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AT THE CIVIL-MILITARY INTERFACE

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ABSTRACT

The literature of military sociology dealing with the convergence of civilian and military institutions in modern society asserts that although structural isomorphism may never be attained, the trend is in that direction. It further asserts that this hypothesized convergence is characterized by a breaking-down of the boundary between the civil and the military. We suggest that particularly in an era of all volunteer armed forces, which is the emerging pattern in the industrial nations of the west, the trend is no longer toward convergence and may be one of divergence. Convergence can be seen as making the military functionally independent of its host society and insulated from it, whereas the enforcement of more specifically military definitions of the military system forces it to maintain open boundaries and enter into exchange relationships with its host society. Data relating to the military family, occupational structure, and research management are presented and the implications for both convergence and interdependence are discussed.

CIVIL-MILITARY CONVERGENCE

The relationship between civilian and military institutions in industrial societies has long been of interest to sociologists. The military sociology of the 1960's stressed the increasing similarity of military and civilian sectors of American society. Thus, Janowitz (1965:17) argued that "to analyze the contemporary military establishment as a social system, it is ... necessary to assume that for some time it has tended to display more and more of the characteristics typical of any large-scale nonmilitary bureaucracy." At the same time, however, there was a recognition that common technologies, leading to common organizational forms, could not lead to total elimination of the fundamental difference between that which is military and that which is civilian.

Although stressing the increasingly similar occupational structures of civilian and military sectors (see Lang, 1964:45) and postulating that on the basis of these similarities civilian and military organizational forms must converge as well (see Grusky, 1964:84), military sociology has not asserted that total convergence would be achieved at some point, or that structural isomorphism would be achieved. Rather, the convergence function has been conceived, at most, as an asymptotic one, with military and civilian structures becoming increasingly similar, but asymptotic failing to reach a point of intersection. (Segal and Segal, 1971; Segal, 1972). Other scholars in fact see the function describing civil-military convergence as tangential rather than asymptotic. Moskos (1970:170), for example, suggested that "the over-two-decade-long institutional convergence

of the armed forces and American society is beginning to reverse itself ... (and) that the military in the post-Vietnam period will increasingly diverge along a variety of dimensions from the mainstream of developments in the general society". A third position posits limits on the asymptotic function, implying that rather than constantly converging under the force of technological development, military and civilian organizational forms will reach a point prior to intersection at which further convergence will be precluded by the basic distinction between the military and the civilian. Thus, pointing out that even in highly technological warfare, conventional military units and the traditional military role must be maintained, and that in an age of deterrence the management of violence is still the prime military mission, Janowitz (1971:21) argues that "the narrowing distinction between military and nonmilitary bureaucracies can never result in the elimination of fundamental organizational differences." Most recently, Moskos (1973) has suggested that the military may at the same time be convergent with and divergent from civilian society depending on the empirical indicators used: a model that he labels "segmented" or "plural". Divergence will be most apparent in combat arms he suggests, and convergence in technical support agencies. We shall propose below an alternative framework for viewing the convergence problem.

THE TWO FACES OF CONVERGENCE

It must be noted at the outset that scholars concerned with the convergence phenomenon differ not only in the degree to which they see convergence occurring but also in their projections of what the

social system would look like if convergence were in fact to take place. The major area of disagreement is on whether the civil or the military will dominate the merged structure. Two opposing positions are apparent here. On the one hand, Lasswell's garrison-state hypothesis, which was the first major projection of civil-military convergence in modern American social science, sees the development of new military technologies that make the risk of being a civilian in wartime almost as great as that of being a military man leading to a merged civil-military social structure dominated by military men in pursuit of military objectives (see Lasswell, 1962). On the other hand, the argument is made that contrary to Lasswell's position, the convergence that has taken place thus far has led not to a militarization of civilian institutions but rather to a civilianization of the military institutions (Biderman and Sharp, 1968: 397). It seems premature at this point to assert that one or the other of these positions is correct. Such a decision presumes that convergence has already been demonstrated. However, the convergence phenomenon today has the status of an interesting hypothesis in military sociology, not that of an assumption. We shall therefore be concerned here simply with the horse, and leave the cart for another occasion, remaining mindful that if convergence is demonstrated, it cannot be interpreted either as a demonstration of civil ascendancy over the military or vice versa without additional analysis.

MODELS OF CONVERGENCE

The study of civil-military convergence is burdened by both conceptual and operational ambiguity. Two scholars using the term convergence may well mean very different things, and a third, interested in the reciprocal interpenetration of the civil and the military, might be referring to either of the first two phenomena, or to some third process altogether. And two scholars who use the same term and mean the same thing by it may nonetheless come to different conclusions if one studies formal organizational properties and the other occupational distributions in the two sectors.

