ABSTRACT: Although much media attention has been focused on the physical and medical effects of a modern nuclear war, very little has appeared concerning the sociopsychological effects of a possible exchange between the superpowers. This article is devoted to speculation concerning the effect of nuclear holocaust on those who survive. To that end, physical and medical effects are summarized, and then projected sociopsychological results for urban and rural residents are covered. The uncertainties are indicated in both cases, and long-term sociopsychological effects are considered.

As July 16, 1945, approached, the countdown to the explosion of the first nuclear weapon proceeded near Alamagordo, New Mexico, amid frantic activity. Physicist Robert Krohn remarked, "Now prior to the shot, back in the lab there had been some speculation that it might be possible to explode the atmosphere—in which case the world disappears" (quoted in Else, 1980, p. 16). Fellow scientist Robert Wilson said, "There was building up tremendous, almost hysterical anxiety . . . Things did not appear to be ready" (quoted in Else, 1980, p. 17). A dispassionate narrator described the scene:

Fourteen July, seventeen hundred hours. Gadget complete. Should we have a chaplain here? . . . The betting pool cost a dollar. Edward Teller bet on a blast equal to 45,000 tons of TNT. Oppenheimer bet low, 3,000 tons. I. I. Rabi put his money on twenty kilotons. Young technicians were horrified to overhear Enrico Fermi taking side bets on the possibility of incinerating the State of New Mexico. (Else, 1980, pp. 17-18)

Obviously, the world's most brilliant scientists were quite uncertain as to what their efforts would bring. Commenting on the myopic judgments made by scientists concerning the physical effects of modern nuclear explosions, astronomer Carl Sagan wondered, "What else have we overlooked?" (Sagan, 1983, p. 7). The question applies to the sociopsychological effects of a nuclear holocaust with even greater force. Although the extreme importance of sociopsychological factors has been clearly recognized (Office of Technology Assessment [OTA], 1979; National Academy of Sciences [NAS], 1975), there has been little speculation concerning sociopsychological results of a present-day nuclear exchange between the superpowers. Nuclear war would not just destroy buildings and people; it would shatter the lives of those who remained. This article is an attempt to anticipate social, cognitive, and emotional outcomes following multiple nuclear explosions. Medical and physical effects of a major exchange are covered first, because these will be precursors of and partial determinants of sociopsychological effects.

Medical and Physical Effects

Hiroshima

At 8:15 a.m. on August 6, 1945, a nuclear bomb variously rated at from 12,500 to 20,000 tons of TNT was detonated 1,850 feet above downtown Hiroshima, Japan. Two miles from the hypocenter, people saw the flash and had time to duck before being showered with debris (Hersey, 1946). At one mile, an office building was splintered. Victims located three fourths of a mile from the hypocenter had time to take one step and then were hurled through space. Near the hypocenter, people were vaporized, leaving only shadows imprinted on stone (Hersey, 1946). Others within a half mile of the hypocenter were destroyed by the force of the blast, burned to death by temperatures ranging up to several thousand degrees or shredded by flying masonry, steel, or glass. It was estimated that 95% of sheltered victims within one-half mile of the hypocenter who did not die of blast, burns, or shrapnel succumbed to radiation. The often slow and agonizing death by radiation was preceded by nausea, vomiting, diarrhea, loss of hair, bleeding gums, and discolored skin.

Heat at ground zero matched the solar surface. Two and one-half miles from the hypocenter, exposed victims were subjected to thermal radiation at 240 °C (460 °F). Burn victims appeared to be covered with soot. They walked like zombies, with arms outstretched to avoid contacting the burned skin that hung from their bodies (Lifton, 1967). A witness reported, "Many of them died along the road—I can still picture them in my mind—like walking ghosts . . . They didn't look like people of this
world . . . They had a special way of walking—very slowly . . . I myself was one of them” (Lifton, 1967, p. 27).

Of Hiroshima’s 340,000 residents, 130,000 died by November 1945 and 70,000 more by 1950 (Silberner, 1981a). That they are still dying today is recognized by U.S. insurance companies that cover Americans of Japanese descent who were present at Hiroshima and Nagasaki (National Public Radio [NPR], 1981). Although the U.S. government has flatly denied any responsibility for Japanese-American victims (NPR, 1981), it is preparing to recognize radiation effects that are delayed even for years (Raloff, 1983a). Leukemia has been the major cause of death for those victims who survived the first few months after the blast (Lifton, 1967). By the late 1950s, the rate of leukemia had dropped considerably, but as of 1971, it was still five times normal (Silberner, 1981a). Just as the threat of leukemia subsided, solid tumors began to be reported. Cancer of the stomach, lung, thyroid, ovary, uterine cervix, and breast have shown increases (Lifton, 1967; Silberner, 1981a). There have also been noncarcinogenic effects. In some instances, cataracts developed one to two years after the attack (Lifton, 1967). Though victims and unborn children have suffered genetic defects, it has been reported that none have been passed on to the offspring of victims (Silberner, 1981a).

