

TECHNOLOGIES OF REPRESENTATION

**DRAWING CREEPY PLACES: REPRESENTING LIMINAL RITUAL SPACES OF
KURUMAN, SOUTH AFRICA**

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**SAFE SPACE: WAR, RISK, AND GLOBAL HAZARDS
IN HENRY DREYFUSS' HANDBOOKS.**

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ABSTRACT

The anthropomorphic drawings of industrial designer Henry Dreyfuss, published throughout the multiple editions of *Designing for People* and *The Measure of Man*, served as a seminal instrument by which explorations of the relationship between humans and design entered into architectural discourses in North America after World War II. By means of quantification methods, statistical analysis, data collection techniques, and other methodologies borrowed from scientific disciplines, these compilations of drawings attempted to translate tedious lists of information into a graphic language that could easily be understood by designers, architects, and planners. Today, the values portrayed by the early versions of these handbooks—certainty, neutrality, legibility, objectivity—remain unchallenged. This is evidenced, for instance, by the overwhelming popularity of a recent Kickstarter campaign that raised more than \$300,000 in less than a month to reissue some of the graphic devices that Dreyfuss used. A closer look into these anthropomorphic drawings, however, reveals that these human figures are far from neutral.

This paper traces the evolution of the values embedded in Dreyfuss' figures, from the "average" man—white, male, healthy, adult, middle class—to the statistical "extreme" and the "outlier," notions used to determine the needs of specific injured bodies. I argue that these drawings depicted the environment as a hostile threat to the body, and offered a picture of human's habitability through protective spatial enclosures against physical and psychological hazards. The sources and nature of these hazards shifted from warfare scenarios and factory threats in the immediate postwar era; to household and transportation accidents in the 1960s and 1970s; to environmental contaminants—pollution, biohazards, radiation—in the 1980s. And today, the same techniques used for visualizing environmental hazards have returned as a response to COVID-19. What began as a preoccupation with the efficiency of complex man-machine warfare equipment eventually evolved into a larger set of global hazards that no longer involved maximizing productivity. The different editions of the Dreyfuss manuals reveal a shift from an industrial society to a "risk society," and offer important evidence as to how design disciplines responded—and contributed—to reformulate the notion of risk after World War II.

INTRODUCTION

The anthropomorphic drawings of the industrial designer Henry Dreyfuss, published for first time in *Designing for People* (1955), and later revised and expanded in the multiple editions of *The Measure of Man* (1959-2003), and *Humanscale* (1974, 1981), served as a seminal instrument by which explorations of the relationship between humans and design entered into architectural discourses in the United States after World War II.¹ These compilations of drawings, displayed as a compendium of cross-referenced human data, were visualizations of large data sets. They attempted to translate tedious lists of information into a graphic language that could easily be understood by industrial designers and architects. By means of quantification methods, statistical analysis, data collection techniques, and other instruments and methodologies borrowed from scientific disciplines, these drawings were emptied of their ideological significance, assuming the paradoxical discourse of silence (Fig.1).

Today, sixty-five years after the first publication of *Designing for People*, these handbooks are still perceived as deeply committed to the rhetoric of scientific rationality and objectivity. Not only was a recent Kickstarter campaign launched to reissue some of the instruments that Dreyfuss Associates designed, it raised more than \$300,000 in less than one week, with the support of more than 1,700 backers.² The astonishing popularity of the project can only be comprehended if we assume that the epistemic virtues portrayed by these handbooks—certainty, precision, neutrality, legibility—are operating nowadays in a very similar manner to when these publications first appeared.

As books of practice, design handbooks remain poorly understood and rarely theorized, and tend to encourage debates that alternate between the morality claims issued by their most ardent apologists and practitioners, and the normalizing accusations of their detractors (Fig. 2). It is not until recently that handbooks are receiving increasing scholarly attention, and that their seemingly universal bodies, humans, and "users" are being interrogated.³ Writing against the backdrop of militarization, mechanization

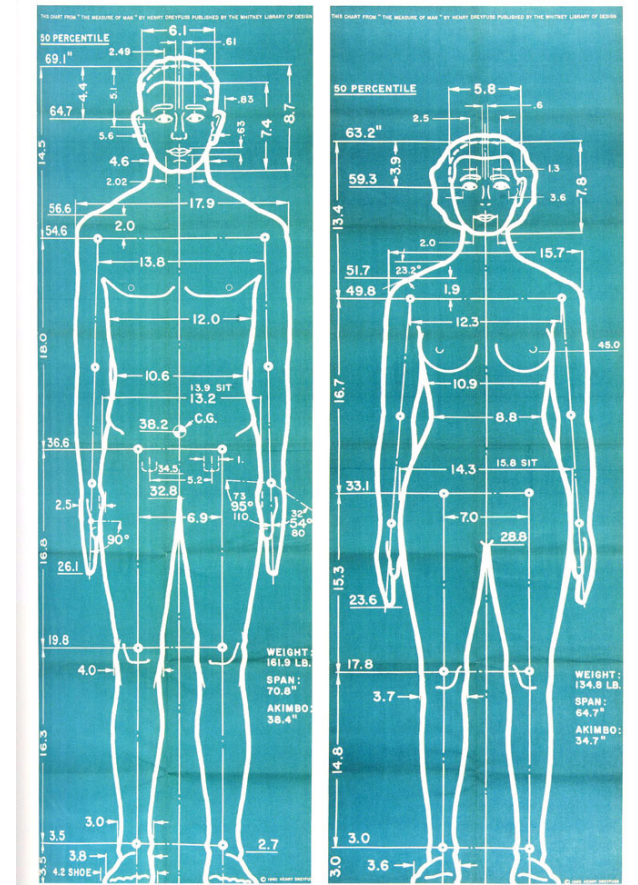


Figure 1: Average man and woman, Joe and Josephine. Henry Dreyfuss, *The measure of man; human factors in design*. (New York, Whitney Library of Design, 1960).

and industrialization, these scholars have excavated beneath the long-standing assumptions of neutrality and focused on notions of efficiency, productivity, and standardization.⁴ This paper engages with these important discussions, but shifts the attention away from the guiding ethos of efficiency, to that of safety. It argues that Henry Dreyfuss' handbooks depicted the environment as a hostile threat to the body, and offered a picture of human's habitability through protective spatial enclosures against physical and psychological hazards.

