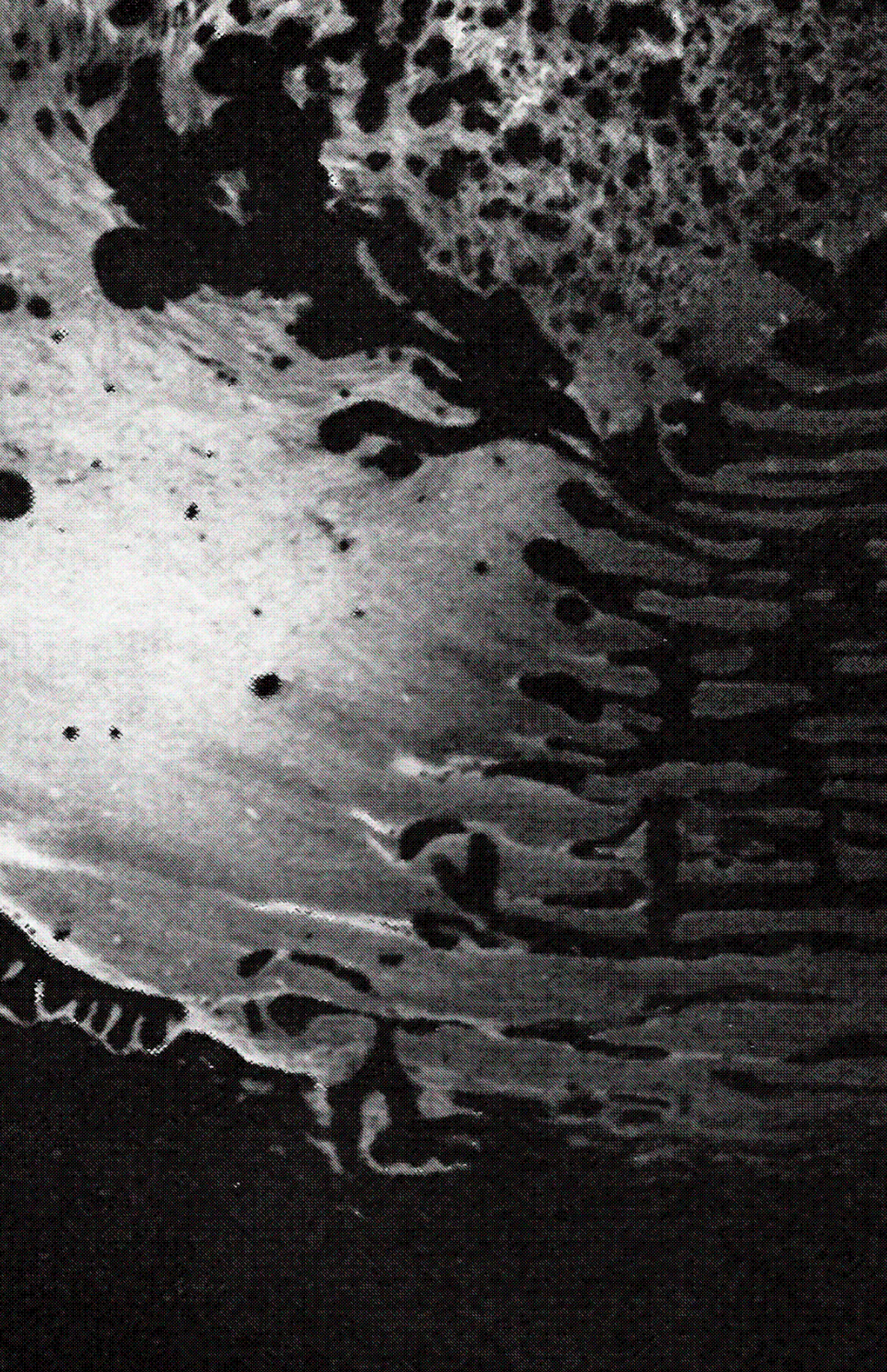


cybernetic pedagogies

between scientific objectivity
and political decisions

Katja Heilingbrunner



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submitted and edited by
Katja Heilingbrunner

Directing professor
Alfredo Thiermann

Supervising team
Javier Nueno / Dieter Dietz

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Table of Contents

10- 15

Introduction

16 - 23

Design/Democracy /

The Hochschule für Gestaltung Ulm

24 - 29

Vergangenheitsbewältigung,

Gegenwartsbewältigung and transformation

30 - 37

Norbert Wiener in Ulm

38 - 45

Objectivity and Grundlagenforschung

46 - 53

Cybernetics in Ulm

54 - 59

Max Bense

60-73

Scientific Overshoot / Rittel and Maldonado

74 - 81

**An Object Ecology / Moles, Bonsiepe and
Maldonado**

92 - 103

Recontextualizing the scientific approach

104 - 115

Conclusion

118 - 123

Table of figures

124 - 133

Bibliography

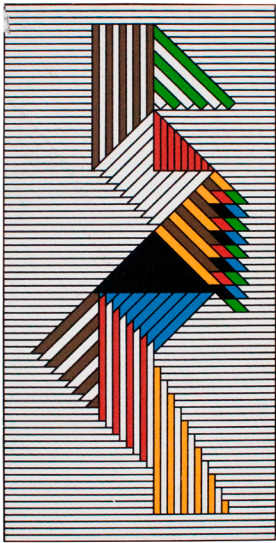


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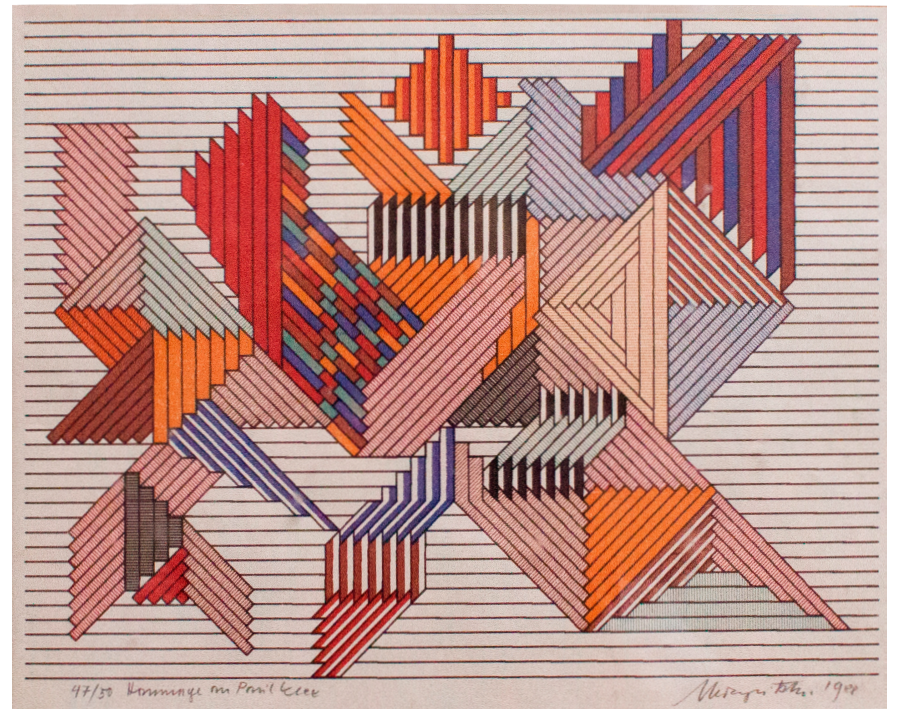