At the conceptual level, two different types of relationships between the civil and the military need be specified. It is necessary to distinguish the structural convergence of civilian and military institutions from the interdependence of these institutions. It is our belief that these two aspects of the convergence phenomenon are negatively correlated with each other. The more structurally similar the military is to civilian society in terms of organizational characteristics, occupational structure, etc., the more capable it is of sustaining itself as an independent entity without depending on the civilian sector. Hence, the greater the degree of convergence in this sense, the more structurally isolated the armed forces may become from civilian society. The greater the constraints placed on such convergence by emphasis on purely military activities, by contrast, the more dependent the armed forces will be on the civilian sector for non-combat activities, and the more permeable will be the boundaries between military and civilian institutions.

CONVERGENCE WITH WHAT?

One of the issues that must be faced in discussions of civil-military convergence is what the military is hypothesized to be converging with. Is the referent an ideal-typical large scale non-military bureaucracy, or is it the total civilian sector of society? While much of the rhetoric of convergence has been presented with a view toward the former kind of comparison, what seems crucial to us is the latter. Whether the US Army is structurally like General Motors may be interesting, but it is less important than the degree to which the U.S. Army can provide all essential services internally. To the degree that a military institution structurally becomes self-sufficient, it also becomes structurally independent from its host society.

"FAMILY ECOLOGY" AS AN INTERFACE PROCESS

There are institutions in American society that may be seen as helping to bridge the boundary between military and civilian sectors. Bramson (1971), for example, has discussed the way the Examination and Induction Center, under a system of conscription and enlistment, served both to bring into the military people who did not want to be there, and to keep out people who did but who were defined by the military as unacceptable for any of a number of reasons. In a more long-term sense, the family can also be viewed as an interface institution, giving the man who spends his working hours on a military base an anchor point in civilian society. The company town of the early twentieth century prevented the family from serving such a boundary function by incorporating it into the company system. The trend in the American economy, however, has been away from company towns, with

the family operating as a more autonomous system entering into exchange relationships with economic organizations. With the movement away from company towns, the company and its host community have become more interdependent (see Parsons, 1960).

The relationship between the military as a corporate entity and the families of its employees has gone in the opposite direction from that of civilian economic organization. The military family did not really exist historically. Most soldiers were not married except for more senior officers, and their wives and families could only rarely live with them on a military post if they were married. Women living in communities outside the base, and in some cases, female employees provided certain marital functions (Little, 1971). Until the beginning of World War II, this was true except during times of national mobilization. Even then, families were far away and little was provided for their support.

During the mass mobilization of World War II and in the cold war period after that, large numbers of married men were brought into the military and for the first time assistance to families in terms of allowance and limited medical care was made available. Because of housing shortages on post, most families lived in cities, but the majority of economic transactions still occurred off post. For many military men their daily trip to the post for their duties resembled the daily trip to the factory or office for others. Increasingly the soldier was a family man and community member. True, he moved more than others and his collar was green or brown rather than blue or white, but there was considerable parallelism in structure and interdependence in activities between the military and civilian sectors.

But what about the present-day military family? How is it similar to or distinct from its civilian counterpart? First, the trends in assistance and support to the family which have come to characterize the post World War II period have continued and expanded in scope. To attempt to measure this trend, one could consider a wide range of empirical indicators. For example, one might want to look at the change in: family allotments (eligibility and amount), medical care for dependents (on and off post), welfare services (such as the Army Community Service), provision of on-post consumer goods facilities (PX and commissary), or entertainment facilities (clubs, athletic facilities, movie theaters, etc.).

As the data presented in Figure 1 show, the percentage of

Insert Figure 1 about here

families in military-owned and controlled housing across time has shown a constant upward trend. Through the decade of the 1960's, there was a relatively stable plateau varying between 23 and 26 percent of military families. This was an increase from the decade of the 1950's, and another major increase is projected in the 1970's. Were data available for earlier periods, the change would probably be even more striking. The trend is clear, however, and would be upward in the future even if no new housing were to be built--at least until the number of personnel and their families decreases to its low point in the all volunteer army. Thus, the family has been increasingly brought within the military structure. More importantly,

given the decrease in civilian company towns, were we to graph difference scores rather than raw percentages, the curve would be changed by a considerable power. Equally important is that 75 per cent of the FY 1972 building program was devoted to enlisted rather than officer housing. This too is in direct contrast to civilian corporations which, to the extent that they see to the housing needs of their personnel, seem to confine their concerns to management rather than assembly-line strata (Jennings, 1970). However, one could also note that as the military installation comes to be structured more like a civilian community by providing community facilities such as housing it becomes less dependent upon a civilian environment.