A Hypothetical Attack on Boston

By today’s standards, the weapons used on the Japanese were minute. Many modern warheads have at least a thousand times the power of the bomb dropped on Hiroshima, and single warheads ranging up to several thousand times the potency of the Hiroshima weapon probably exist (NPR, 1981). A meaningful comparison of the Hiroshima attack to a modern nuclear exchange would be Ervin et al.’s (1962) speculation concerning a 20-megaton (MT) ground blast over the center of metropolitan Boston; 20 MT would equal the blast of about 1,000 Hiroshima bombs. (Two MT is approximately equal to the explosive output of all the bombs dropped during World War II; Sagan, 1983.)

At just under a radius of 30 miles from the hypocenter of a 20-MT attack on Boston, exposed persons would receive first-degree burns, and synthetic cloth would ignite. At 21 miles from the center, people in the open would suffer second-degree burns and injuries due to flying debris driven by winds of up to 1,000 mph. At about 18 miles, third-degree burns would be sustained. Twelve and a half miles from the center, auto upholstery would catch fire. People 11 miles from the hypocenter would be imperiled by the collapse of frame houses and trees. Fallout shelters would be useless. Ten miles from the hypocenter or closer, a reflex glance at the fireball would burn the retina, resulting in blindness. Seven to eight miles from the center, power and telephone lines would be down, and people would sustain ear drum damage. At about five and a half miles, auto sheet metal would melt, and reinforced concrete structures would be damaged. Between three and four miles from the hypocenter, auto sheet metal would vaporize. Individuals who somehow escaped blast and thermal effects would succumb to lung injuries due to a shock wave traveling from the hypocenter faster than sound. Streets would be impassable.

Burning of various structures and fuels would generate a huge firestorm, initially sweeping toward the hypocenter at from 150 to 200 mph and eventually consuming everything in its path out to 16 to 21 miles from the center. Experience with such conflagrations during World War II indicates that fallout shelters and even bomb shelters near the center could be subjected to such high temperatures that no one would survive. For example, days after a fire bomb raid on Hamburg during 1943, shelters burst into flame when opened, because of contact between oxygen and trapped heat (Ervin et al., 1962).

If the 20-MT attack on Boston were an air rather than a ground blast, the damage would be nearly doubled, with each effect listed above extending out from the center almost twice as far. However, ground attacks generate maximum fallout. Ervin et al. (1962) estimated that within 48 hours of the attack, fallout would extend over a 4000-square-mile area, with exposed persons at the fringe receiving a dose sufficient to kill half of the healthy recipients (400 to 450 rads, units of radiation dosage). In all, it was hypothesized that of the nearly 2,900,000 persons in the metropolitan area at the time the scenario was posed, 739,000 within five miles would die of blast effects alone, and an additional 1,501,000 within 16 miles would fall victim to blast and thermal effects (Ervin et al., 1962). These figures assume that victims were sheltered from radiation.

Uncertainties

The hypothetical attack on Boston described above assumes a single 20-MT blast. It is possible that the metropolitan area would be subjected to 10 or more smaller explosions (Knox, 1980). The effects of such attacks are very difficult to predict (Ervin et al., 1962). To further complicate estimations, attacks

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might come in waves. Bunn and Tsipis (1983) suggested that first waves might be off their marks by some margin of error, and because of residual effects of first waves, second waves might be off even more or might be destroyed by lingering effects of first waves. Such inaccuracy could have the effect of scattering warheads, with many dropping in suburban and rural areas, generating interactions with unknown effects. Bunn and Tsipis assumed that most missiles, though perhaps inaccurate, would at least make it to target areas. Marshall (1983) went further by arguing that even the most modern of missiles have some appreciable probability of not working at all (see Associated Press, 1983). In case of misfires or inaccuracy, the superpowers might "unload their guns" on each other for fear that unreliable missiles would leave enemy silos intact and able to retaliate. The result would be Armageddon.

Controversies have always existed concerning the data from the Hiroshima attack (Marshall, 1981). Now, nearly 40 years later, new analyses of that data are fueling fresh debates. For example, it is entirely possible that the form of radiation causing cancer was not the uncommon high linear energy transfer (LET, e.g., neutron), as originally believed. Rather, cancer effects among victims at Hiroshima may have been due largely to low LET radiation (e.g., gamma). As well as indicating uncertainty about radiation effects after almost four decades of study, this possibility bodes ill for persons working around sources of the relatively common low LET radiation. Even more surprising are questions raised about standards of radiation dosage (Marshall, 1981). Such standards form the basis for advice concerning safe dosages of radiation. In fact, there may be no safe dosage. Rather than there being a maximum dosage of radiation per unit of time that yields no ill effects, a linear relationship might hold between dosage above natural background level and probability of ill effects (Marshall, 1981). Thus, even low dosages may increase the likelihood of harmful outcomes. Knox (1980) indicated that a dosage as low as 20 rads increased the incidence of leukemia among exposed Japanese children, and dosages of 50 to 100 rads increased birth and growth defects for offspring exposed in utero at the time of the blast.

