

Children's Thinking in the Wake of *Challenger*

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Objective: The Challenger spacecraft explosion in 1986 offered an opportunity to study the thinking of normal children after a sudden and distant disaster, differences in thinking among children of different levels of emotional concern and different ages, and changes in their thinking over time. **Method:** The authors studied six thinking patterns known to characterize childhood posttraumatic stress disorder and four additional hypothesized patterns in 153 randomly selected children of Concord, N.H. (who watched the explosion on television) and Porterville, Calif. (who heard about it later). They compared the structured-interview responses of the more involved (East Coast) and less involved (West Coast) children, of the latency-age children and the adolescents, and of the children initially (5–7 weeks after the explosion) and 14 months later. **Results:** The children exhibited the 10 predictable thinking patterns. They initially defended themselves, denying the reality of the explosion. They later fantasized about it. They tried to cope by seeking additional information on their own, at home, and at school. Most children talked about Challenger, but a minority of the latency-age youngsters avoided related talk and thoughts. The adolescents experienced more paranormal thinking, philosophical changes, and negative attitudes. Over the year, omens, paranormal experiences, and Challenger-based fantasies tended to disappear, but negative views about institutions and the world's future held steady or increased. **Conclusions:** The children's thinking followed predictable patterns. A higher degree of emotional involvement (East Coast children) was strongly linked to these thinking patterns, as was being an adolescent. Distant disasters appear to set up commonalities of thought that might come to characterize certain generations of children. (Am J Psychiatry 1997; 154:744–751)

Interviewer: Has anything terrible ever happened in your life?

A 17-year-old boy: Just Christa's death. It was pretty much the worst thing that ever happened to me.

—Concord, N.H., Spring 1987

On Jan. 28, 1986, the space shuttle *Challenger* exploded. Six astronauts and a Concord, N.H., high school teacher, Christa MacAuliffe, were killed. A small group of Concord third-graders, mostly class-

mates of Mrs. MacAuliffe's son, were watching the lift-off in the Cape Canaveral viewing stands. School children all over America watched the tragedy "live" on television. But because the explosion occurred at 8:38 a.m. in the Pacific time zone, children in the West in districts that relied on school buses were unaware of it at the time and heard about it later in school. Thus, there were at least three major classes of school-age children's exposure to the *Challenger* disaster in America: being in the Cape Canaveral viewing stands, watching it on television, and hearing about it first before being able to see a television replay some time later.

This tragic episode in space offered a natural psychological experiment with children. Our first inquiry concerned children's post-*Challenger* memories and was published in this journal (1). The second, and the subject of this article, concerned how young people would think about such an event. The third (2) had to do with the symptoms that children would develop.

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In all of these studies, we learned that East Coast children had been more primed in advance about *Challenger* than West Coast children. An East Coast teacher was to teach them from space, and they were proud of her. They therefore were more emotionally involved. One could thus compare more and less emotionally involved children (East Coast and West Coast), latency-age and adolescent groups, and children shortly after the explosion (5–7 weeks) versus those same children 14 months afterward.

A few studies on children's thinking after *Challenger* have already been reported. The day after the tragedy, for instance, Monaco and Gaier (3) questioned children ranging in age from 5 to 15 years and demonstrated that the younger ones were the most likely to attribute concrete, animistic causes to the explosion. Despite 20-minute factual talks that their teachers gave them as part of this experiment, 5-year-olds held on firmly to these unrealistic ideas, while older children considered *Challenger* in the context of other national tragedies. A study by Wright et al. (4) demonstrated that 6 days after *Challenger* exploded, sixth-graders were better than fourth-graders in distinguishing their fantasies about the explosion from the actualities.

