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Methods and measures in developmental emotions research: Some assembly required

Ross A. Thompson

Department of Psychology, University of California, Davis, CA 95616, USA

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ABSTRACT

The remarkable contributors to this special issue highlight the importance of developmental research on emotion and its regulation, as well as its conceptual and methodological challenges. This commentary offers some additional thoughts, especially concerning alternative views of the convergence of multiple measures of emotional responding, the conceptualization of emotion and emotion regulation, and future directions for work in this field. In the end, in light of the complex construction of emotion and its development, we may learn from studying the divergence among multiple components of emotional responding as we do from expectations of their convergence. In each case, some assembly is required.

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Introduction

There are several reasons for the explosion of research interest in the development of emotion and emotion regulation. One is a growing awareness that emotional competence is important to social competence, psychological well-being, cognitive functioning, moral sensitivity, and other important developmental processes (Sroufe, 1996; Thompson, *in press*). Another is the integration of behavioral and biological approaches to emotion that provide greater insight into its development and regulation than was previously possible (e.g., Calkins & Hill, 2007; Pollak, Klorman, Thatcher, & Cicchetti, 2001). A third reason is that research in developmental psychopathology enlists models of the development of emotional competence into understanding the origins and consequences of externalizing and internalizing disorders (e.g., Denham, Blair, Schmidt, & DeMulder, 2002; Luby & Belden, 2006). As the issues studied by the authors of the articles for this special issue readily attest, research interest in this field has grown because it is important.

E-mail address: rathompson@ucdavis.edu

Like many important psychological concerns, however, progress does not come easily. Developmental study of emotion and its regulation faces daunting conceptual and methodological challenges, some long-standing and others more recent in origin. The authors of the articles in this issue should be commended for their courage in straightforwardly facing these challenges, including the variable (and sometimes conflicting) ways in which emotion is conceptualized, the inconsistent and often poor convergence of multiple measures of emotion from the same assessment, and even the problem of how to assess emotion appropriately in developmental samples. As Adrian, Zeman, and Veits (this issue) note with admirable understatement, there has been “great diversity in how emotion processes are understood and evaluated.” More important, however, is concern that this conceptual and methodological pluralism is not leading to greater insight. The diversity in approach and assessment seems to derive not from a vigorous, forward-moving research focus but rather from a field that is searching to resolve fundamental issues to the study of emotional development.

The purpose of this commentary is to add to the achievements of the authors and editors of this special section some additional thoughts that might contribute to progress on these conceptual and methodological problems. I do so with the humility of recognizing that the issues profiled here recapitulate, in many respects, problems that have endured throughout the history of emotions research. We have long struggled with conceptual and methodological issues such as these. What the articles of this issue help to do, however, is highlight some of the core dilemmas faced by developmental researchers and some implicit assumptions about emotional development that may be important to examine. I turn first to pluralism in how we conceptualize emotion and emotion regulation and some of the problems that arise from these definitional problems for developmental study. Next, I consider implications for the search for convergence across multiple measures of emotion and its regulation.

What are we studying?

The editors of this special issue asked the authors to explicitly define the emotion constructs they studied before proceeding to a discussion of research goals and description, and several contributors did so. The editors' request reflects a more general caution for the field. Quite often, how we conceptualize emotion and emotion regulation is implicit rather than explicit in our research design and measures. This occurs because of the ubiquity and familiarity of emotional experience and the assumption that what we mean by “emotion” and its regulation are readily understood. As the editors recognized, failing to explicitly define our constructs obscures underlying assumptions in research approach and measurement.

