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ABSTRACT

The report summarizes recent and ongoing research on processes involved in the development of antisocial behavior disorders in children and adolescents. Studies address both the applied problem of preventing aggressive behavior and the overall relation of cognition to social behavior. A social information processing model of social competence is described, and the results of several studies emanating from this model are noted. Aggressive children are seen as deficient in processing at all five stages of the social information processing model: encoding, representation, response search, response decision, and enactment. A stage model for assessing processing patterns in aggressive children in clinical settings is proposed as a guide to focus intervention efforts. Current research efforts include a longitudinal study on the origins of aggressive behavior which explores whether patterns of deviant information processing are predictive of later aggressive behavior, and whether early family experiences predispose a child to develop deviant patterns of information processing. (JW)

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The Role of Biased Processing in the Development of Aggressive Behavior in Children

The incidence of antisocial behavior, as well as violent crimes, has increased dramatically over the past 25 years. Juvenile violence has tripled during this period. In our public schools, for example, more will be spent in a year on the repair of vandalism and treating the victims of violence than on books. Not all aggressive children grow into antisocial adults, but almost all antisocial adults began deviant behavior in early or middle childhood. In spite of the resources devoted to counteracting antisocial behavior, treatment and prevention efforts have not been very successful.

Kennedy Center investigator Kenneth A. Dodge* has been exploring the processes involved in the development of antisocial behavior disorders in children and adolescents. Much of his research has focused on cognitions—what kind of thinking leads to chronic aggressive behavior. In addition to addressing an applied problem of the prevention of aggressive behavior, Dodge's research addresses a basic problem of the relation of cognition to social behavior.

Dodge's emphasis on cognitions grew out of observational research on groups of second-grade children; some were socially rejected and highly aggressive and others were socially adaptive. In order to understand the development of conflicts, Dodge brought together previously unacquainted children for free play, one hour a day for eight days. With the entire social history videotaped, Dodge was able to observe the development of problems as well as friendships. The rejected, aggressive children seemed to lack skills in essential social areas, such as initiating peer group entry. This pointed to the importance of social cognitive skills and social knowledge in the development of adequate peer relationships.

Through close examinations of children's interactions, Dodge found that when the context among boys in peer groups was *parallel play*, children were not likely to engage in aggressive acts. When the play became more *rough and tumble* or *ambiguously rough*, the rejected boys were likely to engage in an act of aggression, whereas the socially average boys remained unlikely to engage in aggressive behavior. This finding led Dodge to focus on the ambiguously rough play circumstances and to hypothesize that children are interpreting these situations differently. Two kinds of cognitive phenomena are involved in the development of aggression, one a cognitive skill and the other a cognitive interpretation or bias, an attribution or expectancy of what is happening in an interaction.

A Theory of Social Information Processing

To understand how aggressive children think in social interactions, Dodge developed a social information processing model of social competence (see Figure 1). The model is based on the work of several psychologists, including Simon, Goldfried, Flavell, McFall, and others, in which aggressive behavior is viewed as a deviant response, contrasted with socially appropriate, competent behavior that occurs as a function of skillful processing of situational cues.

*Professor of Psychology, Vanderbilt University. Dodge's research has been supported by NIH Research Career Development Award No. K04HD00806 and Grants No. 38765 and No. 42498 from the National Institute of Mental Health.