The cognitive effects of directly traumatic events have been studied in groups of children. Six patterns of thinking, including two defenses, "denial of external reality" and "suppression," or conscious avoidance, have been recognized after trauma in childhood and adulthood (5–8). The Chowchilla kidnapping studies (9–11) further demonstrated that fantasies, omens, pessimistic attitudes about the future, and supernatural experiences characterized the posttraumatic thinking of children. Although a number of these thought patterns from the Chowchilla incident had aspects in common with "defense mechanisms," they were not defined as such, nor were they added to any standardized lists of psychological defenses. A separate clinical series of traumatized children of mixed ages confirmed and expanded on these findings (12–14). We hypothesized that four other thought patterns might be likely to occur in normal children after the *Challenger* explosion. A number of survey studies, for instance, had demonstrated that normal, untraumatized adolescents changed their plans and revised certain attitudes after distant or threatened exposures to nuclear bombings or accidents (15–17). We also thought that talking about the event, philosophizing about it, and seeking more knowledge about it ("after-knowledge") might be worth investigating.

Challenger thus offered us the opportunity to conduct a comparative study of 10 thinking processes that were either known to be related to personal trauma or hypothesized to be stimulated by a distant trauma. We had learned that children's memories were affected by the *Challenger* disaster (1). Would children exhibit trauma-related cognitive effects as well? And would they think differently, according to their ages, levels of emotional involvement, and the period of time that had elapsed? The questions posed in this study had not been answered in any previous study that we had seen.

METHOD

Our methods were described in detail in our previous article on children's memories after *Challenger* exploded (1). In brief, we selected Concord, N.H., and Porterville, Calif., as two relatively well-matched communities for this study. Concord had also sent children to Cape Canaveral, giving us a third group for comparison. Porterville students went to school by bus, and as they rode their buses, the children did not have visual exposure to the "live" explosion.

In 1986 and 1987, one of us (L.C.T.) administered a 298-item, 45-minute structured interview of our own design to third-grade and tenth-grade children. Ten major thinking categories were included. The children were selected with random numbers by their school administrators, and consent forms were signed at a rate of about 90% by both parents and students. Interviews were given 5–7 weeks after the explosion and again 14 months after the explosion. To the main group of 124 children were added nine Concord third-graders and one Concord high school student who had watched the launch from the Cape Canaveral viewing stands and another 19 students from the same Concord and Porterville schools who had signed consent forms in 1986 but who were put into the study a year later as an "interview control." One child was dropped from the study in 1986 because of language difficulties, and five children dropped out of the study or could not be located in 1987; the year-long retention rate of children was over 95%.

We used standard statistical tests, setting up a frequency table expressed in percents and dividing the group into "involved" and "less involved" (East and West) and "younger" and "older" (latency-age and adolescent) groups. To compare the involved children with those less involved, and to contrast latency-age children with adolescents, we used Yates's continuity-corrected chi-square tests with one degree of freedom. To compare groups when any of the table frequencies were less than 5, we used Fisher's exact test. To compare the changes from 1986 to 1987 in cross-sectional groups, we used two-sample *t* tests for paired data. To determine how the same children's thoughts compared 14 months after the explosion with their thoughts 5–7 weeks afterward, we used paired-comparison *t* tests (matched pairs). The *p* values reported are not adjusted for multiple comparisons.

RESULTS

Viewing at Cape Canaveral Versus on Television

I'm glad I was there because it made what happened more believable.

—A girl, age 15, Cape Canaveral viewer, 1986

My eyes were working but I wasn't realizing.

—A boy, age 10, Concord TV watcher, 1987

In comparing the Concord children who had viewed the shuttle liftoff in person with the children who had viewed the tragedy on television in their schoolrooms, we found one significant difference. Whereas five (50%) of the 10 Cape Canaveral viewers said that they had initially delayed accepting the reality of the explosion, comparable viewers in the Concord schools had delayed accepting this reality at the significantly higher rate of 81% ($N=50$ of 62) ($p<0.05$). Other than this finding, there were no important differences in thinking between these two groups; the two groups were then pooled.

Missing the 1986 Interview Versus Undergoing Both Interviews

I think somebody tried to kill Christa. Somebody put a bomb in there.