To illustrate, the measures of emotion regulation surveyed by Adrian and colleagues (this issue) indeed reveal “great diversity.” Included in their survey are direct and indirect assessments of emotion regulation, but also included are child and adolescent temperament and personality inventories, assessments of child behavior problems, measures of parenting stress, attachment in the Strange Situation and from the Adult Attachment Interview, the Neonatal Brazelton Assessment System, and measures of empathy, cooperative peer interaction, and parent–child interaction. All of these measures are probably related to emotion regulation, sometimes as correlates or outcomes of individual differences in self-regulation or as contributors to the development of those differences. As a consequence, these measures reflect a variety of implicit formulations for how emotion regulation should be manifested that are as diverse as the variability in measurement approach (e.g., observation, self-report, physiology) that the authors highlight. Emotion regulation is inferred by some researchers from particular temperament or personality qualities, it is assumed by others to be manifested in a secure attachment or in empathic responding or social competence, and it is assumed by many to be deficient in children manifesting internalizing disorders such as depression and anxiety. In each case, these measures reflect foundational assumptions about the characteristics of emotion regulation that are seldom explicitly articulated and may need to be validated (see, e.g., Thompson & Goodman, 2010). In other cases, emotion regulation is measured through children's social dissembling of emotion; in some instances, children's emotion management is observed when the children are alone; and in other studies, self-regulation is evaluated when children's emotions are managed dyadically.

These are very different situations. Taken together, is there a common, generalizable articulate core construct underlying this diversity in measurement approach?

A similar diversity in conceptual and methodological approach is reflected in the articles of this special issue. Zalewski, Lengua, Wilson, Trancik, and Bazinet (this issue) use experimental procedures to elicit anxiety in preadolescents by requiring them to present a speech to an experimenter. In a startlingly different approach, Schmitz and colleagues (this issue) use a conditioned reflex as an experimental analogue to anxiety and fear in children of the same age, arguing for its utility in cross-species studies of these reactions in animals and humans. Each group is productively advancing an understanding of emotion within very different theoretical contexts, and it requires some conceptual dexterity to understand whether each group is speaking to the same emotional experience. To a surprising extent, then, the question “what are we studying?” remains central to research in this field, especially in the effort to develop generalizable models of the development of emotion and emotion regulation. Much of the reason this question can be difficult to answer owes to conflicting models of emotion and its development that are at the heart of our inquiry.

Structuralist and functionalist accounts

Developmental emotions research is influenced by two approaches to understanding emotion that have long dominated the history of the field. Structuralist and functionalist accounts of emotion both have enduring value because they provide unique contributions to understanding emotion and its development. Although they provide very different (sometimes conflicting) portrayals of emotion, these strengths cause researchers to incorporate elements of each into their conceptualizations of emotion. But each approach also has liabilities that may justify the search for alternative views.

The structuralist account (e.g., Ekman, 1992; Izard, 1977) is, in one form or another, implicit in many studies of emotion. According to this view, emotions are fairly discrete, coherent constellations of physiological, cognitive, subjective, and expressive activity, together with action tendencies, that are organized neurobiologically and reflect the adaptive legacy of our species. The emotion of anger, for example, includes a unique subjective experience, physiological concomitants (which account for the specific kind of energized arousal that accompanies angry affect), a unique facial expression (e.g., lowered eyebrows, narrowed eyes, mouth grimace), and specific behavioral tendencies (which may include approach and attack). The structuralist view of emotion is consistent with our everyday awareness of experiencing emotion categorically and coherently in its arousal and regulation.

A central assumption underlying the structuralist view is that a core *emotion* is manifested in a correlated fashion across different expressive modalities. It is from this perspective that researchers anticipate finding convergence across multiple measures of emotion, each of which is assumed to reflect that core construct. The ambitious investigations of Zalewski and colleagues (this issue) and of Smith, Hubbard, and Laurenceau (this issue) both incorporate aspects of this structuralist perspective in their efforts to denote concordance or discordance between their measures of multiple emotion modalities in assessing emotion regulation. A structuralist orientation makes the approach of convergent operations theoretically sensible in measuring emotion or its regulation.

The structuralist account of emotion has been criticized in several ways. Researchers have raised questions concerning the integrity of its portrayal of emotion and, from cultural anthropology, questions concerning the universality of basic emotion categories (see, e.g., Lutz, 1988; Russell, 2003). To these, we can add the realization that measures of emotion in different modalities do not typically converge very well (e.g., Lang, 1988; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005; Reisenzein, 2000; Russell, 2003). The lack of consistency among concurrent measures of emotion in different response systems, particularly among subjective experience, behavior, and physiology, has led to searching examination of the reasons that might account for the lack of expressive convergence. Relevant considerations include the intensity of emotional arousal, the nature of the emotion, and various methodological issues.

