Stories of Science

The Milgram Experiment—Small Worlds

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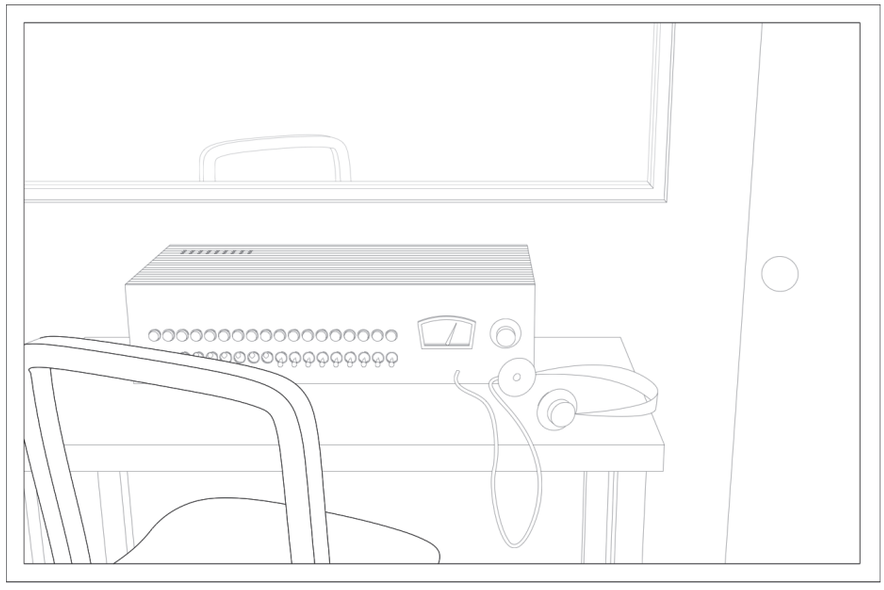
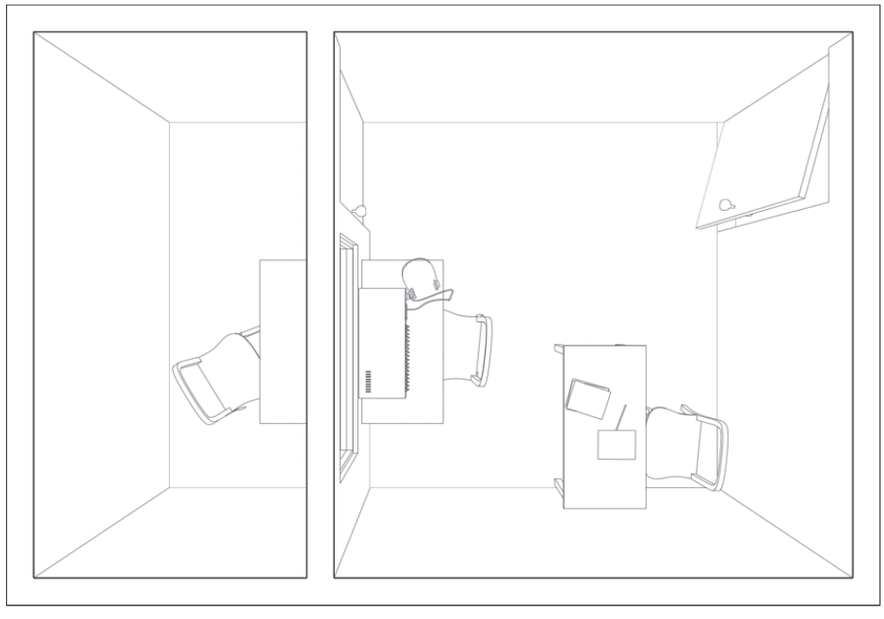




