Fear of Falling Behind and the Medicalization of Computer Attitudes in Cold War USA (1960s–1980s)

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Abstract
This article explores the multifaceted ways in which fear has informed US computer narratives during the Cold War, by analyzing the relationship between "fear of falling behind" and the medicalization of "computer attitudes", "computer anxiety" and "computerphobia" (CAAP). The article focuses on the historical unfolding of this medicalization process from the 1960s to the 1980s, drawing upon the parallel developments of debates about computers in education and the formalization of CAAP as a research topic in the Behavioral Sciences. These developments are presented through official reports, conference proceedings, and academic articles of the period. Large computer projects by the US military-industrial complex, such as SAGE or SDI, were justified by narratives of the fearful consequences of falling behind in the Cold War. From the 1960s onwards, resistance to computers was described as an individual "anxiety" or "phobia" in a number of reports and studies. These negative feelings allegedly hindered personal and professional success as well as endangered the future of the country. In this way, the Cold War "fear of falling behind" was translated into a concern which was rooted in the individual sphere. Furthermore, CAAP definitions were informed by Cold War ambitions of building a technologically advanced capitalist society. As a result, the medicalization of CAAP marginalized competing perspectives on computers and their social significance, particularly those originating in the counterculture of the 1960s and 1970s.

Überblick
Dieser Aufsatz analysiert, wie Angst die Computer-Narrative in den USA während des Kalten Krieges geprägt hat. Die „Angst vor dem Zurückbleiben" führte zur Medikalisierung von sogenannten Computer-Einstellungen ("computer attitudes"), Computer-Unwohlsein ("computer anxiety") und Computer-Angst ("computerphobia"), die hier unter dem Begriff „CAAP" zusammengeführt werden. Der Aufsatz fokussiert dabei auf die Debatten über den Einsatz von Computern im Lehrbetrieb und auf die Formalisierung von CAAP-Forschung in den Verhaltenswissenschaften in den 1960er und 1970er Jahren. Als Quellen wurden vor allem Studien, Konferenzmaterial und

akademische Veröffentlichungen genutzt. Großangelegte US-amerikanische Computer-Projekte wie SAGE oder SDI – hervorgegangen aus intensiver militärisch-industrieller Kooperation – wurden in dieser Zeit durch angsterfüllte Narrative vor einem möglichen Zurückfallen im Kalten Krieg legitimiert. Gleichzeitig wurde der wachsende Widerstand gegen Computerisierung seit Beginn der 1960er Jahre in zahlreichen Studien als individuelle „Angst" oder „Phobie" beschrieben. Diese negativen Einstellungen würden, so die implizite Vorstellung, nicht nur individuellen und beruflichen Erfolg, sondern auch die Zukunft des gesamten Landes gefährden. Auf diese Weise wurde die Kalte-Kriegs-Angst vor dem Zurückbleiben auf das Individuum und die Privatsphäre übertragen. Die CAAP-Forschung war entscheidend von den Bestrebungen geprägt, eine technologisch fortschrittliche Gesellschaft zu formen. Diesem Gesellschaftsbild widersprechende Computernutzungen wurden durch die Medikalisierung von CAAP-Verhaltensweisen marginalisiert. Dies betraf insbesondere Perspektiven, die in den 1960er und 1970er Jahren von der sogenannten „Gegenkultur" favorisiert wurden.

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During the 1980s, the spread of "computerphobia" became a much debated issue in the United States. According to scholars and popular writers, this so-called illness prevented US citizens from fully appreciating the benefits of computers. From 1985 to 1988, the US Department of Education also funded a "Computerphobia Reduction Program".[1] By the end of the decade almost 300 academic articles and dissertations on this topic had been published.[2] In the 1980s, however, fear was also used as a Cold War rhetorical strategy to justify expenditures for military technologies.[3] The significance of fear in Cold War discourses on technology has already received some attention in academia, e.g. in the case of nuclear energy.[4] However, the relationship between Cold War fears and computers is still a largely unexplored territory in history. In this article I will investigate the multifaceted ways in which fear has informed US computer narratives during the Cold War period. I will do so by analyzing the historical developments of the notion of "computerphobia" as a topic of academic interest: What is the relationship between the "computerphobia"

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1   Michelle M. Weil, Larry D. Rosen and Deborah C. Sears, "The Computerphobia Reduction Program. Year 1. Program Development and Preliminary Results", Behavior Research Methods, Instruments, & Computers 19, No. 2 (1987), 180–184.

2   Martin Bauer, "'Technophobia'. A Misleading Conception of Resistance to New Technology", in Martin Bauer (ed.), Resistence to New Technology (Cambridge 1995), 97–122, 100.

3   Peter N. Stearns, American Fear. The Causes and Consequences of High Anxiety (New York, London 2006), 187–188.

4   Spencer R. Weart, The Rise of Nuclear Fear (Cambridge, Mass., London 2012); Sheila Jasanoff and Sang-Hyun Kim, "Containing the Atom. Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea", Minerva 47, No. 2 (2009), 119–146.

discourse and other Cold War fearful narratives about computers? How did these fearful narratives inform the notion of "computerphobia" over time?

My perspective will be that of Cultural and Social History of Technology. In particular, my focus will be on the relationship between fear and computer narratives.[5] In my analysis of "computerphobia" I will also include literature on "computer attitudes" and "computer anxiety". "Computerphobia" and "computer anxiety" are actually a subset of a larger field of research on "computer attitudes" in general. From now on, then, I will address these three concepts collectively under the acronym "CAAP". My investigation will cover the period from the 1960s, when "computers" were mostly large mainframes used by institutions and companies, through the 1980s, when personal computers became an increasingly common household item. In my sources the main technology-related change in CAAP research is the increase and formalization of CAAP studies in the 1980s, paralleling the greater availability and diffusion of (personal) computers which had started in the mid-1970s.