Is it time, however, to reexamine the assumption that concurrent measures of emotion should necessarily converge or to specify more clearly and narrowly the conditions in which convergence can reasonably be expected? One of the challenges of multimethod emotion assessment is that the behavioral and physiological systems underlying emotional responding also contribute to other

psychological functions. Physiological systems associated with emotion are also recruited into broader aspects of stress responding, neurobiological self-regulatory processes influencing emotion regulation are also involved in other aspects of cognitive and attentional regulation, facial and other behavioral emotional expressions are influenced by sociocultural expressive rules and serve diverse social functions, and what individuals cognitively appraise and subjectively feel—and report—is enlisted into networks of attributions, expectations, and other interpretive processes. Just as the brain recruits widely distributed neurobiological networks for emotion and other psychological processes, so too do the multiple systems underlying emotion serve many different psychological functions. This means that each way of measuring emotion will capture some relevant variance and considerable “error” and also, more important, that the extent to which any modality reflects the emotional aspects of an event depends, in part, on the other psychological processes that are also activated in that situation.

It is also important for developmentalists to remember that the biological and behavioral systems underlying emotion are also developing systems, and this should also influence expectations concerning their convergence. Cognitive, expressive, physiological, neurobiological, and even subjective aspects of emotion all are affected by distinctive developmental influences. They mature at different rates and in ways that are likely to influence their consistency at any developmental period. Their development is also shaped by experience, of course, such that children with different prior experiential histories (e.g., chronic stress) are likely to evince different amounts or forms of behavior–physiology–subjective coherence in emotional expression compared with other children (see, e.g., Pollak et al., 2001). Taken together, therefore, there may be value to considering alternative conceptualizations of emotion that do not necessarily assume convergence among multiple aspects of emotion and instead portray this coherence as a developmental process that is influenced by context.

The functionalist account of emotion has other contributions to understanding emotion and its regulation (e.g., Barrett & Campos, 1987; Saarni, Campos, Camras, & Witherington, 2006). Emotions are defined, in this view, primarily by an individual's goals and their attainment. Emotions reflect success or failure in goal achievement and are related to changing or maintaining relations between the individual and the environment in ways relevant to these goals. The emotion of anger, for example, is associated with obstacles to goal achievement, and the action tendencies of anger are directed toward removing these obstacles. Functionalist approaches emphasize the motivational qualities of emotion and the importance of emotional expressions as social signals (not necessarily as direct reflections of underlying subjective experience). The growing influence of functionalist theories of emotion helps to account for increasing theoretical and research interest in emotion regulation, which further reflects the ongoing quality of individual–environment transactions.

The functionalist view of emotion, therefore, is more open to the influence of sociocultural interpretations of emotion experience and to the importance of respondents' goal orientation in the contexts in which emotion is assessed. There is developmental and individual variability in goal orientation, of course, and also the existence of multiple goals (which can be immediate or long term) affecting emotional responding in any situation. These are among the ways in which a functionalist approach contributes complexity and insight to emotional responding and emotion regulation. This approach can also be helpful for interpreting cultural, racial, and gender differences in emotional constructions, such as those identified by Tuminello and Davidson (this issue), and their importance to how emotion is perceived and experienced by research participants as well as how emotional responses are interpreted by researchers.

Functionalist emotions theory has an unusually expansive definition of emotion, however, that obscures the boundaries of this construct. Functionalist researchers often use the language of discrete emotions, but they also refer to broader “families” of emotion that are connected by common patterns of organism–environment transactions. Indeed, the functionalist conceptualization of emotion is so broad as to raise questions concerning what (if any) characteristics distinguish emotion from other motivational states that relate to individual–environment transactions or from relevant personality processes (e.g., are hunger, achievement, conscientiousness, and sensation seeking also emotions?). Because of this, many contemporary researchers use a hybrid approach to the study of emotional development that combines the functionalist approach to goal orientation with structuralist emotion concepts and methods. As a result, the methodological assumptions of structuralism tend to prevail even when researchers incorporate functionalist ideas into their work.

