In 1917, Jules Amar, a French expert on fatigue and labor power, described the eerie “Weir Mitchell” phenomenon experienced by men who had lost parts of their limbs in battle as “the illusion they have of feeling once again and possessing the missing segment of the limb . . . an illusion preceded by a ‘tingling’ . . . close to the cicatrice.” 1 The phenomenon had been identified by Silas Weir Mitchell in 1867. Mitchell maintained that every amputee experiences this strange, “haunting” sensation and that the phenomenon could be expected to recur throughout the course of the amputee’s life. 2 Amar challenged Mitchell’s assessment, claiming that “It is only through inaction, idleness made worse by worry, by bad weather, that this painful feeling of the ‘phantom’ limb manifests itself.” Amar insisted that “the amputee feels only the terminal segment, hand or foot . . . and feels them as they usually were, in a state of motion, the hand holding a work-tool, the foot oriented in the position demanded for labor.” Contrary to Mitchell, Amar argued that the amputee does not experience “tingling at night, but [that] this feeling is aroused by the memory of vocational life . . . and is determined by both a mental cause and a physiological cause.” While Mitchell understood the phenomenon
in terms of the amputee’s inability to adjust psychically and physically to the loss, Amar believed firmly that this “haunting” could be made to disappear through rehabilitation and re-entry into working life. There was nothing mysterious about amputees imagining the limbs or parts they had lost. What the amputee was actually feeling at these moments, in hallucinations brought on by the memory of physical labor, was the loss of a productive capacity that could be at least partially restored in the majority of cases (Amar, _Organisation_ 252–55).

As Director of the French “Laboratoire de prothèse militaire et du travail professionnel” during and after the First World War, it was Amar’s duty to address the problem of the physical and psychological effects of the trauma experienced by men who had been severely wounded in the war, many of whom had lost parts of their bodies in the brutal years between 1914 and 1918. Amar’s approach to “phantom limbs” was symptomatic of his philosophy and strategy for the reeducation and rehabilitation of the war-disabled. Whatever seemed inexplicable or permanent about the phenomenon could be scientifically explained. The loss that produced this ghostly feeling could be managed through a scientific and technological reworking of the soldier’s body that often included the use of prosthetic extensions to replace limbs or parts of limbs. For many soldiers, the “cicatrice” separating battle front from home front seemed to have been permanently drawn. In the discourse of rehabilitation, the scarred and mutilated body of the disabled soldier became a privileged site in the fantasy of national recuperation in France. The conviction that the problems posed by the physical disabilities of many returning soldiers could be solved through science and technology was emblematic of a larger wartime and postwar commitment to the rational management of the destructive and disordered effects of the war experience.

This preoccupation with reconstruction was represented in gendered terms. As historian Mary Louise Roberts has pointed out, gender functioned in the interwar period in France both as a relationship of power between men and women and as a way of signifying social relations in economic and political discourses. The “crisis of masculinity” produced by the war and its rupturing of the social, political, and economic order in France engendered specific discourses of appropriate and inappropriate femininity as part of a more generalized attempt to reestablish traditional gender roles. The rehabilitation of the disabled soldier was also a crucial site of the negotiation of this wartime and
postwar "crisis of masculinity," a masculinity intimately tied to productive capacity and the definition of men in terms of their labor power.

It was in 1919, not long after the close of the First World War, that Freud’s famous essay, "The Uncanny," was published. In it, Freud investigates the uncanny as that which “is undoubtedly related to what is frightening—to what arouses dread and horror” (219). In the Freudian frame, “the uncanny experience occurs either when infantile complexes which have been repressed are once more revived by some impression, or when primitive beliefs which we have surmounted seem once more to be confirmed” (249). It is aroused when the familiar is somehow rendered unfamiliar, strange, or unknown. The uncanny is the return of what the rational has repressed, of what has been forgotten in order to preserve the fixity of a boundary between the real and the phantasmatic. The uncanny effect is produced by the uncertainty about certain objects or events—are they real or imagined, animate or inanimate, alive or dead? As examples, Freud includes “dismembered limbs, a severed head, a hand cut off at the wrist... feet which dance by themselves,” all of which are uncanny because of their association with the castration complex (244). The fear of losing one’s eyes, of being buried alive, of madness and the dead all correspond to the repression of infantile desires and fantasies as told in foundational psychoanalytic narratives such as the Oedipal drama.¹

Freud articulated this explanation of individual trauma at the same moment that European society was faced with a profound collective experience of the uncanny, confronted by the loss of millions of lives and the return of huge numbers of wounded and mutilated soldiers from battle. The French experience of the war was particularly devastating and gruesome. Close to 1.4 million French lives were lost and, though statistics vary, studies have concluded that between 350,000 and half a million French soldiers were badly wounded.² While Germany lost more lives during the war than any other nation, French losses were more significant in proportion to population. Combined with France’s lower birth rate and higher rate of mortality relative to Germany in the decade before the war, the statistics on French losses indicate that “any French death had greater demographic impact than that of any German” (Becker 6).

The experiences of men in combat, the loss of limbs, and the technological reconstruction of the disabled male body during and after the war produced a number of uncertainties as soldiers returned home from the front with physical and psychological damage that could never
be completely repaired. For many, the experience of the war had not only confused the boundaries between women and men—home front versus battle front—but had challenged the distinction between reality and fantasy, between the living and the dead. The rehabilitation of disabled soldiers that included the use of various technological extensions of the body to compensate for the sacrifice of flesh and bone—to fill the absences and chase away the “phantoms”—also held the potential for the production of another set of confusions between the animate and the inanimate, the organic and the inorganic, human and machine. If technology seemed to hold the promise of recovery and regeneration, it also produced an uncertainty about the future of the human body in relation to that technology. In addition to the blurring of traditional gender roles, the war experience raised a new set of questions about the precariousness of a masculine subjectivity dependent upon a notion of the “whole,” organic, productive body.