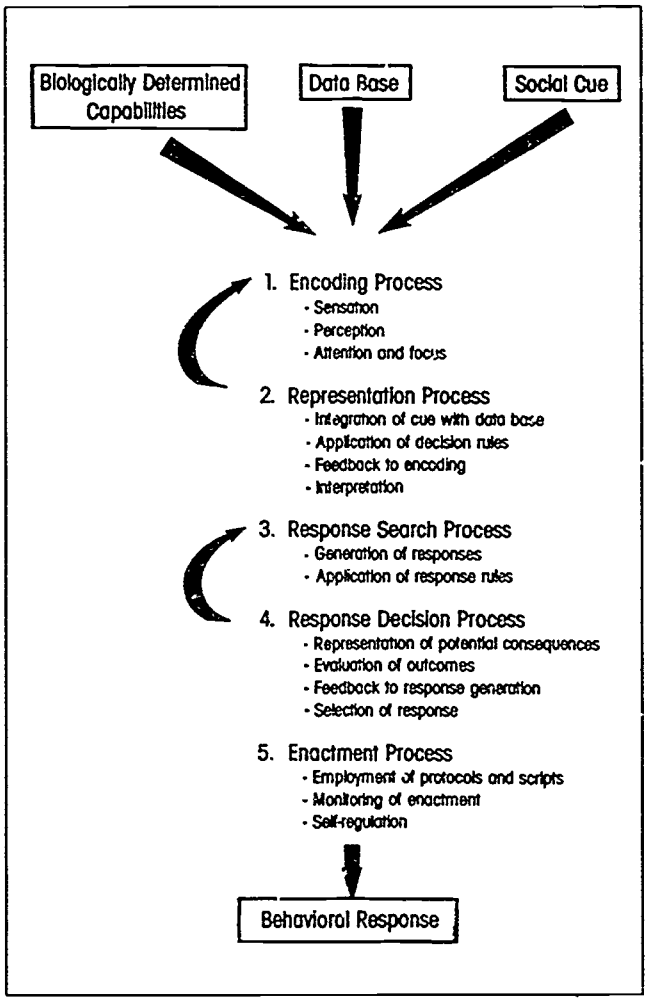

Fig. 1. A social information processing model of competence. From "A Social Information Processing Model of Social Competence in Children," by K. A. Dodge, 1986, *Minnesota Symposium on Child Psychology*, p. 84.

According to this theory, a child comes to a particular situation with a set of biologically determined capabilities and a set of past experiences, or a data base. A child receives as input social cues, such as being tapped from behind on the shoulder. A child's response is hypothesized to occur as a function of a sequence of processing of cues, with deviant behavior occurring as a function of deviant processing.

The first stage is an *encoding* of cues involving perception and a focus of attention on particular cues. Clearly, encoding patterns, such as which cues are attended to, will influence an individual's behavioral response.

The second stage is a mental *representation*, in which a child gives meaning to the encoded cues. Presumably, cues are integrated with a data base, and a set of decision rules is applied. If a peer is laughing when that peer is pushing a child to the ground, the child might interpret the push as a hostile act. Individual differences occur, both in the decision rules and in their application to cues. The rules are assumed to be learned in socialization, further contributing to individual differences. One option for the child at the second stage is to conclude that evidence is insufficient for a mental representation, reflected in the model as a feedback loop to engage in further encoding of cues. At some point, the cues are interpreted, even if the representation is as simple as threat vs. no threat.

The third step is a *response search* of long-term memory for one or more possible behavioral responses. Presumably this is also rule governed. If a child represents a peer's act as hurtful, response options might include crying, hitting back, or running away.

A *response decision* is proposed as a fourth stage. Choosing a competent response requires representing the possible consequences of an act. A deviant response at this stage might occur by misrepresenting the consequence of an act or representing it in a deviant way, such as "If I hit back, I'll be respected by my peers"; or by failing to evaluate the consequence and enacting the first response generated. Since none of the generated responses may be adequate, the model has another feedback loop for further response generation.

Since this process is occurring rapidly in real time, a response is selected for *enactment*, the fifth stage, in which verbal skills and motor skills are employed with protocols and scripts. The process continues as an individual self-monitors the consequences of the behavior, which in turn produces new cues, and thus the process recycles in real time.

Several assumptions are made in this model. One is that processing occurs rapidly in real time. Another is that processing occurs at both conscious and nonconscious levels. Perhaps 90% or more of processing is nonconscious, although it might be equally rule governed. Processing is goal-directed. It is possible to separate processing steps, theoretically and empirically. The way in which an individual processes cues in one situation is not assumed to be equivalent to the way that that individual processes cues in another situation. Processing is highly cue dependent, but within specific domains, or situations, it is hypothesized that individual differences and patterns of processing cues may be stable. Dodge proposes that processing skills are acquired in development and that processing biases are acquired in experience. *Bias* refers to the pattern of processing that occurs under conditions of uncertainty. A final hypothesis is that it may be possible to modify these processing patterns through intervention. These assumptions have guided a series of studies investigating the basic hypothesis that chronically aggressive children are deviant in their processing patterns at each of the steps that have been proposed.

Empirical Studies

In these studies* emanating from the social information processing model of competence, the subjects were aggressive children (primarily boys, although some girls) between the ages of 4 1/2 and 12 years, depending on the study, as well as a matched group of comparison children who were socially well-adapted. Two types of stimulus situations were used, peer group entry and provocation. Typically, a child viewed a cartoon or a videotaped situation on a TV monitor. For example, one scenario showed a child building a structure with blocks. In one version, a peer entered and knocked over the blocks in an angry fit. In a second version, the peer accidentally bumped the table and said "whoops" as the blocks were knocked over. The subject was asked to interpret what had happened and why, i.e., to interpret the peer's intention. Although this might seem a simple discrimination, young children varied considerably in their responses.