Dynamic systems and developmental systems theory

Other approaches to the study of emotional development do not assume that physiological, cognitive, subjective, and other emotion-related processes are necessarily convergent; instead, these processes become coordinated as the result of developmental and contextual influences. They offer some advantages to the study of emotional development, but the question is whether these approaches can yet provide a strong foundation for a comprehensive theory of emotional development.

The appeal of dynamic systems theory to developmental psychology is its focus on self-organization deriving from the recursive interactions among multiple elements of a system (see, e.g., [Howe & Lewis, 2005](#)). The holistic inclusive approach of this systems formulation and its capacity to simultaneously model normative developmental processes and the growth of individual differences, taking both individual and contextual variables into account, is heuristically powerful. With respect to emotional development, dynamic systems approaches are capable of analyzing moment-by-moment transitions in emotional expressions in mother–infant interaction as well as changes in emotional development over years. Each is understood within a theoretical system that describes the emergence and stabilization of organization through changes in internal and external control parameters, which may include patterns of parental responsiveness, developmental changes in cognitive appraisals, aspects of neurobiological maturation, the entry into group child care, and other factors (see [Camras & Witherington, 2005](#); [Lewis & Granic, 2000](#)).

Equally important, dynamic systems theory provides a conceptual context in which to understand how multiple systems governing emotional responding become organized developmentally. [Camras \(2000\)](#) showed, for example, that although infant facial expressions are often not emotionally coherent (e.g., shifting among pain, anger, and sadness during crying bouts) or consistent with presumed subjectivity (e.g., showing surprise while mouthing familiar objects, being inexpressive during an expectancy violation), emotional expressions become progressively better organized and coherent with increasing age (see review by [Camras & Witherington, 2005](#)). This may occur over time as infants observe the expressive mirroring of parental facial expressions and experience the contingent responsiveness of adults in social play together with young children's increasingly discriminating attributions of emotion to the expressions they observe and imitate. Through these and related influences, expressivity and subjectivity better align over time in a manner consistent with the sociocultural context. Neurobiological systems governing emotion and stress responding have a prolonged maturational course owing to the gradual stabilization of the limbic–hypothalamic–pituitary–adrenocortical axis, the growing influence of prefrontal regulation, and other developmental processes ([Gunnar & Vazquez, 2006](#)). During this period of plasticity, these systems also become adapted to the quality of children's experiences (e.g., chronic stress vs. nurturant care) that also influence other aspects of emotion-related responding such as children's developing expectancies and attributional biases (see [Gunnar, Fisher, and Early Experience, Stress, and Prevention Network, 2006](#)). In this manner, the convergence of neurobiological reactivity, cognitive appraisals, and subjective experience of emotion emerges developmentally. Dynamic systems formulations are well suited to modeling these processes by which multiple aspects of emotion become progressively organized.

Unfortunately, these applications of dynamic systems models are not well developed because the research literature applying dynamic models to emotional development is sparse. In addition, many developmentalists find the concepts of dynamic systems formulations to be daunting, making it difficult to determine whether terms such as systemic phase transitions, gradient information, and control parameters offer conceptual clarity or obscurity. Most important, dynamic systems theorists have been much more successful at providing thought-provoking interpretations of existing research findings than at generating testable hypotheses involving novel applications of the theory to new empirical initiatives. As a result, it remains uncertain whether this theory, taken as a whole, offers a useful new approach to understanding emotional development.

Developmental systems theory may, however, offer a useful alternative to dynamic systems theory ([Gottlieb, Wahlsten, & Lickliter, 2006](#); [Thompson, 2011](#)). A central contribution of systems theory is the view that the multiple components of emotion are continuously and mutually influential, and are contextually embedded, in the course of an emotional response. A *developmental systems* view emphasizes how these emotion components become better coordinated in response networks as they

develop and become progressively integrated. Thus, the correlated activity of multiple emotion components does not derive from the central activation of emotion as structuralists argue; rather, it derives from their reciprocal influences over the course of development and during the process of emotional activation and its regulation.