OCCUPATIONAL DISTRIBUTIONS

Much of the argument on civil-military convergence has been concerned with occupational structures. Early reports indicated increasing similarity between the military and the civilian in this regard (see Lang, 1964), but made little comment on the implications of that similarity. However, data presented both by Biderman and Sharp (1968) and by Wool (1968) suggests that this convergence is not taking place. The former authors see important limitations on the "transfer value" of military skills to civilian life, and the latter points out that the military remains a specialized structure, with large numbers of men engaged in activities that are only slightly represented in the civilian occupational structure.

Wool points out that the military remains a very specialized structure with markedly different distributions of individuals in categories of occupations. These differences include the absence of sales and farm workers in the military; the concomitant absence of ground combat troops in the civilian structure; the much greater number of mechanics in the military in comparison to the civilian sector; and the absence of large numbers of non-farm service, operatives and laborers in the military. In short, as can be seen from Table 1, there is by no means a structural convergence between the two sectors.

Table 1 about here

In very broad terms, there have been some similar trends in the civilian and military sectors: increases in skilled and technical jobs; decreases in combat and farm occupations; increases in white-collar jobs; growth of the tertiary sectors. The distributions of specific jobs in the two sectors remain different, and most of the change that did occur took place between World War II and the mid-1950's. Thus, we can assert neither that the trend toward convergence in occupational structure is a long-standing historical one, nor that it is continuing into the future.

Graph 2 presents absolute difference scores between the proportion of the civilian labor force and the proportion of the military labor force in three broad categories of occupations: white

collar (excluding farm and combat occupations); blue collar (excluding farm and combat occupations); farm and combat occupations. This last category might be seen as the declining primary sector

Graph 2 about here

of the civilian and military industrial organization, respectively. At the time of the Civil War, 90.4 per cent of our active duty force was categorized in combat occupations. By 1960, this figure had fallen to 16.3 per cent. Less dramatically, at the time of the Civil War, 53 per cent of the male civilian labor force was engaged in farm occupations as against 6.3 per cent in 1960. Despite a continuing decline in the primary sector, and despite the fact that between the Civil War and 1960 the military overtook and surpassed the civilian sector in the proportion of its labor force involved in administrative and clerical occupations, the difference between per cent in blue collar occupations in the two sectors has remained relatively constant in the post-World War II years, after converging pre-World War I. The difference between per cent in white collar occupations, after declining prior to World War II, is now increasing moderately.

The consideration of occupational convergence between the military and civilian sectors raises again the problem of system boundaries. Lang (1972) sees the primacy of combat orientations

as the basis for a military career diminishing as the need for personnel in the tertiary sector increases. This would, in theory, reduce the discrepancy between that which is military and that which is civilian (cf. Segal, 1972). Because of the inertia of traditional concepts of the military career, however, the military institution has difficulty fitting its skill distribution to its needs. Lang (1972) suggests three alternative means of dealing with the problem: lateral recruitment; use of paraprofessionals; and contract. The first two involve bringing people who are not military professionals into the structure of military management, and would probably contribute to structural convergence. The latter defines as outside the military sphere tasks that are not performed by military personnel, thereby asserting system boundaries and contributing to interdependence. Lateral entry has fallen into disuse in the post-World War II years. The paraprofessional model is approximated today only in the Air Force, and there only at junior grades. The contract model, by contrast, has traditionally been, and continues to be, the major means by which the military secures services. With the transition to an all volunteer force, and with a diminution in the size of the active duty force, we might anticipate that an increasing number of tasks will be defined as non-military and outside of the boundaries of the military system, and will be performed by civilians on a contract basis. Interestingly, Lang (1973), argues that the boundary between the civilian and the military has already "been blurred to a point where it hardly exists any longer.