A comparison between the different editions of *Designing for People*, *The Measure of Man*, and *Humanscale* reveals how their anthropomorphic figures hid dysfunctional and fragile bodies underneath the appearance of the natural metrics of man. From World War II, to factory threats in the immediate postwar era, to household

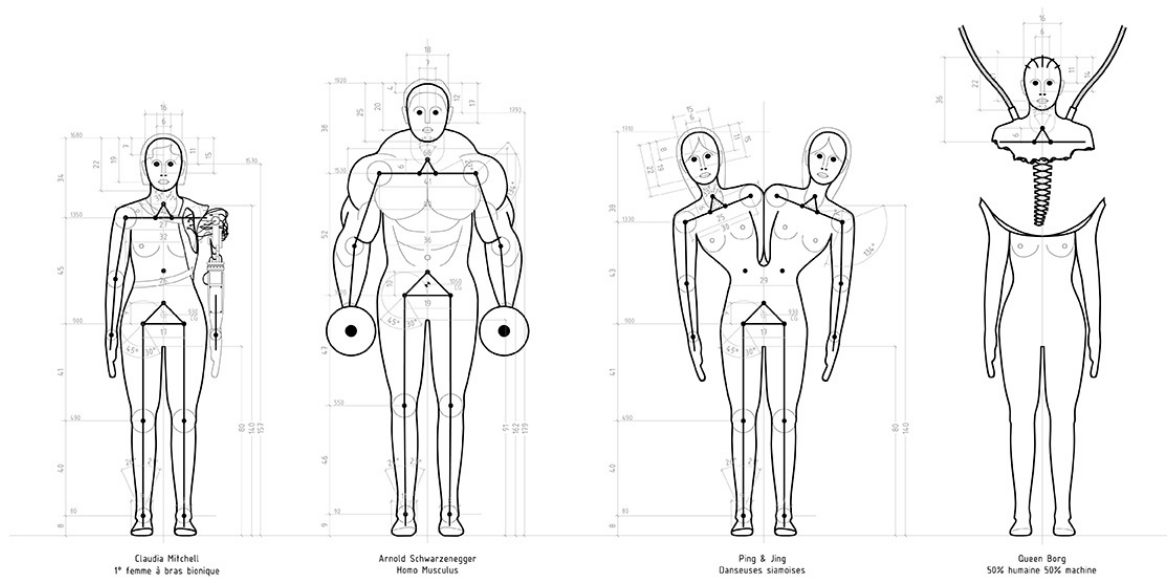


Figure 2: Thomas Carpentier, *Measure(s) of Man: Architects' Data Add-on* (2011).

and transportation accidents in the 1960s and 1970s editions, and to environmental contaminants in the 1980s, the Dreyfuss silhouettes appear as mediating outlines that aim to protect not only their vulnerable bodies, but also their wounded minds. What began as a preoccupation with the efficiency of complex man-machine warfare equipment eventually evolved into a larger set of global hazards that no longer involved maximizing productivity. The different editions of the Dreyfuss manuals reveal a shift from an industrial society to a “risk society,” and offer important evidence as to how design disciplines responded—and contributed—to reformulate the notion of the human since World War II, ghost-writing many of the spaces that surround us nowadays.

IMMERSED IN DATA

Henry Dreyfuss Associates, and specifically industrial designer Niels Diffrient and *human factors*⁵ specialist Alvin Tilley, were among the first to actively encourage the application of human factors in industrial design and architecture—an interest that came along with techniques of data collection. In 1960, Dreyfuss described *The Measure of Man* as a “miniature encyclopedia”⁶ of human factors data presented in

graphic form. Disturbed by the lack of any single body of knowledge that one could turn to, he explained how the office had been collecting books, articles, pamphlets, clippings, and dog-eared index cards since World War II, and methodically transferring such specialized knowledge into a “common language”⁷ that could be shared by a non-technical audience.

Design was presented as a problem of information management. The obsessive collection of data into selector charts, cards, posters, scale figures, and manikins enacted an imaginary of design as a flexible and self-reflected interface—an interest shared by many designers after the impact of cybernetics and communication sciences after World War II. As a result, new techniques of calculation, measurement, statistical analysis, and storage became ethical and truth-producing methods that portrayed a fantasy of good, humane, and satisfying design. These techniques were considered “more reliable than intuition-based design”⁸ because a growing body of data justified them. In other words, information overload had become valuable in itself, both a democratic virtue and an obligation.

The use of data collection techniques and statistical

methods of analysis as evidentiary and persuasive devices is what separates Dreyfuss figures from the human silhouettes that appeared in earlier architecture handbooks. While Modernist conceptions of normative bodies, such as the ones that appeared in Ernst Neufert’s *Bauentwurfslehre* or Ernest Freese’s drawings in *Architecture Graphic Standards*, also appealed to pseudo-scientific and rationalized forms, these previous examples concealed the techniques and sources of measurements. In the Dreyfuss handbooks, data collection techniques were explicitly described throughout all editions. The nature of the data, however, shifted. What began in 1955 as a compilation of data about the “average” man measured in relation to the bell-shaped normal—white, male, healthy, nondisabled, adult, middle class—eventually evolved into an examination of the deviation itself, the statistical “extreme” and the “outlier.” Moving away from the normative average man, succeeding editions of the handbook slowly showed other types of bodies. In 1959, the charts compiled for *Measure of Man* carried not only a drawn average male and female figure, but the “extreme”⁹ small and large counterparts (Fig. 3).