Thereby, I do not wish to discuss "people's fear of computers", but rather to understand which (and whose) social and political expectations were expressed in the computerphobia narrative. In fact, social psychologist Martin Bauer pointed out how computerphobia studies produced a medicalization of resistance to computers,[6] rather than exploring this resistance. By "medicalization" Bauer meant "the expansion of medical expertise to areas of life formerly not within that expertise, [which] functions overall to control, to discipline and to constrain deviance within society at large".[7] Lori Reed also presented a similar perspective in the field of Communication Studies, where she analyzed computerphobia as a normalizing discourse on computer behav-

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5   My research follows the perspective being developed by the research group on "Fearful Technologies" chaired by Karena Kalmbach and Andreas Spahn at Eindhoven University of Technology. The group inquires on the different ways in which fear informed technological development, particularly focusing on the use of fearful narratives to promote technology.

6   See Bauer, "Technophobia". Bauer has published extensively on the theme of public attitudes to technology, and particularly on resistance cases. He is most famous for his work on biotechnologies.

7   Ibid, 98. Bauer developed his definition of "medicalization" from Peter Conrad, "Medicalization and Social Control", Annual Review of Sociology 18, No. 1 (1992), 209–232. In this article I use the same definition. My analysis is also informed by the perspective on "medicalization", and the related notion of "pathologization", as developed in the field of Anthropology, for example in: Nancy Scheper-Hughes and Margaret M. Lock, "The Mindful Body. A Prolegomenon to Future Work in Medical Anthropology", Medical Anthropology Quarterly 1, No. 1 (1987), 6–41; Allan Young, The Harmony of Illusions. Inventing Post-traumatic Stress Disorder (Princeton 1997); Dimitrios Theodossopoulos, "On De-Pathologizing Resistance", History and Anthropology 25, No. 4 (2014), 415–430. In this article I use "medicalization", and not "pathologization", to stress a continuity with Bauer's work and because my focus is on the computerphobia narrative as developed in the clinical field of psychology.

ior.[8] However, Bauer and Reed focused their analysis on literature from the 1980s and 1990s, mostly presenting the final outcomes of the medicalization process.[9] To answer my research questions I will contextualize and expand the analyses by Reed and Bauer. I will argue that the computerphobia narrative was informed by a "fear of falling behind". With "fear of falling behind" I mean the argument through which computers were presented as an urgent and unavoidable technology, whose adoption was necessary to achieve or maintain geopolitical, economic or social status. The notion of "computerphobia", in fact, was guided by competing visions of the role of computers in society. Two main actors were involved in this debate: on the one hand, the US Cold War military-industrial complex; on the other hand, the counterculture movement of the 1960s and 1970s. I will claim that the "fear of falling behind" originated in the US military-industrial complex's Cold War narratives about computers, as described by Paul Edwards.[10] Edwards showed how metaphors linked to the notions of "containment" and Cold War competition were embedded in US computer narratives. Cold War competition was also one of the main sources of fearful narratives in the US, as discussed by Stearns.[11] This relationship between computerphobia and "fear of falling behind" can be seen in the field of education, for three reasons. First, education was the US public sector which, regarding computer adoption, lagged behind the most up to the 1980s.[12] Second, already in the 1960s, educators had been a frequent subject of CAAP research. Third, education, as a general concept, had a central role

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8   Lori Reed, "Domesticating the Personal Computer. The Mainstreaming of a New Technology and the Cultural Management of a Widespread Technophobia", Critical Studies in Media Communication 17, No. 2 (2000), 159–185; Lori Reed, "Governing (Through) the Internet. The Discourse on Pathological Computer Use as Mobilized Knowledge", European Journal of Cultural Studies 5, No. 2 (2002), 131–153. Reed focused on mentions of "computerphobia" in the popular press. She also analyzed the notion of "computermania", which became popular in the 1990s. Reed used the term "normalization" in a Foucaultian sense, defining normalizing discourses as "discourses which function toward the production, negotiation, and management of particular 'appropriate' and 'inappropriate' relationship among (potential) computer users, the new machine and culturally produced social organizations"; see Reed, "Domesticating the Personal Computer", 160.
9   Reed also observed that "computerphobia" was related to fearful arguments regarding computers from the 1960s and 1970s, e.g. ideas about dehumanization and depersonalization, however she did not explore in detail this relationship.
10 Paul N. Edwards, The Closed World: Computers and the Politics of Discourse in Cold War America (Cambridge, Mass., London 1996). Edwards defined the "closed world discourse" as: "the language, technologies, and practices that together supported the visions of centrally controlled, automated global power at the heart of American Cold War" (p. 7). The closed world discourse was based on the metaphor of "containment" and on its maintenance trough technological superiority.
11 See Stearns, American Fear, 11.
12 James W. Cortada, The Digital Hand, Vol. 3. How Computers Changed the Work of American Public Sector Industries (New York 2008).

in the counterculture of the 1960s and 1970s and its criticism of the military-industrial complex.

Therefore, this article will be developed in two sections, in which I will follow the parallel developments of computerphobia research, Cold War as well as counterculture narratives about education and computers. In the first section I will focus on the 1960s and the 1970s. "Computerphobia" was not yet a specific analytic category, since the focus was rather on the measurement of "attitudes" in general. In these two decades the "fear of falling behind" projected a fear of computers on the counterculture. In the second section I will follow the development of computerphobia research in the 1980s. During this time computerphobia as a research topic in the Behavioral Sciences became increasingly standardized and formalized. "Fear of falling behind" was translated into an individual concern. CAAP research placed all the responsibility for changing computer attitudes on the individual user, thereby denying the possibility to negotiate the sources of, as well as the solution for users' concern. Furthermore, this shift sanctioned the marginalization of a competing vision of computers (that of the counterculture) and pushed it into a form of "deviance".