fig.02

[1] Introduction

In 1988, twenty years after the closure of the HfG Ulm, two former HfG faculty members came together to create an homage to the Bauhaus masters. *Hommage an Paul Klee 47/50* presents an intricate arrangement of geometric shapes, interlocking in a layering of striped patterns. The shapes are rendered in a palette of muted earth tones contrasted with blue and red that are directly influenced by the work of Paul Klee, particularly in his use of geometric abstraction and color theory. He called this the “orientation on the formal level.”¹ The methodical precision of the lines reflects the capabilities and aesthetics of the computer-aided design of the late 1980s. Using the IBM PC with AutoCAD on a digitizing tablet, screen, and plotter, Heinrich W. Kapitski explores the transfer of visual craftsmanship of the Bauhaus master into the digital age. According to him, concrete art is transformed into a process of abstraction in which “Descartes meets Klee (“Two men, suspecting each other in a higher position, meet each other”) and Leibnitz, as the breeder of binary logic, has to give his blessing.”²

*The creative work: I analyze the optical alphabet, the visual language of the ancients. I go in search of their modular and canon. [...] I work consciously, I work rationally, because I work with a machine, [...].*³

The print *Hommage an Paul Klee 1/50*, which Kapitski and Eugen Gomringer produced together with IBM Germany GmbH, exemplifies a forward-looking integration of design pedagogy and advanced technology that began at the HfG Ulm. It shows the influence of Gomringer’s tenure as secretary to Max Bill, a founding figure of the HfG Ulm from 1954 to 1956, and the close ties to the Bauhaus in the school’s early years.

While the HfG Ulm lacked the technological means to fully explore computer-human interaction in its formative years, this artwork captures the pedagogical essence of the school two

1 Ernst Gomringer, Herbert W. Kapitski, and IBM Deutschland GmbH, *Hommage an Paul Klee*, 1988, Plotter color print, 40.5cm x 50.5 cm, 1988.

2 Ibid.

3 Ibid.

decades later and its optimistic embrace of the technological future - a sentiment echoed by teachers like Abraham Moles and Horst Rittel, who celebrated the IBM computer as the pinnacle of technological sophistication.⁴

For the technological future envisioned, the cybernetic approach played a central role in establishing design methods at the school. Max Bill, the school's director until 1956, describes this in a letter to the architecture department of the TU Darmstadt during a visit by Norbert Wiener. In this context, cybernetics represents the rational scientific approach, which is engaged in interdisciplinary work. This appealed to post-war designers throughout Germany, especially at the HfG Ulm, who explored the humanistic approach to cybernetics, worked to develop quantitative claims and calculated explanations, and at the same time prophesied the growing influence of computer technology.⁵ This meta-science served as an antithesis to the ideological, ignoring the political involvement of the previous "neutral" scientist in the war. The theories were taught specifically in the Information Department, but also throughout the school as part of an agglomeration of theories in which the boundaries between theories seem to blur.

The role of cybernetics in design and architecture pedagogies is emblematic of widespread technological optimism during the transformative years of the 'Long Sixties' when it was euphorically adopted into architecture faculties and practices across Germany.⁶ Common were the shared high expectations that were placed to assist in dealing with modernizing society and the technologization of daily life.⁷ It was in the transitional time between the industrialized society and today's information society, that the role of the designer was reevaluated.

4 Abraham Moles, "Products: Their Functional and Structural Complexity," *Ulm: Journal of the Hochschule Für Gestaltung* 6 (October 1962): 4–12.

5 Philipp Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland* (Göttingen: Wallstein, 2009), 346.

6 Georg Vrachliotis, *Geregelte Verhältnisse: Architektur und technisches Denken in der Epoche der Kybernetik* (Wien: Springer, 2012), 8.

7 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 13.

This Énoncé théorique explores the rhetoric surrounding the efforts to establish design as a scientific discipline at the Hochschule für Gestaltung in Ulm, tracing its evolution throughout the school's existence. Within this, it examines the tensions between individual actors and groups of cyberneticians within the school. Cybernetics is presented as a dual-faced concept: on one hand, it can be perceived as a technocratic, anti-political tool of control, and on the other, as a theory promoting anti-control.⁸ This analysis is set against the historical backdrop that stretches from post-war reconstruction in Germany to the student protests of 1968 and into the early 1970s, where the interplay between subjectivity and objectivity is a critical theme.

8 Simon Schaupp, "Radikale Demokratie und Kybernetik," in *Radikale Demokratietheorie. Ein Handbuch.*, ed. Dagmar Comtesse et al., 1st ed. (Berlin: suhrkamp, 2019), 766.

[2] Design/Democracy – The Hochschule für Gestaltung Ulm

In 1946, Otl Aicher (1922-1991) held a series of lectures in Ulm as one of the first Germans to get granted permission by the occupation government of the US in Germany. The lectures each Thursday examined the national socialistic past years from a theological perspective. Due to its success, Aicher was advised by the US Cultural Ministry to initiate an educational school for adults – in Germany called *Volkshochschule* (VHS). These emerged *en masse* until 1955 as part of the US reeducation program. From the Volkshochschule Ulm, which Aicher organized Inge Scholl, the notion for a political education school arose from *studio null in 1948*. In the aftermath of the conceptual *Stunde Null*, Inge Scholl (1917- 1998), Otl Aicher, and Hans Werner Richter conceived a plan to cultivate a free and democratic society that would stand in opposition to the restorative tendency that prevailed in the immediate post-war years. This was the beginning of the Hochschule für Gestaltung in Ulm.⁹

Stunde Null denotes the immediate post-World War II period in Germany, marked by the unconditional surrender of the Wehrmacht, the collapse of the Nazi state, and widespread destruction of cities, businesses, and infrastructure. This radical social upheaval presented the founders with both an opportunity and a responsibility for a fresh start. Inge Scholl's siblings, Hans and Sophie Scholl, were members of the Nazi resistance group *Weißer Rose* at the LMU Munich and were active until their execution on February 22, 1943. Aicher also had close ties to Hans and Sophie Scholl,¹⁰ and although both he and Scholl were not in Munich at that time, they were part of the *Ulmer Freundeskreis* and were considered to be affiliated with the resistance.¹¹

9 Noah Horn, "Die Ulmer Volkshochschule Und Die Hochschule Für Gestaltung. Wie Aus Einer Volkshochschule Eine Wichtige Nachfolgerin Des Bauhauses Hervorging," in *Bauhaus Und Erwachsenenbildung*, ed. Anke Grotluschen and Anette Richter-Boisen, 1st ed., Progressive Architektur Im Verhältnis Zu Reformpädagogik Und Arbeiter:Innen-Bewegung (Verlag Barbara Budrich, 2023), 172, <https://doi.org/10.2307/jj.8110914.13>.

