be enhanced when children's distress is escalated by parental agitation (Bush, Melamed, & Cockrell, 1989), criticism, adult apologies, inappropriate giving over of control to the child—or even well-intended adult reassurance (Blount et al., 1989). In fact 7 of 8 child distress behaviors observed in the Blount study were preceded most often by adult's reassuring comments. A further analysis of these data revealed that it did not matter whether the adult giving the reassurance was the parent or a medical staff person (Blount, Landolf-Fritsche, Powers, & Sturges, 1991).

Parents often find it difficult and confusing to be present with their children during painful medical procedures. Unfortunately, what parents do may exacerbate the child's distress as well as what they say. Even the parent who accompanies a child for necessary medical procedures with the best of intentions to provide emotional support for their child may "join the opposition" by, for example, helping medical staff hold down a child whose defensive bodily movements may jeopardize a procedure and result in injury to the child. Sometimes parents become angry at a child's verbal protest or uncooperative behavior (Blount et al., 1989). Some children experience harsh parental coercion, threats, or even temporary abandonment in the clinic (Bush et al., 1989). Parents in the pediatric setting can develop feelings of shame and embarrassment that distance them from their troubled child at the very time that they are most needed, and wanted (Gonzalez et al., 1989).

It has been found that parents and medical staff often underestimate children's experience of pain and distress (Lollar, Smits, & Patterson, 1982; Schechter, 1989; Steward, Steward, Joye, & Reinhart, 1991). For example, Watt-Watson et al. (1991) found that 9% of the parents of children who had received painful, invasive medical procedures denied that their child had experienced pain. Another parent, confusing pain with coping, stated, "He took it like a man!" The denial by a significant adult that a child has been hurt may challenge the child's experience of the reality of the painful body touch, or inhibit a child's willingness to talk about that touch with another adult for fear that she or he may not be believed. However, Lumley, Abeles, Melamed, Pistone, and Johnson (1990) found mothers' ratings of the negative overall quality of their children's previous medical experience was predictive of their children's behavioral distress and cooperation during subsequent anesthesia induction.

In sum there are a number of factors that occur during the administration of medical procedure that may impact a child's experience of those procedures and subsequently their memory of those procedures. These factors include the child's experience of pain and distress, the coping strategies used by the child, and interaction of the child with parents and staff. Research studies document that children can remember and rate past painful experiences, and that consistency of ratings improves with age; but these studies lack independent confirmation of the occurrence of the painful event. Children's clear, sharp memories of functional pain—in contrast to the vaguer memories of children with organically caused pain—may be related to the constructive role that the children played in describing the pain, and in the secondary gain that children achieved with that pain report. Studies on the psychosocial interaction of children and adults during medical procedures reveal that adult behavior, language, and judgments can effectively cue a child's memory for previously mastered coping skills, enhance a child's coping ability, and probably a child's positive memory of a job well done. It is likely that the child's memory of the specific details of the procedure would be diminished. However, adults can increase the child's distress in an already stressful situation, heightening subsequent memory of painful procedures.

Debriefing and Memory

The task of debriefing a child following medical and surgical procedures is a critical one. The purpose of having the medical staff debrief a child after a procedure is to review the events, processes, and procedures that have been administered; report any findings that the child should know; and answer any questions that a child may have about the event. In the past debriefing was rarely done routinely by medical staff. Even today memories based on a young child's misperception and miscognition are most often observed only by the nonmedical staff in the pediatric play room (Chan, 1980; Plank, 1971). Most postprocedural/postsurgical conversations are between medical staff and parents. They focus on the schedule and administration of necessary medications, dietary, or behavioral restrictions. In general the focus is on the healing process. Until recently, the child was not necessarily even addressed, let alone interviewed about his understanding (Beuf, 1979). Children, feeling powerless and frightened, often inhibit their thoughts and feelings when medical staff do inquire. A 6-year-old girl describing her experience of a spinal tap to a nonmedical staff member reported: "I had three tests and I was mad. When they do one I feel too much. I get mad. I say, 'Don't do more!' They say they're gonna do one more . . . they do one more and they do one more again and they do three times that." (Lewis, 1978) This was all reported in a hushed voice, for she was fearful that her doctors might hear her.

Some parents interrupt the conversations between medical staff and their young patients at debriefing time, even as they do prior to administration of procedures, on the false assumption that this will *protect* the child (Claflin & Barbarin, 1991). Koocher and O'Malley (1981) found a dramatic instance of this when they recontacted patients who were on the cancer registry because they were survivors of childhood cancer. They invited the children and their families back for interviews. They found one family unwilling to participate in the follow-up study because they had never told their daughter that she had been diagnosed and successfully treated for cancer as a very young child. In addition, 24% of the siblings of cancer victims interviewed by Koocher and his team reported that they never knew that their sibling had been diagnosed with cancer. Some children

carried unnecessary guilt, blaming themselves for causing a mysterious period of ill-health when in fact the etiology was cancer. More recently a review of 1928 adults who survived childhood cancer found that 14% of the survivors of malignancies at sites other than the central nervous system reported at follow-up that they had not had cancer (Byrne, Lewis, Halamek, Connelly, & Mulvihill, 1989).