The likelihood of surviving radiation is also uncertain. If only the wealthiest residents of Hiroshima and Nagasaki escaped with their lives, estimates of radiation hazards based on survivors' data may be seriously in error (Raloff, 1982). Epidemiologist Alice Stewart estimated the "healthy survivor effect" while controlling for "residual disability effects" by studying the incidence of sudden deaths from cerebral hemorrhage among survivors. Many apparently unsnatched survivors would have been exposed to low level radiation, which would show up only in "residual disability effects," such as bone marrow damage, that would result in decreased immunity to disease. Since cerebral hemorrhage would be relatively uninfluenced by such damage, investigating strokes in survivors controls for residual disabilities due to low level radiation exposure. Stewart showed that survivors were only 70% as likely as normals to die of a stroke (cited in Raloff, 1982). Thus, "healthy survivors" may be more resistant to radiation effects than most people, which means that normal people may be more likely to die of exposure to radiation than was previously recognized.

The Nuclear Winter

Perhaps the most catastrophic effect of a major nuclear exchange would be what scientist Richard Turco and colleagues have called the "nuclear winter" (Turco, Toon, Ackerman, Pollack, & Sagan, 1983). If only 38% of the combined Soviet-U.S. arsenals (5,000 MT) were used, fires and ground blasts would drive so much smoke (as well as soot) and dust into the lower and upper levels of the atmosphere, respectively, that sunlight would drop to 5% to 10% of normal. Within days, temperatures in the northern hemispheres would begin to fall, reaching a low of about −25°C (−13 °F; Turco et al., 1983). The subzero weather could last for months. Reservoirs might freeze solid. If it were summer, plants would die; if it were winter, residual effects of the cold might undermine the spring planting. Plants that survived the cold and radiation would emerge to an environment infested with chemical smog (Ehrlich et al., 1983). Due to the low level of sunlight, it is even possible that photosynthesis would be insufficient to sustain plant life (Turco et al., 1983). Anyone who wishes to learn what it would be like to live through an approximation of the nuclear winter could consult the survivors of the battle of Leningrad during World War II (Bethell, 1980). Leningrad was besieged by the Germans for 900 days. The city was isolated during the infamous Russian winter, and life was much like that which might exist during the nuclear winter. Other recent work indicates that constant, gale-force winds might plague coastal areas as a result of the land–ocean temperature differential (Ehrlich et al., 1983), and certain mountainous areas might be warmer than usual, melting the snows and glaciers and leading to post–winter floods of continental proportions (Raloff, 1983b).

After particles had fallen from the atmosphere, the shroud would be lifted from the earth, but a new danger would arise. Depletion of the ozone layer would expose life to abnormally high levels of ultraviolet radiation (Ehrlich et al., 1983; NAS, 1975; Turco et al., 1983). The result would be the demise of many plants and animals, suppression of
the immune system in humans and other mammals (Ehrlich et al., 1983), as well as an increased incidence of skin cancer and eye damage in humans (NAS, 1975). Of course, a larger exchange would yield more disastrous effects, and even megatonage as low as 100 could create nearly as bad a scenario (Turco et al., 1983). In any case, there might be no place to hide, as effects in the southern hemispheres could be somewhat attenuated versions of those in the northern counterpart (Ehrlich et al., 1983).

Sociopsychological Effects

The behavioral results of nuclear war that are surveyed below are not presented as necessarily representative and certainly not as exhaustive. The focus is on behaviors likely to be associated with the expected physical and physiological effects cited above.

Psychologists have emphasized prevention of nuclear war through attempts to influence policy, rather than prediction of behavioral effects following an exchange (Morawski & Goldstein, 1985). Their efforts were largely confined to the 1940s, 1950s, and early 1960s, a period yielding so little relevant data on which to base advice on policy that frustration was virtually guaranteed (Morawski & Goldstein, 1985). However, today there is sufficient evidence to allow speculation about sociopsychological effects of modern nuclear war. As mentioned throughout this article, physical scientists have been able only to speculate about the effects of a modern nuclear exchange. Because massive nuclear war is a potential rather than actual event, neither they nor we can do more than conjecture about its effects. However, psychologists are no more restricted to past research than physical scientists. As is done in the remainder of this article, psychologists can begin to draw analogies between projected environmental effects of a nuclear war and determinants of known psychological phenomena, but that is not all that can be done. Studies that indirectly address psychological effects of nuclear war can be conducted. For example, presently available psychological research techniques could be used to investigate the joint effects of low temperature and low illumination, conditions that would prevail after a nuclear exchange (Baron & Byrne, 1984). In addition, the exploration in this article of nuclear and nonnuclear events that occurred during World War II could be expanded to include additional analogues to conditions that would exist after a modern nuclear war. In any case, the involvement of psychology and related disciplines in the investigation of life after the missiles is crucial. The behavioral effects of multiple nuclear explosions would be one of several critical factors determining the continuing existence of humanity (Ehrlich et al., 1983; OTA, 1979; NAS, 1975). Behavioral scientists are by definition the most qualified to study those effects.

Generalizing research results to circumstances that have not yet occurred is always risky. In psychology, projecting from laboratory results to outcomes in "real life" must be done with great caution (Baron & Byrne, 1984). Even more care must be exercised in generalizing from psychological outcomes in the lab to "real life" in the future. Once again, though, the situation of behavioral scientists is quite similar to that of physical scientists. The possibility of the nuclear winter was in large part extrapolated from data yielded by Martian dust storms and volcanic eruptions on the Earth (Sagan, 1983; Turco et al., 1983). Similarly, psychologists can generalize from known behavioral effects of crowding to postexchange behaviors associated with that condition.