—A boy, age 11, interview control group, Concord, 1987

TABLE 1. Children's Descriptions of Their Thinking About the *Challenger* Disaster 5–7 Weeks Afterward

Type of Thinking	Very Involved East Coast Children (N=72) ^a		Less Involved West Coast Children (N=61)		Significant Differences Between Very Involved and Less Involved Children ^b	Latency-Age Children (N=71) ^c		Adolescents (N=62) ^c		Significant Differences Between Latency-Age Children and Adolescents ^b
	N	%	N	%		N	%	N	%	
Delay in accepting reality ^d	55	76	28	46	$\chi^2=11.82$, df=1, p=0.001	42	59	41	66	
Avoidance										
Of talk about the subject	8	11	3	5		9	13	2	3	p=0.06
Of thinking too much	12	17	10	16		16	23	6	10	$\chi^2=3.09$, df=1, p<0.08
Seeking knowledge										
By oneself	69	96	58	95		67	94	60	97	
With teachers	52	72	20	33	$\chi^2=19.13$, df=1, p=0.0001	35	49	38	61	
With parents	63	88	49	80		58	82	54	87	
Talking about <i>Challenger</i>	45	63	20	33	$\chi^2=10.51$, df=1, p=0.001	33	46	33	53	
Fantasies about <i>Challenger</i>	49	68	32	52		38	54	43	69	
Experiencing omens	19	26	3	5	p=0.0009	11	15	11	18	
Supernatural experiences										
Paranormal	27	38	12	20	$\chi^2=4.24$, df=1, p<0.04	13	18	26	42	$\chi^2=7.81$, df=1, p=0.005
Ghosts/presences	3	4	4	7		1	1	6	10	
Ability to predict	19	26	13	21		15	21	17	27	
Changed attitudes										
About space program	40	56	26	43		39	55	27	44	
About the United States	11	15	10	16		6	8	16	25	$\chi^2=6.02$, df=1, p=0.01
Negative predictions about the world's future	22	31	18	30		17	24	23	37	
<i>Challenger</i> -connected life philosophy	17	24	4	7	p=0.01	6	8	15	24	$\chi^2=5.04$, df=1, p<0.03

^aIncludes 62 children from the Concord schools and 10 children from the Cape Canaveral viewing stands.

^bChi-square test with Yates's continuity correction; Fisher's exact test was used when any of the four cells in the 2x2 contingency table had fewer than five occurrences (e.g., avoidance of the subject or ghost/presence experiences). The p values are not adjusted for multiple comparisons.

^cIncludes the Cape Canaveral children.

^dThis variable includes 50% of the Cape Canaveral subjects and 81% of the Concord subjects. It was tested only in 1986.

I'm pretty sure there might be a few more explosions at NASA.

—A boy, age 9, Porterville, 1987

In 1987 the interview control group (19 children put into the project in 1987 and thus not interviewed in 1986) exhibited no significant differences in thinking from the much larger groups that we had originally interviewed in 1986. Their data were subsequently merged with the appropriate larger-group data for 1987.

Being Exposed to Traumatic Events Before or During the Study Period Versus Being Unexposed

Some stuff happened in our family—scary stuff. My dad was touching me. He's a jerk! He molested me from seventh to ninth grade.

—A girl, age 16, Porterville, 1986

Twenty-seven children, almost equally distributed among the four large groups, qualified by our definition (1) as having experienced one or more personally traumatic events. Children who experienced traumatic

events were compared with untraumatized children of the same ages and emotional involvement for the 10 major categories of thinking listed in table 1 and table 2. In none of these qualities did the trauma-exposed group significantly differ from the larger comparable cohorts. We also compared the changes in the trauma-exposed children's thinking patterns to those of the others over the 1-year study period. Again, there were no significant differences.

Failing to Accept the Reality of the Event

The explosion made me nervous. I wanted to go home, take a nap, not know what happened.