Piaget has characterized the preoperational thinker as one who is bound to believe what he sees and hears. For the hospitalized child, this can be quite a fascinating and sometimes terrifying experience. During bedside medical rounds children hear and remember words which they interpret literally so that edema—a swelling—becomes "a demon in my belly," the order to stop a medication, e.g., "Cut out the gentomyacin," is understood as a demand for surgery, and the diagnosis of diabetes is heard as the death sentence = die-a-betes! There are also misperceptions and miscognitions about medical experiences that have developed because the child is a competent preoperational thinker at the time of initial diagnosis (Gudas et al., 1991). One very disturbing set of reports about the long-term impact of young children's remembered misperception of repeated, necessary genital examinations is reported by Money and Lamacz (1987). They identified three girls who inaccurately understood the examinations as sexually abusive, and who experienced negative sequelae on into adulthood.

Unfortunately some children hold on to their misperceptions or misunderstandings and are never debriefed, so they grow to middle childhood, adolescence or young adulthood "remembering," for example, that their exploratory abdominal surgery resulted in the removal of "2 kidneys." Many of our preschoolers, victimized by sexual abuse, believe that they have been "all broken inside," while some sexually abused girls (Asher, 1988) and boys recovered from Hodgkins disease (Wasserman, Thompson, Williams, & Fairclough, 1987) grow into adolescence remembering/believing that they are sterile.

In sum, the debriefing period is a natural time to determine the relative accuracy of children's perceptions and cognitions of recently completed medical procedures. There is a biochemistry to support the perspective from developmental psychology that debriefing is a critical time for making any necessary clarifications or corrections for young children before the experience is stored into long-term memory (Gold, 1984, 1987; McGaugh, 1983).

RESEARCH ON WHAT CHILDREN REMEMBER ABOUT MEDICAL PROCEDURES

Seven empirical research studies of children's experience of medical procedures that deal explicitly with and directly assess what children remember are reviewed next. In these studies children's reports have been validated by an independent observer, audio or videotape, and/or medical record so that reliable estimates of memory can be derived. Estimates of children's distress in these studies range

from very minimal to very high. Interviewing strategies and measures of memory differ. Two studies (Bearison & Pacifici, 1989; Reynolds, Johnson, & Silverstein, 1990) focus on children's memory for complex, sequential events. Four studies, designed as analogues to child court testimony, focus on children's capacity to remember and describe or identify the persons and location, as well as to report their experience of body touch and handling (Davies, Tarrant, & Flin, 1989; Goodman, Hirschman, Hepps, & Rudy, 1991; Peters, 1987; Saywitz, Goodman, Nicholas & Moan, 1991). Our own study (Steward, 1989; Steward, Steward, Farquhar, Reinhart, Joye, Myers, & Welker, 1992) was designed both as a court analogue study and to improve our own teaching and delivery of health care to children.

Memory of Complex Medical Events

Jacoby (1989) identified two distinctive functions of memory. It allows one to "be aware of and communicate with others about one's personal past." It also sets the stage "for perception and the interpretation of later events." Nelson's (1989) functional understanding of memory would support Jaccoby's view. Bjorklund (1985, 1987) has championed the importance of the knowledge base that the child has acquired prior to an event about which child is being interrogated. Chi (1978) has documented the novice/expert distinction by demonstrating that children with "expertise" can remember more than adults new to an experience. Nelson and Hudson (1988) have found through the study of children's scripts an effective way to tap into children's expertise. Children can tell us about their knowledge of familiar, routine events. Their narratives usually contain information about causal-temporal sequences, people, and props, and bear a strong relation to underlying event representations from which reports are generated. Nelson and Hudson have found that although the narrative may be somewhat incomplete or skeletal, the content is rarely misrepresented.

If the event a child is asked to remember is affectively charged, then there may be an additional anticipatory lens with which to perceive a repeated event. Nelms (1989) has documented that chronically ill children express significantly more empathy and emotional responsiveness to stories evoking pride, happiness, anger, fear, and sadness than do healthy children. She suggests that because chronically ill children undergo intense experiences, and are repeatedly asked how they are feeling, they develop a heightened awareness of both positive and negative inner states. New theoretical work on the linkages between cognitive and emotional systems (Case, Hayward, Lewis, & Hurst, 1988; Fischer, Shaver, & Carnochan, 1990) suggests that changes in the development of each system has concommitant or subsequent influence on the other.

We have observed clinically that when children remember highly stressful events, the causal-temporal sequence that appears in scripts of neutrally-toned events is interrupted. Children returning to our medical center after hospitaliza-

tion that included medical and surgical procedures have drawn us pictures of "leaving the hospital with mom" as the event that they remember *first*. Although the sequence is not reported, two of the four story cards Jean Robertson selected pictured the child, "Laura," putting on shoes in preparation for going home, and then leaving the hospital with her mother.

Bearison and Pacifici (1989), were the first research team to study empirically children's scripts of medical procedures. They interviewed a group of 4- to 7-year-old children with cancer twice to elicit narratives about "experimental" scripts for "What happens when you come to the oncology clinic?" vs. "control" scripts for eating at a restaurant or going to a birthday party. The youngest children in their study, the 4- to 6-year-olds, recalled significantly fewer event representations and were less consistent in representing the same event from the first to the second interview. There were no content errors in any of the scripts, but there were sequencing errors. As the younger children described a typical visit to the outpatient hematology/oncology clinic, they reported leaving the clinic before they reported some of the medical procedures that they experienced regularly during a treatment visit. They made significantly more sequencing errors in the clinic script than in the scripts of the other two events. The authors suggested that although none of the children showed signs of distress when producing the narrative about the clinic visit, the clinic experience was more highly affectively valenced than the restaurant or party events. Bearison and Pacifici speculated that the sequencing errors reflected the apprehension that the youngest children had about the clinic routines, and the children's desire to leave the situation.