In the first set of studies, Dodge examined children's judgments of peers' intentions under conditions in which the provocation was ambiguous. The results, which have been frequently replicated, were that aggressive children made hostile attributions in ambiguous situations about 25% of the time whereas nonaggressive children made hostile attributions about 17% of the time, i.e., aggressive children were about 50% more likely than nonaggressive children to interpret the ambiguous provocation as a hostile act. When children were asked how they would respond, a strong relation was found between the interpretation made and the behavioral response accessed. Hostile interpretations led to aggressive responses, and benign interpretations led to nonaggressive responses. Since aggressive children were more likely than nonaggressive children to make hostile interpretations, they were more likely to generate aggressive responses. However, even when controlling for the interpretation, the aggressive group was slightly more likely than the nonaggressive group to generate aggressive behavioral responses. Although the magnitude of effects was not large, there were clearly two differences between the subject groups. they differed in the interpretations made, and, controlling for the interpretation, they differed in the responses accessed or generated.

In another set of studies, Dodge examined the accuracy of responses to actually hostile or benign cues. In interpreting hostile cues, both aggressive and nonaggressive subjects were found to be highly accurate, with no significant difference between the two groups. However, under the benign condition, when the provocateur was acting in an accidental or prosocial manner, the nonaggressive children were found to be more accurate than the aggressive children, whose errors were primarily ones of presumed hostility. This *hostile attributional bias* was found in ambiguous provocation circumstances as well as in tests of accuracy of interpretation.

Next, Dodge controlled the interpretation step and assessed response search patterns by asking children "What could you do if this happened to you?" In the provocation domain, aggressive children were much more likely than nonaggressive children to generate aggressive responses rather than competent responses.

In studies of the response decision step, children were presented with possible responses to various situations and were asked to evaluate those responses. For example, in one set of vignettes, children viewed a video of child 1 at play with blocks, child 2 entered the room and wrecked the block structure. Three possible responses were presented. In Response A, child 1 asked "Hey, why did you do that?"—an assertive response. In Response B, child 1 said "You wrecked my tower, you jerk!" and threw a block at child 2—an aggressive response. In Response C, child 1 cried—a passive response. Subjects were asked to evaluate each response, and an endorsement score was generated. Aggressive children were slightly more likely than nonaggressive children to endorse both aggressive and passive responses, and they were less likely to endorse assertive responses.

In studies of the enactment stage, Dodge found that aggressive children were not as skilled at enacting competent responses as were nonaggressive children.

In summary, at each step, aggressive children are less sophisticated in their processing and more biased in hostile ways than are nonaggressive children. The magnitude of these findings in any one study, while statistically significant, is slight and ultimately is not sufficiently informative to derive interventions for aggressive children. Dodge has proceeded with this research in three directions to understand why these findings are not greater in magnitude and what mechanisms might be operative.

Aggregating Processing Differences

The model posits that processing is multistage and that a competent response requires skillful processing at every step. Differences at any one step may account for only a small portion of the variance in socially competent outcomes, but a comprehensive assessment, within a single domain, of all five processing steps and an aggregation of those responses, in a multiple regression or discriminate function analysis, might yield a higher degree of discrimination in predicting the likelihood of aggressive behavior.

To test this hypothesis in the group entry domain, Dodge presented videotapes, which had been used in

*Other researchers involved include Cynthia Frame, Joe Newman, Robin Murphy, Kathy Buchbaum, Gregory Pettit, Melissa Brown, Cynthia McClasky, Dan Somberg, Joe Price, Janice Brown, Zvi Strasberg, Nicki Crick, and Elizabeth Lemerise.

previous research, to aggressive and nonaggressive child subjects and assessed all five stages of processing, separately and independently. The children's actual entry performance in a group situation was also assessed and rated on a scale of competence. Dodge found a number of statistically significant correlations between processing at several stages of the model and group entry success. Again, findings were of low-level magnitude, but when aggregated in a multiple regression analysis, unique increments were found at several steps of the model. Across the five stages of processing, a multiple correlation of .67 was obtained, a highly significant result suggestive of the importance of processing variables in predicting behavior.