Our own interpretation of the data is that the boundary is indeed distinct, and that in an era of shrinking uniformed personnel resources, the military will increasingly diverge from civilian occupational structure and toward its primary mission - combat readiness - the increasingly complex technology of combat notwithstanding. The implications of this lack of structural convergence appear to be in the consideration of the increased contact and interpenetrability that must exist for the military to continue to exist. The civilian sector is still responsible for the manufacture of clothing, equipment, bombs, weapons, tools and so on for the military. Food must be grown by the civilian sector and sold to the military. Services for military personnel, such as barber shops, auto mechanics, and Bible salesmen, must be provided from the civilian sector (although the military continues to provide ministers, doctors, and dentists for its personnel). All of this dictates that there must be a large amount of interaction between the military and civilian spheres for the former's continued existence. A useful example of what a completely independent military might look like can be provided by looking at the military installations in foreign countries, where most equipment and supplies are sent from the United States and there is minimal contact between the military personnel and the indigenous economy. Here one will find little relationship between the happenings of the foreign country and the American military, which for all intents and purposes, is functionally independent by virtue of its being able to fulfill its

own needs (see Wolf, 1969). It appears, then, as if the relative lack of convergence between the occupational structures of the civilian and military structures means that there is still a great deal of contact between the two, and that the military in this country has not become independent of the civilian work force and economy.

RESEARCH AND DEVELOPMENT

Technology has been postulated to be the motor that runs the convergence machine, and research and development (R and D) is the handmaiden of technology. Indeed, given the dependence of a wide range of organizations, the military among them, on modern technology, we might expect civil-military convergence in the R and D area even if it occurred nowhere else.

Recently sociologists interested in organizational analysis have used an open-system approach in studying the internal structure and functioning of organizations. Characteristics of the open-system perspective are a reconceptualization of organizational boundaries as problematic and an emphasis on external variables as the primary agents of social change (Hirsch, 1973; Katz and Kahn, 1966). In particular, Thompson (1967) argues that the structure of all organizations is designed to protect the production or technological core from environmental influences. Therefore, it will be non-production units such as marketing, distribution, and research and development which will be involved in exchanges with the environment. The key aspects of these boundary-spanning roles are obtaining intelligence on probable future demand, on continued availability of raw materials,

on the relative merits of product innovations, and to carry out policy decisions in sales, distribution, and product development and production (Hirsch, 1973). The primary characteristics attributed to the environment in this approach are its complexity and relative unpredictability. This environment includes, for military as well as for civilian industrial organizations, rapidly changing technology and demands for organizational output. Research and development is most commonly seen as an organizational attempt to manage the uncertainty posed by a complex and changing environment through prediction and control of innovation and demand. The military as well as civilian and other governmental organizations engages in research and development in response to environmental threats to organizational control over the production process (in a broad sense). The simple convergence hypothesis would therefore predict that the military organization would increasingly resemble other organizations in research and development expenditures as a proportion of total resources, in undertaking more non-military-specific research especially in management and other general skills and techniques, and that the amount of research done internally (not contracted out to other organizations) would approach that of the comparison organizations.

What are aspects of the R&D process which might be relevant to the convergence hypothesis? Four key parameters might be the number and distribution of manpower resources devoted to R&D, similar measures for financial resources, fields of study within which research is undertaken, and the organization of research, especially the distribution between in-house and contracted research. The civilian benchmark

against which to test convergence might be civilian government agencies or civilian private enterprises. It is necessary to establish both theoretically and empirically the position of these benchmarks in order to demonstrate convergence by the military.

What would be the consequences for interaction of the military with its environment if convergence with one or another of the civilian models were demonstrated? To the extent that the civilian organization is autonomous in its research activities and to the extent that the military converged with that model, military R&D could operate autonomously of its environment. To the extent that military R&D conducted in-house, employs only military research personnel, allots a reasonable (in comparison with other organizations) amount of resources to research, and covers all relevant or necessary fields of inquiry, military R&D is self-contained and needs little or no interaction with most civilian research-related organizations to carry out its functions.

Figure 3 presents mean indices of dissimilarity for R&D expenditures as a proportion of the total budget among the American

Figure 3 about here.

armed services (computed for each pair of services and averaged), for the Department of Agriculture and the Department of Health, Education and Welfare as civilian governmental agencies for comparative

purposes, and between the armed services and the civilian agencies (computed for each service-civilian agency pair and averaged). It is clear that the two governmental agencies are more dissimilar from each other than the three armed services are among themselves. Moreover, the secular trend among the armed services seems to be toward greater similarity, whereas the trend between HEW and Agriculture seems to be toward greater dissimilarity, with the exception of 1969. Most importantly, dissimilarity is greatest in the military-civilian comparisons, and this dissimilarity does not seem to have decreased through the decade of the 1960's.

In the R and D field, the boundary maintenance problem can be approached by considering the degree to which the military conducts such activities in-house, rather than having it done by outside contractors. The former model more closely approximates the activities of civilian enterprises that are highly dependent on technological development, and hence might be seen as contributing to structural convergence. Carrying out R and D activities on a contract basis contributes to a stricter definition of the division of labor between military and civilian sectors, and hence mitigates against convergence and reflects interdependence.