My analysis will be based on three sets of sources. The first set contains reports and other materials on educational technologies from the 1960s to the 1980s, mostly collected through the Education Resources Information Center (ERIC) archive.[13] The second set is based on literature reviews on CAAP research.[14] The third set is a sample of CAAP articles I have assembled myself, using a combination of quantitative and qualitative filters. I based my selection on citations count, "pioneers" or early authors of CAAP studies, mentions in literature reviews or validation and comparison studies. The second and third sets include mostly sources from the 1980s, since CAAP research reached

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13 The archive is sponsored and maintained by the Institute of Education Sciences of the US Department of Education. It contains materials such as reports, conference proceedings or articles on the topic of education.

14 In particular I used the work of Bauer and that of some researchers in the field of psychology and behavioral sciences: Mary J. LaLomia and Joseph B. Sidowski, "Measurements of Computer Attitudes. A Review", International Journal of Human Computer Interaction 3, No. 2 (1991), 171–197; Mary J. LaLomia and Joseph B. Sidowski, "Measurements of Computer Anxiety. A Review", International Journal of Human Computer Interaction 5, No. 3 (1993), 239–266; Donald G. Gardner, Richard Discenza and Richard L. Dukes, "The Measurement of Computer Attitudes. An Empirical Comparison of Available Scales", Journal of Educational Computing Research 9, No. 4 (1993), 487–507; Anne L. Powell, "Computer Anxiety. Comparison of Research from the 1990s and 2000s", Computers in Human Behavior 29, No. 6 (2013), 2337–2381; Larry D. Rosen and Phyllisann Maguire, "Myths and Realities of Computerphobia. A Meta-analysis", Anxiety research 3, No. 3 (1990), 175–191; Janice E.J. Woodrow, "A Comparison of Four Computer Attitude Scales", Journal of Educational Computing Research 7, No. 2 (1991), 165–187. These reviews also contain materials about the 1990s. In the 1990s and 2000s CAAP research started to include the Internet and other Information Technologies as possible sources of anxiety and fearful thoughts. It also became more global, with cross-country comparative studies and more non-US literature.

its peak of popularity in the United States during that decade. Furthermore, many of the methodologies and measurement tools developed in the 1980s also had a considerable influence in the following decades.[15]

1. Cold War, the Counterculture and the Creation of Computerphobia: 1960s and 1970s

Paul Edwards identified three main ambitions of the US military-industrial complex Cold War discourse: "enclosing the Soviet Union"—depicting it as incompatible with democratic values; "enclosing the capitalist nations"—protecting them from external forces and ideas; "enclosing the entire world"—unifying it under the guidance of US capitalism.[16] I argue that these ambitions informed US computer narratives by imbuing them with a "fear of falling behind". Indeed, first and foremost, the success of the US Cold War ambitions required the country to remain ahead of the Soviet Union. In the military sector this argument was often used as justification for large investments in technology research and development. For example, the fearful consequences of losing the nuclear arms race were used to support projects such as SAGE[17] in the 1950s or the Strategic Defense Initiative[18] (SDI, colloquially known as "Star Wars") in the 1980s.[19] But this argument was not confined to large military projects.

In 1958 the National Defense Education Act (NDEA) opened a new chapter for the US education system. This act was one of the reactions to the successful launch of the Soviet Earth satellite Sputnik in 1957. The NDEA was an unparalleled case of government involvement in education on the federal level. It was informed by a fearful narrative on the backwardness of US technology education: the US lag was presented as harmful for national security.[20] Three provisions of the NDEA are interesting for the historical development of CAAP research. These are: a substantial funding for science and math education; the enforcement of standardized tests to measure attitudes and skills; the push towards a greater use of educational technologies in public institutions.[21] These three provisions show a connection between attitudes measurement and technology promotion existing already by the end of the 1950s, prompted by the US government's fear of falling behind during the Cold War. In the next two decades the goals and methodologies of CAAP

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15   See Powell, "Computer Anxiety".
16   See Edwards, The Closed World, 10.
17   "SAGE" stands for "Semi-Automatic Ground Environment". It was an air defense system based on a network of computers which combined data from several radar sites.
18   The Strategic Defense Initiative was a missile defense system designed to protect the US against ballistic nuclear weapons.
19   See Edwards, The Closed World, 110, 288; Stearns, American Fear.
20   Andrew Hartman, Education and the Cold War. The Battle for the American School (New York, Houndmills 2008), 175.
21   Respectively: Title III, Title V and VIII, Title VII.

research were laid out. In particular, CAAP were studied through individual self-report surveys assessing expectations, feelings and thoughts about computers.[22] The surveys used to assess CAAP were the outcome of different methodological choices. Some surveys were created from new.[23] Others were adapted from existing scales for anxiety measurements[24] or even from other CAAP surveys.[25] At this time CAAP research was mostly targeted towards specific professional categories, such as healthcare workers or educators. Some surveys also measured the attitudes of students who participated in programs using computer-assisted educational technologies.

In the early 1960s, IBM social psychologist Robert Lee ran a study titled *Social Attitudes and the Computer Revolution*, which is considered the first survey on computer attitudes in the United States by CAAP authors.[26] This study was conducted in 1963 but published only in 1970. Lee's article shows further connections between computer attitudes research and the Cold War discourse. The first connection can be spotted in the survey itself. Here, the first two "positive" statements in the CAAP survey reflect key themes in Cold War narratives: "[computers] make it possible to speed up scientific progress and achievements" and "[computers] are very important to our man-in-space program"[27]. The second connection appears when Lee discusses possible

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22 The surveys were structured as a list of short sentences. Each sentence contained a statement related to computers, either positive or negative. Most surveys showed a mix of both positive and negative statements, but some only presented negative ones. Study participants had to declare their level of agreement with each of the statements presented in the survey, for example on a range from 1 to 5. The researchers then analyzed the answers to assess the frequency, correlates and distributions of negative and positive attitudes.