Research evidence for developmental systems theory is found neurobiologically in the observation that responses to emotional stimuli are widely distributed throughout the brain. The regions commonly viewed as relevant to emotion activation (e.g., amygdala, hypothalamus, brain stem) and those associated with emotion regulation (e.g., prefrontal cortex, anterior cingulate) are bidirectionally coactive in emotional responding (Kober et al., 2008; Ochsner et al., 2009). In behavioral analysis, reciprocal influences among the components of emotional responding are also apparent. Attentional processes, cognitive appraisals, neurobiological activity, and individuals' subjective experience are mutually influential as emotional responses (and their regulation) unfold (see Thompson, 2011). Furthermore, each aspect of emotion is influenced by the immediate social context, including the linguistic and cultural environment in which individuals develop. Developmental systems theory emphasizes, therefore, that the convergence among multiple aspects of emotional responding is developmentally contingent as these systems mature and become progressively integrated and is contextually contingent on immediate and broader situational and social processes that also guide the organization of emotional responding.

The developmental systems view has important implications for the relation between emotion and emotion regulation that are discussed further below. As a framework for studying emotional development, it shares with dynamic systems theory an admirably holistic inclusive orientation, albeit with less conceptual complexity. Developmental systems theory is weakest, however, at providing novel insightful explanations for developmental change in emotion. Mutual influences among multiple developing systems is not a theory of change, and systems theorists tend to rely on conventional developmental models for explaining how emotions emerge from these bidirectional processes and contextual influences.

Taken together, one of the most important but unsettled questions for emotion researchers concerns expectations for the convergence among multiple aspects of emotion responding. A strong theoretical expectation from structuralism that physiological, behavioral, expressive, subjective, and other aspects of emotional responding are convergent operations conflicts with empirical evidence that these emotional response systems are often weakly associated (if at all). Alternative theoretical approaches view the convergence among different aspects of emotion as a developmental process that is also contingent on contextual influences. It is certainly premature to conclude that the structuralist view is incorrect on the basis of current evidence, in part because of the methodological challenges in accurately assessing emotional responding across multiple response modalities. But it may also be premature to embark on research that depends on an assumption of converging operations without examining why this approach is the best empirical course.

Emotion and emotion regulation

Another conceptual challenge for the field concerns the association between emotion and emotion regulation. In this special issue, several review and empirical articles focus on the assessment of emotion regulation, others are devoted to emotion responses, two articles infer emotion regulation from patterns of emotional expression, and for several articles determining whether they are studies of emotion or emotion regulation (or both) depends on the reader's definition of these phenomena.

There has been considerable debate during recent years about how to conceptualize emotion regulation and its development. Two issues have been at the locus of these discussions. First, does emotion regulation exist as a measurable phenomenon separable from emotion itself? Second, what are the manifestations of emotion regulation?

Developmental researchers' long-standing confidence that emotion regulation can be studied as a distinct empirical phenomenon was based, in part, on the definitional integrity of emotion from structuralist theory. After all, if emotion itself was understood in terms of distinctive constellations of subjective, expressive, physiological, and cognitive activity along with action tendencies, then significant deviations from these adaptive patterns would reflect regulatory influences. Campos, Frankel, and

Camras (2004) criticized such formulations because they reflected a “two-factor” approach in which an antecedent emotional reaction is believed to be subsequently modified by a regulatory response. From a functionalist perspective, they argued instead that emotion and emotion regulation are the same phenomena, each based on processes of person–environment transactions, and they argued for the study of “equipotentiality of responses in the service of equifinality of outcomes” (p. 390) that was widely read as questioning whether emotion regulation could be studied at all.

Campos and colleagues (2004) were correct in their criticism. Emotion and emotion regulation are “two sides of the developing coin” (Thompson, 2011) in their neurobiological constituents, goal orientations, cognitive appraisals, and behavioral tendencies as well as in other ways. As noted earlier, for example, the reciprocal coactivity of brain areas typically involved in emotion activation (e.g., amygdala) and emotion regulation (e.g., prefrontal cortex) indicates that the neurobiological regulation of emotion is not simply the inhibitory control of prefrontal regions over primitive lower emotion centers (Thompson, Lewis, & Calkins, 2008). Rather, emotion arousal and its regulation are occurring simultaneously and enlist common brain circuitry. It is also apparent that many aspects of emotion regulation are antecedent to an emotional response, such as the preappraisal processes and attentional deployment that precede emotional arousal, or in managing situation selection by which individuals (or their caregivers) anticipate and regulate exposure to emotional stimuli (Gross & Thompson, 2007).