Dodge wanted to replicate these findings in the group entry domain and to extend them to the provocation domain. Therefore, he conducted a study in which aggressive and nonaggressive children were presented with stimuli in each of these domains. Processing measures at each of the five steps and behavioral performance measures were collected. When results were aggregated, Dodge found that group entry success could be predicted from the group entry process measures with reasonable power of a multiple correlation of .87. Likewise, the probability of aggression in response to a provocation could be predicted from the provocation processing measures with a multiple correlation of .75. These findings constitute a replication of the first study and an extension to a second domain, with a finding of even stronger power. In general, the hypothesis is supported that there is a greater prediction of aggressive behavioral responses from an aggregation of processing measures than from any single measure.

Affect and Behavior

In understanding this perplexing problem of small-magnitude effects, Dodge's second research direction has been to examine affect as a variable that may moderate the relation between cognition and behavior. The way a child responds in the relatively relaxed setting of a laboratory may not be predictive of that child's behavior on the playground. Under circumstances of arousal, or apprehension, the accuracy of interpretation of aggressive children might deteriorate, and they might be more likely to engage in aggressive behavior as a function of irrational processing. A related question is whether all or only some children are prone to the debilitating effects of arousal.

To simulate what a child must feel on the playground when a fight is likely to ensue, Dodge brought aggressive and nonaggressive boys into the laboratory, had them view some of the same videotapes used in previous research, and asked them to interpret intentions of peers. Halfway through the experiment, the experimenter left the room and the subject overheard, through a microphone and audiomonitor, a supposed conversation between the experimenter and a child in the next room. In this conversation, the experimenter told the child that he would be going into the room to play with the subject-child. The child refused, stating that they would not like each other and would probably fight. The experimenter then returned to the subject's room, told the subject that another child was about to enter the room, but asked the subject to watch additional videotapes while waiting. Thus, the experiment simulated the expectancy of interacting with peers on the playground in a situation that may or may not go well.

Under the relaxed state, nonaggressive boys were slightly more likely to be accurate in interpreting peers' intentions in unambiguous situations than were aggressive boys. A significant but low-magnitude effect was found, similar to that found in previous studies. Following the manipulation of arousal, there was no discernible effect on the accuracy of the nonaggressive boys, but the accuracy of the aggressive boys deteriorated significantly. Similar findings held for responses to ambiguous stimuli. Under the relaxed circumstances, the aggressive boys were slightly more likely than the nonaggressive boys to interpret an ambiguous provocation as being hostile. Following the manipulation, no discernible change occurred in the proportion of hostile interpretations made by nonaggressive boys, but the aggressive boys were significantly more likely to assume that a peer was being hostile. The aggressive boys were resorting to their hostile attributional biases and doing so in inaccurate ways. These findings suggest that affect, or some kind of setting variable, does adversely affect the performance of at least some children but not other children.

Heterogeneity of Aggression

In a third research direction, Dodge and his colleagues have hypothesized that the magnitude of differences between aggressive and nonaggressive children is not great because the aggressive group is heterogeneous. Aggressive children, for example, might differ in the kind of aggression that they display. *Reactive* aggression is an angry response, usually in retaliation for some perceived provocation and filled with considerable emotion. *Instrumental* aggression is a non-angry, non-affect-charged use of coercive behavior in the service of some other outcome. Aspects of processing that lead to one kind of aggression might differ from those that lead to the other kind of aggression.

Dodge and John Coie* have developed a teacher rating measure to distinguish between reactively aggressive and instrumentally aggressive children. They hypothesized

*Professor of Psychology, Duke University.

that these groups ought to differ in their patterns of processing. A child who is inaccurate at reading others' intentions and presumes hostility ought to engage frequently in reactive aggression and become angry but might not be likely to engage frequently in instrumental aggression. On the other hand, children who evaluate aggression as a positive solution to interpersonal problems ought to be more likely to use instrumental aggression in problem solving but might not be likely to become angry or use reactive aggression.

Dodge has tested and supported both parts of this hypothesis. First, using the same videotapes, he assessed intention cue-detection accuracy in five groups of children: instrumentally aggressive, reactively aggressive, both instrumentally and reactively aggressive, nonaggressive rejected and average children. True to the hypothesis, the two groups of reactive aggressive children were less accurate than the other groups who either displayed another type of aggression or were not aggressive at all. For responses to the ambiguous cues, the same kinds of patterns were found: the two groups of reactive aggressive children were highly likely to make a hostile interpretation (70 to 80% of the time), compared with much lower percentages for the other three groups. Second, Dodge and Nicki Crick[†] found that when asked to evaluate the outcomes of behaving aggressively, the two instrumentally aggressive groups predicted positive outcomes, whereas the three other groups did not. Thus, as a result of subtyping the aggressive groups, processing patterns were found to relate to aggression to a larger degree than had been found previously.