As physical scientists dwell on the uncertainties of their work (A. Ehrlich, 1984), so must we consider the imprecision of our efforts. Nevertheless, uncertainties must be tolerated when the fate of all humanity hangs in the balance. To know of the horror that might be is to prevent it.

It is hoped that the account of sociopsychological effects will apply to the United States, the U.S.S.R., and Europe. However, because much of it is based on data collected in this country and, therefore, bound to this culture, caution should be exercised in generalizing beyond these borders (OTA, 1979). As attacks would be concentrated in urban regions, except for a few rural areas near missile silos, effects for the two arenas will be considered separately. More general, long-term effects are covered next, with uncertainties discussed at the end. The worst-case scenario involving a 5,000 to 10,000-MT exchange is assumed and considered plausible. It is difficult to imagine that whoever strikes first will limit the attack in the belief that the target of their deceitful assault will also limit theirs.

Urban Areas

If nuclear war seemed imminent, the superpowers could empty their cities, but that maneuver appears unlikely. Should the side that hoped to attack first clear its cities, it would be telegraphing its move. If, in a crisis, both sides successfully emptied their cities, each could simply reprogram warheads to strike new population centers (Lamperti, 1983). In any case, should either side begin to clear its cities, it might provoke the other side (OTA, 1979). All this assumes that citizens would cooperate and leave the cities in a reasonable amount of time or leave at all and that millions could be somehow accommodated in outlying areas (Leaning & Leighton, 1983). More likely, the cities would not be evacuated. The side attacking first could not issue warnings to
its citizens until detection by the target occurred a couple of minutes after launch, otherwise any hope of stopping the target’s intercontinental ballistic missiles (ICBMs) would be lost (Steinbruner, 1984). Because about 30 minutes would lapse between launch and detonation of ICBM warheads, if the attacker warned its citizens at the earliest opportunity and the target counterattacked immediately, the attacker’s citizens would have at most 28 minutes to escape the cities or seek shelter (missiles launched from submarines and aircraft would leave a shorter warning time; Bunn & Tsipis, 1983). Unless they were anticipating an attack under a “launch on warning” plan (Steinbruner, 1984), targeted officials might waste so much time funneling information of detection through channels that a warning would leave citizens almost no time to act. Although they could have as much as 28 minutes to act (Steinbruner, 1984), targeted heads of state might have as little as 10 minutes (Zacharias, Gordon, & Davis, 1983), leaving targeted citizens no more than 25 minutes to escape. However, there is no need to dwell on the difference between the amount of time the attacker would have to issue a warning and the warning time available to the target. Given too little space in deep underground shelters, warnings would cause monumental traffic jams and ensure that city-dwellers would be trapped in the open when the warheads fell (OTA, 1979). The cramming of shelters and freeways would also set the stage for the panic reactions that would destroy rational, adaptive behavior (Kelley, Condry, Dahlke, & Hill, 1965). To avoid panic, leaders of the U.S.S.R. and the United States might elect not to warn their citizens at all.

Lieutenant General Brent Scowcroft (U.S. Air Force Retired) has argued that an attack would probably not be “a bolt out of the blue” but would nevertheless be a surprise (Zacharias et al., 1983). A public that does not understand the consequences of nuclear war and is full of denial with regard to its occurrence is not likely to believe that it will happen (Lifton, 1967; Nash, 1983). In any case, the differences in the initial reactions of persons having absolutely no warning, those warned of severe international tensions via the media, and those crammed on the freeways attempting to flee the cities are too small to mention further. For most individuals within the borders of large cities, the transformation from conditions that are recognizable to ultimate chaos would be stunning. In the case of a daylight attack, people might one moment be going about their business, walking down familiar halls or seated next to friends or colleagues, and a fraction of a second later they might be flung into a nearby body of water, suspended between shattered support beams, or grooping in a dark abyss formed by debris (Hersey, 1946). They would look about, only to find a wasteland where a house or an office building once stood. A few feet away they might discover the dismembered, bloodied, or badly burned bodies of people with whom they had just been conversing. The horror of viewing mangled bodies may alone be enough to severely and permanently traumatize survivors (Hebb, 1966). Even members of the Nazi SS, who apparently enjoyed annihilation of humans, recoiled at the sight of disintegrated corpses (Dawidowicz, 1975). The shock may be impossible to understand by those who have not experienced it (Lifton, 1967). Apparently, some victims of Hiroshima later showed psychotic symptoms at least in part traceable to the transition from everyday reality to ultimate chaos (Lifton, 1967).