The normalization of the wartime experience and the repression of its horrors was central to the work of figures like Amar who focused on the physical reconstruction of the disabled soldier and his reintegration to work and society. The discourse of rehabilitation and reeducation employed a practical “science fiction” of the body that attempted to rule out the “uncanny” aspects of this first industrialized war, as well as the potentially unsettling effects of the transformation of the disabled male body through prosthetic technology. Amar’s work is an example of this discourse in which the reintegration of the disabled male body seemed scientifically and technologically manageable. The disabled body seemed easily incorporated into an organization and conception of work and the body that predated the war. But there were points of rupture and uncertainty in postwar culture that made the appearance of large numbers of men without limbs, or with mechanical, “fake” attachments in place of human limbs, seem out of place, even horrifying. The disabled soldier’s body could be re-membered, but the traumas of a dismembering war were not easily forgotten. There was, in fact, something powerfully “uncanny” about the hybrid beings produced through the uses of prosthetic technology. In places, “cicatrices” that had been so carefully covered over showed through, producing unease, even fright.6

**The Functional Value of the Stumps**

In 1916, Amar published *La prothèse et le travail des mutilés*, the proceedings of a conference held in January of that same year on
prosthetics and the work of the war-disabled. Amar’s opening remarks included the following declaration: “The hour has arrived, I believe, to organize the work of the wounded, so that each man will be in his true place in the social machine, and contribute to it to the best of his ability, and in this way march towards prosperity.” As evidenced in his response to “phantom limbs,” work seemed to Amar to be the principal issue at hand. Amar underlined the importance of “making rational use of human capacities, even when they are reduced,” noting that this was a question of critical importance not only to the “material and moral future of many thousands of French families” but to the recovery of the French nation as a whole (5). The revival of French industry, agriculture, and commerce would be dependent upon the efficient and full redeployment of labor power in all sectors. According to Amar, a good eighty percent of those wounded in battle could be reeducated. Insisting that “the disabled or wounded soldier holds a capacity for work that is perfectly usable, [that] he represents a value”(4), Amar also emphasized the willingness of most war-wounded to return to work. He pointed out that among the disabled, soldiers were particularly eager to learn and adapt to their new circumstances, approaching their rehabilitation in a brave and spirited fashion.

Amar’s strategy for the reeducation of the disabled soldier was one that he and a number of other European scientists had been working on for some time. Amar was one of the key promoters of rationalization and Taylorist “scientific management” in early-twentieth-century Europe. He was one of an established body of scientists in France and Germany who had, since the last decades of the nineteenth century, been engaged in the study of the working body as a body governed by the laws of thermodynamics, a vital system of energy that could be measured and manipulated to improve its productive capacity and output. The science of labor that emerged in the late nineteenth century in Europe applied a “productivist calculus” to studies of the body, developing a notion of the “human motor” tied to a rational, “social ethic of energy conservation” (Rabinbach 8).

Shortly before World War I, the European science of work was confronted by the American Taylorist system for the rationalization of production. This system of “scientific management” proposed a revolution in the organization of production that included the break-up of work into a series of basic steps, an emphasis on maximum efficiency in the performance of these tasks and the standardization of models for the design of tools and machines. Taylorism also established a relationship
between wages and output and rationalized managerial and administrative functions (Rabinbach 238–39). While some scientists of work opposed Taylorism as a non-laboratory based system intended to serve the interests of management alone, it was received enthusiastically in France and elsewhere by men like Amar who regarded it as a system that could be used to understand and organize the study of the body as well as production. In terms of its practical applications, a Taylorist system that involved a “rationalization of production . . . predicated on the rationalization of the body” could apply the principles of the science of labor to the very real conditions of the shop-floor and address the issues of operation and administration (Rabinbach 243). Amar’s enthusiasm for Taylorism reflected and contributed to the increasing popularity of these ideas in France and throughout Europe during and after the First World War. Scientific management could be combined with the data from experiments involving inventions like the “ergometer”—a combination bicycle and respirator—and the “ergograph”—a weighted system for measuring the strength of fingers and hands (figures 1, 2).

Amar’s qualifications as a fatigue expert enabled his appointment to the French Ministry of War in 1907. The efforts of the science of work, together with the principles of scientific management, had important military implications. As historian Anson Rabinbach has noted, “[t]he First World War launched the first global mobilization of the productive capacities of industrial society for mass destruction” (259). Scientific management of the body and production could be employed in a military context, informing the study of the soldier’s physical capabilities and the organization of labor in combat. The war served as an excellent laboratory for the science of work and for the application of what Rabinbach has termed an “ergonomics at the front” (265). Thus, the war enabled the more widespread acceptance of the Taylorist system by providing an arena for its application in the interests of national defense.

Rationalization was also crucial to the reintegration of soldiers who required physical rehabilitation and reeducation upon their return from battle. Amar outlined a system for dealing with the situation of the war-wounded in his Organisation physiologique du travail, published in 1917. He focused on the reeducation of the war-disabled in a chapter that included discussion of the functional value and power of stumps, the technical method for their measurement, suggestions for interpretation of the data resulting from such measurement, discussion on the modification of the stumps (including prosthetic extensions), and
Figure 1
Jules Amar.
Organisation physiologique du travail.

Figure 2
Jules Amar.
Organisation physiologique du travail.
strategies for reeducation. The rehabilitation of individual soldiers was
captured in the discourse of energy conservation on the national level. It
was important to use as much as possible of the productive capacity of the
disabled in order to lessen the blow to the nation’s labor force. Putting
disabled men back to work also prevented their decline into an idleness
that meant dependence on government pensions and assistance. Men
who were reintegrated into the work force could contribute their labor
and would be prevented from acting as a drain on national financial
resources (Rabinbach 266).