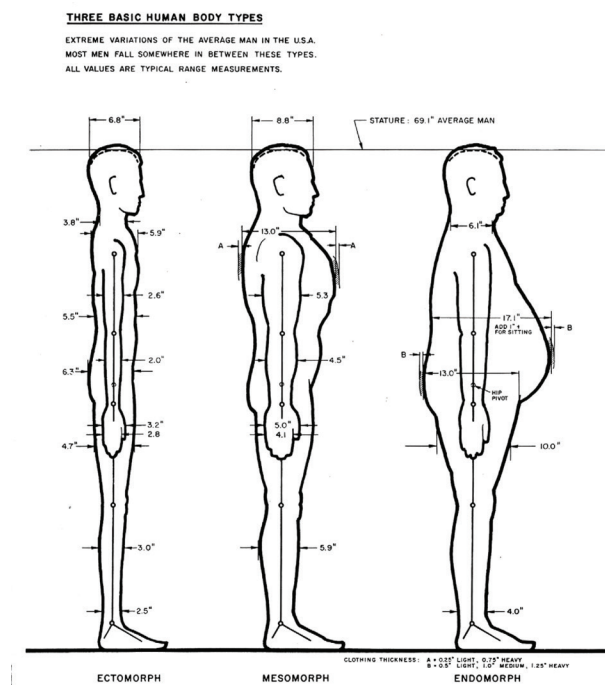


Figure 3: “Extreme variations of the average man.” Henry Dreyfuss, *The measure of man; human factors in design*. (New York, Whitney Library of Design, 1966).

Children were introduced in 1960. Racial differences and provisions for the disabled body and for elderly users were not drawn until the 1974 edition of *Humanscale* (Fig. 4). And Dreyfuss’s original title, *The Measure of Man*, was only changed to *The Measure of Man and Woman* in 1993. What happened, then, between these years to produce such a significant shift of the architectural user?

Gender, age, race, and disabilities had slowly been introduced into the manuals, but their inclusion was not born from social justice discourses. Even if published amid the passage of major civil rights legislation for disabled people and people of color, terms such as *minorities* and the *oppressed* were first mentioned

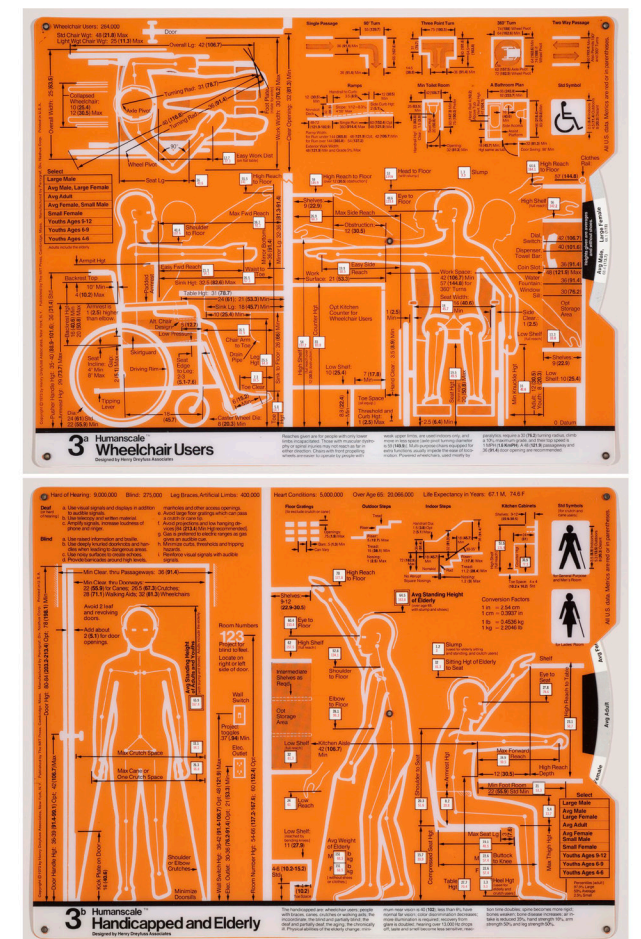


Figure 4: Provisions for “wheelchair users,” the “handicapped” and the “elderly.” In Niels Diffrient, Alvin R. Tilley, Joan C. Bardagjy. *Humanscale 1/2/3* (Cambridge, Mass, MIT Press, 1974.)

by Diffrient only in 1974 (and only in passing),¹⁰ and normative terminology such as *cripples* or *handicapped* hinted instead to the intertwined interwar history of scientific management, human factors research, and rehabilitation that historian of disabilities Aimi Hamraie has traced.¹¹ Yet, the additions to Dreyfuss' handbooks directed more attention not only to the wheelchair user, but also to the aged, the paralytic, the blind, the deaf, the chronically ill, the obese, the socially alienated, etc. What, then, was shifting the attention away from the Gaussian distribution curve to the statistically atypical?

Merging military human factors and civil industrial design, the handbook's emphasis on non-normative, misfit bodies reflected designers' preoccupations with machine-driven danger. Its close relationship to the military ergonomic research conducted in Great Britain and America during World War II embedded Dreyfuss' images in the demands and exigencies of warfare, and brought designers to study the limits of the combined performance between men and machines by tackling physical and psychological problems. In the context of warfare, the bell-shaped normal could no longer respond to the needs of vulnerable and injured bodies. The exception, rather than the rule, became the focus of research and design.