ARCHITECTURE, IT HAS OFTEN BEEN CLAIMED, IS A SYNTHESIS OF SCIENCE AND ART. On the surface, it seems that these are the opposite poles of human intelligence; the former is logical, reproducible, hard, the latter is emotional, unique, and soft. Since Vitruvius, architects have prided themselves on inhabiting both worlds. In perhaps the pinnacle of this *topos,* Sigfried Giedion went so far in *Space, Time and Architecture* as to proclaim that modern architecture had a unique, healing role in modernity because of its ability to overcome the increasing split between these two poles. Some architects' infatuation with computation over the last two decades, from blobs to parametricism, replays this script. Yet, it is possible that the dialectic of art and science is only a fiction. After all, many of the best artists are not merely technically adept, but also experiment with materials as part of their practices, while the most successful scientists are great storytellers—illustrating their hypotheses with captivating anecdotes to make them accessible to the public. Ask school children about famous scientific experiments and they will tell you about the apple falling on Newton's head or Archimedes yelling "Eureka!" when his tub overflowed. No matter how hard-headed it may seem, a written experiment is a story with a plot, a set of characters, a setting, props, and an outcome. More than that, when people are the subjects, for example in medical experimentation, the process itself can skew the results, making them hard, even impossible to verify.[1] In clinical drug trials, this has become a serious problem; drugs that appear to be effective in the laboratory deliver results comparable to placebos. Frequently, it is not so much that the actual drugs are ineffective; they perform as expected. The problem is that sugar pills produce similar results; individuals' faith in drug trials skews the outcomes. Even double-blind trials and methods that can account for the effects of the experimentation process on the participants' behavior and perceptions no longer seem to go far enough. Increasingly, it seems we live in a world whose laws are not so much determined by science as by fiction.[2]

Some scientists have been keenly aware of the role of fiction in their field and sought to investigate its effects. Perhaps chief among these is social psychologist Stanley Milgram who, in the early 1960s set out to investigate how these processes of experimentation—in particular the authority individuals invest in scientists, the means by which procedures are followed and instructions are given, and even the architectural setting of an experiment—influence the behavior of human beings. Milgram claimed that his study, which he called the "obedience to authority experiment" but which later also became known as the "Milgram experiment," was inspired by Hannah Arendt's book on the 1961 trial of Adolf Eichmann *in Jerusalem*. Struck by Arendt's conclusion that the SS lieutenant colonel and transportation administrator of the "Final Solution" wasn't a monster but rather saw himself as a bureaucrat doing his job, Milgram presumed that "Though such prescriptions as 'Thou shalt not kill' occupy a preeminent place in the moral order, they do not occupy a correspondingly intractable position in human psychic structure. A few changes in newspaper headlines, a call from the draft board, orders from a man with epaulets, and men are led to kill with little difficulty."[3] In drawing this hypothesis, Milgram suggested that obedience to authority could as effectively strip moral principles from individuals in the United States of the 1960s as it had in Nazi Germany two decades earlier.

As a Ph.D. student, Milgram investigated conformity in an experimental setting, editing a book on the results of a series of experiments on conformity by his mentor, psychologist Solomon Asch. In these trials male college students who volunteered to participate in the study were informed that they would be interacting with a group of other college students although in reality the others were all actors. Meeting with a student and the group together, Asch displayed a card with a drawing of a line, then another card with a drawing of three lines. When asked to identify which line on the card with three lines matched the first card with a single line drawn on it, the actors all offered an incorrect answer. Asch's results suggested that peer pressure significantly affected the subject's behavior, with 75 percent of the subjects answering at least one question incorrectly. When he began his own research, Milgram saw an opportunity to move the exercise beyond mere academic and logical disagreements, making the experience more physical and of greater public interest:

> I was trying to think of a way to make Asch's conformity experiment more humanly significant. I was dissatisfied that the test of conformity was judgments about *lines*. I wondered whether groups could pressure a person into performing an act whose human import was more readily apparent, perhaps

> behaving aggressively toward another person, say by administering increasingly severe shocks to him. But to study the group effect…you'd have to know how the subject performed without any group pressure. At that instant my thought shifted, zeroing in on the experimental control. Just how far *would* a person go under the experimenter's orders? [4]

The key for Milgram was human experience, "The important task, from the standpoint of a psychological study of obedience, is to be able to take conceptions of authority and translate them into personal experience. It is one thing to talk in abstract terms about the respective rights of the individual and of authority; it is quite another to examine a moral choice in a real situation."[5] Obedience, Milgram observed, is nothing less than "the psychological mechanism that links individual action to political purpose." [6]