10 René Spitz, *HfG Ulm - Concise History of the Ulm School of Design*, ed. Jens Müller, A5 06 (Düsseldorf: Lars Müller Publishers, 2014), 27–28.

11 Inge Scholl was found guilty by association due to her family relation to the siblings and therefore thrown into prison for five month. in Horn, "Die

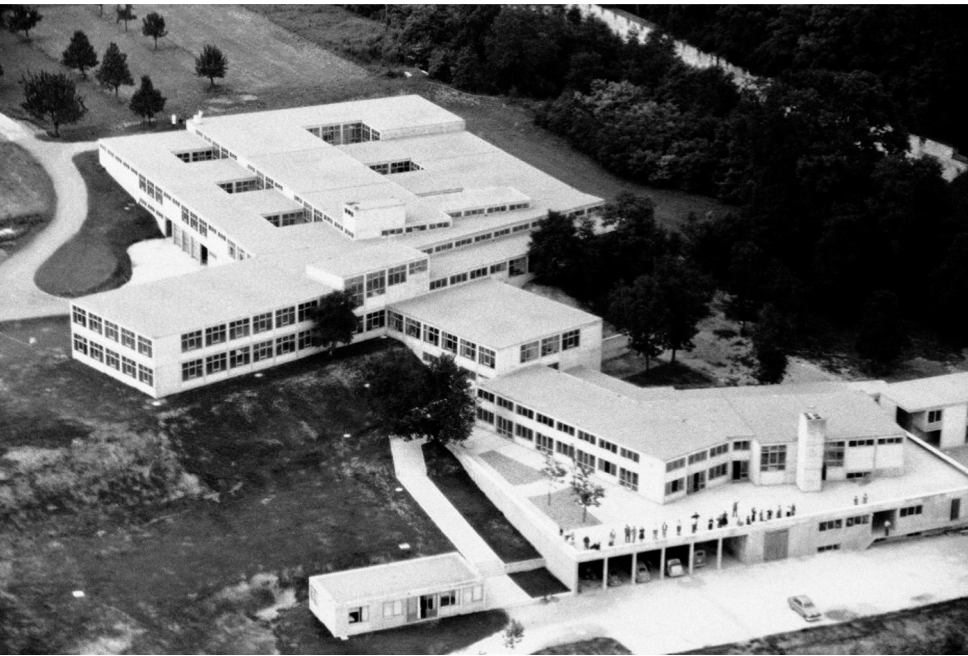


fig.03

The initial concept was a “Geschwister-Scholl-Schule” for educating the modern citizen through evening lectures. Upon discovering Swiss designer and architect Max Bill (1908-1994), Inge Scholl and Otl Aicher convinced him of their project. Bill’s involvement transformed the school, later known as the Hochschule für Gestaltung Ulm, into an institution centered around design.¹² Although the school began as a political institution with design elements, Bill’s influence shifted towards envisioning a design school with a political and social mission—striving for a free and democratic society through well-designed environments.¹³

The concept was fundamentally based on the idea that the world could be designed, emphasizing the social responsibility to educate post-war German youth to prevent further fascist atrocities. Everything could be analyzed, dissected, and redesigned into a new system. As a result, designers played a central role in the cultural and spiritual reconstruction of Germany, providing stability to a nascent democracy.¹⁴ This belief in a successful project based on analysis and planning is also an underlying concept in cybernetics: Everything can be analyzed, predicted, and reorganized. As a result, everything in modern life influenced this design of society. Aicher describes this in 1950:

The forms of political life, the printed and spoken word in the press and radio, the image in magazines, displays, exhibitions and in film, the forms of the devices we use, the shape of the home and a city, they all determine the intellectual mentality of the general public and form the basis of their thoughts and feelings and give them the decisive direction. The great responsibility that its designers take on requires a school that combines a sense of social responsibility and cultural openness.¹⁵

Ulmer Volkshochschule Und Die Hochschule Für Gestaltung,” 173–88.

12 Ruedi Baur, “HfG Ulm: Von der Stunde Null bis 1968” (Exhibition, HfG-Archiv Ulm, September 14, 2017), <https://www.hfg-ulm.de/de/erleben/hfg-archiv-ulm/>.

13 Spitz, *Concise History of the Ulm School of Design*, 26.

14 Ibid., 31.

15 09.11.1950 Otl Aicher (Ai AZ 1937.2), quoted in Baur, “HfG Ulm: Von der Stunde Null bis 1968.”

Elevating the designer's role to a social one aligns with the legacy of movements such as the Arts-and-Crafts Movement, Jugendstil, exemplified by the Darmstädter Künstlerkolonie, and the Bauhaus Dessau.¹⁶ The Hochschule für Gestaltung was conceived as a successor to the Bauhaus, partially influenced by Max Bill's association as a former Bauhaus student in Dessau. Further, it stems from the belief that good design enhances the quality of life, intending to pick up where the Bauhaus left off post-closure.¹⁷

In his inaugural address to the completed building in 1955,¹⁸ Walter Gropius agreed to name the new institution Bauhaus Ulm. Ultimately, the founding team chose Hochschule für Gestaltung Ulm, recognizing the controversial use of *Gestaltung* to connect with the Bauhaus without simply replicating its concept. Rather than directly continuing the teachings of the Bauhaus, Maldonado framed their efforts in 1957 as continuing "the progressive, anti-conventional attitude, the drive to contribute to society within the specific historical context."¹⁹ Nonetheless, both Maldonado and Aicher acknowledge the roots of the approach to scientific design aesthetics in the Bauhaus, especially during the Hannes Meyer era.²⁰

The impact of industrialization shaping the Western World into a technical society influenced the institution's emphasis on industrial production. The continuing nationalist tendencies oriented themselves on prewar classics, such as Goethe or Schiller, and the ideals of the Weimar Republic.²¹ In opposition, the

¹⁶ Ibid.

¹⁷ David Oswald, "Cybernetics, Operations Research and Information Theory at the Ulm School of Design and Its Influence on Latin America," *AI & SOCIETY* 37, no. 3 (September 1, 2022): 1046, <https://doi.org/10.1007/s00146-021-01339-1>.

¹⁸ Walter Gropius, "Gropius: Einweihung der Schule 1955," *Output*, no. 1 (March 1961): 4.

¹⁹ Tomás Maldonado, "Maldonado: Eröffnungsrede 1957/58," *Output* 1 (March 1961): 4–5.