The authors found no differences in clinic script knowledge based on length of time in treatment, prognosis, order of interview, or gender. They assert that clinic scripts are well established early in treatment and parallel findings of children's general knowledge of other social routines (Nelson, 1986). Clinic scripts may provide an important method for assessing differences in individual children's level of understanding and adjustment across time to necessary but painful medical treatment.

Reynolds et al. (1990) were the first to employ independent observers to investigate the accuracy of diabetic children's 24-hour recall of the self-administration of medical procedures. They observed two procedures that cause children mild stress—glucose/ketone testing and insulin injection—as well as their memory for exercise and dietary behaviors, events related in important ways to blood glucose levels. Seventy-five 7–12-year-old children, attending a special camp for diabetic children were observed. Twelve observers each monitored 3 or 4 children from the same cabin from the time the campers got up in the morning until after they finished the dinner meal. A 13th observer collected observer reliability data throughout the study. All children were observed on 3 randomly selected days over the course of 2 weeks, with 24 recall interviews conducted the day after each observation. Unfortunately the interview format was limited to

direct questions, so that accuracy of the content but not sequence of children' memory could be assessed. In general, the children's memory was demonstrate to be highly accurate for the occurrence of events across the whole day, but les so for specific timing and quality of activities remembered. Children's memor was highly accurate (above 90%) on 9 out of 10 measures related to insuli injection (the observers reported that the injections occurred later than did th children). Children were judged to be "reasonably accurate" (above 70%) i reporting the occurrence of glucose/ketone tests, exercise, and meals, but the underestimated duration and strenuousness of exercise and their food intake– especially their intake of sweets (60%), bread (34%), and fat (17%). The 7 and year-olds were less accurate than were the older children on details of exercis and diet. Age differences in remembering may have been dependent upon di ferences in the fine-tuning of initial categories, such as dietary exchange unit that children used to monitor and code their experiences as well as on differenti capacities in the storage or retrieval of remembered events. Subtle but critic differences in memory for the sequences of eating, exercise, testing, administr tion of insulin might be revealed if an event memory methodology were utilize with this population of children and adolescents.

Analogue Studies: Children's Memory of Touch, Persons and Place

Davies, Tarrant, and Flin (1989) created a simulated health inspection for 1 children, half 6–7 year-olds and half 10–11 year-olds. The medical procedur were painless, simple, and noninvasive. Children were asked to remove the shoes. Then they were individually weighed, measured, and eye color check by a "health survey visitor." Each child was touched only once by the heal survey visitor: either on the arm or on the shoulder. One week later children we asked to describe the health visitor and what had occurred. Following free reca children were asked direct questions about the health visitor's appearance inclu ing several details of the hair, face, eye, nose, mouth, and lips. They were al asked the health visitor's name, whether or not the child had clothing removed, they had been touched, and location of touch. There were no gender differenc and few age differences found in the accuracy of children's memory of t events. Older children did report more information than younger children on fr and prompted recall of events and appearance and made fewer errors on recall appearance. In free recall the younger group remembered only 23% of the 12 k events in the sequence, while the older group remembered 36% of the events. I child in either group mentioned an event that had not occurred. There were differences between the two age groups on identification of the health visit from photographic array or the goodness of children's construction of a co posite pictures. The confidence that children had in their own judgments was r related to accuracy/error of their memories. Children from both age groups we

able to report more of what they remembered when cued with direct questions. The errors in cued recall were more frequent for descriptions of the health visitor than for information about the event in which the children participated.

Saywitz and her colleagues (Saywitz, et al., 1991) interviewed 36 5-year-old and 36 7-year-old girls 1 week or 1 month following a special physical examination. Half of the girls in each age group received a vaginal and anal examination and half received a checkup for scoliosis incorporated into the examination. The focus of the study was to explore how best to elicit a girl's memory of genital contact. A sequence of three interview strategies was employed. Memory for body touch was elicited first by free recall. Then a child was asked to demonstrate touch with dolls. Finally the examiner pointed to body location on the dolls as the child was asked directly about touch to the genitalia and back. Accuracy for free recall was 93% and for demonstration was 87%. Both the 5- and 7-year-old girls reported nearly twice as much information when given the opportunity to demonstrate the event they experienced. Yet reports of body touch were sparse when free recall (10%) or demonstration techniques were employed (29%). When the information from free recall and demonstration are combined 27% of the girls reported vaginal touch and 19% reported anal touch at least once, while 92% reported vaginal touch and 82% reported anal touch when asked directly. Only one of the girls reported spinal touch in free recall and none in demonstration. When asked directly, 60% reported spinal touch accurately, but that rate does not differ significantly from chance. The difference in reporting rates for touch to different body parts may be a function of the fact that genital touch may be more stressful from a socioemotional perspective and therefore more memorable than back touch to little girls. In response to direct inquiry, errors increased, but errors of omission were more frequent than errors of commission and no child in the back touch condition falsely reported genital touch. In this study specific interview strategies were correlated with order, so that question repetition as well as question format may have contributed to reporting differences.