Milgram initially sought funding from the Office of Naval Research under the pretext that it would give insight into how the Red Chinese were able to extract information from captured American soldiers, but instead approached the National Science Foundation for funding a study on obedience in the laboratory when he felt his prospects were better there. Milgram received notification that funding was approved for the obedience studies on May 3, 1961, at the end of the academic year when most students were already planning their summer vacations so he took the experiments outside of the academic setting by employing local volunteers as subjects.[7]

Milgram solicited subjects through a set of ads in the *New Haven Register* as well as through phone calls to randomly chosen individuals from the white pages, inviting them to participate in a Yale University sponsored experiment purportedly about learning. Individuals were usually male, between the ages of twenty and fifty, but chosen to reflect diverse socioeconomic and professional backgrounds. Subjects were greeted by John "Jack" Williams, a thirty-one-year-old high school biology teacher who played the role of the experimenter, wearing a gray lab coat to distinguish him as a laboratory scientist—not the more common white coat that could have signified a mere medical professional. Williams then paired the volunteer with a purported volunteer named "Mr. Wallace" who was really James McDonough, a forty-seven-year-old head payroll auditor at the New York, New Haven & Hartford Railroad. McDonough was employed to play the role of the learner or victim. Milgram would observe: "This man would be perfect as a victim—he is so mild mannered and submissive; not at all academic… Easy to get along with" and described him as "stout and kind of sloppy… he looked like a cardiac type."[8] After giving each individual $4.50 for their trouble and explaining the importance of the

study, Williams had them choose a piece of folded paper to randomly assign one as teacher and the other as learner. In fact, the drawing was rigged with a sleight of hand trick.[9]

Once teacher and learner accepted their roles, Williams gave instructions to both and the experimenter led the learner to a room. The teacher witnessed Williams attach electrodes to McDonough and strap him into a chair. Sitting in an adjoining room where he monitored the learner via a glass window and sound system, the teacher was instructed to give word pairs to the learner who was to repeat them back. After each incorrect answer, the teacher was instructed to depress a lever on a 3ft long, 15.5 inch high, and 16 inch deep apparatus that contained a line of thirty switches, each corresponding to an increasing level of voltage and labeled in groups reading "Slight Shock, Moderate Shock, Strong Shock, Very Strong Shock, Intense Shock, Extreme Intensity Shock, and Danger: Severe Shock."[10] As the learner made mistakes, the teacher would deliver ever-increasing levels of shock.

The point of the obedience to authority experiment was to examine the reaction of the teacher as the level of voltage increased. The teacher was expected to experience a degree of moral conflict as the simulated voltage levels increased and the learner feigned crying out in pain, complaining that he had a heart condition and begging the teacher to stop. When the teacher hesitated or threatened to quit the experiment, the experimenter would insist that the teacher must continue and that the experiment would be ruined if they quit. The experimenter would use a series of escalating prods to encourage the subject, first saying "Please continue," or, "Please go on," then "The experiment requires that you continue," followed by "It is absolutely essential that you continue," and finally "You have no other choice, you must go on."

Milgram reported that some 65 percent of subjects willingly subjected the learner to the highest voltage levels indicated on the shock machine.[11] In describing the results, Milgram observes,

> "Many subjects will obey the experimenter no matter how vehement the pleading of the person being shocked, no matter how painful the shocks seem to be, and no matter how much the victim pleads to be released. This was seen time and again in our studies and has been observed in several universities where the experiment was repeated. It is the extreme willingness of adults to go to almost any lengths on the command of an authority that constitutes the chief finding of the study and the fact most urgently demanding explanation."

In doing so, Milgram continues, individuals were often going against the very core of their beliefs about right and wrong, but still "could not bring themselves to make

an open break with authority." Despite protestations, they went on to perform the experimenter's bidding.[12]

This conflict between abstract principles, no matter how fervently held and the actions of individuals in an experimental setting was the very focus of the experiment. However, Milgram argued that the setting was critical to making the role of authority clear. In his six-page-long grant proposal, he introduces the use of a simulated shock generator, explaining his other intention to experiment with the influence of the experiment's setting itself:

> The question is not so much the limits of obedience. We know that given certain general circumstances, such as the situation of an army in war, men can be commanded to kill other men and will obey; they may even be commanded to destroy their own lives and will comply. Thus it is by no means the purpose of the study to try to set the absolute limits of obedience. Within a laboratory situation we cannot create the conditions for maximum obedience; only the circumstances of real life will extract the highest measure of compliance from men.
>
> We can, however, approach the question from a somewhat different viewpoint. Given that a person is confronted with a particular set of commands "more or less" appropriate to a laboratory situation, we may ask which conditions increase his compliance, and which make him less likely to comply.[13]

To this end, Milgram carefully developed an experimental environment, presenting a book titled *The Teaching-Learning Process* to the subject as an intellectual pedigree for the experiment. As well, the purported shock machine produced realistic noises of relays clicking and circuits buzzing as the shocks appeared to be administered and delivered a demonstration shock of forty-five volts to the teacher at the start of each experiment to prove how it worked while setting a baseline voltage that the teacher could identify. The contraption itself was sufficiently convincing to pass inspection by two electrical engineers.[14] Before running the experiment, Milgram ran a series of "pre-tests" on early volunteers. Receiving dismal results—few subjects obeyed the experimenter's orders—he tuned the experiment repeatedly until it would generate positive results. He modified the setting repeatedly over the course of the experiment to compare results, for example, putting teachers and learners in the same room, adding a third actor who would simulate the role of the teacher, making the experimental subject merely a bystander, or removing the experiment from the university campus to a nondescript office building in Bridgeport, Connecticut.[15] Milgram later declared,

"Although experiments in chemistry and physics involve shiny equipment, flasks, and electronic gear, an experiment in social psychology smacks much more of dramaturgy or theater."[16]

Milgram's allusion to theater and its emphasis on settings, staging, and props recalls both Richard Wagner's idea of the *gesamtkunstwerk* as well as the work of Milgram's contemporary sociologist Erving Goffman, for whom everyday life is essentially an act of theater. For Goffman social interactions between participants are facilitated through a series of assumed roles established by behavior, speech, props, and sets. An unspoken trust between individuals exists, Goffman concludes: so long as behaviors follow group expectation, the resulting story will be believed.[17]

Having completed Obedience to Authority, Milgram faced the task of explaining the moral conflict produced within the individual at the shock machine and how he or she deferred to the experimenter, thus assuming a role outside of normal behavior. Milgram concludes that since organized social life—and with it a coordinated hierarchical social structure—has clear advantages for survival, "from the standpoint of cybernetics, the most general need in bringing self-regulating automata into a coordinated hierarchy is to suppress individual direction and control in favor of control from a higher level of authority." Curiously, this mention of cybernetics is something of an anomaly in Milgram's work and does not appear in any of his previous journal articles. Still, Milgram kept abreast of trends in academia, so this reference points less to Milgram's allegiance to a cybernetic theoretical framework and more to his reliance on the authority of scientific theories then *en vogue*.[18] But this reliance on cybernetics was not entirely a matter of fashion, for if a system demanded that individuals subordinate themselves to it, obedience to authority would naturally arise in evolution. The key, Milgram explains, is the "agentic shift" in which the individual makes a transition to acting on behalf of the other: "of course, we do not have toggle switches emerging from our bodies, and the shifts are synaptically effected, but this makes them no less real."[19] In other words, the agentic shift transforms the individual acting according to internal guidance to a node in the network. But if the agentic shift allows us to participate in a social network, it also allows us to commit unspeakable acts of cruelty.

Embedded in Milgram's experiment was an additional cruelty on the subject. As Milgram recognized from the start, acting against one's principles could cause emotional damage to the teacher by producing cognitive dissonance. In an effort to ameliorate this, Milgram had Williams explain the nature of the project once the experiment was complete, revealing that McDonough had not been subject to any real shocks and bringing him back on stage to restore an environment of friendly

relations. Milgram then noted the reactions of the teachers to the news.[20] In this conclusion to the experiment—recorded in a documentary film—echoed the punch line of the popular television show *Candid Camera*. Milgram was a fan of this show—as a student at Cornell producer Allen Funt was an assistant to Kurt Lewin, one of the founders of social psychology—in which skits were not complete until the subject became fully cognizant of the situation.[21]

But this process of "dehoaxing," as Milgram describes it was itself a sham. Perhaps to avoid word getting out that the experiment was rigged, most subjects were not told the entire truth, merely reassured that they had not harmed the learner and that the shocks weren't as bad as they seemed. During the reconciliation, the learner would frequently say only that the shocks had not been painful, that he was merely getting overexcited. The truth of the experiment would only be revealed months later, via a letter.[22]