²⁰ Matthew Holt, "Ulm Aesthetics," *Journal of Design History* 33, no. 2 (2020): 144, <https://doi.org/10.1093/jdh/epz038>.

²¹ Horn, "Die Ulmer Volkshochschule Und Die Hochschule Für Gestaltung. Wie Aus Einer Volkshochschule eine Wichtige Nachfolgerin des Bauhauses Hervorging," 190.



functionalism of the Bauhaus inspired the early years of the HfG.²² Housing and the manufacturing of everyday tools and appliances were viewed as a “political method” to counter the emergence of affluence and a *Sonntagskultur* of elevated kitsch reserved for special occasions.²³

HfG was a private institution and not owned by the state, which was unusual at the time. This meant no state control, which was central to the self-perception of the school and its founders. The VHS and HfG were both rooted in a conception of politics that operated independently of centralized government institutions. The political, according to Scholl, inhabits a sphere detached from traditional party systems and bureaucratic entities, which were viewed with skepticism of possible ideological biases (in German *Ideologieverdacht*).²⁴ Independence from the state was perceived as the right thing based on past experiences with the Nazi regime just years before.²⁵ By this, the Hochschule für Gestaltung became the first private design school in Germany.²⁶

The school's financing materialized with support from John J. McCloy (US High Commissioner) and Shepard Stone, who were keen on backing the idea of a new school with a donation of 1 million Deutsche Mark. The condition was set that Inge Scholl, Max Bill, and Otl Aicher would secure an additional million through other means. Despite Inge Scholl's success in securing the necessary funding required for the support of the US government, the project encountered strong opposition. In the tense atmosphere of the Cold War, allegations of communism cast a shadow over the project, halting its progress. The project could proceed only after dispelling these accusations and realigning the school's direction. Therefore, any socialist efforts were eliminated, instead replaced by “something like the Bauhaus” and a goal to establish

22 Ibid., 192.

23 Spitz, *Concise History of the Ulm School of Design*, 27.

24 Horn, “Die Ulmer Volkshochschule Und Die Hochschule Für Gestaltung,” 180.

25 Spitz, *Concise History of the Ulm School of Design*, 27–28.

26 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 5–35.

a timeless and internationally recognized “good design.”²⁷ In 1952, Inge Scholl successfully secured the second million Mark. On June 23, 1952, the funds were officially received by the Geschwister-Scholl-Stiftung in Ulm City Hall. The Hochschule für Gestaltung commenced teaching in August 1953.²⁸

27 Horn, “Die Ulmer Volkshochschule Und Die Hochschule Für Gestaltung,” 190–91.

28 Spitz, *Concise History of the Ulm School of Design*, 35.

[3] Vergangenheitsbewältigung, Gegenwartsbewältigung and transformation

[3] Vergangenheitsbewältigung, Gegenwartsbewältigung and transformation

The inauguration of the school unfolded against the backdrop of a nation grappling with extensive reconstruction. Ulm, like many other German cities, had suffered severe bombing during the war. In West Germany, cities such as Frankfurt and Karlsruhe were devastated up to approximately 70% and became arenas for impassioned debates on the future of architectural practice and how to address the past. The imperative of *Wiederaufbau* (reconstruction) took precedence, prompting Germans to retreat into private spaces, stifling discourse on the recent past. In this context, the pre-war Weimar culture resurfaced as a sanctuary.²⁹

Kurt Lewin, a German American social psychologist, one of the modern pioneers of social, organizational, and applied psychology in the United States, wrote during WWII as part of a U.S. American group of social scientists about a “cultural reconstruction” in Germany after the war. The state was to be dissolved with its authoritarian structures to let a critical public stance emerge. Teaching democratic values in small groups was to inform a nation.³⁰ While he was not able to develop large-scale models, the U.S. government actively supported cultural projects across Germany, spanning from avant-garde music to the *Volkshochschulen* mentioned before, the *Amerika Häuser*, and the HfG Ulm.³¹ The school's programmatic stance and Aicher and Scholl's inclusion on the U.S. government's “White List of Germans to be Used for Adult Education in Germany” made it a good fit for U.S. educational efforts in the 1950s.³² In combination with the revised school program after the communism allegations in 1952, the school became more of a poster child of a US reeducation campaign that brought Germany back to the international market.³³ In German this is also part of an effort

29 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 14.

30 Steve J. Heims, *The Cybernetics Group* (Cambridge, Mass: MIT Press, 1991), 219.

31 Margit Staber-Weinberg, “Hätte ich doch damals ein Tagebuch geführt! - ‘Information’ an der hfg,” in *Rückblicke. Die Abteilung Information an der hfg ulm*, ed. Christiane Wachsmann, David Oswald, and Petra Keller, Schriftenreihe club off ulm eV (Verlag Dorothea Rohn, 2015), 33.

32 Horn, “Die Ulmer Volkshochschule Und Die Hochschule Für Gestaltung,” 174.

33 Horn, “Die Ulmer Volkshochschule Und Die Hochschule Für Gestaltung.”

called *Vergangenheitsbewältigung*, a collective memory work with the past after World War II.³⁴ Already at that time, Lewin warned that this would have to be combined with a throughout clearing of former Nazis.³⁵

However, the immediate post-war years did not lead to the demise of the former fascists, but instead to an avoidance of the past on the part of the older generation. The Nuremberg Trials, which aimed precisely at this “throughout cleansing”, failed to prosecute the main actors of the war. In *Rückblicke. Die Abteilung Information an der HfG Ulm*, Margit Staber-Weinberg portrays this period as a time when “the Nazi era had gone down in smoke and ashes, an iron grating of repression in the parents’ generation was coming down, only to emerge a generation later with the laborious establishment of a Holocaust consciousness.”³⁶ In this historical context, the Hochschule für Gestaltung Ulm offered an anti-fascist refuge in Germany for a student body of diverse backgrounds.³⁷ Like the United States, the German avant-garde and academic youth contested the rigid worldviews that emerged as immediate post-war reactions. This resulted in young students questioning traditional norms in family, work, and life.³⁸

The conception of the Hochschule für Gestaltung is closely linked to this cultural renewal. In addition, during this period, there was a pervasive fear of being left behind in technological developments. Interestingly, this fear co-existed with a widespread mistrust of technological advancements and evolved into a fear of

34 Kristian Handberg, *Conquering the Present in the Long Sixties: The Curatorial Birth of Contemporary Art* (Aarhus: Antipyrine/Motto Books, 2019), 16.

35 Heims, *The Cybernetics Group*, 219.

36 Christiane Wachsmann, David Oswald, and Petra Keller, eds., *Rückblicke. Die Abteilung Information an der hfg ulm*, Schriftenreihe club off ulm eV (Verlag Dorothea Rohn, 2015), 33.