After the initial shock, reactions of some may be tainted with selfishness (Leiderman & Mendelson, 1962; Lifton, 1967; NPR, 1981). People who are severely wounded do not think of loved ones or small children in their charge: They blindly seek comfort. A number of victims at Hiroshima spoke of leaving family members behind as they fled the terror of pain or fire (Lifton, 1967). Needless to say, their guilt never subsided. At Hiroshima and Nagasaki, there were a few heroic exceptions to self-centeredness and some profound tributes to the capacity of humans to deny. Some people picked themselves up and went about their daily tasks amid the rubble, although their endeavors had totally lost meaning. A messenger received such severe burns on the back that he later spent months on his abdomen begging to die, yet he paused to pick up his mail (Silvern, 1981b). A soldier carefully gathered up the ashes of official papers in his possession, so that he could obediently return them to superiors (Lifton, 1967). But most Japanese victims simply made their way from the center of the disaster, or begged for help, or died where they lay.

City dwellers who initially survived would find that all they took for granted about modern urban living had been obliterated in a single stroke. A turn of the water faucet would produce a diminishing dribble; a flick of the light switch would not alter the darkness; no reassuring dial tone would emanate from the receiver; TV and radio would probably be off the air; and transportation would be at a standstill (Sidel, Geiger, & Lown, 1962; Zacharias et al., 1983). Stores might not be open, even if they were accessible over streets littered with debris. Police and firefighters who remained would be overwhelmed, but more important, medical facilities and personnel would be extraordinarily deficient. The entire United States contains facilities for only 1,300 burn victims and fewer than 65,000 intensive care patients (Adams, 1983). The former would be grossly inadequate even for one large city, and the latter probably would not accommodate a targeted city the size of Chicago. It
was estimated that of 6,500 physicians and 128 hospitals in the Boston metropolitan area during the early 1960s, only 640 and 24, respectively, would survive (Sidel et al., 1962). In a desperate attempt to provide beds for the injured, physicians might seek evacuation of psychiatric institutions (Sidel et al., 1962) and even prisons. If they succeeded, persons who were dangerous or unable to care for themselves would be left to roam the streets. Remaining medical personnel would be under unimaginable pressure. Physicians and perhaps even laypersons would hurriedly inspect the injured lining hospital halls and make snap judgments as to whether they might survive if given medical attention (Hershey, 1946). Many who might have otherwise had a chance would be passed over as a result of inadequate diagnosis or would not even receive a look. Conditions would be ripe for the practice of euthanasia (Stiebe & Kunetka, 1984). Thousands would stream into hospitals daily, and thousands would leave as corpses (NPR, 1981). Sidel and colleagues (1962) have suggested that Boston is potentially a giant mausoleum. The bodies would be only one of the more severe health problems (Bethell, 1980). Stress generated by these conditions would take a heavy toll on physicians and other medical personnel, making many suicides likely. In fact, experience with total disaster during World War II makes it seem probable that numerous suicides would occur among even healthy survivors (Ryan, 1966). But some individuals would live to face the nuclear winter.

As the pall of near total darkness enshrouded large portions of targeted areas, surviving victims would begin the search for food and fuel. Acting under the assumption that radioactivity in the environment had diminished to safe levels, or being willing to risk contamination to avoid starvation, individuals would leave enclosures to scavenge for what they could find (OTA, 1979). At first, there would be food left in stores that had escaped destruction, wood for fires, and perhaps, in some areas, coal or fuel oil. Money would be the medium of exchange in the beginning, but the disruption of closing of financial institutions and the absence of help from local or national governments would soon destroy faith in dollars or the equivalent (Zacharias et al., 1983). Bartering would become the way of the marketplace, with food being the most valued commodity. Under these circumstances, looting would be the order of the day; citizens would even prey on corpses (Lifton, 1967). A burgeoning underground would develop to feed on the inevitable black market. It might be led by former criminals, but ordinary people would be hard-pressed to resist the relative luxury it would offer. The actual "merchants" in this enterprise might be children, urchins forever denied socialization by the loss of their parents (Lifton, 1967).

The hospitals would continue to overflow, but the people queuing outside would contain a new element. Thousands would view the symptoms of radiation victims, and they would see themselves as suffering from a dreaded new affliction, called "A-bomb disease" by residents of Hiroshima (Lifton, 1967). The neurosis that would result has been termed hysterical contagion (Wheeler, DeC, Reis, & Zuckerman, 1978). Because only a minimal stimulus seems needed to trigger this epidemic conversion reaction even in the absence of a universal crisis, it is easy to imagine the reaction that widespread radiation sickness would instigate following the devastation of the northern hemisphere. As the number of people stricken with this neurosis would be extremely large, psychologists and psychiatrists could be as overwhelmed as medical personnel. This would be especially true because psychological personnel would be heavily concentrating in the cities, and therefore they would be greatly reduced in numbers.

The filth in the air and on the ground, the lack of water for bathing, the lack of fresh clothing, the tendency to form gangs for support and sustenance (OTA, 1979), the prevalence of facial injuries in burn victims, and the existence of perpetual night might reduce many people to a state of deindividuation. Deindividuation is the loss of individuality or sense of uniqueness and is often accompanied by bizarre, antisocial behavior (Diener, 1980; Zimbardo, 1970). Anonymity due to "being lost in the crowd" or to being indistinguishable from other burned and soiled people can be precursors of deindividuation. Lifton (1967) reported that some victims at Hiroshima were so badly burned about the face that even immediate family could not recognize them. The continued darkness of the nuclear winter could alone be a powerful and general determinant of deindividuation (Mann, 1981). Behavior resulting from deindividuation would range from simple aggression to wild, frenzied attacks, sometimes perpetrated on individuals by mobs (Zimbardo, 1970). It is even possible that psychotic symptoms would result from the sensory deprivation accompanying chronic darkness (Buxton, Heron, & Scott, 1954). If humanity is not "bombed back to the stone age," it might nevertheless regress to the savagery of the medieval period.