—A girl, age 9, Concord, 1986

Children in both parts of the United States immediately failed to accept the reality of the *Challenger* tragedy (table 1). This defensive negation of thought was used as much by latency-age youngsters (59%) as by adolescents (66%); but it was significantly more evident in the more involved East Coast group. As already noted, the Cape Canaveral children were an exception.

TABLE 2. Children's Descriptions of Their Thinking About the Challenger Disaster 14 Months Afterward

Type of Thinking	Very Involved East Coast Children (N=87) ^a		Less Involved West Coast Children (N=60)		Significant Differences Between Very Involved and Less Involved Children ^b	Latency-Age Children (N=80) ^c		Adolescents (N=67) ^d		Significant Differences Between Latency-Age Children and Adolescents ^b
	N	%	N	%		N	%	N	%	
Avoidance										
Of talk about the subject	14	16	6	10		17	21	3	4	p=0.003
Of thinking too much	5	6	0	0		4	5	1	1	
Seeking knowledge										
By oneself	79	91	43	72	$\chi^2=7.91$, df=1, p=0.005	59	74	63	94	$\chi^2=9.24$, df=1, p=0.002
With teachers	33	38	10	17	$\chi^2=6.77$, df=1, p=0.009	25	31	19	28	
With parents	47	54	20	33	$\chi^2=5.32$, df=1, p=0.02	40	50	27	40	
Talking about <i>Challenger</i>	24	28	6	10	$\chi^2=5.72$, df=1, p<0.02	14	18	16	24	
Fantasies about <i>Challenger</i>	24	28	8	13	$\chi^2=3.44$, df=1, p=0.06	21	26	11	16	
Experiencing omens	12	14	2	3	p<0.05	9	11	5	7	
Supernatural experiences										
Paranormal	8	9	8	13		6	8	10	15	
Ghosts/presences	1	1	1	2		2	3	0	0	
Ability to predict	14	16	4	7		6	8	12	18	
Changed attitudes										
About space program	50	57	27	45		43	54	33	49	
About the United States	28	32	16	27		12	15	32	48	$\chi^2=17.13$, df=1, p=0.0001
Negative predictions about the world's future	40	46	23	38		24	30	39	58	$\chi^2=10.72$, df=1, p=0.001
<i>Challenger</i> -connected life philosophy	18	21	7	12		1	1	24	36	p=0.0001

^aIncludes 68 children from the original group and 19 children added for internal control (assessed only in 1987).

^bChi-square test with Yates's continuity correction; Fisher's exact test was used when any of the four cells in the 2x2 contingency table had fewer than five occurrences. The p values are not adjusted for multiple comparisons.

^cIncludes 68 children from the original group and 12 children added for internal control (assessed only in 1987).

^dIncludes 60 children from the original group and seven children added for internal control (assessed only in 1987).

Most early inability to accept the reality of *Challenger* was reported to have disappeared within a few hours. Of the children who, in 1986, remembered denying the reality for more than 30 minutes, twice as many were adolescent (40%) as latency-age (21%) ($p<0.03$).

Acquiring More Information About Challenger

Dear NASA, Can I have a big colored poster of the seven astronauts and the shuttle? And a letter from you?

—A girl, age 9, Concord, 1986

I cut out the article in *Ebony* about the black guy who went up in *Challenger*.

—A girl, age 16, Porterville, 1987

In 1986 more than 95% of all the children were attempting to cope with *Challenger* by seeking and acquiring further information on their own (table 1). Even in 1987, more than 72% of all children reported continuing to seek *Challenger*-related information (table 2). Initially, about twice as many children in the East learned about *Challenger* from their teachers (72%) as children in the West (33%) (table 1); but in all groups, parents were cited by their children as having offered

informative conversations (at rates of at least 80%, even in the West).

Talking About Challenger

My sister said the shuttle had a hole in it. I didn't see one. I later realized I was right and I told her so.

—A girl, age 8, Concord, 1986

Talking about *Challenger* was initially common on both sides of the country (table 1). By 14 months, all groups of children had significantly diminished their *Challenger*-related talk ($p<0.01$ for all groups).