37 René Spitz, “Die politische Geschichte der Hochschule für Gestaltung Ulm (1953-1968): Ein Beispiel für Bildungs- und Kulturpolitik in der Bundesrepublik Deutschland” (doctoral thesis, Cologne, Universität zu Köln, 1997), 8, <https://kups.ub.uni-koeln.de/437/1/11w750.pdf>.

38 Nina Gribat, Philipp Misselwitz, and Matthias Görlich, *Vergessene Schulen: Architekturlehr zwischen Reform und Revolte um 1968*, 1st ed. (Leipzig: Spector Books, 2017).

losing human control through automation and the mechanization of human beings.³⁹ The future-obsessed and fearful worldview is described by the art historian Werner Haftmann as “utopian futures and contemporary fears.”⁴⁰ This is emblematic of a Janus-faced Cold War attitude. The pressure of the Cold War between the United States and the Soviet Union and the arms race began with the Soviet testing of atomic bombs in 1949.⁴¹

This proved at the time as unreasonable, after no AI took over the work of humans and instead introduced new gadgets to the household, like fridges, TVs, radios, mass printing, and developments of personal and public transport. From our perspective today this belief in fast-paced innovations seems almost naïve at times when AI only recently obtained a stable and widespread application. On the other hand, this time of the 60s kickstarted many of the technological advances and was the beginning of a rapidly changing world, which put current developments into perspective.⁴²

Back then, in the wake of rising affluence, a literal hype around technologies and computers emerged.⁴³ Arthur Marwick terms this the “Long Sixties” which encapsulated a period of extensive innovation across various fields, both socially and culturally, including the realm of scientific research and theories – such as cybernetics. The spirit of optimism characterized this transformative phase, commencing in 1958/59, where concepts and ideas from the 1950s underwent rapid transformations. Traditional music for example was challenged through experimental atonal music, composed on computers, and executed with synthesizers built

39 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 13.

40 Werner Haftmann, “Utopie und Angst” in *Zeugnisse der Angst in der Modernen Kunst* (Darmstadt, 1965), 5-9. as quoted in Handberg, *Conquering the Present in the Long Sixties: The Curatorial Birth of Contemporary Art*, 38.

41 Fred Turner, *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (Chicago: University of Chicago Press, 2006), 31.

42 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 450.

43 Ibid.

from war technology.⁴⁴ Similarly, the visual arts were redefined on an international level in the *Documenta* starting in 1955. The exhibition was organized by Arnold Bode as part of a reflection on the "contemporary culture and its social conditions." While the first editions focused on *Entartete Kunst* (Degenerate Art) later editions from 1959 shifted to contemporary art. A similar attempt of *Gegenwartsbewältigung* or coming to terms with the present and the past, was the famous *Darmstädter Gespräche*, which was held from 1950 to 1975 in the former *Jugendstil* city in central Germany. Participants included Theodor W. Adorno, Johannes Itten, Hans Sedlmayr, and Otto Bartning. One of the earlier editions in 1950, titled *Das Menschbild in Unserer Zeit* (The Image of Man in our Time), showcased a heated debate between modernists and anti-modernists.⁴⁵

The existence of the HfG Ulm overlaps with the height of post-war cultural modernism in these long sixties. James C. Scott describes this as: "the belief in a linear process, absolute truth, and rational planning of ideal social orders under standardized conditions of knowledge and production [...]. The modernism that resulted was [...] positivistic, technocratic, and rationalistic at the same time as it was imposed as the work of an elite avant-garde of planners, artists, architects, critics..."⁴⁶ This spirit of optimism and technophilia during the transformative 60s influenced the scientific approaches that would define the pedagogies at HfG Ulm and the emerging political consciousness.

44 Jennifer Iverson, *Electronic Inspirations: Technologies of the Cold War Musical Avant-Garde* (Oxford: Oxford University Press, 2019).

45 Handberg, *Conquering the Present in the Long Sixties: The Curatorial Birth of Contemporary Art*, 33–37.

46 James C. Scott in Odd Arne Westadt, *The Global Cold War* (Cambridge University Press, 2006), 11 in *Ibid.*, 15.

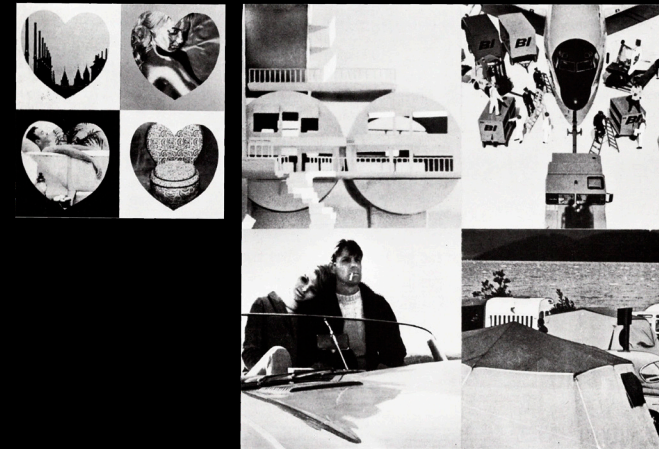


fig.05

[4] Conception of the school

After a year of teaching in the Volkshochschule Ulm, the school moved to its new building on the Kuhberg outside Ulm's city center in January 1955. Prior, the Max Bill-designed structure was still being built. This made the expertise of the architecture students an integral part of the teaching program in the initial year. Walter Zeischegg guided the planning of interior equipment, some of which remains today.⁴⁷ Throughout its existence from 1953 to 1968, the school was dedicated to the mission of modernism, seeking to enhance people's lives through the pursuit of the so-called "*Gute Form*." In response to the advanced atrocities of the Third Reich, the school distanced itself further from industrialized propaganda, overpowering emotionality, and artistic staging that characterized the cultural landscape a decade prior. Aicher asserted that mastering technical civilization required a new cultural understanding grounded in rationality and reason, rejecting the emotional and misinformation-driven ideologies of fascism.⁴⁸

In a reflection on the school's concept in the 1960s, Horst Rittel (1930-1990) conveyed to the Gesellschaft 50 that the HfG was not a school of one master with one ductus. Instead, it was founded on scientific methods to react to individual conditions of a design problem. Rittel emphasized that scientists and engineers should not merely accumulate knowledge in their niche but employ it for social projects.⁴⁹ His rhetoric drew on cybernetic terminologies to explain the efforts of the school: "Openness to the multiplicity of competing points of view is not the product of hypertrophic democratism; it is the engine of development and the instance of constant self-control. The unifying principle of the HfG is a joint task and not a one-size-fits-all solution. Rittel articulated several principles for designers, including the development of a personal understanding of the *Sollzustand*, defining a clear milieu for their work, maintaining an unapologetically expressed political

⁴⁷ Spitz, *Concise History of the Ulm School of Design*, 36.

⁴⁸ Spitz, *Concise History of the Ulm School of Design*.