While there are differences among the branches of the American military and fluctuations over time in the degree to which R and D activities are carried out in-house, no clear case can be made for

convergence, and a mild case can be made for interdependence. The Air Force, which through the decade of the 1960's grew from having the smallest R and D obligations relative to its budget among the services to having the greatest, performed about 13 per cent of its R and D activity in-house at both the beginning and the end of the decade, with fluctuations in between. The Navy experienced similar overall stability, although the proportion of its total R&D budget which was spent within the organization was more than 30 per cent throughout the ten year period. The Army, on the other hand, was the only service to show a secular trend in these data. It decreased its internal R and D activity from 40.7 per cent of its total R and D effort in 1960 to 34.5 per cent in 1969. The comparison organizations, HEW and the Department of Agriculture, show an intermediate picture. The latter conducted most research within the organization, drawing to a much smaller extent on non-governmental resources, while the former showed a moderate decline in in-house research as a proportion of the total R and D budget, from about 26 per cent to about 19 per cent. While it is impossible to conclusively demonstrate either convergence or divergence from these data, the relatively small total amount of in-house research conducted by the Navy and the Air Force and the decrease in the amount conducted by the Army are suggestive of military-society interchange and interdependence.

Table 2 about here

DISCUSSION

Where previous discussions of the civil-military convergence phenomenon have tended to view such convergence as contributing to the permeability of the boundary of the military system, we suggest that the greater degree of structural convergence, the less dependent the military is on its host society, and the more insulated it may become from civilian sensibilities (see Moellering, 1973). Empirical indicators of structural convergence of civilian and military sectors examined here do not in the aggregate support the hypothesized convergence. By attempting to bring the pattern maintaining functions of the family within the military system, for example, the military is becoming more structurally similar to the civilian community and is therefore becoming a more closed system. The continuing dissimilarity of the civilian and military occupational structures and the continuing reliance of the military on civilian R & D activities, however, do indicate a lack of structural convergence and the concomitant necessity of the military to maintain itself as a more open system.

The continued lack of convergence between civilian and military occupational structures, maintaining the military's need for civilian employees and services, and the handling of a good deal of the research and development of technological and managerial skills on a contract rather than an intra-mural basis seems to suggest a strengthening of the distinction between what is military and what is civilian through the mechanism of differentiation in function. By more clearly defining

the boundary between the military and the civilian, the military is able to maintain itself as a more open system. Where Lang (1973) sees a blurring of the civil-military boundary associated with increased military dependence on civilian expertise, we see a reaffirmation, in the current decade, of a traditional division of labor that perhaps did get blurred in the early 1960's. It might be hypothesized that a healthy relationship between the military institution and the democratic society it protects seems to require that the military function be narrowly defined so that the military is functionally dependent upon civilian institutions which can, in turn, benefit from military sponsorship. It may be that under an all-volunteer system it is especially important for the military to self-consciously integrate itself into civilian society, and that a clearer definition of the boundaries of the military system must be developed precisely so that the military institution can be maintained as an open system (Janowitz, 1973). On the other hand, others, most notably the critics of the "military-industrial complex" have argued that this type of symbiotic relationship, instead of being healthy, creates a degree of interdependence with civilian and military goals so intertwined that military (and political) policy is at least partly dictated by corporate needs and vice versa. Either relationship could be conceived as injurious to democratic values and processes. An insulated military, able to function by itself, could possibly be in a position to operate independently either within this country or on the international scene. The interdependent military, conversely, raises

the possibility of military activities, still not controlled by the nation as a whole, but by some form of power elite. In either event, the exact nature of the civil-military interface must be made explicit if questions such as these are to be answered.

From this perspective, Moskos' (1973) "segmental" model of convergence, while conceptualizing military personnel systems as evidence for divergence from the civilian occupational structure, has different consequences for the problem of interdependence. The combat army, as the traditional nucleus of military operations, has become increasingly mission oriented, and wholly staffed by personnel in uniform trained in combat specialities. It is here that divergence from civilian society takes place. The support agencies, by contrast, in an era of fewer enlistees and no conscripts, may become increasingly dependent on civilian employees or on services performed contractually by civilian organizations. Alternatively, one may view the segmental model in terms of two armies: a combat army, oriented to the combat mission and structurally divergent from civilian society, and a support army, similar in structure to civilian institutions (Hauser, 1973). The combat army in this case would be functionally dependent on the support army rather than on the civilian sector, and thus its relationship to civilian society would be at one remove. A similar phenomenon arises with regard to the military family. At the level of complex organizations, there is structural divergence in comparison to corporations and company housing and other services for employees and their families. However, the military installation represents a structural convergence with