23 In some cases they were produced by college students: Gary S. Nickell and John N. Pinto, "The Computer Attitude scale", Computers in Human Behavior 2, No. 4 (1986), 301–306; Matthew M. Maurer, Development and Validation of a Measure of Computer Anxiety (Ames 1983) (unpublished master's thesis, Iowa State University); in others through interviews to the general public: Robert Lee, "Social Attitudes and the Computer Revolution", Public Opinions Quarterly 34 (1970), 53–59; or by panels specifically created for the occasion, mostly composed of university professors; or by people who self-identified as "computer anxious": Brenda H. Loyd and Clarice Gressard, "Reliability and Factorial Validity of Computer Attitude Scales", Educational and Psychological Measurement 44, No. 2 (1984), 501–505; George A. Marcoulides, "Measuring Computer Anxiety. The Computer Anxiety Scale", Educational and Psychological Measurement 49, No. 3 (1989), 733–739; Loyd and Gressard mentioned generic "judges" without clarifying what they meant with this designation, Marcoulides included professors using computers for instructional support.

24 Brett A. Cohen and Gordon W. Waugh, "Assessing Computer Anxiety", Psychological Reports 65, No. 3 (1989), 735–738.

25 Jo N. Campbell and Judith E. Dobson, "An Inventory of Student Computer Anxiety", Elementary School Guidance & Counseling 22, No. 2 (1987), 149–156.

26 Robin H. Kay, "A Practical and Theoretical Approach to Assessing Computer Attitudes. The Computer Attitude Measure (CAM)", Journal of Research on Computing in Education 21, No. 4 (1989), 456–463, 456; Michelle M. Weil, Larry D. Rosen and Stuart E. Wugalter, "The Etiology of Computerphobia", Computers in Human Behavior 6, No. 4 (1990), 361–379.

27 See Lee, "Social Attitudes and the Computer Revolution", 55.

correlates of negative attitudes. He identified two predictors for negative computer attitudes which reveal an underlying anti-communist discourse. These predictors are the belief that "government owes everyone a comfortable life" and the "need [of] more government control in business".[28]

Between the late 1960s and 1975 IBM ran an advertising campaign in which, according to Aspray and Beaver, "both a threat and a censure are [...] projected [...]; the censure is that the failure to use computers is tantamount not only to rejecting the American Dream, but also to refusing to participate in improving America".[29] The image of the computer as a tool to achieve the American Dream resonates with the positive statements used in Lee's survey, e.g.: "[computers] will help bring about a better quality of life for the average man".[30] According to Aspray and Beaver this advertising campaign was a response to the "social turmoil" (their own words) of the period, and to the widespread criticism of multinational companies. This "social turmoil" stemmed from the competing visions by the military-industrial complex and the counterculture. The term "counterculture" was popularized by Theodore Roszak in 1969[31] to describe youth protests against the technocratic tendencies of US policymakers. Some of these protesters used technology as a symbolic tool to voice their concerns. In particular, participants of the Berkeley Free Speech Movement often employed IBM punched cards to criticize the increasing alienation and standardization of the US society.[32] Education was an important element in this movement for two reasons: first, as the name suggests, it originated within an educational institutions, the University of California Berkeley. Students remained a very large component of the Free Speech Movement once it spread outside of Berkeley. Second, the movement's criticism of the standardization of society was also prompted by a criticism of the standardization of educational institutions. The punched card used by the Berkeley protesters were their own cards, or cards belonging to the institutions in which they themselves received their education.

Indeed, the NDEA guidelines and particularly the interest in Computer Assisted Instructions (CAI) became visible at the turn of the decade. Computers entered US schools between the end of the 1960s and the beginning of the 1970s.[33] In the late 1960s the US Department of Education begun to use computer attitudes measurements as a way to test the efficacy of CAI pro-

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28   Ibid., 57–58.
29   William Aspray and Donald deB. Beaver, "Marketing the Monster. Advertising Computer Technology", Annals of the History of Computing 8, No. 2 (1986), 127–143, 139.
30   See Lee, "Social Attitudes and the Computer Revolution", 55.
31   Theodore Roszak, The Making of a Counter Culture. Reflections on the Technocratic Society and Its Youthful Opposition (Berkeley 1969).
32   Steven Lubar, "'Do not Fold, Spindle or Mutilate'. A Cultural History of the Punch Card", Journal of American Culture 15, No. 4 (1992), 43–55.
33   See Cortada, The Digital Hand.

grams.[34] During the same period CAAP research also had an interest in other professional categories, for example healthcare sector workers.[35] Educators, too, received particular attention as being directly involved with educational technologies. However, in the past, US teachers had not been adverse to innovation in the classroom.[36] Now there was rather a lack of innovation to begin with: experiments with CAI and other educational uses of computers started as early as in the 1950s, but software which was actually useful for teachers appeared only around the first half of the 1980s.[37] The introduction of computers in schools was in fact mostly pushed by politicians, parents, education administrators, computer vendors but only a minority of teachers.[38] Computers could be either used to study software programming, or for instructional support aimed at providing a more individualized education to students. But in the same period, during the counterculture wave, educators preferred experimenting with other forms of educational innovation. In fact, apart from the criticism against the standardized system, the counterculture movement also developed and promoted alternative ideas regarding the future of education. Examples can be found among the works of Ivan Illich[39] on libertarian education and those of Paulo Freire,[40] one of the founders of Critical Pedagogy. A tangible outcome of these experimental pedagogic theories was the Free School Movement which grew substantially in the 1960s and the 1970s.[41]

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34 Samuel M. Long and C. Alan Riedesel, Use of Computer Assisted Instruction for Mathematics In-Service Education of Elementary School Teachers (Pennsylvania 1967) (ERIC number: ED089791) (program report); Murray Melnick, The Effect of a Short Computer Course on Attitudes Toward the Computer (Hempstead 1969) (ERIC number: ED034474) (program report). In 1975 a review on the impact of CAI was also published: Anne Truscott King, Impact of Computer-Based Instruction on Attitudes of Students and Instructors. A Review. Final Report. Air Force Human Resources Lab., Brooks AFB, Texas (ERIC number: ED112872) (research report).