WAR AND BODY

Dreyfuss Associates' interest in human factors grew out of their involvement with military design projects for World War II. From the design of combat vehicles, to specialized anti-aircraft protective devices, control devices, consoles, and prosthetic limbs for veterans, the participation of Dreyfuss Associates within war conflicts inflected their design values:

Shortly after the war, our office was working on the interior of a heavy tank for the army. We had tacked a huge, life-size drawing of the tank driver's compartment on the wall... Surrounded by arcs and rectangles, he looked like one of the famous dimensional studies of Leonardo. Suddenly it dawned on us that the drawing on the wall was more than a study of the tank driver's compartment: without being aware of

it, we had been putting together a dimensional chart of the average adult American male.¹²

These projects focused on the interaction between soldiers and their war equipment. They aimed at efficient man-machine systems and raised a whole range of psychological, anatomical, and physiological concerns—including stress, anxiety, and emotional disturbance.¹³ Nothing can better portray the influence of the war in Dreyfuss' human factors research than the name chosen to designate the male version of the handbook silhouettes: Joe. Derived from the usage of G.I. Joe for the generic U.S. soldier, this theoretically average male adult refers specifically to the American soldier.¹⁴ This American icon, seemingly young, strong, and healthy, is however reframed in terms of its potential to be damaged, both physically and psychologically. Underneath the appearance of the natural metrics of man hid dysfunctional and fragile bodies that suffered all types of pathologies: "Joe and Josephine have numerous allergies, inhibitions and obsessions,"¹⁵ affirmed Dreyfuss already in 1955. A bad illumination could cause "nervousness, eye fatigue, or illness," while certain colors could make them "gay or sad; aid their digestion or make them ill."¹⁶ "They react strongly to touch, ... they are disturbed by glaring, insufficient light and offensive coloring, and they are sensitive to noise."¹⁷ In addition, Joe and Josephine are also frequently checked by all kinds of medical specialists: "ear doctors, neurologists, psychologists and opticians,"¹⁸ for theirs is a preventive kind of research. What at first sight appeared as healthy was in fact broken and compromised, and invoked feelings of pain, fears, and anxieties.

This depiction of the human condition in terms of its failures and deficiencies responded to the traumatic experiences of World War II and its destructive aftermath. The postwar struggle was articulated around the necessity to respond to an irrevocably different world, one fundamentally changed by the horrors of combat, revelations about concentration camps, and the shock of the atomic and hydrogen bombs. The consequences of this scenario were not only physical or limited to those bodies that directly experienced the battlefield. As historians of architecture and technology Paul Virilio and John Harwood have demonstrated, the nuclear bomb was a paradigmatic example of a

world-destroying object that distorted the relationship between subjectivities in a warfare scenario.¹⁹ Space had become weaponized to an unprecedented scale, and the human being was responsible for it. World War

II turned bodies into targets and the environment into a hostile and unsafe setting from which those bodies had to be protected.