regard to the facilities and processes found in civilian communities (see Clark, 1968). Increasing incorporation of the entire family into a situation, as on most military bases, where military supervised and controlled institutions mediate in the soldier's contact with the civilian sector, removes the individual aspects of the military-civilian interface and leaves a situation in which the actors are not individuals but organizations -- for instance, military procurement offices and civilian supply corporations instead of individual consumer and retailer. Thus civil-military interdependence is increased at the institutional level but decreased at the level of the individual soldier and his family. Whether these relationships at one remove between the military and the surrounding society present threats to civilian ascendancy and control or increase high-level military recognition of and adjustment to dependence on the civilian sphere is another question which, at present, remains unresolved.

FOOTNOTES

¹The data for 1961-1968 come from U.S. Department of Defense Annual Reports for the respective fiscal years. The percentage represents the proportion of military families in adequate family housing units owned and controlled by the military. The number of military families was operationally defined as the number of wives listed as military dependents of the total DOD military personnel. For 1952, the percentage was estimated based on 200,000 reported housing units (US DOD Annual Report, 1952) and on an estimate made of the number of families which was based on the 1952 total personnel strength using the wives to total personnel ratio of 1967, a year with similar troop strength and war mobilization. For 1960, the number of wives were estimated using the wives to total personnel ratio of 1961; the number of housing units was given in the annual report. For 1970, the data on the number of families and the number of adequate housing units came from US House hearings (1972; 106). For 1971, the number of housing units are from US House hearings (Ibid.) and the number of families were estimated based on the ratio of families to personnel in 1970. This probably underestimates the numbers of families--and increases the proportion given--because the reduction in force between 1970 and 1971 probably involved young, single men disproportionately. The 1976 figure is based on projected family and housing unit figures for 1976 (US House, 1972: 106).