According to Amar, it was important to begin the rehabilitation
process by distinguishing between the truly “infirm” or invalid and
the merely “impotent,” between those “incapable of any functional
restoration” and those men who were “still capable... characterized by
the absence of a limb or a part of a limb, or organ in some cases,” the
category of “amputee” being reserved for “those who ha[d] sustained the
mutilation of an organ of movement” (Organisation 229). Once it was
determined that a man was “impotent” and not “infirm,” a series of
movement tests could be performed to determine exactly what the
soldier’s disability involved. Amar maintained that some men who were
only mildly injured during the war could, with physiotherapy, return to
their former occupations. Some of these men might require a certain
degree of mechanized support, for example, aluminum gutters to
reinforce fingers that had become limp through injury. Other men would
need to change their profession, particularly those who had had entire
arms amputated (La prothèse 6–7). Reeducation of the disabled included
a regime of physical training in order to regain speed and strength and to
develop rhythm, precision, and intensity of force for movement. Men
requiring prosthetic appliances would have to build up enough strength
to carry and move with attachments that were quite heavy.

The second stage of the disabled man’s rehabilitation involved
fitting him for the appropriate prosthetic appliance or tool, depending on
his particular injury and needs. Amar’s studies focused on the arms and
legs, those parts considered critical to work and production. The
“prosthetic” stage involved a number of measurements and tests centered
around the stump or stumps remaining. Amar identified a schema for the
evaluation of the stump(s) in terms of an already well-developed
ergonomic method that required little adjustment for the disabled body.
This schema involved the determination of the functional value of the
stump(s) as well as the measurement of strength and mobility. Finally, the
disabled soldier equipped with the right prosthesis could be trained to operate the appliance and could either return to his former employment or, if this was not possible, could be retrained to perform some other, more suitable, work. One writer commented in 1918 that, once reeducated, the disabled might find employment in shoemaking, agriculture, various mechanical trades, and printmaking. In addition, he noted that “The manufacture of artificial limbs and other appliances—a growing industry in France—is also considered a good trade for the disabled man” (McMurtrie 45).

The body of the disabled soldier fit easily into an existing framework of the “human motor.” The same methods could be used to determine the functional levels and values of different stumps as had for some time been employed in cases where no part of the limb in question was missing. The absence of parts of the arms or legs, or of entire limbs, did not affect the procedures involved in the analysis of energy and strength (figure 3). This framework had already imagined the body as a series of interdependent parts, accepting the fragmentation of corporeal

**Figure 3**
systems of energy and force. Therefore, the very real fragmentation of the amputee presented little difficulty for the quantification of the disabled body by the science of work. The scientist of labor and the body did not discriminate between so-called “whole” bodies and those from which certain parts were missing. In the rationalized model, every body represented a set of productive values that could be measured and manipulated in the same way. Differences among disabled men, depending on the degree of their disability, and between the disabled and the “able-bodied” man merely produced different data: different lengths of stumps, different measurements of strength and energy output.

_Macabre Anecdotes_

In the literature that emerged during and after the war, French soldiers and trench journalists who had witnessed the death and destruction of the front line described their experiences using an imagery that was radically different from the language of rationalization that Amar used to describe the body of the disabled soldier. While scientists like Amar were able to conceive of the body of the wounded soldier in terms of productive values and measurements of the size and strength of stumps, accounts of the frontline experience and the disorientation of the return home reveal a side of the wartime and postwar imagination that was excluded from the discourses of rehabilitation and national reconstruction. The experiences of battle and its aftermath deeply affected the lives of individuals and their families. The situation of the disabled was particularly difficult because “[v]iolence [had] indelibly scarred crippled soldiers” (Whalen 37). The confrontation with death marked the minds and bodies of men and women during and after the war, radically altering conceptions of mortality, pain, and suffering.

Narratives of the wartime experience were riddled with “macabre anecdotes” (Prost 5). Forced to witness death as “impotent spectators,” men in battle experienced the loss of their comrades as “a constant reminder of [their] own mortality.” Death was everywhere and soldiers experienced the front line as

>a vast charnel house [where] the soldiers lived among corpses . . . The men made efforts to bury or remove the bodies of their comrades killed in the trenches; but many corpses lay between the lines. One could not always avoid seeing them by a casual
glance...and the stale smell of them...was a reminder of their presence. (Prost 5)

Representations of the war that appeared in trench journals written by men at the front for other soldiers were graphic in their descriptions of “[t]he pain of men’s wounds, their death pangs, massacres of all kinds” (Audoin-Rouzeau 75). Horror was a crucial element of war narratives in which “[t]he screams of the wounded...[were] often screams not of pain, but of terror” (Whalen 52). Soldiers’ morbid accounts did not fail to emphasize the fear that they experienced in the midst of battle as they watched “[m]en fall, split open, scatter in pieces...” (qtd. in Prost 6). Many accounts of the conflict were dominated by “the grotesque” and made continual reference to the “insanity of war” (Whalen 45). Journalists “did not hesitate to describe the wretched scenes after battles: the suffering of the wounded, the corpses strewn on the ground...” (Audoin-Rouzeau 77). One writer described the mutilation of limbs in the following couplet:

Some arms stretched up and others cut in two
Offered their scarlet stumps in hideous gesture

Another report described a horrifying scene of bodies and body parts:

Beyond the memory of the dead man who was still warm, lying there in the upturned earth, my thoughts soon range further...I have a very clear image of the five men heaped up in the clay, their limbs dislocated, their faces black and dreadful.

Depictions of the devastation at the front referred continually to the break-up of bodies and limbs in bloody detail. The dead and wounded seemed to split apart and move like horrible puppets or dolls. One journalist emphasized the gory theatricality of what he had witnessed in the following passage:

I was walking along, happy despite everything because of the sunshine, when I stopped short at the edge of a shell-hole. At the bottom, in the fresh upturned earth, five bodies were spread out so symmetrically...the shell had burst right in the middle of a little group of men, sending each one flying in a different direction so that these poor bodies looked like five arms in a macabre review... The arm of one of these flattened bodies
stuck straight out of the clay, the hand was intact with an aluminum ring on one finger.⁹

At the front, the fragmented body held a symbolic significance absent from Amar's discourse of rehabilitation. In the terms of the science of work and the Taylorist organization of labor, the body was divided not into the horrifying and blood-soaked parts of soldiers killed or wounded in combat but into discrete units of force and energy that could be utilized rationally and efficiently. In the context of battle, bodies “scatter[ed] in pieces” were graphic emblems of the fear of annihilation and a disillusionment with the destructive project of the war. Human bodies were transformed into “uncanny” parts, recognizable as arms, hands or fingers because of certain familiar cues, but terrifying because they had taken on a character all their own. Wrenched from the soldier's body, these parts functioned in wartime and postwar narratives as signposts of death and destruction strewn across the physical and psychic landscapes of battle.