Peters (1987) studied the impact of moderate stress on memory. He observed 3- to 8-year-old children undergoing dental visits. The focus of his study was on children's ability to remember persons and settings, not on children's memory of the dental experience (96% were for dental check-ups or teeth-cleaning, only one child had cavities filled). Stress was defined by rating the child's anxiety during the dental visit, based on a combination of judgments made by the parent and the dentist. Two additional anxiety ratings were made by the parent and different research interviewers following two home visits. Children were judged to be more anxious in the dental visit than at home. Peters suggested that this higher level of anxiety functioned to inhibit children's subsequent photo identification of the dentist (43% accuracy) in contrast to the research interviewer whom the children met at home (71% accuracy). The more anxious the child, the less accurate she or he was in identifying the dentist or his assistant, and the greater

the likelihood of false identification in photo recognition tasks. There were no effects of stress on relative accuracy of photo identification of the setting, or the voice recognition (earwitness).

Goodman and her colleagues (Goodman et al., 1991) conducted a series of studies with 3- to 7-year-old children about their memories of a venipuncture or an injection in the arm or thigh. In two studies—one with 9 children, and another with 17 children—reports by the subjects were contrasted with reports of control children. The controls were carefully matched so that they were seen in the same clinic by the same staff for a painless application of a stencil on the same body location where the experimental child received a needle. Children's distress was judged on a 6-point scale by parents and research assistants who observed the event. Goodman and her colleagues found no impact on accuracy or suggestibility as a result of stress. In a third study 5 of 48 children were rated as being "extremely frightened or upset." These highly distressed children recalled significantly more correct information about their experience with an injection and were significantly more resistant to suggestion than children rated as less stressed. Unfortunately none of the children who were rated as highly stressed were available for the 1 year follow-up so the long-term impact of distress on their memory could not be determined. In neither the Goodman nor the Peters study was stress rated by the children who experienced the procedures.

The Child Memory Study

We (Steward, 1989; Steward et al., 1992) have just completed a study of 130 young children's memory of the experience of a visit to one of seven outpatient clinics at our medical center. The children in our study were touched typically on a dozen different places on their bodies and they experienced a very wide range of potentially stressful medical procedures. Children rated their own distress on a face scale originally designed by children (Bieri, Reeve, Champion, Addicoat, & Ziegler, 1990) and the medical staff person who administered the procedure to a child rated the child's distress on a 6-point Likert scale. The pediatric visits and interviews of the children were all videotaped so that we could study three different measures of memory—the accuracy, completeness, and consistency of children's reports—over a 6-month period. We were interested in what children could tell us about touch and handling of their bodies, and how well they could describe the persons present during the clinic visit, and the place it occurred. Four experimental interview strategies were designed: a core verbal interview and three interviews enhanced with drawings, dolls and equipment, or computer graphics. In addition to assessing the differential efficacy of the interview strategies to elicit children's memories, the predictive power of twelve covariates was assessed in four blocks, organized according to the ease/expense of acquiring the information: (a) child's age, gender, and ethnicity, (b) parental report of child's health history, family stress, and parental education, (c) child's experience

during the pediatric visit including the number of invasive medical procedures, medical staff rating of child's health status and of children's distress, the child's pain judgments, and (d) the number of outpatient and inpatient visits that occurred between the original clinic visit and follow-up interviews at 1 and 6 months.

The analysis of the data from our study is complex and the reader is invited to review our report for a more detailed discussion of the results. In brief, 5 of the covariates entered significantly into the predictions of accuracy, completeness, and consistency (age, distress, maternal education, medical experience, and the number of medial procedures a child experienced); 7 of the covariates never came into play (gender, ethnicity, family stress, health status, medical staff judgment of distress, number of intervening outpatient or inpatient visits). There were very few consistent errors and none of the variables contributed to prediction of the error scores.

At the initial interview the data revealed that 3–6 year-old children were highly accurate in their spontaneous recall of the locations on their bodies where they were touched by medical staff (94%), but they reported only 25% of the touch they experienced. The accuracy of their descriptions of what they were touched with (72%), the persons who touched them (86%), and the place where the event occurred (86%) were also high, but lower than body touch. When children repeated information at follow-up interviews their reports were more consistently accurate than consistently in error. When directly questioned about touch to four body locations, their errors of omission were 5 times higher than their errors of commission. Over time accuracy of report of body touch dropped to 70%; yet some children offered new accurate information about body touch at the 1 and even at the 6-month follow-up interviews. Children who received enhanced interviews were able to provide more complete reports of their experience than were those in the verbal interview. The reports of very young children (3 and 4 year-olds) in the verbal interview were especially sparse. Age contributed to the predictions of both completeness and consistency, but never to the accuracy of children's reports.

Children's rating of distress was significantly correlated with the completeness, but not accuracy of a child's spontaneous recall of body touch during the initial and 1 month follow-up interview. Distress became a significant predictor of both accuracy and completeness of children's reports of body touch at the 6 month follow-up interviews. Distress was never related to scores of consistent accuracy or consistent error at 1 or 6 months. There was no relationship between the children's rating of distress and the ratings given by physicians or nurses, nor were medical staff ratings significantly related to any of the three measures of children's memory.