⁴⁹ Spitz, 31-32.

stance, and recognizing that “culture can be found in the product, not just in art.”⁵⁰

The HfG Ulm comprised four departments: *Product Design, Building, Visual Communication, and Information*. In 1950, the school's conceptual framework covered a much wider range of disciplines: politics, journalism, radio, photography, advertisement, industrial design, and urban design.⁵¹ Three years later, Bill still described an additional department for urban design and planning. The theoretical courses are described as complementing the practical work in the atelier. They were supposed to stand in direct relation to the design work⁵² but were later abandoned.⁵³ The department *Building* responded to the need for industrialized building methods, visual design addressed new interface designs and advertisements, product design tackled consumerism and mass production, and the information department explored the role of language and journalism in design. Theoretical courses were shared by the sections, teaching methodologies for all design fields by delving into philosophical, theoretical, and scientific concepts. Starting from 1955 until his departure, Tomás Maldonado (1922-2018) designed the pedagogical concept.

*In the Grundlehre, students should acquire the factual and intellectual foundations common to all areas of teaching at the university: the ability to work creatively, to make independent judgments independent of convention, and an understanding of the cultural problems of our time.*⁵⁴

This foundational training, akin to that of the Bauhaus and its predecessors, provided a comprehensive introduction to all

50 “Auszüge aus dem Vortrag von H. Rittel vor der Gesellschaft 50,” 14-16.

51 Gui Bonsiepe, “Ein persönlicher Rückblick auf die Abteilung Information,” in *Rückblicke. Die Abteilung Information an der hfg ulm*, ed. Christiane Wachsmann, David Oswald, and Petra Keller, Schriftenreihe club off ulm eV (Verlag Dorothea Rohn, 2015), 46.

52 Max Bill, “Ausbildungsprogramm der Abt. Stadtbau und Planung” (draft, Ulm, 1953), AZ 030.5, HfG-Archiv Ulm.

53 Ibid.

54 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 6.

disciplines within the school. This aimed to cultivate versatile designers rather than narrow-minded specialists.⁵⁵ Already at the VHS Ulm, Scholl advocated for a neo-humanist educational philosophy, emphasizing comprehensive general education to counter the lack of self-reflection she believed led to fascism and argued for guiding people towards art and science education.⁵⁶ This formed an integral part of the early years of the HfG. It was complimented by the Wednesday lectures, where various international guests were invited to the school to hold lectures expanding the repertoire of the school itself.⁵⁷

Most of the didactic structures go back to Otl Aicher, Tomás Maldonado, Anthony Frøshaug, and Horst Rittel.⁵⁸ A leaflet describes the architecture pedagogies at the department *Building*: “[...] The course essentially consists of practical design work in the department. Some seminars with specific exercises complement this design work, while the lectures of the theoretical subjects provide insights into new developments in science and technology.”⁵⁹ The lectures on the theoretical subjects were often held collectively across the sections, as the borders especially between product design and architectural design were blurry. Especially the *Grundlehre* rejected previous design pedagogies that sought to educate the senses, teach manual practice, and liberate the expressive capacity of the individual. Instead, as Maldonado describes, it was “devoted to both the practice and analysis of visual means, cultural problems, social responsibility and being freed from the ‘psychological deformations’ of early training”⁶⁰ Further, the goal of the department building was to solve the problems of the industrialization of the building industry.

55 Zeynep Çelik Alexander, *Kinaesthetic Knowing: Aesthetics, Epistemology, Modern Design* (Chicago ; London: The University of Chicago Press, 2017), 176.

56 Horn, “Die Ulmer Volkshochschule Und Die Hochschule Für Gestaltung,” 179.

57 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 27.

58 Ibid., 7.

59 “Prospekt: Architektenausbildung an der HfG,” 1966, AZ 072, HfG-Archiv Ulm.

60 Holt, “Ulm Aesthetics,” 6.

stapeln. Oder noch kompakter hochgestapelt: Dieses Geschirr ist ein Beispiel für eine Designauffassung, welche wir, d. h. eine Gruppe von an der Hochschule für Gestaltung in Ulm praktizierenden Designern, mit dem Ausdruck "compact-design" bezeichnen. Compact-design steht zwischen den beiden Extremen des Funktionalismus (Motto: was gut funktioniert und seinen Zweck erfüllt, das ist auch gut und schön) und des künstlerischen Expressionismus. Im Compact-design werden experimentelle Methoden ebenso benutzt wie das Raffinement des Geschmacks. Compact-design ist kreatives Design. Design mit einer Idee.

Wohlgemerkt: mit einer Idee, nicht mit zweien! Dazu aber auch den Kompakt-Designern ins Noutbuck: besser mit einer Formenfamili als mit zweien! Werdet noch kompakter!"

dinnerware "is an example for a design concept, which we, being a group of designers practising at the Hochschule für Gestaltung in Ulm, designate as "compact-design". Compact-design lies between the two extremes of functionalism (the slogan of which is: what functions well and fulfills its purpose is good and beautiful) and artistic expressionism. Compact-design demands experimental methods as well as the refinement of taste. Compact-design is creative design. Design with an idea."

Be it noted, with one idea only — not with two. But furthermore, for the attention of 'Kompakt-Designers': better to use only one Formenfamili than two! Try to be even more 'kompakt'!"



Reyner Banham.

Kühle Ausbildungsstätte

Bemerkung von Reyner Banham in dem Artikel 'Design by Choice', erschienen in der Zeitschrift 'Architectural Review', Juli 1961.

"Ulm: ... Obgleich eine kleine Schule, erwies sie sich als sehr einflußreich in der Welt des Design, zumindest auf der Ebene der Ideen. Ihre Art des Designs ist wohl bekannt durch die Braun-Geräte; doch hat sie bisher noch nicht einen eigenen Designstil entwickelt. Vielmehr ist sie eine kühle Ausbildungsstätte für eine technokratische Elite geworden."

Cool Training Ground

Note by Reyner Banham in his article 'Design by Choice', published in the magazine 'Architectural Review', July 1961.

"Ulm: ... Although small, the school proved extremely influential in the world of design, at least at the level of ideas. Its manner of designing is best known through the cabinet work of Braun electrical appliances, but it has so far produced no characteristic style of design. Rather it has become a cool training ground for a technocratic élite."