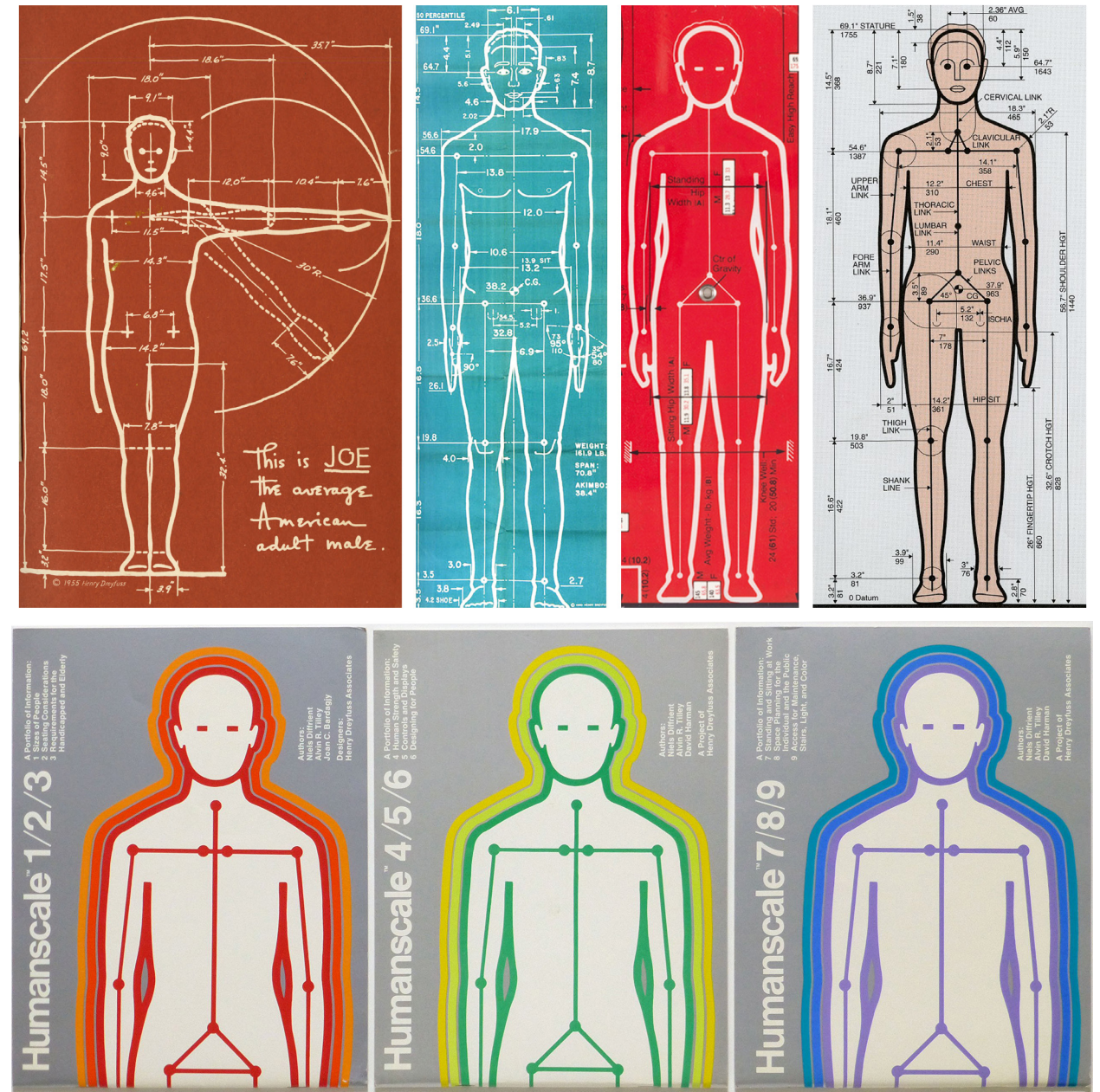


Figure 5: Evolution of the figure of Joe throughout different editions. Note the continuous emphasis in the skin. Left to Right: Henry Dreyfuss, *Designing for people*, (New York, Simon and Schuster, 1955); Henry Dreyfuss, *The measure of man; human factors in design*, (New York, Whitney Library of Design, 1960); Niels Diffrient, Alvin R. Tilley, Joan C. Bardagjy. *Humanscale 1/2/3* (Cambridge, Mass, MIT Press, 1974.); Alvin Tilley, *The Measure of Man and Woman* (New York: Whitney Library of Design, 1993); Niels Diffrient, Alvin R. Tilley, Joan C. Bardagjy. *Humanscale 1/2/3* (Cambridge, Mass, MIT Press, 1974.); Niels Diffrient, Alvin R. Tilley, David Harman. *Humanscale 4/5/6* (Cambridge, Mass, MIT Press, 1981); Niels Diffrient, Alvin R. Tilley, David Harman. *Humanscale 7/8/9* (Cambridge, Mass, MIT Press, 1981.)

In this context, Joe and Josephine's anthropometric drawings should also be seen in relation to the war traumatic experiences. These empty silhouettes show no organs or skeletal structures, only outlines that denote an interface between man and environment (Fig. 5). Unlike detailed representations of anatomical studies, these drawings depict a simplified body outline, smoothed of any anomalies and variations. Excluding the accidental and eliminating impurities, they select, compare, typify, and generalize. They seek out the commonalities and differences of the studied subjects, separating the typical from the particular. They teach the observer to look at the essential and overlook the incidental. They are simplifications achieved by pictorial taxonomy.

But these harsh, bold, and thick outlines have a further signification. The obsession with an enclosed and simplified figure was not only the result of a logic of taxonomy and replicability—otherwise joints and axes would have taken on a greater relevance—but also an effort to redirect attention from the interior of the body towards its periphery, its surface. This boundary, conceptualized as a potential barrier against traumatic experiences, encloses the body in order to protect the mind. Seen from this perspective, Joe and Josephine's contoured bodies appear as mediating outlines that aim to protect not only their vulnerable bodies, but also their wounded minds. Their thick skins serve as a reinforced boundary that shields, prevents, and alleviates traumatic neuroses. They represent the desire to counteract a hostile environment that had become weaponized to an unprecedented degree from the smaller scale of the human body. Like suits of armor, Joe and Josephine's bold outlines and spatial envelopes protect the human subject from excessive external stimuli. The thicker this outline, the greater external variations they can survive.

OTHER HOSTILE ENVIRONMENTS

Concerns with hazards and safety permeated all the editions of Dreyfuss handbooks, but the sources of these hazards changed. Whereas the first edition of *Measure of Man* shows Joe and Josephine standing and sitting in standardized work areas filled with multiple safety requirements [safety guards, non-slip treads and floors, illumination that avoids reflection,

etc.),²⁰ the 1966 edition no longer focus only on the performance of the machine operator. The extended set of drawings included Joe and Josephine seated in multiple vehicles: an automobile, tractor, airplane, railroad, bicycle, and even a space couch. Coinciding with public claims against the automobile industry for their reluctance to increase safety measures, such as the ones offered by consumer advocate Ralph Nader in *Unsafe at Any Speed*, Joe and Josephine were described as experiencing new sets of transport-related pressures, including dizziness, claustrophobia, lumbar and thoracic pain, and varicose veins, among others. In 1974, *Humanscale* shifted the emphasis once more and showed the household as a major source of danger, and the children and the elderly as the main subjects at risk. From open spaces in railings for stairs, landings, and balconies to open stair risers, slippery treads, undetectable hot objects, sharp edges, small objects, and even dust, the house was depicted as a space in urgent need of safety improvement, and so it was progressively filled with devices and appendages that minimized the danger.²¹ However, it was not until 1981 that the sources of danger acquired an unprecedented scale, no longer limited to a defined space or a certain population group. Coinciding with the rising environmental movement, in this edition of *Humanscale* Diffrient identified more than seventy-five different types of danger sources related to environmental hazards, contamination pollutants, biological threats, and nuclear waste, and compiled their symptoms, effects, tolerances and human protections in a graphic form. He referred to the designed selector chart as a device that could enable a "rapid retrieval of basic information on dangers of humankind"²² (Fig. 6).