Our own work employing medical equipment, which had been used during medical procedures, to elicit memory of what children were touched with offers a complex, not a simple picture—at least in the case of young children. In one of

the four interview protocols the children had access to medical equipment. These children were able to provide a more complete report by demonstrating their experience of body touch immediately after the event, than were children in the verbal interview. But at 1- and 6-month follow-up interviews children who had access to the equipment received lower accuracy scores, well below that of children who gave verbal reports. Review of the videotapes revealed that children did not use the medical equipment as toys in fantasy play, as might be suggested by DeLoache. Rather the medical equipment stimulated event memories so that children used the medical equipment to demonstrate procedures they had experienced on other pediatric visits—though not the one that we had videotaped. This interpretation was supported by the finding at the 1-month follow-up of a low, but significant negative correlation between the accuracy of children's memory of body touch and the parent's report of the child's past medical experience, suggesting the intrusion of previous medical scripts into their memory (Nelson & Hudson, 1988).

Because we are interested in the role of trauma on memory there were two groups of children who particularly caught our eye: those who reported high distress and those who denied not only the distress, but even the body touch. There were 47 children who rated at least one of the body touches they received as extremely painful. They did not differ from the rest of the children on scores of medical experience, language skills, or family stress. These children did, however, disclose more information on all three interviews. And the accuracy of their report about body touch dropped only to 81% by the 6-month interview.

There were 43 children who did not rate any of the body touches by our medical staff as being painful. When we took a closer look at the videotapes, it was apparent that 23 of the children had experienced a routine pediatric examination. There was little reason to judge any of the touches as painful. The videotapes of the remaining 20 children revealed that they had all received invasive medical procedures that were judged by the medical personnel who administered them as having been at least somewhat painful, and several received touches judged even by our medical staff (who tended to rate children's distress quite conservatively) as extremely painful. This group of children, whom we characterized by the report of one child that "He didn't touch me and it didn't hurt!", did not differ from the "no pain/no reason" group on language skills or family stress. They did differ on two other characteristics: gender and medical experience. There were 11 boys and 12 girls in the "no pain/no reason" group, while there were 14 boys and 6 girls in the "He didn't touch me" group. The "no pain/no reason" group also had significantly less medical experience than did the "He didn't touch me" group.

It is too simple to label either the "He didn't touch me" group or their psychodynamic strategy as denial. These children do not fit the expectations of memory deficit seen in the repeatedly traumatized group defined by Terr (1991). In contrast to the "no pain/no reason" group, they were more accurate in their

descriptions of both the persons present and the clinic room. Joey, the 4-year-old boy who told us that "He didn't touch me and it didn't hurt!", is one of the children from this group. He was interviewed after he had experienced a spinal tap. Rather than providing a spontaneous and detailed report of his experience as might be expected from the clinical literature, he boldly told us nothing. This child's report of his visit to our medical center was challenged by one of my pediatric colleagues who confirmed that he had administered the medical procedure and who judged it to have been painful for the child. We reviewed the videotape of the child's clinic visit and coded his behavioral protest which included crying, a physical struggle with the nurse who had a firm grip on his head and upper torso, and a plea to his mother to "Help me!".

We don't know why Joey didn't tell us what happened to him, but we do have some hunches that we are currently testing. Joey, a strong, sassy, competent child had been frightened, physically hurt, and had his body restrained. Why would anyone want to rehearse such a terrible, helpless scene? For a child medical procedures are nested not only in the personal but also in interpersonal and environmental contexts. As Neisser (1988) observed, each context may contribute variables that independently and in interactive ways synergize to modify both memory and reporting processes. When Joey called for help, his angry and embarrassed mother shouted back at him, "If you don't shut up, I'm going to leave you!" We surmise that she imagined the medical staff was judging her parenting skills rather harshly since she was unable to control her noncompliant son. Her threat to abandon him may have been her last ace in the hole. In the telescoping scenario Joey was in trouble with himself and with his mom, and his mom was in trouble with the medical staff.

As a result of this work we have become interested not only in children's remembering, but also in children's reporting. We have begun to focus not only on what children tell us about past events, but also what they choose not to tell us. There may be little or no discrepancy between children's memories and what they report when the experience in focus has been an emotionally neutral one. Strong negative emotions appear to drive a wedge between remembering and reporting and result in what we have begun to term the "narrative of omission." Joey was able to tell us who was present, and to describe where the medical procedures took place—items that fit Terr's (1991) description of a child thinking about how to protect himself from those particular people and that particular setting next time. What he omitted from his report was just what had happened to him.

We have begun a careful analysis of the events that occurred during the pediatric visit to determine just what variables/experiences/persons might have contributed to this narrative of omission. We are examining the adult-child and adult-adult conversations during the procedures to determine if either the informational or affective content challenged the child's experience. Were any of these children told that they "would NOT get the needle today," and/or were any

of them told that "it won't/doesn't/didn't hurt?" We are also examining the interview tapes for clues to children's self-conscious emotions which Lewis, Sullivan, Stanger, and Weiss (1989) have identified, such as being ashamed of their behavior during the painful procedure. In other words is the child's silence the result of a self-instruction not to tell us, due to the fact that it would be embarrassing or shameful, not "grown-up" or would do no good (i.e., a child's protest may not be able to prohibit effectively "uncontrollable events") (Altshuler & Ruble, 1989).