Avoiding Thought and Talk About the Subject

When others bring it up I stay quiet, and when it comes up on TV, I walk away.

—A girl, age 9, Concord, 1987

In 1986 a minority of the children said that they had the sensation of thinking too much about *Challenger* (17% of the entire study group) (table 1). Fourteen months after the explosion, a significantly larger number of latency-age children, as opposed to adolescents,

TABLE 3. Changes in Children's Thinking Over Time After the *Challenger* Disaster^a

Significance of Change Over Time ^b	Very Involved East Coast Children (N=68)	Less Involved West Coast Children (N=60)	Latency-Age Children (N=68)	Adolescents (N=60)
Diminishing types of thinking				
p<0.0001	Seeking knowledge with teachers, with parents Fantasies about <i>Challenger</i> Supernatural experiences: paranormal	Seeking knowledge by oneself, with parents Talking about <i>Challenger</i> Fantasies about <i>Challenger</i>	Seeking knowledge by oneself, with parents Talking about <i>Challenger</i>	Seeking knowledge with teachers, with parents Fantasies about <i>Challenger</i>
p<0.001			Avoidance of thinking too much	Supernatural experiences: paranormal
p<0.01	Talking about <i>Challenger</i>	Avoidance of thinking too much	Seeking knowledge with teachers Fantasies about <i>Challenger</i>	
p<0.05	Avoidance of thinking too much	Seeking knowledge with teachers	Supernatural experiences: ability to predict	Talking about <i>Challenger</i> Supernatural experiences: ghosts/presences
Steady or increasing types of thinking				
p>0.10	Avoidance of talk about the subject Experiencing omens Changed attitudes about space <i>Challenger</i> -based life philosophy	Avoidance of talk about the subject Experiencing omens Changed attitudes about space Negative predictions about the world's future <i>Challenger</i> -based life philosophy	Avoidance of talk about the subject Experiencing omens Changed attitudes about space, about the United States Negative predictions about the world's future	Avoidance of talk about the subject Experiencing omens Changed attitudes about space <i>Challenger</i> -based life philosophy
p=0.05–0.09		Changed attitudes about the United States	<i>Challenger</i> -based life philosophy ^c	
p<0.05	Changed attitudes about the United States ^d			Negative predictions about the world's future ^d
p<0.01				Changed attitudes about the United States ^d

^aChange from 5–7 weeks to 14 months after the disaster.^bThe p values are derived from paired-comparison t tests.^cAlthough this finding reflects a diminution over time (p<0.06), all other findings regarding *Challenger*-based life philosophies remained steady.^dThis finding reflects significantly increasing national and world views.

reported deliberately avoiding *Challenger*-related talk (table 2). While the sensation of thinking too much about it had diminished in all groups by 1987 (table 3), the deliberate avoidance of the subject held steady in certain children (in table 3, see the nonsignificant p values for "avoidance of talk about the subject").

Fantasies About Challenger

I think of going back in time and telling Christa, "Don't go up!" Soon it'll be possible to go back in time and save people from plane crashes.

—A boy, age 9, Cape Canaveral viewer, 1986

In 1986 *Challenger*-based daydreaming was extremely common among all the children (table 1). East Coast children fantasized at a rate of 68% and West Coast children fantasized at a rate of 53%. By 14 months the West Coast children reported half as many *Challenger*-related fantasies as those from the East Coast (table 2). In 1987 we found that the children's fantasies had significantly diminished in all four major groups (all p values <0.01) (table 3).

There were three general themes in children's fantasies afterward: dying and death—what it feels like to blow up or not to exist; reunion—rescue of the astronauts, their survival, their return; and prevention—re-designing spacecraft, rearranging time. The following quotes are examples.

(Dying) I'm a little aware now of what it feels like to die. I thought about it, maybe five times. I used to not think about it at all.

—A boy, age 9, Concord, 1986

(Reunion) I daydream a lot. I just think, "What if it didn't happen and I'd be learning all about space from Christa, and that'd be fun."