It was not just the volunteers who were caught up in Milgram's fiction. Recent research suggests that Milgram's results indicating 65 percent compliance were limited to one iteration of the experiment. Instead, a close study of the results suggests that some 60 percent of subjects refused to comply.[23] Moreover, although Milgram indicated that Williams, the experimenter, would only coldly indicate that the success of the experiment depended on the teacher's continuing, as the experiment wore on, Williams played a greater role, not only pushing subjects to continue, but also downplaying the effect of the shock, saying that it caused no harm.[24]

Not all volunteers were dupes. Many saw through the fiction, often stating that the elaborate staging of the experiment led them to believe it was phony. Only some 56 percent of subjects fully believed that the experiment was valid. Of subjects who were "obedient," some 3.8 percent were convinced it was rigged and there were no shocks whatsoever being given, while 16 percent believed that the subject was likely not getting any shocks. Thus, a significant portion of teachers willing to give shocks were as much actors as the experimenter and the learner. Those least willing to give the highest level of shocks were typically those most convinced that the shocks were real.

Milgram downplayed such contradictory information while critics fed the fire by arguing that unlike *Candid Camera*, Milgram's obedience to authority experiment produced potentially destructive real-world effects on the participants. For psychologist Diana Baumrind, by leading a subject to commit unethical acts Milgram damaged his or her sense of trust in the profession. Merely revealing the shock as a charade, she argued, would not erase that damage. Further, the revelation of this charade might cause further harm as the subject realized he or she had been made a fool, thus losing the opportunity to properly work through the trauma. Baumrind called for

developing ethical guidelines to prevent future damage to the profession, and in 1973 the American Psychological Association published revised ethics guidelines discouraging the use of deception in experimentation.[25]

Although many of the subjects did indeed feel trauma, Baumrind was certainly right when it came to the individuals playing the part of the learner and the experimenter. McDonough, the learner, died in 1965, three years after the experiments were completed; while Bob Tracy, who briefly also played the learner, died two years later. Perhaps the Milgram experiment had a placebo effect of the worst kind after all.

Other critics saw even greater darkness in the work and, in so doing, gave it ever greater notoriety and prominence. In rejecting Milgram's paper on the experiment for publication in the *Journal of Personality,* editor Edward E. Jones called it a "triumph of social engineering." Psychologist and ethicist Herbert C. Kelman later echoed this sentiment in an article describing the use of deception in such experiments as having an unpleasant parallel to the rising tide of systematic deception and manipulation of humans on a mass scale by political campaigns. Kelman was concerned about the use of computers to process the results of large-scale, public opinion polls to determine the response of populations to campaign issues, and thus reduce political action to a by-product of marketing. At its most dangerous, it became clear to many that the Milgram experiment could be a blueprint for mass control. Bruno Bettelheim would describe the research as "so vile that nothing these experiments show has any value. They are in line with the human experiments of the Nazis."[26]

In a rare dissent, psychology professor Hank Stam argues that Milgram's most fundamental insight is that the laboratory setting could be adapted to make anyone do anything. In the abstract world that Milgram created, any result would be possible once the experimental setting had been fine-tuned. Stam concludes, "He had this other story in mind already. He knew what success would look like."[27]

Milgram was initially reluctant to publicize his research in the popular press, claiming that it would interfere with future research, but once published, the work soon spread through a series of popular press accounts. Milgram reacted by becoming a savvy popularizer of his work, releasing his study as both a mass-market paperback and a documentary film. The experiment captured the imagination of the public in a made-for-TV movie. The lessons of the obedience to authority experiment quickly became part of popular culture and were applied to understanding disturbing events such as the My Lai massacres and Abu Ghraib torture and abuse scandal. In doing so, the experiment proved that its real significance is that it reveals how everyday life is made up of a series of shared stories in which actors, backgrounds, props, and even architecture are equal influences in our understanding of reality. Instead of

living life according to clear ideas of right and wrong, the experiment suggests our context determines our thoughts and actions. In doing so, the Milgram experiment becomes one of these stories, purporting to account for our inhumanity to each other and thus legitimate it.