Frightful images of the undead, phantoms, and animated corpses appeared throughout biographical, autobiographical, and fictional accounts of the war.¹⁰ Soldiers were sometimes haunted by the spirits of men they had killed (Prost 9). Administrative and statistical representations of death that seemed to neglect the body altogether competed with personal accounts of the war experience detailed in the personal diaries, journalism, and fictional writings of soldiers and others. These statistics were troubled by an uncertainty produced by the circumstances of mass, industrial killing; “[c]asualty lists were never accurate . . . [m]issing men turned up; men reported dead were found to be alive” (Whalen 39). Attempts to quantify death seemed to create a numerical nether world of ghostly apparitions and resurrected bodies. Images of the supernatural also appeared in the self-representations of the disabled and returning soldier. The haunting was ongoing:

For the soldier, peace was long in coming, for the discord in his mind survived the war . . . On coming out of the army, life received him ill . . . to earn his living he had to apply himself to tedious trades, with the very painful feeling that he was seen as an importune ghost. (qtd. in Prost 13)

Robert Whalen has pointed out that “disabled soldiers had, in a sense ‘risen from the dead,’ . . . [w]ar victims described themselves as the
‘special representatives of the dead,’ as ‘translators’ who communicated both with the living and the dead” (182–83).

It was not surprising, then, that soldiers returning from the front with missing limbs or parts of limbs might imagine their body parts as painful, haunting phantoms, a phenomenon that Amar rationally explained as the effect of idleness experienced only by the unproductive man. Phantoms had become an important part of the imagery and language used by soldiers to describe their experiences in battle. The supernatural was a powerful conceptual frame for the seemingly unrepresentable horrors of the war. The disabled soldier represented his physical and psychological trauma by invoking the metaphors and figures of a world beyond the living, beyond rationality and explanation, a world that he seemed to have visited in war and from which his psychic return, like his body, remained only partial.

Neither the horrors of the wartime experience, nor the potentially disturbing effects of the technological reconstruction of the body through prosthetics seemed to have a place in Amar’s discussions of rehabilitation and reeducation. Of course, Amar’s subjects were those who could be rehabilitated and the question of the irremediable losses sustained by some men was not within his domain. But the painful psychological and physical memory of violence and injury was something that Amar had a vested interest in suppressing. The fantasy of individual and national recovery required that the terrifying or gruesome aspects of the war be forgotten and overcome. The rationalization of the body and its productive capacities served as an ideal framework in this instance. The transition to a peacetime economy and society required that the traces of wartime trauma be eliminated, and this process included the reintegration of the soldier into the work force. However horrifying the circumstances of injury and dismemberment, the body of the disabled soldier could be reimagined through the discourses of industrial labor and technology. Enabling the repression of the grotesque, Amar’s rationalized system also seemed able to combine man and prosthesis without any fear or anxiety about the natural-unnatural, animate-inanimate hybrid that this combination created.
Elegance and Utility

The goal of the prosthesis is not, in effect, to replace the limb or the missing segment of the limb, but to make up for a function lost, or greatly reduced. If, by definition, it is anatomical, in truth it is physiological and utilitarian. While it copies Nature, it is not a slave to it... (Amar, La prothèse 5)

This was Amar’s opening statement in his discussion of the prosthetic stage of rehabilitation. All that was necessary, in Amar’s formulation, was the restoration of the basic functions necessary for the performance of work. This utilitarian emphasis was typical of scientists, orthopedists, and engineers involved in the design of artificial limbs in the period; “The principle of design was efficiency, not aesthetics. There was no point in trying to copy the human arm; it was the arm’s use-value that had to be reproduced” (Whalen 61). While the aesthetic may have seemed irrelevant as a general rule, however, the attempt to approximate nature—both the detailed function and the appearance of human body parts—was still a consideration. Amar emphasized the superior quality and economy of French prosthetic models, noting the progress in national artificial arm and leg technology and design. While he criticized many of the complicated “luxury” appliances of German and American design, he predicted that in France, “[a] very nearby future w[ould] show the realization of this progress that takes into account both elegance and utility” (La prothèse 12).

As early as 1916, Amar had already developed the design of a “working-arm” for which he would become famous on both sides of the Atlantic (figure 4). The “working-arm” consisted of a steel rod articulated at the elbow comprising the forearm to which a series of basic tools could be attached, the most common being a pair of universal pliers. The arm came equipped with a main de parade, a hand for show attached to a leather sheath formed to the forearm that, according to Amar, “respond[ed] to a well-accepted aesthetic” (La prothèse 10). It was understood then, that the disabled man should be provided with a natural-looking arm to satisfy aesthetic concerns when he was not engaged in labor for which he required a specific tool. While an expert like Amar would emphasize the functional uses of artificial extensions of the body, prosthetic design did have pretensions to replace more than just the functional value of the missing part or parts.
Working from earlier designs, Amar perfected the "mechanical arm" whose key feature, the "articulated hand," recalled the *main de parade* of the working arm (figures 5, 6). The main difference between the "mechanical arm" and the "working arm" was that the mechanical model aimed for the automatic control of movements and, in particular, the mobility of the fingers. Made of metal and complete with articulated fingers that could be made to open and close, it could simulate some of the movements of the human hand. Controlled by a cable attached to a band that fit around the chest, the hand could be made to open or close by the expansions and contractions produced by deep inhalation or exhalation. This eliminated any sudden movements, making the hand seem more natural in its operation. The mechanical arm and articulated hand could be used by men who had simply lost a forearm, as well as by those who had lost an entire arm.