—A girl, age 9, Porterville, 1986

(Prevention) I've tried to picture how it might have happened from the engineering point of view—a lot of times—maybe 50 since it happened. I'm still doing it.

—A boy, age 15, Porterville, 1986

It is important to note that despite the significant diminution of fantasies, a year after *Challenger*, 13%–28% of all of the children reported that they still occasionally daydreamed about it (table 2).

Experiencing Omens

We were all saying, "It'll blow up!" And it did.

—A boy, age 15, Concord, 1986

Some children who are exposed to a traumatic event retrospectively focus on a turning point at which the whole thing could have been avoided (7, 10). A similar, often identical, thinking phenomenon, "cognitive reappraisal," also occurs (6). Omens and cognitive reappraisals are modes of illogical thinking that are marked by incoordination of timings and/or personalized causalities. Among the East Coast children in our study, 26% had discovered omens by 5–7 weeks, whereas only 5% of the West Coast group experienced this phenomenon (table 1). By 1987 the incidence of omens had diminished to 14% on the East Coast and 3% on the West Coast (table 2). But on paired-comparison *t* test analyses of the same children over time, this diminution did not reach statistical significance (table 3).

Experiencing the Paranormal

Last Tuesday, I went to bed early. I heard the paper in my closet crinkling. There I heard, "Mary Anne, Mary Anne." It sounded like the voice was in my radio. And I ran out of my room real quick!

—A girl, age 15, Porterville, 1986

I dream things—like about the space shuttle blowing up—and then it blew up. Maybe that means I have powers.

—A boy, age 15, Concord, 1986

One time I thought I saw Christa MacAuliffe walk by in the hall [of school]. I was unsure whether it was her ghost. Once in the cafeteria I thought she got lunch and turned on the TV. It's frightening to see her, and it's happened two or three times.

—A girl, age 15, Concord, 1986

Sometimes I wake up in the middle of a dream with a picture or a word in my mind. Then 2 years later I see it or hear it again. I've had more of this kind of thing since Christa died.

—A boy, age 15, Concord, 1986

We inquired about telepathy, *déjà vu*, and powers (pooled as paranormal experiences); ability to predict the future; and the sensation of presences or of ghosts. All of these represented unusual perceptual experiences and illogical, often functionally defensive, forms of cognition. In 1986 42% of the adolescents, and 18% of the latency-age children told us that they had experienced at least one paranormal phenomenon since *Challenger* exploded (table 1). These phenomena were also significantly more common in the East Coast children. When we compared the same children's responses over time, we found that these "uncanny experiences" (18) had significantly decreased by 1987 (table 3).

Changing Attitudes About Space, the Nation, the World

Before *Challenger* blew up I thought everything was perfect. Now I realize things go wrong.

—A girl, age 15, Concord, 1986

I don't trust our country as much. They can make other mistakes, worse mistakes.

—A girl, age 16, Porterville, 1986

Children thought about *Challenger's* relationship to their world, and as they did so, their attitudes changed negatively. Many children's altered attitudes remained steady or increased over time (table 3). In fact, whereas 25% of the teenagers in our study reported that they had changed an attitude about the United States within the first weeks after the explosion, 48% reported such a change by 14 months, a near-doubling over the 1-year study period.

Examples of negative attitudes about institutions, the world, and God included the following.

I feel angry—more than ever before—at NASA.

—A girl, age 16, Porterville, 1987

I want to know what really happened. I'm mad at the manufacturers!

—A boy, age 15, Concord, 1986

We Americans are the first ones to have something like that blow up. It makes me feel bad, sort of, for our country.

—A boy, age 9, Porterville, 1987

Maybe right now some elderly Slavic gentleman is laughing at us.

—A boy, age 15, Concord, 1987

I was so mad, I wanted to punch somebody—anybody. I was mad at God. God might have wanted the shuttle to explode. Or the devil.

—A boy, age 11, Concord, 1987

Making Negative Predictions About the World's Future

Maybe the world will stay around and last, but people will be like zombies.