35 Marvin Reznikoff, Charles H. Holland and Charles F. Stroebel, "Attitudes Toward Computers Among Employees of a Psychiatric Hospital", Mental Hygiene 51, No. 3 (1967), 419–425; Terry T. Startsman and Robert E. Robinson, "The Attitudes of Medical and Paramedical Personnel toward Computers", Computers and Biomedical Research 5, 1972, 218–227; J. Mark Melhorn, Warren K. Legler and Gary M. Clark, "Current Attitudes of Medical Personnel Toward Computers", Computers and Biomedical Research 12, No. 4 (1979), 327–334.

36 See Cortada, The Digital Hand, 259.

37 See ibid., 264–265; Robert A. Reiser, "A History of Instructional Design and Technology. Part I: A History of Instructional Media", Educational Technology Research and Development 49, No. 1 (2001), 53–64.

38 See Cortada, The Digital Hand, 264.

39 Ivan Illich, Deschooling Society (New York 1971); Ivan Illich, "After Deschooling, What?", in After Deschooling, What?, ed. Alan Gartner, Colin Greer and Frank Reisman (New York 1973), 1–28.

40 Paulo Freire, Pedagogy of the Oppressed (New York 1970); Paulo Freire, Education for Critical Consciousness (New York 1973).

41 Allen Graubard, "The Free School Movement", Harvard Educational Review 42, No. 3 (1972), 351–373.

But the countercultural ideas for educational innovation clashed with the US Cold War ambitions of building a techno-industrialized country with a capitalist economy. Governmental documents on technology and education soon started to describe the Free Speech Movement as "fearful". In 1966 the National Commission on Technology, Automation and Economic Progress published a report on "Technology and the American Economy". This report contained an appendix on "Educational Implications of Technological Change", in which "the ill-defined drive toward a new value system, symbolized by the student revolts at Berkeley and elsewhere" is pointed out as one of the sources of present concern for the educational system.[42] In 1967 one of the first government reports on attitudes towards CAI mentioned that "For many students and teachers the computer and the IBM card are symbols of an automated society which is dangerously depersonalized".[43] In 1970, a report to the US President and Congress by the Commission on Instructional Technology again referred to punched card protests, as showing "fears [which] center around prospects of depersonalization, standardization, conformity and the gradual elimination of diversity".[44] In 1981 and 1982 Allen Schmieder, at the times director of the US Department of Education's Division on Teacher Centers, gave a speech at the annual national conference on teacher centers. The speech starts by mentioning "the doomsayers [warning us] that machines were going to take over and their mad creators would find new ways to spindle and mutilate us".[45]

However, the projection of these fears onto the counterculture was grounded in a misunderstanding. The 1960s Berkeley protesters were not afraid of technology: they rather protested against a specific vision of technology.[46] Writers and intellectuals also shared their concerns, showing that debates were actually quite articulated.[47] Computer Assisted Instruction was sometimes

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42   James D. Finn, "The Emerging Technology of Education", National Commission on Technology, Automation and Economic Progress, Technology and the American Economy. Educational Implications of Technological Change, Appendix Volume IV (Washington 1966). Here from: Ronald J. McBeath (ed.), Extending Education Through Technology. Selected Writings by James D. Finn On Instructional Technology, Association for Educational Communications & Technology (Washington 1972), 269.

43   Robert H. Davis, Frank N. Marzocco and M. Ray Denny, Interaction of Individual Differences with Methods of Presenting Programmed Instructional Materials by Teaching Machine and Computer (East Lansing, Michigan 1967) (ERIC number: ED017190) (program report), 1.

44   Commission on Instructional Technology, To Improve Learning. A Report to the President and the Congress of the United States (Washington 1970) (commission report), 40.

45   Allen Schmieder, "Robots Universal Robots", in Using Computers to Enhance Teaching And Improve Teacher Centers. A Report of the National Teachers Centers Computer Technology Conference (Houston 1981), 7–11, 7; Allen Schmieder, (Untitled), in Look to the Center. Conference Proceedings of the National Teacher Center Directors Conference (Washington 1982), 61–64, 61. This was the same speech given in two different occasions.

46   See Lubar, "Do not Fold, Spindle or Mutilate".

47   See for example: Jacques Ellul, The Technological Society (New York 1964); Lewis Mumford, The Myth of the Machine. Technics and Human Development (New York 1967).

criticized by computer engineers themselves: Ted Nelson devoted an entire section of his book *Computer Lib/Dream Machines* to criticize CAI.[48] And education innovators of the 1970s, like Illich and Freire, were not adverse to the use of technology as an educational aid.[49] Illich's work, for example, influenced the computer engineer Lee Felsenstein.[50] And Freire was an advocate of media literacy as a necessary tool for individual empowerment.[51] The Whole Earth Catalog, a magazine started in 1968 promoting both independent education and technology as sources for individual empowerment, shared a similar idea.[52] Historians have credited the Whole Earth Catalog as one of the cultural influences behind contemporary computer network architecture.[53] These examples show that, despite counterculture's concerns over "dehumanization" and "depersonalization", this didn't imply a refusal of technological development. On the contrary, in some cases these concerns actually fostered the development of new technologies.