What seemed most exciting to Amar about the articulated hand was the degree to which it permitted the disabled man to "execute, in public, all of the normal practices of life . . . drinking out of a glass, removing his hat, playing the violin, as well as performing certain forms of vocational work: drilling wood, planing, etc." (*La prothèse* 11). The
Figure 5
Jules Amar,
Organisation physiologique du travail.

Figure 6
Jules Amar,
Organisation physiologique du travail.
mechanical arm was not, however, intended for all workers, but ideally for those engaged in the “liberal professions” (figures 7–9). It was especially designed for so-called white-collar work, though it did enable the performance of other vocational tasks. Different types of work called for different degrees of mobility and different levels of the approximation of natural, human hands. A factory worker could be reduced to a set of pliers, while a man engaged in office work required not only the functional value, but the appearance of a real arm. It would be a mistake to conclude that scientists like Amar deliberately deprived particular kinds of workers of realistic prostheses. Work had simply become so specialized that it was considered more practical to replace fingers with hooks, hands with magnets or pliers, than to attempt to recreate a human hand. For mechanical forms of work, only the basic apparatus and its crude attachments were required. While at work, a man’s limb was a tool. In some types of work, the hand and its dexterity were still required, and it remained the appropriate “tool” for certain forms of leisure and practices of everyday life.

The prosthetic appliance of the disabled working man served to make explicit the reduction of men’s limbs to their mechanical function that was already a part of the idea and practices of industrial work. The reduction of human beings to hands, hands being understood as basic
Figure 8
Jules Amar, *La prothèse et le travail des mutilés*.

Figure 9
Jules Amar, *La prothèse et le travail des mutilés*. 
"tools," was an important effect of the Industrial Revolution. The introduction of machines and the division of labor into specific and narrowly defined tasks led to a gradual dehumanization of labor. The "replacement of the human hand by the machine... made [the worker] vulnerable to being made a 'hand'... no longer a versatile part of the whole human being, but a clockwork essence" (Mazlish 65–68). This specialization preceded, and was underlined by, the science of work and the principles of Taylorist "scientific management." In the American context, Bill Brown has argued that "the very success of mechanized industry and the growth of scientific management had disintegrated the body at the site of production." A principal effect of the Taylorist (and later Fordist) systems for the organization of production has been that "[human labor has been] analytically and materially reduced to the operation of the body part, and the individual human functions only as a part, the 'conscious limb' within the machine system" (136). Prosthetic technology developed for disabled workers undertook to replace the limb's clockwork essence, but in the fabrication of a hand for show it was silently acknowledged that the purely functional tool would not do outside of the work/shop context. During off hours, the aesthetics of the natural body would resume their importance. The line between utility and elegance could not always be so easily drawn. In prosthetic design, even rational scientists like Amar recognized that the simulation of a whole human body was, in certain contexts, part of the functionality of the appliance.

The artificial limb was not the same as any other work tool. It was a replacement for a part of the body, and while the universal pliers of Amar's "working arm" might suggest that prosthetics were regarded simply as tools like any others, the provision of the main de parade, the only functional value of which was to look like a human arm, meant that the status of the prosthetic limb was somehow different than that of the machine. In the case of the mechanical arm and articulated hand, this confusion between the artificial limb as tool and as body-part was particularly apparent. While this was indeed a confusion that reflected the reduction of men to "hands" in industrial labor, it also opened up the question of where the boundaries of the human body lay. Figures 10 and 11 are good illustrations of this confusion. Amar used before-and-after photographs such as these at different moments in his work to illustrate the restorative power of prosthetic technology. It was important to show the transformation from the loss of productive capability to the
resumption of meaningful labor. In photographs like these, a certain shock in the face of mutilation and loss could be aroused and then quelled by the calming image of a man returned to his work. In Figure 10, we are shown a man who has lost the fingers on his left hand holding a metal glove in his right hand. On the table in front of him, there are a number of tools, some made of materials similar to the glove he is holding. In the next image, we are shown the same man, glove on, artificial fingers in place. In his right hand he holds a hammer poised to strike the piece of metal held in place by his artificial fingers. While the artificial fingers are represented as completing the incomplete body, the tools remain tools, not to be confused with fingers or hands. In this instance, the distinction between the prosthesis as a tool and those tools not intended to replace human body parts is unmistakable.

The case of a hand completed, not with universal pliers, but with metal “fingers” suggested a different relationship between hands and tools. If human hands had been reduced to tools in the context of industrial labor, it was also true that certain tools—prosthetic appliances of various kinds—were being regarded as if they were human hands (or fingers) because they were capable of the same functions as organic body parts. While some prosthetic appliances were similar to work tools such as pliers, others resembled human body parts and were named as such. In these cases, inanimate, inorganic devices were being reimagined as human. An artificial limb may have been artificial like any other tool, but it was differently valued in symbolic terms as a “limb.” Even in the rationalized framework of rehabilitation, there was room for a certain engagement with the phantasmatic.

The boundaries of a whole body previously aided or enabled through technological devices of various kinds were, in the case of prosthetic limbs, being renegotiated and redefined. While it was clear that prosthetic limbs were not really human, the degree to which they were designed to replace the functional value of the authentic limb and, to a certain extent, to simulate its appearance raised a question about the limits of the disabled body in relation to technology. The non-necessity of the entire, articulated human body for certain forms of work and production seemed to open up a space for the body without certain limbs or parts—or for a functional body enabled with prostheses that only partially simulated the workings of human limbs. At the same time, however, the fixation on the limb as the principal site of a man’s productive value and the reconstruction of that limb with non-human, non-organic
Figure 10
Jules Amar,
*Organisation physiologique du travail.*

Figure 11
Jules Amar,
*Organisation physiologique du travail.*
materials enacted the body’s partial replacement with a mechanical device. The disabled male body seemed to represent more explicitly than any other the fantasy of the man-machine hybrid that was, at one and the same time, the dream and the nightmare of industrial production, its rationalization, increasing mechanization and, eventually, automation.¹⁵

Amar never explicitly raised the issue of unease, of either disabled men’s own difficulties adjusting to the prosthetic extension of their own bodies or their anxiety about various kinds of public or private gazes to which they may have been subjected (the gazes of wives, children, passengers on public transport, other customers in shops, restaurants, and cafés).¹⁴ However, the provision of attachments like the main de parade and the development of more realistic, natural-looking appliances were attempts to normalize the disabled body, for the men involved as well as for those who might encounter them. While “utility” served to enhance productivity and mobility in the workplace, restoring the labor power of the disabled soldier, “elegance” worked to eliminate the “uncanny” in two ways. Close approximations of human limbs could help to efface the terrible memory of the wartime experience that the disabled soldier seemed permanently to embody. In addition, the “elegant” prosthesis could also serve to alleviate anxieties about the melding of men and machines, the dehumanization of labor in a rationalized system of production and the animation of wood, metal, and leather that prosthetic technology involved.