From warfare scenarios and factory threats in the immediate postwar era, to household and transportation accidents in the 1960s and 1970s editions, and environmental contaminants in the 1980s, the earlier concerns with efficient man-machine relationships eventually evolved into a larger set of dangers that could no longer be limited to the space of the battle or to the work space, and that no longer involved maximizing productivity. In this transition, the different editions of the manuals designed by Dreyfuss Associates rendered visible the transition from an industrial society to a "risk society," as defined by the German sociologist Ulrich Beck:

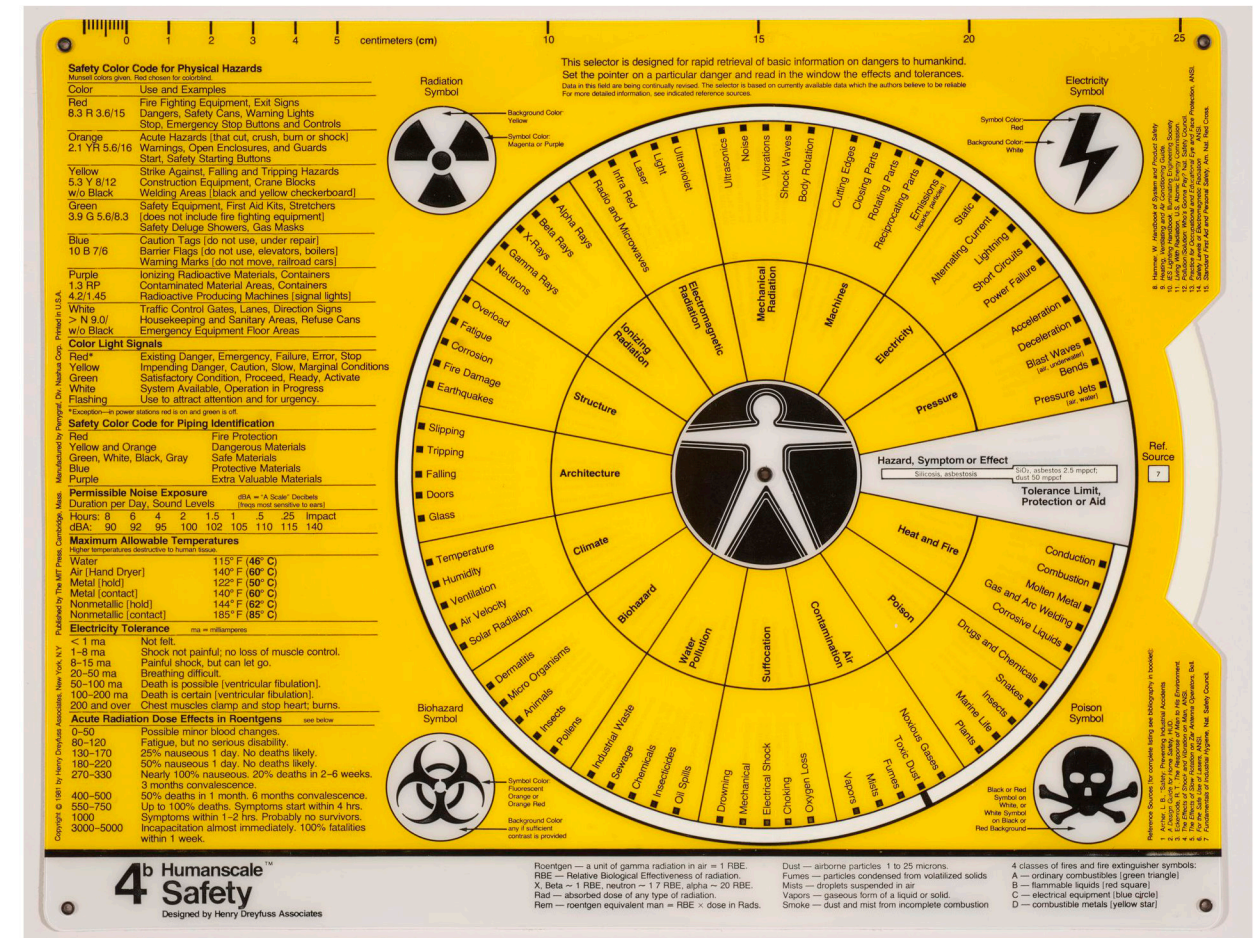


Figure 6: Graphic selector that identifies more than 75 sources of danger. In Niels Diffrient, Alvin R. Tilley, David Harman. *Humanscale 4/5/6: a portfolio of information: 4. Human Strength and safety; 5. Controls and displays; 6. Head and vision.* (Cambridge, Mass, MIT Press, c1981.)

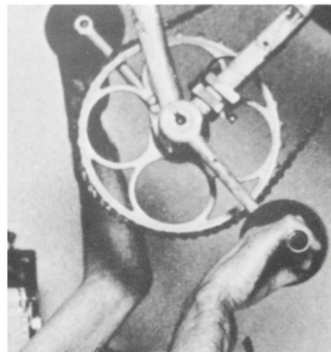
Risks may be defined as a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself. Risks, as opposed to older dangers, are consequences which relate to the threatening force of modernization and to its globalization of doubt. They are politically reflexive.²³

The later risks described by Dreyfuss Associates were no longer limited in time (future generations would be affected) nor in space (they crossed national boundaries). They became more difficult to perceive, and consequently to measure, manage, and control. As Ulrich Beck noted, in a *risk society* the focus is "more and more on hazards which are neither visible

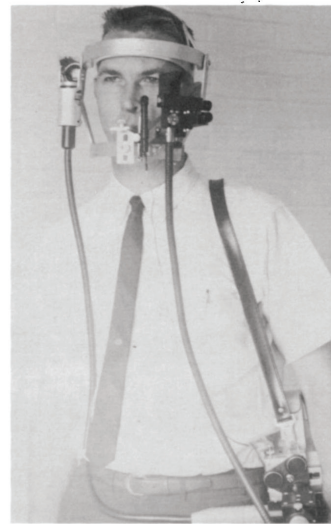
nor perceptible to the victims... hazards that require the sensory organs of science—theories, experiments, measuring instruments—in order to become visible or interpretable as hazards at all."²⁴ Thus, it comes as no surprise that the measuring techniques used by Dreyfuss Associates also shifted. If the postwar context saw the use of anthropometric techniques derived from military uses, such as the "andrometer"²⁵ that was used to make distinctions between successful fighters and those whose bodies were less likely to successfully win in armed combat, later editions portrayed a progressive interest in devices that measured less perceptible hazards.