2. From Social Concern to Individual Fear: Computerphobia in the 1980s

Notwithstanding these examples of positive narratives in the counterculture, from the early 1980s on, computer attitudes studies grew in number, as they gained popularity in the Behavioral Sciences. Popular media also gave much attention to the phenomenon, with several magazines publishing articles on the topic.[54] College students became the most observed subjects of CAAP studies, however educators still received special attention. The first scholarly definition of "computerphobia" appeared in 1981 and directly referred to punched card protests and to educators. In the journal *Educational Technologies* Timothy Jay described "feelings of aggressiveness" towards computers and quoted (as an example of these feelings) the Free Speech Movement slogan: "let's bend, fold and mutilate these cards!".[55] Indeed, after a relatively quiet period during the détente years, fear again played a central role in the US domestic

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48 Ted Nelson, Computer Lib/Dream Machines (Chicago 1974), 111–114.
49 Richard Kahn and Douglas Kellner, "Paulo Freire and Ivan Illich. Technology, Politics, and the Reconstruction of Education", Social Justice Education for Teachers 5, No. 4 (2007), 431–448.
50 Lee Felsenstein, The Tom Swift Terminal or a Convivial Cybernetic Device (Berkeley 1975).
51 See Paulo Freire, Pedagogy of the Oppressed; Kahn and Kellner, Paulo Freire and Ivan Illich, 435.
52 Fred Turner, From Counterculture to Cyberculture. Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism (Chicago, London 2006).
53 See Turner, From Counterculture to Cyberculture; Paul E. Ceruzzi, A History of Modern Computing (Cambridge, Mass., London 2003), 207–208 and 326–327.
54 See Reed, "Domesticating the personal computer".
55 Timothy B. Jay, "Computerphobia: What To Do About it", Educational Technology 21, No. 1 (1981), S. 47–48, 47. The full definition is: "[Computerphobia implies] (1) resistance to talking about computers or even thinking about computers, (2) fear or anxiety toward computers, and (3) hostile or aggressive thoughts about computers". Bauer reported Jay's

management of the Cold War in the 1980s. Nuclear fears are often used as an example here.[56] But computer narratives also kept being informed by fear. In 1983 a government report on technology and education was published, titled "A Nation at Risk. The Imperative for Educational Reform". Its main argument paralleled the one which led to the NDEA in 1958. "A Nation at Risk" warned against US children not receiving enough technology education, and was a catalyst for the massive adoption of computers in schools.[57] In 1984 the Strategic Defense Initiative was set up. Indeed, Bauer has shown that the years 1985–1986 produced a peak in the number of publications on computerphobia and computer anxiety.[58] In the same period a grant of the Fund for the Improvement of Secondary Education of the US Department of Education started the Computerphobia Reduction Program (1985–1988).[59] At first, the program targeted students, but eventually also faculty members were involved.

During the 1980s, negative attitudes towards computers were clustered in their own sub-field of study, identified by the concepts of "computer anxiety" or "computerphobia". Statements marking positive attitudes in CAAP surveys tended to be quite generic. Some examples are: "I look forward to a time when computers are more widely used"[60] or "life will be easier and faster with computers"[61]. On the other hand, negative attitudes were often associated with concerns similar to the ones expressed by the counterculture movement. Concerns about individual freedom and autonomy, for instance, were often used as indicators of a negative computer attitude in CAAP studies, e.g.: "In the future, power will be concentrated in the hands of the technology elite", "Computers are dehumanizing to society", "Computers seem 'anti-human' to me".[62] In this decade measuring and classifying the number of "computerphobics" or "computer anxious" became more relevant than understanding what caused this so-called syndrome. Indeed, CAAP research was unable to pinpoint specific risk factors for negative computer attitudes. Usually, two other sets of

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definition in his article, but did not include this example which Jay placed in another paragraph after the definition.

56 See Edwards, The Closed World, 284; Frank Furedi, Culture of Fear Revisited (New York, London 2006), 18; see Stearns, American Fear, 188.

57 See Cortada, The Digital Hand, 265.

58 See Bauer, "Technophobia", 100.

59 For an evaluation of the program see Larry D. Rosen, Deborah C. Sears and Michelle M. Weil, "Treating Technophobia. A Longitudinal Evaluation of the Computerphobia Reduction Program", Computers in Human Behavior 9, No. 1 (1993), 27–50.

60 See Maurer, Development and Validation of a Measure of Computer Anxiety, 73.

61 Nickell and Pinto, "The Computer Attitude Scale", 303.

62 Respectively in: Annalyse C. Raub, Correlates of Computer Anxiety in College Students (Philadelphia 1981) (unpublished doctoral dissertation), here from: Gardner, Discenza and Dukes, "The Measurement of Computer Attitudes", 503; Nickell and Pinto, "The Computer Attitude Scale", 303; Scott T. Meier, "Predicting Individual Differences in Performance on Computer-Administered Tests and Tasks. Development of the Computer Aversion Scale", Computers in Human Behavior 4, No. 3 (1988), 175–187, 186.

data were collected: 1) demographic information such as gender, age, ethnicity, education level and previous computer experience; 2) other measurements of anxiety and/or personality features.[63] The only predictor for computerphobia on which CAAP authors agreed was the presence of a pre-existing anxiety disorder. The Computerphobia Reduction Program, was not as successful as its proponents had hoped. Rosen, a behavioral scientist and one of the leading investigators of the Program, reported to be working on a project to replicate the Program as a workshop for elementary and secondary school teachers.[64] However, in the final report of the program he also noted that "students did not flock in droves to [their] offices"[65] and the effort required to persuade the university population of the usefulness of their program was much higher than expected. CAAP research, then, was not successful in clarifying the drivers behind computerphobia and ultimately curing it. At the same time, however, it contributed to making the societal "fear of falling behind" a concern on an individual level. This process is one of the outcomes of the medicalization of computer attitudes, and can be observed in two features of CAAP studies.