But even if the two-factor approach to emotion regulation is inadequate, this does not mean that regulatory processes cannot be studied as distinct empirical phenomena. Indeed, in the study of cognition, perception, and other psychological processes, researchers have proven to be adept at studying complex regulatory influences on biobehavioral systems without needing to specify which components are exclusively “activational” and which are specifically “regulatory.” It is here that a developmental systems approach may also prove to be helpful because of its emphasis on the reciprocal interactions among multiple components of an organized response system. Furthermore, developmental emotions researchers have long recognized that emotion regulation co-opts processes that are also involved in emotional arousal. The definition of emotion regulation cited by several contributors to this special issue, for example, identifies monitoring and evaluating emotional reactions as components of emotion regulation even though how one monitors and appraises one’s current affective status also contributes to generating new emotional responses (Thompson, 1994). In the end, therefore, the two-factor model may be a caricature of how researchers understand the complexity of the association between emotion and emotion regulation. Appreciating that emotion and its regulation are two sides of a common developmental process does not undermine efforts to understand the influence of distinct regulatory processes and their development.

At times, in fact, a focus on regulatory influences can have theoretical and practical benefits. In this special issue, the study by Silk and colleagues represents the contributions of emotion regulation research to developmental psychopathology. Their ecological momentary assessment technology enabled them to characterize the dominant affect of clinically depressed adolescents as well as the intensity, range, and lability of their emotional responding. These “emotion dynamics” derived from regulatory influences (Thompson, 1990) have been useful to others working with clinical populations (see, e.g., Luby & Belden, 2006). An important part of their research design also enabled Silk and colleagues to document how the course of clinical treatment was longitudinally associated with a predicted positive change in these dynamic response parameters. These findings provide incentive to further examine how the dynamic processes of emotion regulation might offer insight into clinical psychopathology and its treatment.

In another article, Tobin and Graziano (this issue) focus on children’s emotional displays during the well-known “disappointing gift” paradigm. The regulation of emotional displays is included in some definitions of emotion regulation (e.g., Eisenberg & Spinrad, 2004) but not in others (Thompson, 1994) because of uncertainty as to whether managing emotional expressions according to social rules necessarily involves regulating underlying feelings. Tobin and Graziano’s finding of a curvilinear interaction between personality ratings of children’s agreeableness and mother’s presence/absence in predicting children’s negative expressions raises the intriguing possibility that children high and low in agreeableness may have been regulating their emotional displays for different reasons. The former shared with their mothers the disappointment they felt in a manifestly inappropriate gift, whereas

the latter exhibited unqualified (and perhaps unregulated) personal dismay. In each case, their negative expressions were greater than those of children mid-range in agreeableness, who tried to put their best face on in a bad situation.

These findings lead to a second locus of current discussions about emotion regulation: How is it manifested? Contemporary interest in the development of emotion regulation derives in part from expectations that control processes are important to ensuring that emotional arousal, which has the potential to undermine behavioral organization, contributes more constructively to person–environment transactions. (Developmentalists' long-standing confidence in the benefits of self-control dates back more than a century to the child study movement that emphasized the importance of self-control to moral character, and it continues in contemporary interest in the development of ego control and now executive function.) Consequently, emotion regulation competence has been associated, both theoretically and empirically, with greater social competence, personal well-being, moral sensitivity, and even cognitive competence. At the same time, problems of aggression and social withdrawal are often portrayed as deriving from emotional dysregulation, as are a broader range of internalizing and externalizing disorders (see, e.g., Garber & Dodge, 1991). Emotion regulation is, in short, crucial to more positive developmental outcomes.