An example of this appeared in the 1975 article

A6 Ergometer



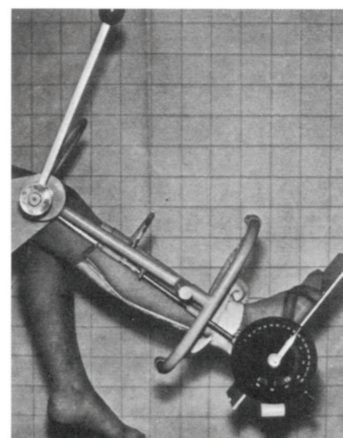
B1 Eye Movement Recording



D9 X-Raying



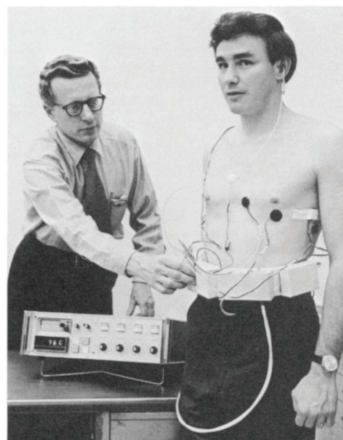
A12 Measuring Foot Motion



B15 Touch Sensitivity



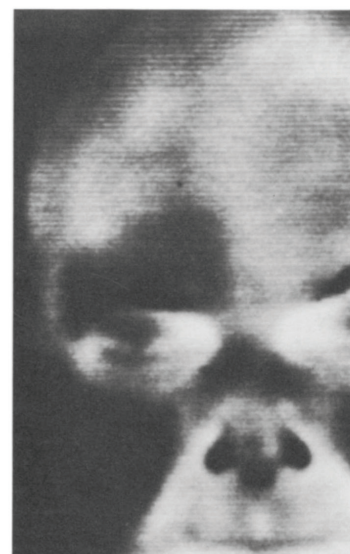
F11 Biobelt



B2 Light and Eye Movements



D10 Thermography



F2 Electroencephalograph

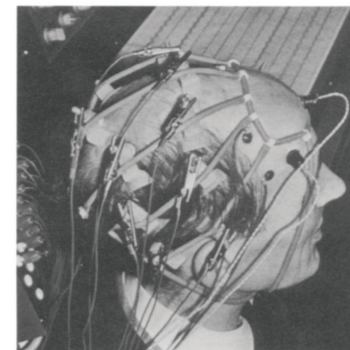


Figure 7: Selection of measuring devices depicted in Niels Diffrient, Joan C. Bardagjy and Nicholas Polites, "Dimensions of Experience: Understanding and Measuring Human Experience in the Designed" in *Design Quarterly*, No. 96, *Dimensions of Experience* (1975)

published by Diffrient for *Design Quarterly*, that compiled measuring tools and techniques used in a wide range of disciplines—from psychotherapy to behaviorism, anthropology, and sociology. The long list of measuring devices tested the limits of human inhabitation by measuring the body's physical and psychological response to various environmental phenomena. The electrogonometer, for example, recorded muscle activity and was used to treat hands with arthritis, polio, and stroke; the heat suit measured energy expenditure and was used to design specialized requirements in hospitals; eye movements were measured to enable quadriplegics and those who lacked arms or legs to control a motorized wheelchair; voice prints were studied to measure psychological states; and techniques to measure body sensitivity were applied to the design of prosthetic devices²⁶ (Fig. 7). Either monitoring oneself or others, these technologies were aimed at analyzing people's responses to changing environmental stimuli.

The shift from anthropometric tools that measured distances to devices that measured stimuli runs parallel to the shift from occupational hazards to global risks. Such changes reveal a different attitude to the notion of safety: from safety as a means to maximize efficiency and labor productivity in a work environment (an attitude derived from earlier "scientific management" practices), to safety as a means to achieve ethical and socially responsible products. This transition came alongside the departure from the average man, to the inclusion of certain minority groups. As the needs of wheelchair users, the elderly, the ill, etc. began to be considered, the manual's authors departed from concerns with maximizing economic productivity and claimed that the manual could become an opportunity to respond to social issues from the point of view of design.

It could be argued that such a shift was never achieved. Recent responses to the handbook, such as the one drawn by architect Thomas Carpentier, demonstrate with great creativity how normative these handbooks still are. Departing radically from the notion of the average or the standard, Carpentier's graphic subversion of Dreyfuss' silhouettes shows how these manuals could explore diversity rather than continue to carry modernism's dream of standardization

and universality. But beyond criticizing Dreyfuss' normativity, projects like Carpentier's signal the main challenge of so-called "user-centered" design: how to accommodate the needs of a greater diversity of bodies and still account for replicability. Maybe one important lesson that we could extrapolate from the evolution of the Dreyfuss manuals is that the concerns of people with disabilities, the chronically ill, the elderly, etc. are not marginal, but rather central to a diverse population with a host of potential vulnerabilities. In the current COVID context, where the environment is being conceptualized (again) as a potential source of danger for a vulnerable body, such lesson seems more important than ever before. ■

ENDNOTES

1. *The Measure of Man* was revised and enlarged in 1967; then again in 1994, 2001, and 2003 under the name *The Measure of Man and Woman*. *Humanscale* was first published in 1974, and then expanded in 1981.