Because earlier and later in this article many analogies are drawn to the reactions of people at Hiroshima and Nagasaki, the reader should remember that conditions following a multimegaton exchange of nuclear weapons are likely to be drastically different from those at the two Japanese cities. Hiroshima and Nagasaki were two small sites of nuclear disaster. Unaffected areas quickly furnished...
help. The outside world provided a stimulus and model for return to normality, as well as untainted environs to which victims could escape. Adjustment was facilitated by the positive attention provided to the relatively few victims of an unusual weapon. Such conditions would not prevail if the superpowers launched a major attack on one another.

_Rural Areas_

Although some rural areas near missile silos would be destroyed (Bunn & Tsipis, 1983), many others would be initially unscathed. However, destruction of communication centers and the electromagnetic pulse generated by high altitude explosions would lead to a cutoff of electronic communications (Steinbrunner, 1984). The major networks would be off the air, and long-distance telephone service would terminate. The latter would be a source of most immediate stress, as it would be impossible to contact friends and relatives living in cities. Mail services would stop, and trains, buses, and other forms of supply and transportation would cease. Although the nuclear winter would not arrive for a number of days after the blasts (Turco et al., 1983), a feeling of impending doom would grip rural areas. Normal life would continue for a time, but it would be in the back of people’s minds that everything would soon change (OTA, 1979).

Among the first evidence of imminent disaster would be hoarding. People would swap stores, buying up everything, especially food. Huge quantities of gasoline and fuel for heat would be purchased and stored in personal residences. Soon store shelves and fuel tanks would be empty, as neither would be replenished by supplies from the outside. However, as there is evidence that people in rural areas might be more likely to show altruistic behaviors than their urban counterparts (Byrne & Kelly, 1981), it is possible that initially people would share. Co-ops might even be set up to help the poor and disadvantaged. Certainly, neighbors would help neighbors, and family members would aid one another. In fact, “the spirit of community” might never be stronger than just after the missiles, but it would surely die in time. As supplies dried up and exposure to fallout created much sickness and death, people would begin to think only of the next meal and enough fuel to blunt the cold of the nuclear winter.

Individuals would continue to work for some time after the missiles fell, but eventually it would be obvious that their efforts were meaningless (Lifton, 1967). Needed supplies would not arrive, and products could not be shipped to market. For people employed by national firms, pay might be suspended. As writers like Erskine Caldwell (1962; _God’s Little Acre_) and Studs Terkel (1975: _Working_) have illustrated, jobs are essential to feelings of identity.

Without them people’s sense of self would begin to deteriorate (Allen & Potkay, 1983). However, these effects would be evidenced for only a few weeks after the missiles. Later, people would descend Maslow’s hierarchy of needs and be concerned only with bare survival (Potkay & Allen, in press).

Confinement indoors would begin with the first evidence of fallout and continue for months because of the cold. Inevitably, people would venture out, thus exposing themselves to radiation and later to the effects of freezing weather, but most hours would be spent inside. Anne Frank’s (1952) _Diary of a Young Girl_, experiences in the Jewish ghettos of World War II (Dawidowicz, 1975), and considerable research (Baron & Byrne, 1984; Brigham, in press; Paulus & McCain, 1983) all indicate that crowding people together in cramped space for long periods generates depression and conflict. Adding starvation and sickness to this scenario would make matters much worse (Dawidowicz, 1975).

In a few days or weeks, people in rural areas would be faced with a new threat (OTA, 1979). Survivors from urban areas would start to arrive. Migration would begin because of depletion of supplies in the cities and because city dwellers would, like ghetto residents, assume that life anywhere else would be better (Dawidowicz, 1975). Massive conflict over limited supplies would accompany the hordes of dirty, injured, and degenerated infiltrators from the cities. Rural residents might begin to feel they were living the legend of frontier people besieged by hostile “natives,” but they would be without the glory of winning in the end. Paranoia would be widespread, and violence would be common. Within a few months after the missiles, rural and urban areas would be indistinguishable in terms of inhabitants’ behaviors.

_Long-Term Effects_

The 5,000-to-10,000-megaton nuclear exchange envisioned by those who postulate the nuclear winter would kill about 1.1 billion people almost immediately and would leave a like number stricken with serious injury and radiation sickness (Sagan, 1983). Months later, as many as two billion people—half of the world’s population—might be dead as a result of the war (Rainoff, 1983b). However, many might live until some semblance of stability, if not normality, returned. These people would suffer the guilt that is common in survivors (Lifton, 1967). They would ask, “Why was I spared?” Many would remember friends and loved ones that they failed to help or could not help sufficiently. Even if they could have done nothing for intimates who perished, they might suffer the continual nightmare of having somehow contributed to the demise of family members and colleagues (Lifton, 1967). Special guilt...
would characterize scientists and government officials who failed to anticipate or prevent nuclear war (Lifton, 1967). It would be guilt nurtured by loss of status. Because government and other institutions would have failed, respect for people associated with these institutions might diminish to near zero. Being located close to the centers of large cities where even deep shelters might be inadequate (Ervin et al., 1962), many high government officials would die, but those who remained would face humiliation or worse. Individuals who were powerful and esteemed before the missiles might become scapegoats afterward.