As the findings of Tobin and Graziano suggest, however, the empirical picture may be much more complex in light of the complex, sometimes multiple, goals underlying emotion regulatory efforts. This may be especially true in conditions of developmental psychopathology. One reason for this is that the constellation of hereditary and environmental risks for affective psychopathology can make “optimal” regulation of emotional arousal difficult (if not impossible). This is particularly true because children in difficult circumstances may have multiple goals underlying their efforts at emotion management, and certain goals may have long-term costs. Young children at risk for anxiety disorders, for example, show hypervigilance in situations associated with fear-provoking events, attentional orienting to anxiety-eliciting stimuli, and a tendency to construe benign situations as disproportionately negative or threatening. These appraisal and preappraisal processes develop to accomplish the immediate goal of avoiding anxiety-provoking events, but they contribute to dysfunctional broader consequences for children's social and behavioral competence (Thompson, 2001). Children with a history of abuse likewise become hypersensitive to adult expressions of anger, which accomplishes the immediate goal of vigilance for anticipatory cues of maltreatment. But this hypervigilance undermines their social competence outside of the home in their overreaction to benign challenges from peers and adults (see review by Thompson & Goodman, 2010).

These considerations are not exclusive to children at risk for psychopathology. Children in maritally conflicted families likewise face trade-offs between immediate coping (which requires sensitivity to cues of incipient conflict between parents) and long-term adjustment (which may be undermined by hypersensitivity to conflict cues) in ways suggesting that “optimal” emotion regulation may be very difficult to achieve (Davies & Woitach, 2008). Even children being bullied by a peer may face emotion regulatory trade-offs that require responding in a manner that elicits adult assistance at a cost of long-term peer competence, defending oneself at the risk of further conflict, escaping immediate intimidation at the cost of future bullying, or other trade-offs between immediate and long-term goals.

Because emotion regulation is a “double-edged sword” (Thompson & Calkins, 1996), it is unwise to consistently identify emotion regulation competence with optimal or even desirable developmental outcomes. From a functionalist perspective, emotion regulation and the strategies enlisted to achieve it are not inherently adaptive or maladaptive except in relation to the goals governing individuals' self-regulatory efforts. From this perspective, the study by Zalewski and colleagues (this issue) underscores the emotion specificity (and possible situation specificity) of preadolescents' emotional coping in situations evoking frustration and anxiety. As these researchers note, the appraisal and coping correlates of well-regulated emotional responding in situations evoking anxiety were not paralleled by comparable correlational associations with well-regulated responding in situations evoking frustration. Unregulated responding for each emotion also had different correlates. “Optimal” emotion regulation with respect to frustration seems to be constructed differently than that for anxiety because of the different goal orientations and adaptive strategies suitable to each. Comparison of their findings

with those of Smith and colleagues further suggests that management of anger in younger children has different correlational associations.

Taken together, these studies indicate that although emotion regulation is far more conceptually complex than intuition allows, it remains important and subject to empirical study. Moreover, the conceptual complexity arising from recognizing that emotion and emotion regulation are codevelopmental and that multiple (sometimes conflicting) goals can underlie self-regulatory efforts is likely to yield greater insight into how emotion regulation occurs in developing populations, especially those at risk for emotional problems.

How shall we proceed?

The view I have proposed is *not* that expectations for the convergence of multiple components of emotional responding are unwarranted. Our understanding of how the physiological, expressive, cognitive, behavioral, subjective, and other components of emotional responding are mutually influential leads us to anticipate their convergence. Rather, I think that we should be less surprised by the weakness of the associations between measures of emotional responding than we are. This empirical picture arises from measurement issues, the multidetermination of the response systems underlying emotionality, and developmental and contextual influences that can cause assessments of emotional responding to diverge. In light of alternative theoretical views of how components of emotion become developmentally assembled and contextually organized, “some assembly [is] required” is not a daunting conclusion but rather a challenge to better understand these constructive influences.

An important research task, therefore, is to learn from the *lack* of convergence among different measures of emotional responding. What influences help to account for the failure to find predicted associations among different measures of a common emotional response? How does this help us to understand emotional expression, regulation, and understanding? For Tuminello and Davidson (this issue), this is the central question of their investigation of racial and gender influences on children’s perception of emotion in adults. Their findings indicate that characteristics of the child as well as the adult contribute to how emotion is socially interpreted. Their conclusions suggest that these interpretive processes should be an important topic for developmental emotions research rather than contributing to “error” in emotion assessments.