First, the relevance of CAAP research was argued on the basis of generic expectations about computers rather than on an accurate clinical analysis. This mirrors the "fear of falling behind" narrative, in which computers are portrayed as urgent and unavoidable on the basis of exaggerated expectations. In fact, most CAAP authors neither defined what the words "anxiety" and "phobia/fear" meant in the context of their research, nor to which "computer" they were referring to. The authors who gave definitions of computer anxiety and computerphobia described them as generic negative feelings emerging from the direct interaction with computers or when thinking about them. These feelings supposedly led to behaviors of avoidance or even hostility towards the machines.[66] Even though some of these definitions are detailed, they are

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63 The most common were trait anxiety, state anxiety and math anxiety and, in the 1980s, test anxiety. "Trait anxiety" identifies a permanent, generalized anxious state, while "state anxiety" is a response to a specific condition or situation. "Math anxiety" and "test anxiety" are self-explanatory. The study of personality traits was quite diversified and in most cases one specific trait was studied per article. Some examples are: sex-role identity; learning style; alienation; flexibility. For a complete list see Rosen and Maguire, "Myths and Realities of Computerphobia", 182, and Powell, "Computer Anxiety", 2368–2369.

64 Larry D. Rosen, A Model Program for Computerphobia Reduction (Carson 1988) (ERIC number: ED318466) (program report to funding agency).

65 Ibid.

66 Some definitions: "A computerphobic may evidence one or more of the following: (a) anxiety about present or future interactions with computers or computer-related technology; (b) negative global attitudes about computers, their operation or their societal impact; or (c) specific negative cognitions or self-critical internal dialogues during present computer interaction or when contemplating future computer interaction", in Weil et al., "Computerphobia Reduction Program", 6; "[Computer anxiety is] the fear or apprehension felt by individuals when they used computers, or when they consider the possibility of computer utilization", in Matthew M. Maurer and Michael R. Simonson, "Development and Validation of a Measure of Computer Anxiety", Proceedings of the Research and Theory for Educatio-

still not accurate in describing what "computers" and "anxiety/fear" meant. In fact, some definitions are quite recursive, defining "computer anxiety" as fear of using, or thinking about computers and viceversa (see previous footnote). However, many CAAP authors agreed that, for the majority of the study participants, computer anxiety and computerphobia did not qualify as "anxiety disorders" according to the Diagnostic and Statistical Manual of Mental Disorders (DSM) of the American Psychiatric Association.[67] This lack of clarity over the object of study was accompanied by a great confidence of its relevance. Being computer anxious or computerphobic was considered an important psychological malfunction to address. For example, computer anxiety could lead to a significant "loss of job opportunities"[68], "be detrimental to [a person's] performance in society"[69] or lead to a general "loss in productivity"[70]. These generic expectations are similar to the statements used in CAAP research on educators. In fact these statements usually presented computers as a generally useful tool without providing a real rationale for their utility in the educational sector. Some examples are: "Computers can be a useful instructional aid in almost all subject area", "I believe computers will help keep alive what is best in education.", "All elementary students should use computers", "Computers would motivate my students to do better work".[71] Ultimately, the reasons to address negative computer attitudes were correlated with the needs of the US economy. These motives resonate with the Cold War ambitions described by Edwards, as the second and third am-

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nal Communication and Technology (Dallas 1984), 318–330, 321 (ERIC Report Number: ED243428); "Computer anxiety involves a more affective response, such that resistance to and avoidance of computer technology are a function of fear and apprehension, intimidation, hostility, and worries that one will be embarrassed, look stupid, or even damage the equipment", Robert K. Heinssen, Carol R. Glass and Luanne A. Knight, "Assessing Computer Anxiety. Development and Validation of the Computer Anxiety Rating Scale", Computers in Human Behavior 3, No. 1 (1987), 49–59.

67 See Meier, "Computer Aversion"; Heinssen et al., "Assessing Computer Anxiety".

68 See Campbell and Dobson, "An Inventory of Student Computer Anxiety", 150; Heinssen et al., "Assessing Computer Anxiety", 50; Weil et al., "The Etiology of Computerphobia", 378.

69 See Maurer and Simonson, "Development and Validation of a Measure of Computer Anxiety", 320.

70 See Ella P. Gardner, Peg Young and Stephen R. Ruth, "Evolution of Attitudes Toward Computers. A Retrospective View", Behaviour & Information Technology 8, No. 2 (1989), 89–98, 97.

71 In order, from: Dorothy J. Stevens, "How Educators Perceive Computers in the Classroom", AEDS Journal 13, No. 3 (1980), 221–232, here from: Woodrow, "A Comparison of Four Computer Attitude Scales", 182; Daniel J. Rohner, Development and Validation of an Index of Computer Anxiety Among Prospective Teachers (Ames 1981) (unpublished master's thesis, Iowa State University), 91; Ruth Elkins, "Attitudes of Special Education Personnel Toward Computers", in: Educational Technology 25, No. 7 (1985), 31–34, 32; Kay, "A Practical and Theoretical Approach to Assessing Computer Attitudes", 458.

bitions ("enclosing the capitalist nations" and "enclosing the entire world") were based on the defense and promotion of capitalism.