fig.06

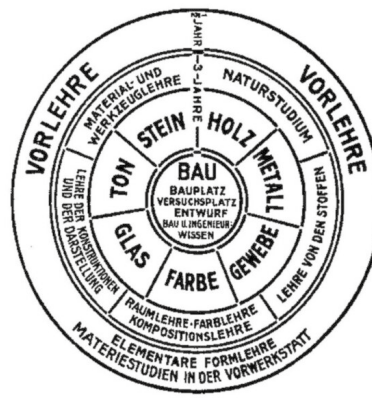


fig.07

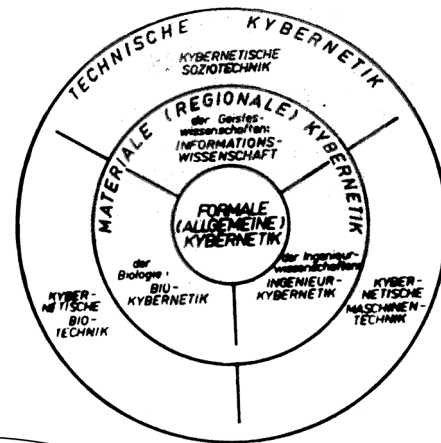


fig.08

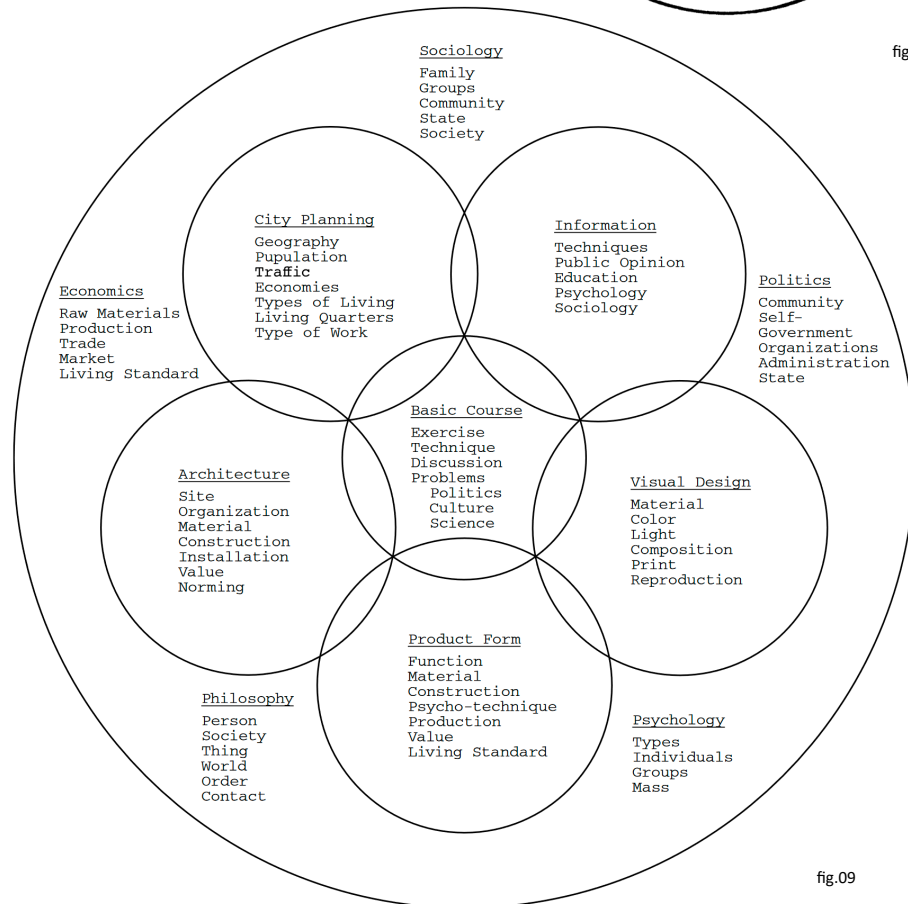


fig.09

Therefore, the HfG aimed to equip its students with knowledge regarding industrialization and its work processes. In contrast to the Bauhaus, they attempted to separate the subjective and artistic from the “rational design.”⁶¹

The school stood out as a pioneer in the scientization of design, a theme that was central to its narrative. This emphasis on science sometimes obscured its practical aspects from the public, creating an agglomeration of scientific theories adapted for design purposes. Throughout its history, the school underwent several reorientations around this theme, leading to intense tensions among strong personalities who were integral to its evolving approach. Even though so far there has been only mentioned a school as a singular entity in the narrative, the opinions were far more fragmented and fluctuating.⁶² The *Grundlehre* was later abandoned for more specific education as a reaction to the rupture in the profession of the designer who now worked with industrial production and automated processes in an increasingly complex relation between professions. In 1959/60, a reform for a department-specific formation phase was introduced.⁶³ Lucius Burkhart, a former lecturer at the school in 1959, argues in *Werk 11* from 1960 that Ulm’s legitimacy and distinctiveness were closely tied to establishing a unique pedagogical approach. This was tied to the condition that those were not replicated elsewhere, thereby filling a void in the existing industrial framework by specializing in the departments starting from the first year.

The Building department’s pedagogies were deeply connected with the school’s broader educational approach. At the core of the school’s overarching concept was a systematic approach, a framework that while cultivating a certain breed of creativity, sometimes also controlled and even suppressed it.⁶⁴

61 “Abteilung Bauen Vorplanung Lehrplan 1966/67” (67 1966), AZ 007.8, HfG-Archiv Ulm.

62 Spitz, “Die politische Geschichte der Hochschule für Gestaltung Ulm.”

63 Wachsmann, Oswald, and Keller, *Rückblicke. Die Abteilung Information an der hfg ulm*, 21.

64 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 36.

In the following we will see how cybernetic theories were tied into the overarching goal of design as a scientific discipline. The optimistic belief in technology and the power of design fluctuate between technocracy, radical democratic theories, megalomania, and sometimes a “*geisttötenden und bürokratisch anmutenden formalen Apparat*” (mind-numbing and bureaucratic formal apparatus).⁶⁵

65 Ibid.

On Thursday, July 14, 1955, at 17:00, MIT professor Norbert Wiener delivered a lecture at the Hochschule für Gestaltung in Ulm, one of four such lectures in Germany. The American mathematician's visit was part of an invitation extended by philosopher Max Bense, recognizing Wiener's status as a highly valued, scientifically knowledgeable intellectual and a pioneer of cybernetic theory. During his visit, Wiener explored the newly completed school building and conducted a lecture on cybernetics, specifically focusing on the latest developments in artificial grammar for "universal languages."⁶⁶ The visit marked one of his four visits to Germany.⁶⁷ This occurred during the early years of cybernetic explorations in Germany, a focus that intensified in the 1960s and left a lasting impact on the school's teachings.⁶⁸

The German book *Keiner weiß was Kybernetik ist* (Nobody Knows What Cybernetics Are) by Rolf Lohberg and Theo Lutz from 1970, illustrates the vagueness of the term. The subtitle "Eine verständliche Einführung in eine moderne Wissenschaft" promises to allow a comprehensive understanding of a "modern" science. Wiener is recognized as a key figure in the development of this modern science that emerged in the post-war *zeitgeist* in Europe, America, and worldwide. Cyberneticians, associated with the field, did not form a cohesive group with a singular line of thought.⁶⁹ Instead, they constitute a network of individuals, groups, and institutions, each developing their unique perspectives on the subject. The resulting theories did not primarily present themselves with the definitional unity of an academic discipline but rather with the more complex nature of an epistemology.⁷⁰ When examining the applications of cybernetics, combined with system theory, communication theory, and game theory at HfG, one perceives it quite differently than discussions in other fields such

66 Oswald, "Cybernetics, Operations Research and Information Theory," 1045.

67 Spitz, "Die politische Geschichte der Hochschule für Gestaltung Ulm," 126.

68 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 13–14.