2. See <https://www.kickstarter.com/projects/iacolaborative/reissue-of-humanscale/posts/1961090> [accessed August 15, 2020]

3. Much of this attention has been garnered around Ernst Neufert *Bauelementelehre*. See Nader Vossoughian, "Standardization Reconsidered: Normierung in and after Ernst Neufert's *Bauelementelehre* (1936)," *Grey Room*, 54 (2014): 34-55; and Anna-Maria Meister "Ernst Neufert's 'Lebensgestaltungslehre': formatting life beyond the built" *BJHS Themes*, 5 (2020), 167-185. For a comparison between Ernst Neufert and Henry Dreyfuss handbooks see John Hardwood, "The Interface: Ergonomics and the Aesthetics of Survival," *Aggregate*, ed. Governing by design architecture, economy, and politics in the twentieth century, (Pittsburgh, Pa: University of Pittsburgh Press, 2012); and Paul Emmons and Andreea Mihalache "Architectural handbooks and the user experience" in Kenny Cupers, ed. *Use matters: an alternative history of architecture* (Abingdon, Oxon ; New York : Routledge, 2013): 35-50. From a contribution to this scholarship from the point of view of disability, see Aimi Hamraie *Building Access: universal design and the politics of disability* (Minneapolis : University of Minnesota Press, 2017).

4. For a theorization on architectural standards as closely tied to military-industrial efficiency, see Vossoughian, "Standardization Reconsidered", 34-55. For a further relationship between technical 'norms' (standards) and social 'norms' (modes of conduct that enhance productivity and save time), see Meister "Formatting life", 167-185. For a brief compendium of how the human subject has been represented and 'designed' across multiple timeframes and geographies in architecture circles (with a focus on productivity, efficiency, and industrialization) see Beatriz Colomina and Mark Wigley "The Frictionless silhouette," *Are we human?* (Zürich, Switzerland : Lars Müller Publishers, c2016.): 147-161. Even the scholarship written from the perspective of the politics of disability argues that "ergonomic" design was about military-industrial efficiency. See Hamraie "Flexible users," *Building Access*.

5. *Human factors* or *human engineering* was the term used in the United States to denote the problems of human work and control operations that came into

prominence during World War II. The demands and exigencies of warfare raised questions concerning the design of the equipment and machinery, and brought psychologists to collaborate with physicists and engineers in the design of aircraft and electronic equipment. The institutionalization of the discipline came in 1956, when the Human Factors Society of America was voted into official existence. See "Human Factors a Brief History" in Alvin Tilley, *The Measure of Man and Woman; Human Factors in Design* (New York: Whitney Library of Design, 1993): 9

6. Henry Dreyfuss, *The Measure of Man; Human Factors in Design*, (New York, Whitney Library of Design, 1960): 4

7. Niels Diffrient, Joan C. Bardagjy and Nicholas Polites, "Dimensions of Experience: Understanding and Measuring Human Experience in the Designed" in *Design Quarterly*, No. 96, Dimensions of Experience (1975): 16, 19.

8. Diffrient et al. "Dimensions of Experience", 9

9. This is the term that both Dreyfuss and Diffrient use. As referred to in the handbooks, it includes all those below the fifth percentile and above the ninety-fifth percentile.

10. Diffrient et al. "Dimensions of Experience", 7

11. Aimi Hamraie argues that early disability discourses were entrenched in notions of military-industrial efficiency and productive citizenship, as defined by a person's amenability to both rehabilitation and enhancement. See Hamraie, *Building Access*, 41-64.

12. Dreyfuss, *The Measure of Man*, 4

13. Mainly taken from Air Force and Navy sources, the bibliography of *Measure of Man* cites medical, psychological, and physiological survey reports for military aircraft and undersea crafts that examine not only human measures in relationship to war machinery, but also the effect of psychological stress, anxiety, and emotional disturbance in warfare, and the design of prosthesis for amputee populations. For the complete bibliography see Dreyfuss, *The Measure of Man*, 15

14. During World War II the term "G.I. Joe" was used to refer to an enlisted soldier of the U.S. Armed Forces. The name appeared in the 1945 American film *The Story of G.I. Joe*; in 1952 it was used to name a large retail chain of army surplus merchandise in Portland, and in 1963 it gave birth to the military action figures developed by Stan Weston. In the context of the Dreyfuss handbooks, "G.I. Joe" first appears in the 1955 edition of *Designing for People*. See Henry Dreyfuss, *Designing for People*, (New York, Simon and Schuster, 1955): 30

15. Dreyfuss, *Designing for People*, 27

16. Ibid., 37

17. Ibid., 27

18. Ibid., 36

19. In contrast to other types of distance weapons that still encompass the concept of targeting (marking a subject and engendering a space in which both the target and the targeted are part of the same logic), the target of the bomber was no longer a subject, a machine, or an army, but the whole extension of the territory. See Paul Virilio, *Pure War* (New York, N.Y., U.S.A.: Semiotext(e), c1983.) and John Harwood, "The Wound Man: George Nelson and the "End of Architecture"" *Grey Room*, No. 31 (Spring, 2008): 90-115

20. Dreyfuss, *The Measure of Man*, 13

21. The main source of information listed in the bibliography that focused on this

issue, *A Design Guide for Home Safety*, was a survey and design manual prepared by the US Department of Housing and Urban Development in 1972. Using reports from various governmental agencies and the National Safety Council, the HUD evaluated building codes and standards through human factor analyses, classified the nature and the cause of the different dwelling accidents, and proposed a series of design guidelines intended to provide architects and builders with preventive and safety measures. See Niels Diffrient, Alvin R. Tilley, Joan C. Bardagjy. *Humanscale 1/2/3* (Cambridge, Mass, MIT Press, 1974.): 10, 29-30

22. Diffrient et al. *Humanscale 1/2/3*

23. Ulrich Beck, *Risk Society. Towards a New Modernity* (London; Newbury Park, Calif.: Sage Publications, 1992): 21

24. Ibid., 27

25. For a history of the use of human factors and anthropometric tools and methods in military contexts see Hamraie, *Building Access*, 41-64.

26. Diffrient et al. "Dimensions of Experience"