Clinical Implications

In summary, aggressive children are deficient in processing at all five stages of the social information processing model. The magnitude of individual effects is generally low. There seems to be variation across children, e.g., some aggressive children are deficient in representation of peers' intentions, whereas other children are deviant in the responses generated. There are also variations across situations, e.g., some children are deficient in group entry situations and others in provocation situations. There are also variations across the affective setting, under affectively arousing circumstances, deficiencies may be greater than in relaxed circumstances. Importantly, there seems to be a strong relation between these patterns of processing and patterns of aggressive behavior when all five processing stages are assessed.

In view of these findings, Dodge proposes the following stage model for assessing processing patterns in aggressive children in a clinical setting. (A) Identify the aggressive child. (B) Identify those areas in which this particular child displays aggressive behavior, e.g., group entry, response to provocation, a situation that arouses emotion. However one defines the environmental variables, one must describe the setting in which this child's aggressive behavior is occurring. (C) Once the problematic setting is defined, a clinician must evaluate the child's typical patterns of processing information in that setting. Using the social information processing model, a clinician would evaluate whether processing patterns are skillful, competent, or deviant at each of the five stages. A child-unique profile would result that identifies problem areas for a particular child, e.g., interpreting peer's intentions in provocation situations. That same child may also have problems in evaluating the consequences of acting aggressively in group situations. Dodge's research shows that this profile will discriminate at least 90% of aggressive children from nonaggressive children. Thus, it is potentially a powerful model for intervention, or at least a guide to focus intervention.

Origins of Aggressive Behavior

Dodge and Gregory Pettit[††] have conducted a pilot investigation of the relations among family experiences, social information processing patterns, and socially aggressive behavior in a sample of 56 highly aggressive 5-year-old children from lower socioeconomic class backgrounds. They wanted to explore a simple proposed model of the socialization of patterns of aggressive behavior; that is, that some set of early experiences with family or peers is related to later patterns of social behavior. For example, in studies of violent children in North Carolina, a sample of 1500 children, over 70% were found to have histories of child abuse, neglect, or grossly poor parenting. The finding of a relation between aggression and early family experience is not new, but added to it in this work is the hypothesis that a child emerges from early family experience ready for the social world, armed with a set of patterns of processing social information, and that those processing patterns result in a transfer of aggression to new settings. In this pilot study, two aspects of early family experiences were examined, the quantity and quality of experiences with peers that mothers provided to their children, and mothers' endorsement of the use of aggression. With respect to the amount and quality of exposure to peers, it was found that rejected aggressive children received significantly lower scores than the average and popular children, suggesting that mothers of children who became aggressive had not attended to exposing them

[†] Research Assistant, Vanderbilt University.

[††] Assistant Professor, Department of Family and Child Studies, University of Tennessee.

children to peers in high quality ways. With respect to mothers' endorsement of child aggression, significant differences were found in that the rejected aggressive children's mothers endorsed aggression as a solution to interpersonal problems more than did mothers of average or popular children. True to the hypothesis, the child's social problem solving skills mediated this relation between maternal behavior and child outcomes. The findings supported the hypotheses that early experiences and parental values and behavior are important in socializing children, and that children's social cognitive patterns mediate aspects of this relation. These hypotheses are now being tested more thoroughly in a longitudinal study* that will follow 600 children, from 4 to 6 years of age, as they begin formal schooling. Children have been selected from three geographic sites (Nashville, Knoxville, and Bloomington) and represent diverse socioeconomic and racial backgrounds. Measures of early family experiences include a developmental history, interview assessments of parenting practices and values, and direct observations of teaching and socializing events in the home. Assessments of children's characteristic patterns of processing social information and evaluations and observations of children's peer relations and aggressive behavior in school will be collected yearly. Two major questions are being investigated: whether patterns of deviant information processing are predictive of later aggressive behavior, and whether early family experiences (e.g., inadequate parenting patterns, early trauma) predispose a child to develop deviant patterns of information processing.

The long-term goal of Dodge's research program is to develop interventions to teach children social information processing skills that will promote nonaggressive behavior and will prevent children from falling into patterns of academic failure, delinquency, and violence.

Related Readings

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About RESEARCH PROGRESS

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*Co-principal investigators in this NIMH-sponsored research (Grant No. 42498) are John E. Bates, Professor of Psychology, Indiana University, and Gregory Pettit.