Having established that stories organize daily life, Milgram then developed his own role as a storyteller, creating a clearer picture of what a social structure made up of actors simultaneously playing different roles would look like in his other famous experiment, the "small world problem." Having understood the importance of public opinion, he published these results first not in a scientific journal but in the inaugural issue of *Psychology Today* and introduced the experiment with a story.

> Fred Jones of Peoria, sitting in a sidewalk cafe in Tunis, and needing a light for his cigarette, asks the man at the next table for a match. They fall into conversation: the stranger is an Englishman who, it turns out, spent several months in Detroit studying the operation of an interchangeable bottle cap factory. "I know it's a foolish question," says Jones, "but did you ever by any chance run into a fellow named Ben Arkadian? He's an old friend of mine, manages a chain of supermarkets in Detroit."
>
> "Arkadian, Arkadian," the Englishman mutters. "Why, upon my soul, I believe I do! Small chap, very energetic, raised merry hell with the factory over a shipment of defective bottle caps."
>
> "No kidding!" Jones exclaims in amazement.
>
> "Good lord, it's a small world, isn't it?"[28]

For Milgram, this anecdote illustrates that regardless of the vast number of individuals in this world, random links within networks make such startling encounters relatively commonplace. Milgram continues, citing Jane Jacobs, who in *The Death and Life of Great American Cities* describes a game of "Messages" that she and her sister played after moving to New York. In the game, they imagined how a message might pass by word of mouth between "two wildly dissimilar individuals—say a headhunter in the Solomon Islands and a cobbler in Rock Island, Illinois…" Each sister would come up with a chain of messengers and the one who could provide the shortest chain would win. Jacobs's point was that to be successful a city district needed "hop-skip" people, often politicians or public officials, who knew large numbers of individuals and could cut long chains of communication significantly, thus weaving together the district in resilient social patterns.[29]

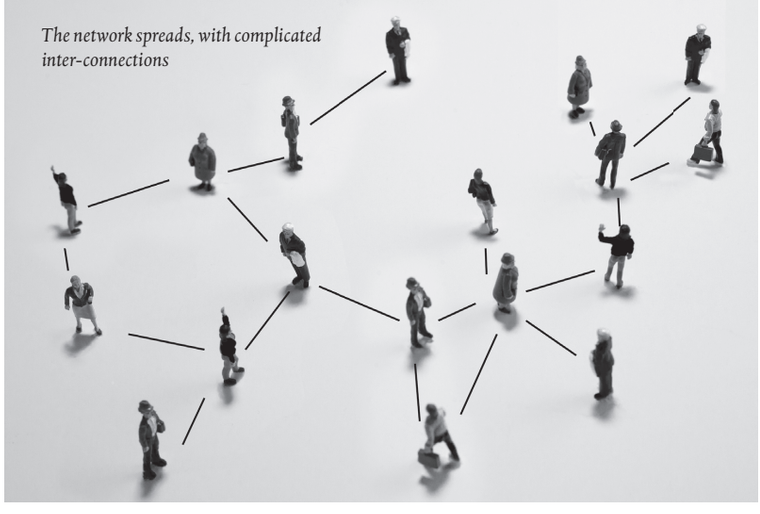
Where obedience to authority was based on Asch's work, the small world experiment was based on a mathematical model and subsequent survey developed by MIT researchers Ithiel de Sola Pool, Manfred Kochen, and Michael Gurevich. They concluded that even if there was only a one in 200,000 chance that two Americans might know each other, there was a 50 percent chance that they would be connected by two people that each might know.

To conduct his experiment, Milgram distributed a set of letters to randomly selected "starters," individuals in Omaha, Nebraska, and Wichita, Kansas, each requesting to have a package sent to a specific "target," a stockbroker living and working in Boston. If the starter did not know the target, they were asked to forward the letter to someone they knew who they thought was likely to know the target or how to reach him; this new person would become the next link in the chain. Milgram soon concluded that five intermediaries—or six degrees of separation—was the average it would take to convey a message from one individual in the "vaguely 'out there'" to the Boston stockbroker.[30]