What do our research results suggest about the shape of the relationship between memory and emotion? First, it is not a straightforward linear one. More memory is not necessarily elicited from children who were more distressed. There is some support for a cubic (inverted U-shaped) relationship. At the far left, we found that children who had experienced only the benign pediatric touch of a well-child visit remembered/reported little about the who, what, or where of the event. At the far right, it is possible to believe that with highly distressing experiences a child's coping mechanisms can be overwhelmed (Type II trauma, Terr, 1991) resulting in a narrowing of the perceptual field of relevant stimuli (Easterbrook, 1959) such that a child's memory for the event is impaired. A second mechanism may be operating in another group of children who underreport very distressing experiences. We believe some children may underreport in response to stimulation by parent, medical staff, or self of negative self-evaluative emotional experiences (Lewis et al., 1989). These negative stimuli may inhibit reporting but not memory. Anna Freud's (1952) valuing of the child's meaning of the event over some absolute or objective judgment by another, is strongly supported by our data. In fact, our data fit an inverted U-shaped curve only if the child, as opposed to an observer, makes the judgment about just where on the curve the experience lies.

FUTURE DIRECTIONS IN RESEARCH

Adults Who Remember Childhood Illness

The upsurge of studies in autobiographical memory is of interest to many researchers focusing on the link between childhood and adult memory. However, some may be troubled by the lack of requirement for veridicality of the material produced (Brewer, 1986). There is no doubt that memory reconstructed in adulthood about childhood events may influence meaningfully a person's beliefs, decisions, and behaviors—whether it is true or not. However, as is shown by the work of Loftus and her colleagues (1979; Loftus & Davies, 1984; Loftus & Ketcham, 1991) on the suggestibility of adult eyewitness memory, we should be cautious in evaluating the accuracy of adult memories of childhood events where there is little or no corroboration.

There are two groups of adults who experienced illness as children and one group of adults who were eyewitnesses to childhood illness that might be of particular interest to researchers who wish to understand the interplay of the development of affect and cognition on the accuracy of childhood memories: Adults who were diagnosed with polio as children, those diagnosed with childhood cancer, and siblings of persons chronically ill in childhood. For both groups of former child patients there is the likelihood that their medical records are still available to enable accuracy checks on current memories; access to sibling data may require cooperation and corroboration of a number of family members.

Most post-polio adults are currently in their 50s and 60s. These adults experienced dramatic medical intervention, and vigorous encouragement from medical staff and parents to invest in recovery. Many endured excruciating pain and distress during physical therapy on their way to regaining mobility. The story of their physical health status continues to change. Unfortunately for many in midlife there is a swift deterioration of the muscles originally affected by the disease process and strengthened so painfully by physical therapy. My informal conversations with adults from this group reveal considerable negative affect and disillusionment at this turn of events.

Given the potential confounding influence of current depressed mood on memory retrieval, an investigator would need to struggle with the identification of an appropriate control group. It might still be possible to identify a healthy cohort within the group of post-polio adults, although that appears increasingly unlikely. Self-reported ratings by individuals of their emotional status at several points throughout the life cycle might provide an interesting covariate. These reports could include the period of active disease status, the period of stable health and current deteriorating health status. Reports for the first two periods would be, of course, retrospective.

The second group of adults with childhood experiences of medical procedures are now in their 20s and 30s. They are the first wave of adult survivors of childhood cancer. The change in treatment which occurred in the early 1960s has transformed the survival rates from 5–10% to upwards of 80%. Research on this group has focused primarily on cognitive and educational strength/vulnerabilities during the school years; and on marital status, employment, insurance issues in adulthood (Koocher & O'Malley, 1981). For these young adults, there has often been a veil of silence and sometimes even secrecy about their early medical experiences. There is a counter-phobic defensive maneuver that supports the silence of the adult survivor—if one doesn't discuss cancer, maybe it will not recur. The discussion of cancer elicits fearful responses from some listeners. Some believe that it is strategically unwise to inform a potential employer of one's childhood cancer as one's job, and more importantly, job-related benefits such as medical and life insurance may be negatively impacted. For both the polio and cancer groups there is a wealth of potentially verifiable information that could be elicited about their childhood experiences.

Siblings constitute a generally forgotten subpopulation within the constellation of families who have a child with chronic illness. As a group, they are once removed from medical procedures. Their memories of medical procedures are built on a different data set—absent the proprioceptive, kinesthetic, and nocioceptive cues that are components in the experience of the child patient. Pynoos and Nadar (1989) used a semistructured interview technique to study children's memory of a schoolyard shooting. They found that the *distance* a child was from a traumatic experience influenced the amount and kind of accurate information a child remembered and also the pattern of distortions found in a child's memory. It would be very instructive to apply their research techniques and compare their findings when siblings of chronically ill children are interviewed about medical procedures. Distance variables might include sibling presence/absence during procedures, participation in the procedure (e.g., as a donor of blood, bone marrow, etc.), actual or perceived responsibility for the ill sibling, etc. Other variables that might impact sibling memory of medical procedures include birth order of the chronically ill child vs. the sibling, and intense feelings such as jealousy, or fear. Koocher and O'Malley (1981) found that 25% of the siblings of childhood cancer in their study did not even know that their brother or sister had been diagnosed with cancer. Earlier follow-up of sibling memories might contribute not only to the memory literature, but also to the mental health of these children.