Status differentials would largely disappear, with former possessors of rank, name, and/or wealth joining the rest (Strieber & Kincka, 1984). The collapse of the social ladder would destroy the power of status. Stripped of their usual sources of influence, people would be left with mainly one method of getting their way, aggression (Tedeschi, Smith, & Brown, 1974). Life in the mythical “wild west” would seem lawful and tame by comparison (Strieber & Kunetka, 1984).

The United States and the U.S.S.R. would suffer severe loss of status. In a just world “you get what you deserve and deserve what you get” (Lerner, Miller, & Holmes, 1975). The people of other nations might well see the Americans and the Soviets as getting what they deserved. The status of the two countries would be lowered even further because each would have to accept aid, given that there were enough people left to help. More likely, both former superpowers would disintegrate into a multitude of states, some controlled by foreigners (Strieber & Kunetka, 1984).

Democracy would be an early casualty of a major exchange (Office of Technology Assessment, 1979). In relatively undamaged areas and during recovery, governments would likely take over with a vengeance (OTA, 1979). In such cases, blind obedience to omnipotent authority would be common (Milgram, 1974). After Pearl Harbor, Hawaiians surrendered their individual rights to military authorities, even going so far as to obey when ordered to give blood in “payment” of traffic fines (Zich, 1977). In the long run, authoritarian rule would dominate in the northern hemispheres (OTA, 1979). One gets the picture of automatons all marching to the same drummer. By contrast, immediately after the attack in areas where damage and death were high, authority would be undermined and its credibility lost (Allen, 1978). At that time in those locations, people would be unlikely to obey anyone. Chaos would be the result.

With the enormous reduction of population, small pockets of humanity might be formed, each cut off from the others. The result could be wide-spread intermarriage, including incest. Such behaviors would lead to loss of genetic diversity, resulting in the deterioration of the human species (Ehrlich et al., 1983).

The number of serious and permanent scars resulting from burn wounds would be enormous. Keloid tumors, ugly reddish, swollen areas, were common among survivors of the attacks on the Japanese cities (Lifton, 1967). Aside from physical problems, such as inability to gain weight due to painful stretching of scars, disfigurement would create serious social and psychological problems (Lifton, 1967; also see Walster, Walster, & Berscheid, 1978). Severely disfigured persons, especially those burned on the face, would be shunned by some and would suffer a crippling loss of self-esteem (Lifton, 1967; NPR, 1981). The premium that Westerners place on physical attractiveness might be enhanced if it continued after the missiles (Allen, 1978). Burn scars could create a wide gulf and a strong contrast between those who are and those who are not attractive, to the advantage of the former and the detriment of the latter. This tragic aftermath of blast and fire could become one of three prime sources of prejudice against victims of the missiles. A second would be the belief that all burned people were exposed to high radiation and that the resultant genetic damage could be passed to future generations. Although such transmission might be slight (NAS, 1975) or nonexistent (Silberner, 1981a), the belief would very likely be propagated anyway (Lifton, 1967). A third source of prejudice would be the “just world” belief that disfigured individuals suffered victimization because they were “bad people” (Lerner et al., 1975). One important practical result of prejudice against victims would be extreme frustration in their pursuit of suitable marital partners (Lifton, 1967; NPR, 1981). Even more serious would be the day-to-day agony suffered by objects of prejudice (Brigham, in press; NPR, 1981). Anger and frustration result from persecution and can lead to hostility toward those even lower in the social ladder (Byrne & Kelly, 1981; NPR, 1981). Lifton (1967) reported that some Japanese victims did turn on those at the bottom of their country’s social stratum. Prejudice breeds prejudice, a fact of social life that might be more prominent after the missiles than before.

Lifton (1967) conveyed the impression that nearly all of those who were victims of the atom bomb bore its stigma indefinitely. Those who coped best were individuals who campaigned against nuclear weapons. However, this source of adaptation and relief would not be available to victims of a modern nuclear exchange. Working to rid the world of nuclear arms would not make sense after Armageddon had already occurred.
Uncertainties