—A girl, age 15, Porterville, 1986

In 1986 and the early months of 1987, American school children experienced relatively peaceful and prosperous times. The Chernobyl, U.S.S.R., nuclear disaster occurred 1 month after the *Challenger* tragedy, but at the time, there was not much widespread concern among the children whom we interviewed. The adolescents in our study predicted a negative future for the world at rates of 37% in 1986 and 58% in 1987 (tables 1 and 2). In 1987 the adolescents were significantly more negative than the latency-age children (30%) about the world's future (table 2). After *Challenger*, young people's greatest concerns for the world were nuclear wars, biblical-type Armageddons, and food shortages. When we compared individual children's attitudes about the United States in 1986 and 1987, we found that these negative attitudes had significantly gained momentum both in the East Coast group and in the adolescents (table 3). Negative predictions about the world's future had significantly increased in the adolescent group.

While untraumatized latency-age children do not ordinarily make pessimistic predictions or, for that matter, any sort of predictions for the future of the world, about one-quarter of the children of this age in our

study offered such ideas 5–7 weeks after *Challenger* exploded. By 1987 almost one-third of the latency group made negative predictions. Although this was not accompanied by the statistically significant gain that we had found in the adolescents, the finding remained remarkably steady (table 3). The following is a latency-age example.

The world's future is trees. Dead ones. Burned down houses. Big rocks that come from space and land on the earth.

—A girl, age 9, Concord, 1987

Philosophizing Based on Challenger

I'm afraid of wanting something too hard.

—A girl, age 8, Concord, 1986

This event has changed my ideas in a way. It's made me more aware of how fragile life is.

—A girl, age 15, Porterville, 1986

Follow your dreams and don't give up. That idea partly comes from Christa.

—A boy, age 17, Concord, 1987

Ordinarily, if one is able to get a latency-age child to say anything about how he or she feels about "life," the response will be something like "Life is people, food, and pets" (a girl, age 9, Concord, 1987). But 5–7 weeks after *Challenger*, 8% of the latency-age children and 24% of the adolescents offered life philosophies that were based on *Challenger* (table 1). A number of these credos were positive, echoing Christa MacAuliffe's motto, "Reach for the stars." But the obvious terror in space was also associated with a number of negative ideas about life. Especially in adolescents, these new philosophies, once altered, did not tend to change back over a year's time (table 3).

DISCUSSION

In initially postulating that deeply upsetting, distant events would set up cognitive patterns, including defensive operations, that were similar to those of childhood posttraumatic stress disorder, we had guessed that three, or perhaps four, similar patterns might be found. But this study produced six similarities to psychic trauma—denial, avoidance of thought, fantasies, omens, paranormal phenomena, and negative attitudes about the world's future. We also found one pattern common to previous studies of normal, untraumatized, but nuclear-disaster-threatened children (15–17)—attitude change—and three other patterns that we believed might be present in this group—after-knowledge, *Challenger*-connected life philosophy, and *Challenger*-based talk. It turned out that the more a child cared about *Challenger*, the more likely he or she was to exhibit these cognitive, defensive, and coping patterns. If the child was an adolescent, he or she was also more likely to exhibit this kind of thinking (with the exception of thought avoidance, which was significantly more evident in the latency-age children). Taking

the three major areas of the *Challenger* project—children's memories (1), symptoms (2), and thought—we found enough similarities to childhood posttraumatic stress disorder to call these more removed conditions "distant traumas."

Denial of the full impact of the event was the most immediate of all the thinking patterns that the children described. It is interesting that the most involved children—those in the Cape Canaveral viewing stands—were less prone to denial than their counterparts who were watching television at school. Being there in person was one important factor. Also, the Cape Canaveral group were heavily chaperoned, with one adult to every two children. If adults could immediately provide explanations, aimed at correction of misunderstandings and at logic, this could decrease the amount of denial.