METHODOLOGICAL ISSUES FOR FUTURE RESEARCH ON MEMORY AND EMOTIONS IN PEDIATRIC SETTINGS

There are four issues about memory and emotions which have become clearer from this review of clinical and experimental research in pediatric settings, and from examining our own work in this context.

1. Remembering and reporting are not identical phenomena. K. Nelson (1989) noted that young children often remember more than they can tell. When the focus is memory of medical procedures there are several variables that should be tested to determine how they serve as moderator variables between remembering and reporting. One set of variables is related to the fact that the child is being asked to report body touch and handling—sensory, kinesthetic, and proprioceptive stimuli for which a child may not have developed adequate expressive language. A second set of variables is related to the fact that the child is being asked to report a neutral to negatively valenced experience over which she had no control, and from which she could not escape.

2. For young children remembering/reporting of important past experiences can be communicated nonverbally as well as verbally. This is compatible with

the dual memory model of Pillemer and White (1989). Many of the research data collected thus far on children's memory have been dependent on audiotape technology. By definition there has not been access to nonverbal cues. We believe that much has been missed, or will be missed, if the analysis of verbalized memories is not augmented (or even contradicted) by information from the face, from body gesture, and from the opportunity to demonstrate with props. In our own videotaped study of 3- to 6-year-olds children's memories of medical procedures only 17% of their responses were purely verbal, 58% included both verbal and nonverbal gesture, and 25% of their responses were exclusively nonverbal (Steward, 1989).

3. There is a complex relationship between remembering, reporting, and emotion. This complexity challenged our belief, based on clinical vignettes, that all children had an uncanny ability to report the details of painful medical and surgical procedures. We found not one but two clusters of response when children were asked to remember and report experiences that were judged to be very distressing. For the majority of children, the more negatively toned the experiences were judged, the more complete the report. But for a second group of children, their report became a narrative of omission as they told us who was there and where it happened, but not what had happened to them—an experience that was guarded from the interviewer but was clearly not forgotten by the child.

4. The veridicality of an individual's memory of childhood events is critical to the assessment of their physical and mental health in adolescence and adulthood. Although there is renewed interest in autobiographical memory, the findings from those data sets do not serve children well because there is no test of veridicality built into the methodology. Self-care and accurate diagnosis of physical symptoms of individuals in adolescence and adulthood are dependent on accurate information about childhood illness, injury and disease (Byrne et al., 1989). The psychotherapist, like the physician, needs accurate information about past childhood physical and sexual abuse in order to work therapeutically with the troubled adolescent or young adult (Lyons, 1987).

SUMMARY

The pediatric setting is rich with action, players and experiences. For those researchers interested in the accuracy and consistency of either short- or long-term memory of children's early experiences, the pediatric setting is especially attractive. There is access to an independent source in the medical records to corroborate children's narratives and reports. The pediatric setting also has much to offer those researchers interested in children's memory of highly emotionally charged experiences, particularly highly negatively charged emotional events, and in the impact of parents and medical staff behavior on children's experiences and memories.

Review of research on children's memory of medical procedures to date reveals that even very young children can report many facets of that complex experience with high degrees of accuracy, but in conditions of little or no stress they spontaneously report only a small fraction of what they remember. With skillful interviewing, including direct questioning, it is possible to elicit a more complete report of what they remember. Children's distress when defined in terms of physically painful, invasive procedures has been shown to interrupt the sequence, but not the accuracy of children's reports. When defined by observers, extreme distress appears to increase free recall and resistance to suggestion. When defined by children, highly stressful experiences of body touch and handling increase the completeness and accuracy of their reports over at least a 6-month period.

In many facets of children's lives memories of past events are deemed a good thing. Yet when an event is very stressful, memory may haunt a child with compulsive rehearsal or immobilize a child with fear. Such memories may interrupt rather than facilitate a child's normal growth and development. There is need for longitudinal study. Joyce Robertson's diary of her daughter's 3-day hospitalization, nested in 6 months of observation, is still the most detailed event record available on children's memory of medical procedures. The diary highlights the active role of the child in anticipation of the event and in rehearsal following the event—with both anticipation and rehearsal contributing to the working memory of the event. There is no parallel in the research literature to document and verify a child's memory of repeated, complex, multistep medical regimens where the sequencing of events is critical. The results of such studies could contribute to professionals who work in the health, mental health, and legal communities.

In sum, the pediatric setting provides a context where a stressful event can be studied with attention to preparation and debriefing; with attention to the interaction of biological, psychological and social variables on memory; with attention to the character of memories of painful events and their impact on future experiences; and with attention in research design to the documentation of the event to be remembered later.

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10 A Case Example of Clinically Relevant Research: Commentary on Steward