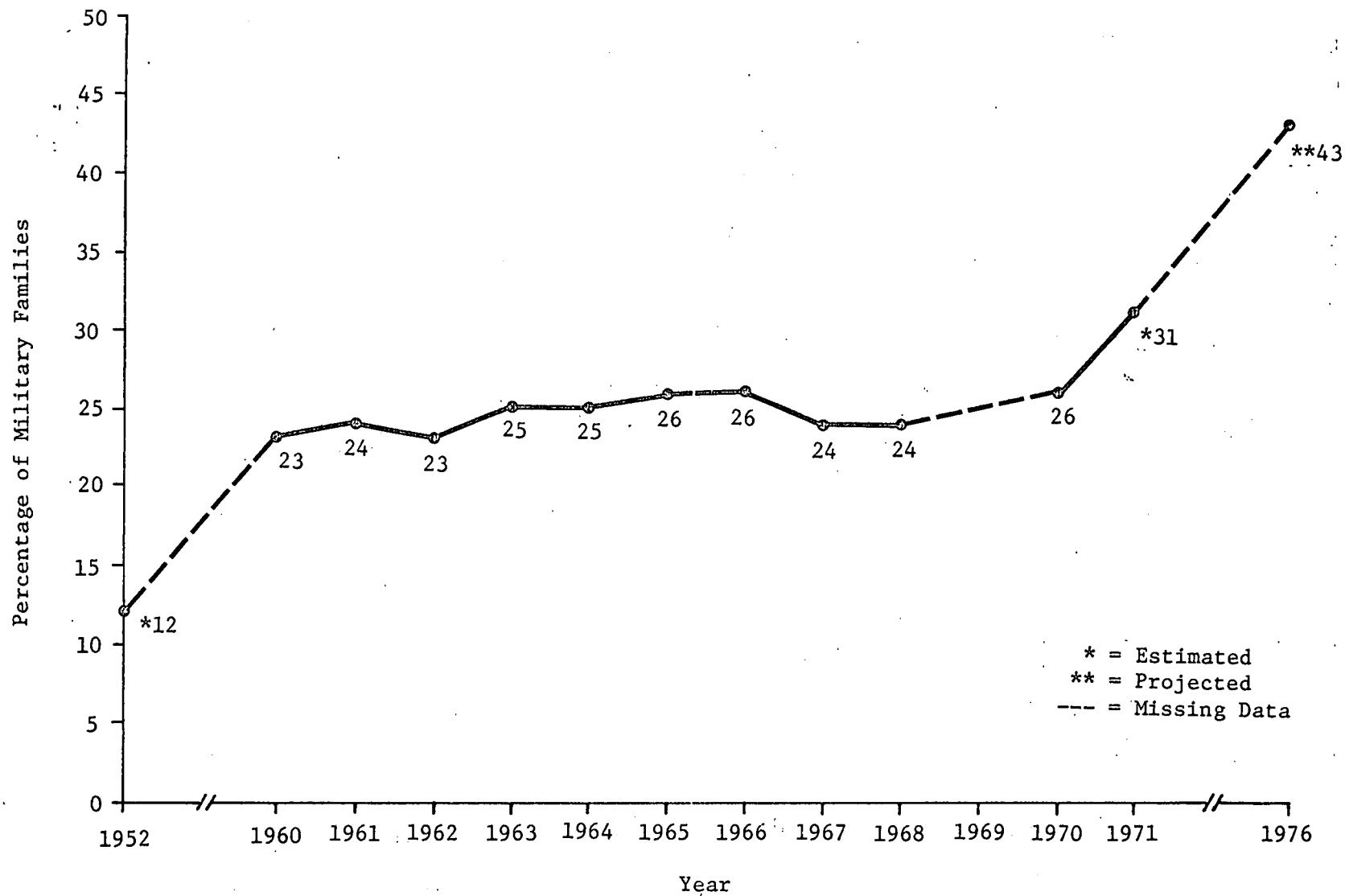
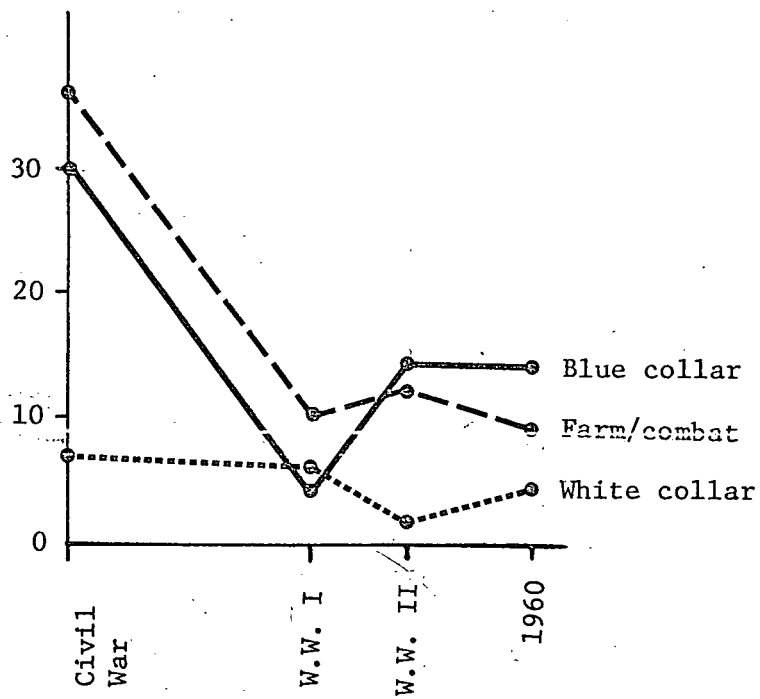
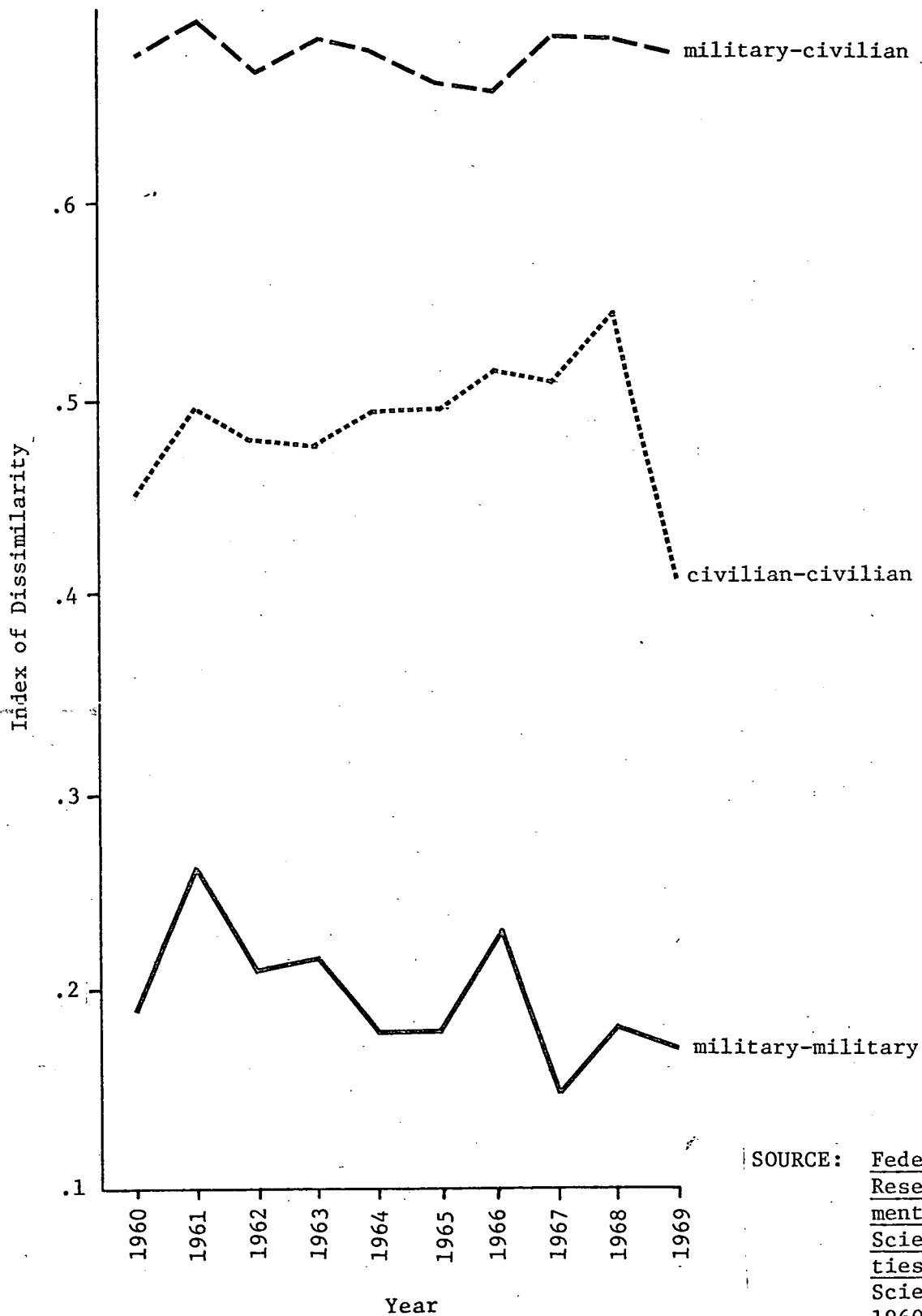