Second, the responsibility of changing computer attitudes fell entirely upon the individual user. In the Cold War scenario one role of the state was to invest in computer technology in order to not fall behind in the global technological race. The CAAP narrative moved the need for this investment to the individual citizens, by pushing them to invest their time (and money) to fix their computer attitudes. CAAP research, in fact, addressed negative computer attitudes exclusively as a problem of the user. The remedy offered was a mixture of computer exposure and psychological treatments, mainly cognitive-behavioral restructuring techniques[72] and relaxation techniques[73]. Another reportedly successful method for the reduction of computer anxiety and computerphobia was the alteration of behavioral outcomes by guiding people in being successful in a computer task.[74] However, CAAP research did not consider the hypothesis that computerphobia might be the result of an ill-envisioned or a badly designed technology, for which largely the computer engineers and designers were responsible. Nor did engineers share this hypothesis, as they did not really engage with CAAP literature: the IEEE and ACM databases[75], for example, store a very small quantity of articles on "computerphobia" and "computer anxiety" for the decades of the 1960s through the 1990s. Bauer, too, pointed out this lack of communication between CAAP authors and computer designers.[76] Indeed, Bauer suggested an alternative way to assess computer resistance, focusing on achieving a greater integration with the design process.

These two aspects show how, during the 1980s, CAAP research further reduced the possibility to include different computer visions and expectations in the design and uses of the new technology. Even more, the individualization of computerphobia overshadowed the social, political and cultural implications of this exclusion. With these claims I do not want to deny that clinical cases of computer anxieties and fears existed. However, as I have shown, the computerphobia narrative implied a much wider array of fears (real or projected) than just "people's fear of computers".

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72 Cognitive or behavioral restructuring aims at changing a negative thought or behavior by training the person to recognize it, stop it and substitute it with a positive one.

73 Carol R. Glass and Luanne A. Knight, "Cognitive Factors in Computer Anxiety", Cognitive Therapy and Research 12, No. 4 (1988), 351–366, 363; Weil et al., Computerphobia Reduction Program, 23–61.

74 See Glass and Knight, "Cognitive Factors in Computer Anxiety", 363.

75 IEEE – Institute of Electrical and Electronic Engineers. ACM – Association for Computing Machinery. Professional and scholarly associations for engineers and computer scientists.

76 See Bauer, "Technophobia", 111.

Conclusion

The Cold War ambitions and fears embedded in the computerphobia narrative worked as a tool to discredit criticism of computer technology and to normalize behaviors,[77] rather than to engage with competing perspectives on technology. Indeed, medicalization attributes a pathological connotation to phenomena which were not topics of medical interest before. This does not imply the existence of a pathological condition at the individual level. Rather, medicalization is tied to the enforcement and maintenance of larger social and political visions. Ultimately, in CAAP research, acts of political sabotage were reduced to "aggression" (see Jay's definition) and then to mere expression of unmotivated individual fears and anxieties. In this way, those who questioned the computer narrative of the military-industrial complex were categorized as "deviant" subjects, expressing irrational thoughts. This process, as I have shown, was the result of the medicalization of computer attitudes fostered by the "fear of falling behind" narrative. CAAP research is an example of a Cold War fearful discourse which informed the proliferation of computers throughout the second half of the 20th century.

A further exploration of this discourse could provide fruitful insights in the understanding of how fear informed Western narratives of technology development. In fact, "fear of falling behind" was still employed in US computer narratives after the end of the Cold War. McAfee reported that during the 1990s a shared "fear of being left behind" (his own words) led companies to make large investments in IT equipment. This choice was often made only to keep up with competitors, even when such investments had no specific strategic advantage for the company.[78] At the end of the 20th century, "Fear, Uncertainty and Doubt" (FUD) became a common tactic in IT marketing. Initially the term identified a specific IBM marketing strategy.[79] But over time FUD narratives became increasingly common in the IT sector at large. By the 2000s FUD was no longer confined to IBM: the term became a way to describe any IT marketing strategy based on stimulating fearful feelings. Indeed, in the 1990s, some perspectives on computers were still being delegitimized by fearful discourses in the United States. For example, cultural anthropologist Gabriella Coleman reported that the Free Software Movement[80] was the object of FUD campaigns organized by software companies to discredit the reliability

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77 Here I use "normalization" as in Reed (fn. 8).
78 Andrew McAfee, "Do You Have Too Much IT?", MIT Sloan Management Review 45, No. 3 (2004), 5–22.
79 Brian Pfaffenberger, "The Rhetoric of Dread. Fear, Uncertainty, and Doubt (FUD) in Information Technology Marketing", Knowledge, Technology & Policy 13, No. 3 (2002), 78–92; Stearns, American Fear, 155.
80 The Free Software Movement, founded by Richard Stallman in the mid-1980s, promotes a software licensing scheme allowing users to run, study, improve and redistribute software. The word "free" in "Free Software" does not mean "free of charge", but "free from proprietary restrictions".

of non-commercial software.[81] And in the field of IT security FUD narratives became quite similar to US Cold War military narratives. IT security has been often promoted with the help of exaggerated threats of cyber-attacks.[82] Further historical research on these topics will provide insights on how fear has been used to foster specific choices in the development of computers. And how, as a result, the same fear restrained other technological paths and possibilities. Was the US Cold War "fear of falling behind" exported abroad by the proliferation of computers? Or were different fears being mobilized elsewhere? If so, how did they shape local narratives on technology? If the world is in the middle of a "Cyber Cold War", like some politicians and global news outlet are claiming,[83] these questions might be more relevant than ever.

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81 Gabriella Coleman, Coding Freedom. The Ethics and Aesthetics of Hacking (Princeton 2013), 81.
82 Huseyn Cavusoglu, Birendra Mishra and Srinivasan Raghunathan, "A Model for Evaluating IT Security Investments", Communications of the ACM 47, No. 7 (2004), 87–92; Andrew Jaquith, Security Metrics. Replacing Fear, Uncertainty, and Doubt (Boston 2007).
83 Jose Pagliery, "The Emergence of the 'Cyber Cold War'", CNN Business, January 2017 (website of news channel, accessed August 22, 2019); Patrick Wintour, "Cyber Cold War is Just Getting Started, Claims Hillary Clinton", The Guardian, October 2017, (online edition of newspaper, accessed August 22, 2019).