Susan Phipps-Yonas

I came to the task of discussing Steward's chapter (this volume) as a clinical psychologist who works primarily in the area of sexual abuse. I approached it, as well as the other chapters that constitute this volume, from the perspective of one who believes that the field of psychology, indeed all of the disciplines that contribute to the study of mental health, has been grossly negligent, at least until very recently, in terms of considering the impact of such trauma on development. Like most of my colleagues, I was trained at a time when there was virtually no mention of sexual abuse. Freud had long since thrown out his poorly termed "seduction theory," and psychiatry textbooks in use at that point (20 years ago) reported the incidence of incest as 1 in a million (e.g., Freedman, Kaplan, & Sadock, 1975). Although developmental psychopathology was emerging within the academic world, there was no attention given to what would have been deemed an extremely rare problem had psychology professors even considered such a possibility. Nor did clinical supervisors appear to know any better. As a psychology intern in 1975, I was assigned a child patient who had been sodomized by her stepfather and consequently placed in foster care. In my ignorance, I asked my supervisor what to do with such a freakish situation. He advised me, as likely would most of his peers, not to bring up the subject in the therapy sessions that I had with this youngster. Because she remained silent—as we now understand most victims do (see Berliner & Conte, 1991; Briere & Conte, 1989; Briere & Zaidi, in press; Finkelhor, 1984; Jones & McQuiston, 1988), we never talked about what had happened to her nor what it meant in terms of her mental health status. While I was thankful at the time for that fact, current experts (e.g., Friedrich, 1990, 1991; James, 1989) would deem such a practice incompetent.

A number of authors (e.g., Butler, 1978; Crewdson, 1988; Money, 1985; Reiss, 1990; Rush, 1980; Summit, 1988) have offered varied and interesting speculations as to the source of our earlier ignorance. It seems that as a society, we have relied upon repression and denial of a problem of immense proportion (see Peters, Wyatt, & Finkelhor, 1986; Russell, 1988 for discussions of incidence and prevalence). The taboo and resulting silence attached to the subject of sexual abuse, remain with us, in large part. However, by the early 1980s, the situation had changed somewhat in that many mental health professionals recognized first, that sexual abuse was a common problem within the populations with which we worked and second, that it had significant developmental implications for our patients, as well as for our theories of human behavior. There was very little, nevertheless, in the psychological literature on the topic. It was relatively easy at that point to read all that was written, treat a few victim/survivors and become a so-called "expert."

Over the past decade more and more books and articles have appeared that address questions regarding the prevalence and historical or cultural significance of sexual abuse or outline evaluation, treatment, and prevention strategies; however very little that has been written offers any type of developmental perspective on the subject. This has troubled (and puzzled) me because there are seemingly endless questions that developmental researchers could explore that could aid the clinical work of therapists who work with child victims as well as provide empirical data that could be employed to educate judges and jurors about children who give, or are the subject of, often difficult and confusing courtroom testimony.

Regardless of the particular domain of their research, be it in the area of cognitive or social or personality development, most child psychologists are in a position to advance the state of knowledge relevant to sexual abuse. The value of basic research notwithstanding, it is important that scientists appreciate the kinds of questions that need answers in the real world. Consider, for example, that when James Gibson, one of the premier theorists and researchers in perception, was called upon in World War II to apply what was known in his field to selecting pilots who could land airplanes successfully and teaching them how to be more skilled, he concluded that virtually nothing that was known about perception at that point was helpful for that task. As distressing as that conclusion may have been at the time, it directed him to study action in the real world, and thus came to guide his work and that of many of his students in the decades that followed the war.

In my view, basic research that is relevant to problems that individuals face in day-to-day living and that can therefore inform practitioners is superior to research which is not. The data presented at the 1991 Minnesota Symposium invite a number of potential (and exciting) applications for those of us who work directly with young patients and their families. Along with other recent efforts such as the 1989 Cornell Conference on the Suggestibility of Children's Recollections (Doris, 1991), this volume constitutes a significant step in an important direction.

SOME CHALLENGES OF APPLIED RESEARCH

The above stated enthusiasm notwithstanding, several cautions are indicated. The first follows upon the issues raised by Davies (this volume). As he has noted, courts in this country and, in fact, around the world, are seeking information about children so as to make better decisions about what certain behaviors and/or statements may mean or what youngsters can and cannot be expected to do. Unfortunately, many of the data that find their way into legal proceedings are, at best, quasi-scientific in nature. In part, this may be due to the fact that our system of justice functions in many ways that are antithetical to those of science. While both enterprises may seek an ever elusive "truth" about the world, our courts go about doing so in an adversarial manner wherein observations and conclusions are, by necessity, absolute. In such an arena of "good guys" and "bad guys" there is very little room for ambiguities or for complexities. Yet all competent students of human behavior, be they researchers or clinicians, know that our subject areas are extremely complicated. Almost nothing is black or white, and only rarely can we make statements that do not require some qualification. Furthermore, we strive to distance what we say from our values. The way that psychologists typically talk and write is an anathema to attorneys.

Thus, it is often difficult to maintain any semblance of scientific neutrality when one is drawn into a courtroom. The scene there often elicits adversarial posturing. This is what apparently happened at the Cornell Conference; sides have been drawn up and now some researchers seemingly seek ammunition for their "cause." The need for balance is critical, yet difficult to achieve. As Bull (1991), one of the Cornell conferees, so aptly framed the question: What should psychologists being asked to testify in court do if there is good reason to believe that the court or jury holds views, or a lawyer presents arguments, for which (a) there exists no support from psychological research or (b) the research that does exist suggests an opposing view?

Davies (1991, and this volume) provides an excellent model as to how to maintain a scientific balance that can be useful to a court. His approach deserves to be emulated. As he has advised, scientists should be thoughtful both in framing research questions and in interpreting the findings. Although researchers need not be advocates themselves, they should be mindful of what is done with their work.

The following excerpt provides an example of how, all too often, so-called scientific results are presented to courts of law. It is taken verbatim from a report submitted to a judge in a child custody trial by a Minnesota psychologist.

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