The "total war" conditions described above might not occur. Of course, one would like to believe that any level of nuclear exchange is improbable. On the one hand, a disaster the magnitude of that proposed here is unprecedented in the history of humanity. On the other hand, just as it is likely that there are other intelligent beings in this universe or another, it is probable that the perpetual buildup of weapons in the context of international tension will eventually result in an exchange, if only by accident (Zacharias et al., 1983). Should that happen, it is possible that the exchange would be limited (Hackett, 1978; Zacharias et al., 1983). If a future nuclear war were so small in scale that it was below the threshold for the nuclear winter (Sagan, 1983), humanity would survive. Further, if one is willing to forget that thousands, even millions, would die if only a few missiles were fired (OTA, 1979), there could be possible positive results of a limited war. Favorable outcomes might include markedly fewer automobiles and, thus, fewer accidents, less fuel consumption, and more physical exercise (OTA, 1979). There would be little meat and, therefore, less of the cancer thought to be caused by it (OTA, 1979). The need to be near jobs would end the flight from and decay of the cities (OTA, 1979). Those who dislike technology would be pleased to find it diminished in importance in the relatively primitive existence that would characterize life after a small exchange (OTA, 1979). Computers, telephone equipment, and other electronic systems would be scarce, because many such units would be destroyed by electromagnetic pulse (Steinbruner, 1984). Replacement would be haphazard due to the lack of components for repair and for construction of new equipment (Strieber & Kunita, 1984). With the demise of technology would come the downfall of its citadel, the university. If technology is the bone structure of higher education, the arts and humanities are its flesh. However, the latter two might seem trivial when the theme of life had become mere survival. Obviously, preservation and transmission of knowledge would be in jeopardy.

Even in a limited exchange, almost every family in the United States and the U.S.S.R. would lose members. A death in the family might have salutary effects on surviving members. Families might become closer, and members might experience psychological growth (Moriarty, 1967). However, it is unfortunately also possible that families might deteriorate due to loss of members (Moriarty, 1967). Adults might be too grief-stricken to function as parents, and children would be likely to show aggression, withdrawal, denial, destructiveness, and preoccupation with death (Moriarty, 1967).

As indicated earlier, people might initially be devastated by the ubiquity of death and suffering manifested in piles of bodies and the commonness of unrelieved pain. In time, desensitization might diminish the reaction of horror, facilitating adaptation. If multiple murders and assaults per hour of television programming can desensitize children to violence, people can get used to death and suffering (Baron & Byrne, 1984). However, this loss of sensitivity would be a mixed blessing. It would lower stress but would also numb survivors to the suffering of others and to the value of life.

Finally, it is likely that the world would come to the aid of the relatively few victims; circumstances would be more like those at Hiroshima and Nagasaki than those depicted earlier in this article. Also, it is possible that humans might learn their lesson—people everywhere might finally rise up and destroy nuclear weapons. However, one would not want to bet heavily on a positive outcome of a small exchange. After all, the lessons of Hiroshima and Nagasaki were not learned.

It is possible that, should a major exchange occur, the aftermath would not be so extreme as indicated in this article. People might take adequate shelter or even be absent from the cities. Climatic conditions might make fallout effects less severe than expected (Ervin et al., 1962), and the ravages of the nuclear winter might be less severe than predicted. Total disaster might cause people to rally around one another. Altruism might characterize behavior, and people might forever swear off the evil precursors of war, aggressiveness and prejudice. At the minimum, the world after a major exchange might be just what the survivalists want, a chance to struggle for existence and emerge the "fittest." After all, postulations about a future nuclear war are all speculations, open to debate (Rallof, 1983b). No wholly adequate experiments can be conducted, and there is no precedent for such a war (Turco et al., 1983). Unfortunately, it is also possible that the dire outcome presented above understimates the horror that would descend with the warheads (Sagan, 1983). If this article is an understatement, instead of gloriously besting others in the struggle for meager resources, the few remaining survivalists would be grooping in the frigid opacity of the nuclear winter, scratching for food and fuel and awaiting almost certain death.

Should favorable behavior characterize responses to nuclear disaster, it would be because the widespread ignorance and denial of nuclear war that now prevails would have been eliminated before the warheads fell (Nash, 1983). More important, such a cure for our intellect and psyche would be an important factor in preventing disaster. The seriousness of the failure to think of or collect information about nuclear catastrophe can be seen in the respon-
ses of first-year university students. Out of 25 multiple-choice questions about nuclear war, only an average of 11 were answered correctly, with a fourth of the respondents being unable to identify "Hiroshima" and less than 30% correctly selecting the date of the first nuclear explosion. Zweingenhaft (1984) reported similar results for a nonuniversity population.

Even if the horror described in the first part of this article were replaced by the more favorable scenario presented in this section, the difference would be only a matter of degree. The contrast is in the comparison between one of the worst tragedies in recorded history and the end of mankind. If any degree between the two extremes should occur, many if not most survivors would find life after the missiles not worth living.

Epilogue

In a now famous lamentation, J. Robert Oppenheimer, director of the project to develop the first nuclear weapons, spoke on film about the feelings he and his colleagues experienced after witnessing the awesome destructiveness of their invention:

We knew the world would not be the same. A few people laughed, a few people cried. Most people were silent. I remembered the line from the Hindu scripture, the Bhagavad Gita. Vishnu is trying to persuade the prince that he should do his duty, and to impress him, takes on his multi-armed form and says: "Now I am become death, the destroyer of worlds."

In one way or another, we all felt that way. (Else, 1980, p. 30)

Perhaps, like Vishnu, we have been transformed, albeit not by our own volition. Although once we were preservers of the world, passive acceptance of weapons we do not understand threatens to make destroyers of us.

REFERENCES