The disabled soldier in Figure 12 emblematizes some of the normalizing impulses behind Amar’s mechanical arm and articulated hand, appliances that could enable certain types of work and the normal conduct of leisurely activities in public. The inclusion of photographs like this one testified to the suggestion by Amar and others that prosthetic technology could be used to restore more than just the productive capacity of the disabled man. Amar’s publications included images whose sole purpose seemed to be to show that the elegant prosthesis and rehabilitation held the promise of a man’s complete restoration and reintegration to all aspects of life. Such instances reveal once again that, despite disclaimers about the purely utilitarian aims of prosthetic design, Amar felt the need to show just how close to nature the prosthesis could come. In Figure 12, a man, seated in a café, plate and glass before him, having completed his meal, lights a cigarette. What could be more natural, more French? A patron seated at another table might recognize him as a soldier because of the medals he wears. If not for these signs of
valor in battle, the onlooker might not even think about the horrific war in which this soldier lost the limbs now replaced by feats of technological design that seem to do everything that human hands might. The body could be reconstructed. Normal life could be resumed. Everything could be returned to the way it once was . . . except for the glare of those inhuman fingers catching the light from a nearby window, or from the soldier's match, and the stiffness of the cold, dark metal.

**Uncanny Masculinity**

In "The Uncanny," Freud comments that "dismembered limbs, a severed head, a hand cut off at the wrist . . . feet which dance by themselves . . . all have something peculiarly uncanny about them, especially when, as in the last instance, they prove capable of independent activity in addition" (244). Freud points to an anxiety that Amar's prosthetic technology could engender by bringing together the animate human and the inanimate prosthesis, at the same time that it worked to eliminate the unease created by the absence of the missing limb or body part. Whatever productive capacity had been lost through mutilation or
dismemberment of the male body could be replaced by an appliance like the “working” or “mechanical” arm. The missing value of the disabled male body could be at least partially restored. While it may have been clear that the animation of the inanimate prosthesis was inextricably linked to the human body, Amar’s use of mechanical replacements for human parts held the possibility of the elimination of the human body by the “machine” that was already a part of the threat of industrial mechanization and rationalization. Amar’s own representations of the human body and prosthetic technology suggested an uncertainty about the status of the whole, natural male body whose functional value and elegance he was working to restore. The science of work and rationalization had turned the body into a “human motor” and prosthetic technology employed the same technological means that threatened its wholeness to begin with. While this seemed to go unacknowledged, attempts made to produce an elegant prosthesis that might blend in with the rest of the body were, in some sense, efforts to minimize this discomfort.15

Paul Painlevé, the Minister of Education, Fine Arts, and Inventions of Interest to National Defense, introduced Amar at the 1916 conference on prosthetics as the man who could best relate the “hope that should remain strong in all those seeking to remain whole men, despite the fatality of nature,” reassuring his audience that “human science could, in a number of cases, repair what seemed irreparable” (2). The reconstruction of the male body in World War I France was connected to a gender ideology that placed the figure of the male provider at the center of his family, the economy, and the nation.16 In other words, the replacement of the functional value of the limb held a particular symbolic significance tied to the reestablishment of traditional gender roles that Roberts has pointed to in her work. When Amar identified the rehabilitation of the disabled soldier with the fate of the nation as a whole, he gestured towards the equation of individual male productivity with masculinity and prewar gender roles. The rhetoric of a family and nation dependent upon the able and willing male body mobilized disabled men otherwise reliant on forms of social assistance. Of course, the call to the disabled soldier was the same as the call to war that had preceded it. Putting the male body to work in peacetime relied, as it had in wartime, on the identification of productivity with masculinity and the interests of the nation.

The disabled male body made explicit the problems that the return to work and family involved for all soldiers, both in terms of the
reestablishment of traditional gender roles and in terms of the individual and collective capacity to forget the horrors of the wartime experience. Prosthetic technology worked to resolve these problems but, in doing so, raised another set of issues about the body's erosion in the face of the mechanization of industrial labor. The male body completed by technology could function as the best example of the possibilities of individual and national reconstruction, but, from another perspective, this hybrid of man and machine made the threat of that body's elimination apparent. Prosthetic technology promised the reconstruction of the male body at the same time that it seemed to threaten it. How could the replacement of human parts by mechanical devices work to assuage fears about a masculinity tied to productivity if contained in that replacement was the suggestion that the human body was becoming less and less necessary?

The mutilated or dismembered soldier was an important signifier for the crisis of male authority and power in and beyond wartime. Feminist film theorist Kaja Silverman has argued that representations of the body of the male amputee in American films of the post-World War II era point up the fundamental lack upon which all subjectivity is based. In her Lacanian formulation, the crisis of war works to unmask the foundation of male subjectivity, a lack that is continually disavowed in the cultural identification of the male body with phallic power. Moments of historical trauma call into question the relationship of the male subject to the phallus, and the disabled soldier embodies this uncertainty in his physical lack of certain body parts and/or functions (52). While Silverman does not explicitly discuss the uncanny in relation to the soldier's physical and psychological defamiliarization, or in relation to the prosthetic attachments used to restore his body, her emphasis on the dependence of male subjectivity on the wholeness of the male body is relevant here. In Amar's discourse of rehabilitation, the repression of the uncanny dimension of the soldier's wartime trauma and of the uncertainties produced by the technological transformation of his body was critical if the coherence of a masculine subjectivity identified with that body was to be maintained.

