deamplify were correlated with Agreeableness suggests that expressing emotions that are felt with no modification (i.e., qualification or masking) is associated with social appropriateness. We have no interpretation for the correlation between Conscientiousness and Amplify.¹⁷ It is important, however, that these relationships replicated even when the ERQ Suppression and EES scores were controlled. It is further interesting to note that Control was *not* correlated with Openness, Agreeableness, or Conscientiousness, which further differentiates between it and the DRAI

¹⁷ One anonymous reviewer suggested that this correlation may have occurred because conscientious people may make more of an effort to report their emotions truthfully and not exaggerate them. This would explain the marginally significant positive correlation with expression and negative correlation with amplification.

scales. (Note that ERQ Suppression was negatively correlated with Extraversion, Openness, Agreeableness, and Conscientiousness; see Gross & John, 2003.)

General Discussion

Across both studies we reported evidence for the internal and temporal reliability of the DRAI and for its convergent and concurrent predictive validities. The differential pattern of results obtained for the various DRAI scales compared with the Control scale derived from the previous MDS results provides evidence for its discriminant validity. The derivation of its expressive modes from previous theoretical work provides for its content validity. The cross-cultural data reported in Study 1 not only provide for its external validity but, to our knowledge, constitute the first survey of how expression management alternatives differ as a function of emotion, situation, and culture.

The DRAI is the first scale to measure individual-level expression management and display rules that surveys the broad range of expressive modes theoretically possible. Moreover, previous research has demonstrated that people actually engage in a variety of behavioral responses, not just suppression, in reaction to emotionally arousing stimuli (Cole, 1986; Ekman & Rosenberg, 1998). The results from both studies clearly show that masking, amplifying, deamplifying, and qualifying one's expressions not only are conceptually different but also are empirically independent of each other and are related to different things.

Future studies may examine further how these different expressive modes may be associated with different outcomes. It is entirely possible, for example, that some expressive modes other than deamplification or control may be predictive of the interpersonal, cognitive, emotional, and adjustment variables that previous research has shown to be associated with suppression (Gross & John, 2003). Specifying exactly which behavioral responses are associated with which kinds of interpersonal, personal, or intrapersonal outcomes may be important to refining our conceptual notions of how outcomes are produced, and how we can intervene to improve them.

Future research using the DRAI is necessary in order to further refine the instrument. With additional data from more countries, we may be able to eliminate redundant parts of the instrument, perhaps reducing the number of emotions tested and the number and types of situations. Indeed, currently participants make 112 ratings, which can be cumbersome. A more economical and practical instrument that is correlated with not only expressive behaviors but real-life outcomes in health and relationships will be of use to practitioners and researchers alike. In addition, it is clear to us that the version of the DRAI used in this study is not appropriate for children; revisions and simplifications to the instrument will be necessary for use with younger samples, and these revisions should be made on empirical bases. Future research will also be necessary in identifying the developmental trajectories of the various behavioral responses and the developmental milestones in cognition and physiology that are correlated with those trajectories (see the excellent review and discussion of these issues by Cole, Martin, & Dennis, 2004). Future research should also endeavor to tease out differences among knowledge of expressive strategies, expression-regulation goals, and motivation to use expressive strategies.

These studies were not conducted without limitations. As we mentioned in the introduction, there is a possible inherent limitation to assessing display rules using paper-and-pencil measures. Another limitation concerns the validation of the instrument against other paper-and-pencil tests. Although those tests have shown validity coefficients against actual, real-life psychological outcomes, it will be important for future research to validate the DRAI against actual expressive behaviors, including the various types of behavioral responses that it assesses. It will also be important for future studies to attempt to link different display rules with different physiological patterns of emotional response; it may very well be, for instance, that different indices of autonomic and nervous system arousal are associated with different expression modalities. Also, the version of the DRAI used in these studies did not specify the intensity level of the emotion being considered, nor did it assess the emotion referred to when the respondents made their ratings. It is possible that such intensity differences in hypothesized emotions may have confounded the ratings and influenced the findings across cultures, emotions, or situations. Future research using the DRAI will need to control for this influence, either experimentally in a revision of the DRAI or statistically after obtaining such data on the hypothesized emotions. Future research will also need to use more specific context information, with more specific social relationships and specific contexts tested. The exclusive use of college-age samples is another limitation, which restricts the generalizability of the utility of the DRAI and its findings. Another limitation of the studies reported above concerns the relatively small samples of American men; future studies will need to obtain more data from this group. Finally, although a factor analysis on doubly standardized data from three countries was used to validate the expressive modes (in addition to a nonreplication of the previous MDS results), it is possible that data from a broader range of countries, or other statistical techniques, would yield different results. This possibility needs to be investigated in the future as well.

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(Appendix follows)

Appendix

Sample Response Sheet From the DRAI

Please tell us what you think people *should* do when they feel each of the emotions listed toward someone in each of the four situations when interacting with that person. At the top of the page is a list of seven possible responses for how one may behave in those situations. Please select a response for *each* emotion and *each* situation. Record that number in the appropriate space provided for that emotion and situation.

Possible Responses:

1. Express the feeling as is with *no inhibitions*.
2. Express the feeling, but with *less* intensity than one's true feelings.
3. Express the feeling, but with *more* intensity than one's true feelings.
4. Try to remain *neutral*; express nothing.
5. Express the feeling, but together with a *smile* to qualify one's feelings.
6. Smile only, with no trace of anything else, in order to hide one's true feelings.
7. Some *other* response.

	Family	Close Friends	Colleagues	Strangers
Sadness	—	—	—	—
Anger	—	—	—	—
Shock	—	—	—	—
Contempt	—	—	—	—
Joy	—	—	—	—
Aversion	—	—	—	—
Worry	—	—	—	—
Happiness	—	—	—	—
Disgust	—	—	—	—
Gloomy	—	—	—	—
Surprise	—	—	—	—
Hostility	—	—	—	—
Defiance	—	—	—	—
Fear	—	—	—	—

Note. A copy of the DRAI in its entirety is available from David Matsumoto.

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