Fantasy was used by more than one-half of all the children in this study in the first weeks following the explosion. *Challenger* inspired youngsters to picture themselves dead or dying (a trauma-related repetition) or reunited with a lost astronaut or re-engineering a space craft (a compensatory fantasy). It also inspired them to have supernatural experiences on an external basis, rather than on the basis of the internally driven castration anxiety/Oedipus complex that Freud proposed in his two papers on uncanny mental experiences (18, 19). In addition to internal development, externally distant trauma would be an impetus for children to confront the uncontrollable by means outside the realm of actuality.

After the *Challenger* tragedy, young people went on to develop negative attitudes about space, technology, manufacturers, government, and occasionally God. This negativity grew with time. Negative attitudes appeared to flow from all of the other observable thinking phenomena. *Challenger* pushed children to venture out and to learn. But it also pushed them to experience vicariously the horror of being inside a disintegrating spaceship. And as this horror subsided, the children increasingly developed negative attitudes.

One very intriguing question after this study was, Why were the adolescents more prone to these negative cognitive effects than the latency-age children? One explanation lies in the more flexible, more varied, and more logical styles of thinking (20) that the adolescents were able to utilize. Teenagers exposed to *Challenger* were ready to question everything—not only on the basis of their superior thinking styles but also on the basis of their quests for personal identity (21, 22). Because adolescent formal logic was relatively newly established, it could be twisted into supernatural experiences after *Challenger*. It could be used in quasi-technical daydreams. It could be applied to negative world views. It could be abandoned altogether in the attempt to pretend within the first few hours that nothing tragic had happened. Because the typical latency-age child cannot yet use and manipulate this formal, more mature logic, this thinking style was not available for experimentation, twisting, and application to argument. What even-

tually happened was that the latency-age youngsters came to experience more symptoms (2), while the adolescents experienced more cognitive distortions and negative attitudes. All of the “whys” for this phenomenon are not yet apparent. But there does appear to be a relationship between thinking and feeling in which one or the other may be more affected by a distant traumatic event at a certain age.

Two negative findings from this study are worthy of note. First, previously traumatized youngsters and untraumatized youngsters did not think significantly differently about *Challenger*; and second, a group taken into the study a year later than everyone else did not think significantly differently from the rest. Apparently, old personal traumas do not have an impact on traumatized children's thoughts about new and more removed disasters. This finding implies that varied, single events can be sequestered without significantly influencing the thinking connected with another event. It also implies that children exposed to trauma are able to distinguish distant events from the more personal ones. The internal control group of 19 children, who reported no detectable cognitive differences from the larger corresponding groups, showed us that our structured interviews, given in 1986, did not significantly alter children's thinking. This finding might begin to disprove a fear commonly held by the public—that psychiatric interviewing hurts children.

To conclude, we return to the single most striking finding of this study—that after the *Challenger* disaster, children became increasingly negative about space, technology, the media, manufacturers, the United States, and the world. There were at least two contributing factors at work here: external contagion and internal transformations of thought patterns and emotions. Most of the children whom we studied had been talking to one another about *Challenger* and watching television and media discussions of the disaster (tables 1 and 2). Talking and television are known to breed contagion (23). Internal cognitive processes were also at work, as we had seen in 1986. Seeking information, harboring fantasies, and experiencing symptoms (2) most likely were transformed over a year's time into negative attitudes and pessimistic world views.

From this study, one can see how a very large group of children may, in a sense, lose their innocence in the wake of one very distant, but widely publicized and meaningful event. One can also begin to perceive one of the many reasons why a certain generation would be labeled by a distant trauma—for instance, the “depression generation,” the “war generation,” the “'60s generation.”

To summarize, there was good news and bad news about the thinking of children after the *Challenger* disaster. The good news was that within a year, most *Challenger*-related thinking diminished. The bad news was that within that same year, certain *Challenger*-connected attitudes steadied or even gained momentum. This effect could account for commonalities of thought across hundreds of thousands of children of similar

ages and with similar exposures. By analogy, it could also account for other common attitudes across other generations of children.

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