FIGURE 1. Percentage of military families in adequate military (owned and controlled) housing¹



SOURCE: Wool, 1968, p. 52.

FIGURE 2. Differences between civilian and military sectors in percent of labor force engaged in white collar, blue collar, and combat/farm occupations.



SOURCE: Federal Funds for Research, Development, and other Scientific Activities, National Science Foundation 1960-69.

FIGURE 3. Indices of dissimilarity among and between U.S. armed services and governmental agencies in R and D expenditures, 1960-1969.

Table 1. Military/Civilian Occupations:

% in Certain Jobs

	Military	Civilian
Ground Combat	13.4%	0.0%
Aircraft Mechanics	10.6	.3
Electronics	13.4	.5
Medical and Dental	4.6	.4
Ship Operating Crafts	1.3	.1
General Administrative & Clerical	7.1	2.9
Automotive Mechanics	3.2	1.5
Construction and Utilities	3.2	7.5
Metal Working	1.1	2.1
Laborers, non-farm	-	7.5
Sales	-	6.7
Farm	0.0	8.1

- = statistics not available; believed to be less than .1%

Source: Harold Wool, The Military Specialist, Johns Hopkins Press, Baltimore, 1968, Page 56.

Table 2. Intramural R&D as Percent of Total
R&D Obligations

<u>Fiscal Year</u>	<u>Army</u>	<u>Navy</u>	<u>Air Force</u>	<u>Agriculture</u>	<u>HEW</u>
1960	40.7	31.1	13.7	71.3	25.5
1961	43.7	30.8	9.0	72.5	22.7
1962	40.8	38.4	11.6	69.1	21.0
1963	34.2	40.6	10.4	70.1	20.1
1964	33.1	35.8	13.0	68.9	19.3
1965	34.3	36.6	14.0	67.9	18.6
1966	35.5	45.5	14.1	69.9	17.9
1967	32.7	32.8	13.9	69.1	17.8
1968	38.9	32.9	14.6	71.9	17.7
1969	34.5	33.4	13.1	73.2	18.8

Source: Federal Funds for Research, Development, and Other Scientific Activities, National Science Foundation, 1960-1969.

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