A similar conclusion emerges from the study by Hourigan, Goodman, and Southam-Gerow (this issue), who studied discrepancies between 9-year-olds and their mothers in their reports of the children’s inhibited and dysregulated expressions of anger, sadness, and worry. Mothers diverged from their children in their perceptions of the children’s emotionally inhibited behavior, and these discrepancies varied according to the emotion. Their findings suggest that mothers may have greater difficulty in reporting on aspects of their children’s emotion regulation that are less visible to an observer. Other findings indicate that mother–child discrepancies were not random but rather informative concerning the nature of emotion regulation. Hourigan and colleagues’ study underscores how characteristics of mothers can influence their perceptions of their children’s emotion regulation, which is similar to the lesson that temperament researchers have learned about maternal perceptions of child temperament (e.g., Vaughn, Bradley, Joffe, Seifer, & Barglow, 1987).

Recent research in our own laboratory has yielded a similar conclusion (Waters et al., 2010). Our study of emotion regulation in 4-year-olds included a “denied request task” in which preschoolers were given a treat for working on lab tasks and children were told that they could eat the treat immediately with their mothers’ permission. In another room, however, mothers were not informed of these instructions and instead were asked to ensure that their children *not* eat the snack until after they had returned home. Mothers and children were then reunited. This task has been shown in past research to induce moderate frustration in young children, and indeed it accomplished this purpose in our protocol. Later in the procedure, mothers and children were independently invited to a separate room, where they were shown the videotape of the denied request task and were interviewed about what had happened. The tape was played from the beginning of the procedure and stopped at the moment of children’s peak emotional intensity. Children were asked to identify how they felt at this time using words and simple line drawings of facial expressions of emotion. Subsequently, mothers independently watched the same video vignette and were also asked how their children felt and

why. Later, we also obtained ratings from independent observers of children's emotional expression at the same moment in the videotape when children and mothers made their emotion judgments.

We found that mothers' attributions of emotion to their children were consistent with children's self-reports only 40% of the time. This low rate of agreement was despite the fact that the target event had occurred earlier in the lab session and both mothers and children had reviewed a videotape of the event, and it was lower than the 54% agreement of independent raters with children's self-reports. More important, the concordance of mothers' reports with children's self-reports of emotion was associated with two factors. First, mothers were more consistent with their children when they shared a secure attachment relationship. This is consistent with the reliable association between maternal sensitivity and attachment security. Second, mothers who reported being more attentive to their own feelings on a questionnaire measure of adults' acceptance and understanding of their emotions were more concordant with their children's self-reports. In other words, mothers who were more attentive to their own feelings were also more attentive to their children's emotional expressions.

These findings, together with those of Hourigan and colleagues (this issue) and others (e.g., Levine, Stein, & Liwag, 1999), have the narrow value of contributing caution to the interpretation of parent report measures of children's emotions and emotion regulation. More broadly, however, they encourage developmental researchers to consider the divergence among different sources of information concerning emotional responding as informing our understanding of assessment methods. If each window into emotional responding and regulation captures multiple sources of variance, then understanding those sources contributes to our broader knowledge of social influences on emotion perception, the neurobiology of emotion-related responding, the cognitive construction of emotion understanding, the self-referential beliefs relevant to the subjective experience of emotion, and the rich tapestry of processes that contribute to our measures of emotion and emotion regulation.

Conclusion

Is it necessary to abandon the unified psychological perspective advocated by Sternberg and Grigorenko (2001) in the study of emotional development and regulation? No. But the method of converging operations in emotions research requires recognizing how the components of emotional responding are multidetermined, developmentally changing, and contextually organized. The divergence among different assessments of a common emotional response may be as informative to our understanding of emotion as is the convergence among these multiple assessments. Moreover, our methods provide partial insight into this complex phenomenon. In a sense, if our metaphor is of blind men touching different parts of an elephant, we must recognize that one blind man has an infrared monitor, another has a tape recorder, and a third is interviewing others about the elephant. Divergence as well as convergence in their reports is the likely result.

In developmental science, we have theoretical viewpoints that help us to perceive divergence as meaningful in understanding the developmental and contextual construction of emotional responding. As the remarkable articles in this special issue attest, we have much to learn from how children's emotional responding both confirms our expectations for its organization and challenges us to understand the self-organizational processes that are at work.

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