Humane "Weapons"

At about the time that the Department of Defense was preparing its weather modification program as a weapon to be used in Vietnam (News and Comment, 7 June, p. 1054) two reports by Harrison Salisbury (*1*) appeared in the *New York Times* describing how the Vietnamese moved massive amounts of material by strapping heavy loads of supplies on bicycles which were guided along highways by barefoot Vietnamese. At about the same time, the U.S. Air Force was being accused of dropping vicious shrapnel-producing antipersonnel bombs in their attacks upon transportation routes in North Vietnam. Since Salisbury's eyewitness reports suggested that, at the time of an air raid, the Vietnamese left the highways and then resumed their bicycle convoys as soon as the raids were over by simply walking around the craters that were created, I took the opportunity to write to the then Secretary of Defense Robert McNamara with a suggestion of a more humane and perhaps effective means of combatting the bicycle without destroying people and the environment.

My suggestion was that small, sharp pieces of metal similar to the familiar six-pronged children's jacks be dropped in large quantities along the dirt roadways. I reasoned that these would become imbedded in the roadways and would be a great impediment to bare Vietnamese feet or to the pneumatic tires of bicycles. In order to prevent feet and tires being punctured, time would have to be taken after each air raid to carefully sweep the embedded fragments from the roadbed. I am unable to locate the reply I received from the Assistant Secretary of Defense for Public Information. I recall that he thanked me for my suggestion and said that it would be referred to the proper office of the Department of Defense for consideration. Actually, my colleagues and I (I was on the faculty of Columbia University at the time) thought the implication was clear that my letter had been sent to the "nuisance file." It did not seem to have even merited placing me under investigation as a subversive, although one never knows on such matters.

Now that I read the *Science* report on weather warfare, I wonder whether I should have pursued the matter further. How foolish could my suggestion have been compared to the 7-year, multimillion-dollar effort to produce questionable amounts of rainfall during the monsoon season? As Deputy Secretary of Defense Doolin told Senator Pell (D–R.I.) during the hearings, even if 2 inches of rain were added, it would be hard to know the difference. I think that Senator Pell was being overly generous when he said, "an elephant labored and a mouse came forth." The quoted exchange between Senator Pell and General Furlong concerning the possibility that emulsifiers may have been used to attempt to make the mud retain its slipperiness makes me regret that I had not hit upon an even better weapon than children's jacks—Silly Putty.

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References

1. H. Salisbury, *New York Times*, 7 January 1967, p. 1; *ibid.*, 12 January 1967, p. 1.

Computer Music

I have strong reservations about the viability of the type of work reported in the article "Computers and Future Music" by Mathews, Moore, and Risset (25 Jan., p. 263). When musicians play a musical score, the score may be thought of as the input to a system the output of which is sound with affect, that is, music. However, the quantity of data contained in the output sound that may be mapped algorithmically from the input score is only a fraction of the data that are required to completely specify the output. Indeed, in the case of popular music—and the overwhelming majority of music performed and heard is popular music—the score represents only a small fraction of the data contained in the end product. The remaining data, which contribute largely to the emotional content of the sound and thus serve to differentiate music from simply sound, come from the performing musicians themselves as they function in a very heuristic, intuitive, and humanistic capacity. This function of the performing musician depends upon his actually hearing the score played, rather than just imagining how it will sound, and, in the case of an orchestra, also depends upon his interactions with the other players. Therefore, the performer-generated data cannot originate with the composer, and so cannot be included in the score. Hence if an automaton is to take the place of the human beings who perform music, then it must be capable of generating the data that must be *created* by the performer. And the computer that can do this, that can "bootstrap" the interpretation of the inspired soloist, would be able to pass the Turing test without blinking a byte. Consequently, any meaningful success of a project such as Groove is not to be expected, except, perhaps, in the very distant future when robots and people are more or less interchangeable.

I urge the researcher interested in electronic music, before embarking on any project, to contact the National Academy of Recording Arts and Sciences at 6430 Sunset Boulevard, Hollywood, California 90028, and learn what the needs of the music industry are.

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Mathews, Moore, and Risset have made valuable contributions to the technology of computer music and can be expected to continue to do so, but their estimates of the state of music at present and the particular impact of computers on the music of the future seem to me largely mistaken.

Relatively few composers of our time are "frustrated in trying to create new expression with traditional instruments." Quite the contrary, there seems to be a reawakening of interest in music for traditional instruments. The music of such composers as Elliott Carter, George Crumb, and William Albright is performed widely and apparently enjoyed by a growing public. While some symphony orchestras are in financial trouble, there are many that are playing innovative music and enjoying generous community support. One problem with the analysis of Mathews *et al.* may lie in their conception of productivity. Apparently the total number of man-hours spent listening to music is to be taken as the output measure of the medium of musical production. It follows that the most pro-