**This Civilization No Longer Has Hands**

The reconstruction of a male body emblematic of the French nation had a cultural existence outside of Amar's discourse of soldier
rehabilitation and industrial production. Interwar France saw an explosion of literary and artistic movements in which fantasy and horror played a major role and in which the problematic status of post-World War I gender identities was explored as well. Amar’s own work was, in some ways, one instance of a broader cultural fascination with the grotesque and the uncanny in France that included a set of questions about the relationship between technology and (gendered) identity. In conclusion, I will present one literary example from the postwar period.

In 1920, Maurice Renard, a French science fiction and fantasy writer, published Les mains d'Orlac, a novel that dealt with trauma, reconstruction, prosthetics, and the supernatural world. Originally published in serial form in the Parisian evening paper L’Intransigeant, Les mains d’Orlac recounts the story of Stephen Orlac, a world-famous pianist whose hands are severely damaged in a train wreck. His surgeon, Dr. Cerral, secretly replaces Stephen’s hands with those of an accused murderer, Vasseur, who died in the same wreck. For most of the story, it seems that nothing will ever be the same for Stephen or his poor wife Rosine, whose reflections form the basis of the first half of the novel. Stephen’s genius and his livelihood are threatened by his injury; he becomes obsessed with the restoration of his hands and their creative capacity.

The worlds of the living and the dead are blurred throughout the story. Rosine and Stephen both encounter ghostly apparitions. Orlac’s father holds seances and is mysteriously murdered. Stephen is implicated. Once the secret of his grafted hands is revealed, the characters become convinced that he has been possessed by the spirit of the dead Vasseur and that Cerral’s surgical reconstruction has produced a murderous mind/body split. Vasseur seems to return from the dead and threatens to provide evidence that the crimes are Stephen’s if he is not compensated for the loss of his hands. In one of the novel’s final chapters, he appears to Stephen with mechanical prostheses in place of the hands Stephen now wears as his own. In the end, it is revealed that another character, the true criminal, has framed both Vasseur and Stephen. The real villain’s mechanical hands are “fakes,” attachments he deviously wore to appear dismembered while his own hands were hidden from view. In the story’s final scene, the detective in charge of the investigation assures Stephen of the innocence of the accused Vasseur. Stephen’s new hands, though incapable of the musical genius of his original pair, are thus restored to him as innocent members of his body, free of guilt and
any threat of supernatural possession. This restoration resolves the problem of agency produced by the grafted hands, despite the fact that they are not really his own.

Renard's novel is a confusing tale of the macabre and fantastic possibilities of bodily reconstruction and psychic dissociation that makes explicit the confusion and anxieties embedded in Amar's rehabilitation of the disabled soldier. Renard's writing imagined the horrific possibilities of bodies mangled and reconstructed, the loss of productive and creative capacity, and the relationship between technology and the unexplained or supernatural, all of which held very specific cultural meanings in interwar France. These images and representations were attached to the memory of huge loss of life, the wounding and disabling of a significant segment of the male population, as well as the difficulties of return and reintegration for many soldiers.

Renard's science fiction raises a number of issues that Amar's never could. In Renard's work, the confusion between the living and the dead, between the animate and the inanimate recurs throughout the story in twists and tangles of suspense and mystery. The "uncanny" produced around the reconstructed body and technology is explicit. Renard's resolution depends on the identification of all of the story's unexplained phenomena as technological effects. The ghosts and apparitions are explained as "special effects" produced by phonographs, projectors, etc. The supernatural is replaced by the technological, the horror of ghosts and the undead replaced by the terrifying possibilities of the machine. Machines are revealed as the true sources of ghostly apparitions, visual and auditory hallucinations, in acknowledgment of a confusion about technology and the supernatural, as well as the uncertain status of human agency and reality.

While Orlac's hands are never completely replaced, the novel does enact the same kind of fantasy of reconstruction that Amar's rehabilitation promised. Of course, Renard's science fiction permitted him to explore the possibility that such a reconstruction could be organic. While Amar had to settle for hands that functioned and looked somewhat like natural body parts, Renard could imagine the transplantation of limbs, raising questions about the relationship between the mind and parts of the body. The normalization of the reconstructed body that Renard's fiction enacted was not so different from the continual suppression of the "uncanny" in Amar's fantasy of the body recuperated through technology. But the mysterious and unexplained phenomena
along the way, the fears and anxieties about science, and the potential disturbances produced in physical and psychic realms by the scientific manipulation of the body, were issues that Renard’s fantastic universe could tolerate as plot twists and mysteries. In Amar’s literature, the macabre and the supernatural were repressed, but the “special effects” of prosthetic technology did produce their own unease. The natural, whole, and productive male body was haunted, even in the rationalizing discourse of science, by the traumatic events of the past and by the threatening possibilities of the future.

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ROXANNE PANCHASI is a graduate student in the History department at Rutgers University. She is the author of “Graphology and the Science of Individual Identity in Modern France,” an article forthcoming in Configurations.

Notes

1. Unless otherwise indicated, all translations are my own. I will be using the word “cicatrice” throughout this paper to refer to the scar that marks a physical boundary of the disabled male body. The cicatrice in this instance is not just the mark of the wound and the place of its suture. In the case of the amputee, the cicatrice is the border, the newly drawn frontier beyond which the missing limb or segment of the limb used to reside. Unlike the scar that simply draws a line between two regions of flesh and bone, the cicatrice in this instance constitutes the boundary between the body and the memory of the missing fragment. To highlight this difference, I will keep the technical term.