But as a storyteller, Milgram is an unreliable narrator. Milgram boasted that he wrote his papers while on drugs and could tell precisely which drug he was under the influence of—marijuana, mescaline, cocaine, or methamphetamine—when he looked at the texts later.[31] Indeed, the results from the small world experiment are far from conclusive. Milgram himself notes that of 160 chains started in Nebraska, only forty-four were completed, attributing it to a lack of obedience among subjects.[32] More recently, however, Judith Kleinfeld points out that in a first, unpublished study only 5 percent of the letters made it through and even in the published studies, the rate of completion was only 30 percent. While Milgram argues that the high dropout rate was a matter of apathy or disobedience, Kleinfeld observes that the article to be delivered was "an official-looking document with a heavy blue binding and a gold logo," hardly something that should readily be put aside. Likely, she suggests, the chains had hit a dead end. Kleinfield concludes, "the belief that we live in a small world gives people a sense of security. And small-world experiences that we encounter naturally buttress people's religious faith as evidence of 'design.'"[33]

However, religion is based on stories and the small world experiment is a good story. Indeed, today it seems that we have adopted the network as a faith. Networks and the small worlds they describe serve as organizational models for businesses and universities, friendships and economies. In doing so, they stand in for our own behavioral process; few people want to believe that their thoughts and actions are determined by a sequence of programmed instructions, but most don't mind understanding their relationships with others, or even their bodies or brains as comprised

Random dispersement of people in the small world



The network spreads, with complicated inter-connections

of networks. Milgram understood the consequences of the shift he had uncovered. In his conclusion to the experiment, Milgram phrased it succinctly: "while many studies in social science show the individual is alienated and cut off from the rest of society, this study demonstrates that, in some sense, we are all bound together in a tightly knit social fabric."[34]

The conclusion to obedience to authority initially appears to be directly opposed to that of the small world experiment. In the former individuals lose their sense of empathy and connection with other humans when placed in a bureaucratic condition, in the latter we find ourselves part of a vast, interlinked chain of humanity. But small world has a darker side as well. Jacobs's game—and small world—are uncannily similar to Hungarian writer Frigyes Karinthy's 1929 short story "Láncszemek" or "Chain-Links." One of a series of character studies that Karinthy became famous for (Milgram, we should add, was born to a Romanian-Jewish mother and Hungarian-Jewish father), "Láncszemek" appears as stream of consciousness reflection by a somewhat manic narrator sitting in a café. Looking for a sign of direction or evolution in the universe, the narrator finds it in global telecommunications which he concludes has brought the Earth's population closer together than ever before, making it possible to connect any two people in the world to each other through just five intermediate links. This reflection allows the narrator to see the world as simultaneously vast and intimate, and in that dialectic find a new spirituality, the knowledge that "[the] *last link leads to me,* the source of everything."

Even if the global telecommunications network was still in its infancy when he wrote his story, unlike Jacobs and Milgram, Karinthy understood the inherent narcissism of a network-based existence. Like Facebook, small world and "Láncszemek" replace God with the individual, putting us at the center of a vast social web enveloping the entirety of humanity. Milgram's insight is the "good news" of a new religion: we can leave behind a modern culture of disconnection and alienation and turn to a world that revolves around us by adopting the network and its culture of interconnection.

In the end, both obedience to authority and small world demonstrate that stories are not merely incidental to science and everyday life but rather are constitutive of it. It is the stories we tell ourselves—and the Milgram experiment and small worlds are prime examples—that create the rules that bind us together in a network and that allow us to act as we do to each other. In this, architecture becomes a backdrop, the stage set that makes the stories with which we organize our lives possible.

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11 Perry, 9.

12 Milgram, *Obedience to Authority,* 5, 10.

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14 Blass, 78–81.

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16 Quoted in Blass, 264.

17 Goffman.

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23 Perry, 9.

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27 Perry, 249–250.

28 Stanley Milgram, "The Small-World Problem," *Psychology Today* 2, no. 1 (1967): 60. Milgram would subsequently publish this material in a scholarly study with Harvard sociologist Jeffrey Travers as principal investigator. Travers and Milgram "An Experimental Study of the Small World Problem." *Sociometry 32, no. 4 (1969): 425-443.*

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30 Milgram, "The Small-World Problem," 66.

31 Blass, 65.

32 Milgram, "The Small-World Problem," 65.

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34 Milgram, "The Small-World Problem," 67.