2. Amar’s reference is to a French translation of Mitchell’s post-Civil War work on the effects of amputation entitled Lésions des nerfs, published in 1867. Silas Weir Mitchell was an American physician of the late nineteenth century who was particularly interested in neurasthenia, a category of nervous disorder that included a variety of physical and psychic symptoms. Women were particularly singled out as “nervous” and in need of rest in diagnoses and treatment plans that saw many forms of mental illness as responses to modern life. Of course, neurasthenia was more than just a “woman’s problem.” Physicians like George Miller Beard pointed out that the stresses of modern life could also have severely negative effects on men, especially those involved in business and commerce. Interestingly, Mitchell was famous as a proponent of the rest cure that involved seclusion and the removal of the patient from stimuli which were thought to bring on illness. In contrast, Amar’s philosophy of rehabilitation took the view that idleness lay at the source of the physical and psychological pain of the amputee.
and that a restored productivity could eliminate symptoms. Thus, Amar's program might be understood as a kind of work cure. On Mitchell, see Lears 50–53.

3. Susan Kent has made a related argument regarding the British case in which she examines connections between interwar gender ideology and the feminist movement. Kent pays particular attention to the ways in which war functioned as a metaphor for gender relations in the period and how the wartime experience shaped gender relations and the agendas and strategies of interwar feminism.

4. My understanding and use of the uncanny here is informed by Castle's recent work on the "invention of the uncanny" in the eighteenth century. In her collection of essays, Castle makes the argument that "the Freudian uncanny is a function of enlightenment." Suggesting that "the uncanny itself has a history," Castle points out "that it is precisely the historic internalization of rationalist protocols that produces the uncanny" (7, 15). While Castle's emphasis is on the production of the uncanny in and through the Enlightenment, the uncanny as a historical category can be useful for the analysis of other moments when the rationalization of deep trauma produces other forms of unease, the trauma in this instance being the First World War.

5. The exact figure in Becker is 388,800 wounded (552) while the estimate in Johnson is much greater (20).

6. For a fascinating discussion that mobilizes the uncanny to look at prosthetics and science fiction, exploring the issues of race, empire, labor, and the body in the American context in the early twentieth century, see Brown. I would like to thank Peggy Prescott for bringing his work to my attention.

7. From the journal L'Echo du bouquet, 12 March 1917, quoted in Audoin-Rouzeau 80.

8. From the journal L'Argonnaute, 1 August 1916, quoted in Audoin-Rouzeau 50–51.

9. From the journal L'Argonnaute, 15 August 1916, quoted in Audoin-Rouzeau 78.

10. Resisting the suggestion that the literature of the Great War was somehow de-mythologizing, Fussell insists that "[i]n one sense the movement was towards myth, towards a revival of the cultic, the mystical, the sacrificial, the prophetic, the sacramental, and the universally significant" (131). This mysticism was tied to the representation of ghosts, fairies, and other imaginary creatures that were thought to inhabit the battlefields and trenches where soldiers fought. While Fussell's discussion focuses on the British case, a similar argument can be made for the French context. Audoin-Rouzeau, for example, comments on the "developing invasive superstition" of soldiers (85).

11. In his discussion of the reeducation of soldiers and sailors, McMurtrie mentions the development of forms of prosthetic technology, including an arm similar to Amar's. Developed by Dr. Bourcet, the various attachments or "hands" that could be used by the disabled soldier included "a hand for a vine grower, for a postman, . . . a ladder-cutter, a soldier, a plumber, a mechanic, a carpenter, a packer, a jeweler, a
priet and a driver of animals or tractors” (59).

12. I am grateful to Jonathan Kahana for suggesting that I think about Amar’s use of photographs to render visible the transformative power of prosthetics and the success of his strategies for rehabilitation.

13. Seltzer has pointed out that Henry Ford’s fantasy of the automated factory included the use of the disabled body as an ideal against which technological progress could be measured. “The production of the Model T required 7882 distinct work operations, but Ford noted, only 12% of these tasks—only 949 operations—required ‘strong, able-bodied, and practically physically perfect men.’ Of the remainder—and this is clearly what he sees as the major achievement of his method of production—we found that 670 could be filled by legless men, 2,637 by one-legged men, two by armless men, 715 by one-armed men and ten by blind men” (157).

14. Roberts has pointed out at least one instance of the horrified response to the mutilated male body in a postwar narrative. She cites Jean Dufort’s 1921 novel, *Sur la route de lumière* in which the protagonist “Olivier Mauret returns from the war without an eye and an arm, and struggles ‘to restore the heaping ruins left by four years of systematic destruction.’ . . . [H]e sees the war as ‘the monstrous fruit of an essentially industrial and scientific civilization’ that presently lies in ruins, ‘torn apart by doubt and suffering.’” Olivier’s fiancée, “repulsed by his mutilated body,” rejects him in the story. Olivier’s body seems emblematic both of the destruction of the war and of woman’s power to destroy man.

15. Carolyn Dean has argued that “in France, all psychoanalytic and literary attempts to rescue the self after the Great War led instead to its dissolution, and all attempts to stabilize the self in new theoretical terms reiterated its instability” (3). I want to make a similar argument for the attempt to reconstruct the body of the disabled soldier and suggest that all attempts to rescue and stabilize that body in *new and existing technological and scientific terms* reiterated its instability.

16. I have found no references in Amar’s work to mechanical arms, hands, or artificial limbs designed with women in mind. The body being rehabilitated in Amar’s framework is always the male body. Presumably, there were women who lost limbs or parts of limbs in this period, but the silence in Amar’s work about the woman worker or the rehabilitation of the disabled female body underlines the ways in which the disabled male body stood in singular relation to the discourses of production and national reconstruction in this period.

17. See Douglas and Madeleine Johnson on the art of the interwar period. The work of the Surrealists that included machine imagery, horror, and a preoccupation with the unconscious and dreams is particularly relevant here (50). Hulten also comments on the ways in which the Dadaists of the interwar period “inter-
mingled the rationality of ma-
chine forms with the irrational”
(12). Monaco has commented on
the centrality of the war experi-
ence to cinematic representation
of the period, in which violence
and bloodshed were repeatedly
dramatized (107–08). For literary
examples in which gender figured
centrally, see Roberts.

Works Cited