69 Ibid., 26.

70 Vrachliotis, *Geregelte Verhältnisse*, 15.



fig.11



fig.10



fig.12

fig.13

TU Darmstadt
Universitätsarchiv
Bestand TH 7115
Nr. 14
hochschule für gestaltung ulm telefon 6575

einladung

an die förderer der hochschule für gestaltung ulm
und an die freunde der geschwister-scholl-stiftung

zu einer gastvorlesung von professor dr. norbert wiener

am donnerstag, den 14. juli, punkt 17 uhr
in der hochschule für gestaltung ulm

das thema der in deutscher sprache gehaltenen vorlesung von prof. wiener bewegt sich im rahmen seiner neuesten forschungen auf dem gebiet "künstlicher grammatiken" für universell anwendbare "sprachen".

norbert wiener ist professor der mathematik am MIT massachusetts institute of technology und gastforscher am instituto nacional de cardiologia in mexiko. seine gedanken und forschungen gehören zu den wichtigsten beiträgen zur entwicklung des wissenschaftlichen denkens der nachkriegszeit. er gilt als gründer der kybernetik, der von ihm so benannten wissenschaft der information und kommunikation. gegenstand der kybernetik ist das studium von nachrichten-übermittlungsmethoden bei lebewesen und maschinen. unter den praktischen arbeiten, die prof. wiener und einige seiner kollegen mit hilfe der kybernetik durchgeführt haben, befindet sich ein tropismometer, das der beobachtung der parkinsonschen krankheit dient, sowie eine sinnesprothese für taube und blinde, mit deren hilfe die umwandlung von nachrichten von einem sinnesgebiet auf ein anderes gelingt. ein wichtiges anwendungsgebiet der kybernetik sind die elektronischen hochgeschwindigkeitsrechenmaschinen und die vorausagemaschinen.

in deutscher sprache ist von norbert wiener das populär gehaltene buch "mensch und menschenmaschine" im verlag alfred metzner, frankfurt a.m. und berlin, erschienen. es ist eine sehr gute einföhrung in die problematik der welt der elektronischen maschinen und ihre anwendungen.

es ist das ziel der hochschule für gestaltung, eine einheit des gestalterischen schaffens zu erreichen, deshalb verfolgt sie mit grossem interesse die entwicklung der kybernetik und lehrt ihre grundlagen in vorlesungen innerhalb der "kulturellen integration". die kybernetik ist besonders als wissenschaft der information und kommunikation auch eine der grundlagen der abteilung "information" der hochschule.

mit freundlichem gruss

max bill, rektor

as biological cybernetics or cybernetics of psychology, exemplified by the *Cybernetic Group*.⁷¹

The origin of the term “cybernetic” lies in the Greek *κυβερνητικός*, which translates roughly to ‘steersman’, ‘steering’, and ‘steersmanship’.⁷² The concept stemmed from previous research during World War II, showcasing the technological developments of the 1940s in communication, information technology, and computation. During the Second World War, it was developed at science laboratories at universities such as MIT in collaboration with the military and industry. At that time, Norbert Wiener developed together with Julian Bigelow and Paul Mooney an anti-airplane predictor (AA predictor) in the fight against the Nazi airplane bombers. This was based on the observation that human behavior turns repetitive and therefore calculatable under stress.⁷³ The research explored a goal-seeking behavior in a machine. In this case, the goal was defined as predicting the trajectory of Nazi airplanes and shooting them down. The gunner on the ground would receive real-time feedback on the difference between the target and the trajectory of the previous shot. Through the feedback as a new input, the trajectory of the gun could be adjusted, therefore shooting down the plane. By analyzing the behavior based on input and output, the man-machine boundaries blurred. Plane and human are here equated into one entity.⁷⁴

In Wiener's second book *The Human Use of Human Beings* from 1950, Steve J. Heims describes the research which “[...] extended ideas and used metaphors from physics and electrical engineering to discuss a variety of topics including neuropathology, politics, society, learning and the nature of time.”⁷⁵ Wiener

71 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 11.

72 Norbert Wiener, *Cybernetics or Control and Communication in the Animal and the Machine* (Paris: Hermann, 1958), 11.

73 Galison, “The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision,” 229-234.

74 Ibid., 246.

75 Heims calls *The Human Use of Human Beings* the popularized version of Wiener's previous book *Cybernetics or Control and Communication*

describes this as an exploration of the boundary regions between disciplines.⁷⁶ Cyberneticians adopted an interdisciplinary research style during the laboratories of World War II.⁷⁷ This approach significantly influenced post-war designers who were enthralled by scientific collaboration with industry to elevate design to the status of science.

In the 1950s, the focus on cybernetic discourse shifted towards more humanistic approaches. However, the cultural roots of the new science remained deeply embedded.⁷⁸ What did change was the growing awareness that cyberneticians and scientists. Scientists, such as mathematicians, physicians, or biologists, had previously been seen as “neutral scientists,” committed only to developing scientific knowledge as neutral, unquestioned truth. The bombing of Hiroshima and Nagasaki defined the shift in perspective from the harmless scientist as postulated by G.H Hardy in *A Mathematician Apology*, towards that of a political actor. Wiener himself highlights the social and ethical responsibility in their research, particularly due to their potential to enable centralized power structures, a potential that had materialized.⁷⁹

The establishment of the Hochschule für Gestaltung coincides with the commencement of the third epoch defined by Wiener as the age of communication.⁸⁰ In Germany, cybernetic concepts began to take root in the 1950s as part of a larger agglomeration of theories. Following a ten-year incubation phase that coincided

in the *Animal and the Machine*. It is also a more politicized version of the first exploration Wiener's, which highlights the dangers of technological advances. Steve J. Heims, “Introduction,” in *The Human Use of Human Beings*, by Norbert Wiener, 2nd ed. (London: Free Association Books, 1989), 16.

76 Wiener, *Cybernetics or Control and Communication in the Animal and the Machine*, 2.

77 Gabrielle Isabelle Schaad, “Performing Environmental Textures – Intersected Bodies of Gutai and Metabolism (Japan, 1955–1972)” (doctoral thesis, Zürich, ETH Zürich, 2016), 172.

78 Galison, “The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision,” 254.

79 Heims, “Introduction,” 11.

80 Galison, “The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision,” 252–53.

with the nation's reconstruction – *Wiederaufbau* - and the prioritization of more immediate concerns, such as solving the physical problems caused by destroyed cities and institutions, cybernetics experienced a notable surge in popularity during the Long Sixties. This period, marked by heightened technological optimism, saw a literal hype surrounding cybernetics. This conjured various expectations.⁸¹

*West German cybernetics contrasted in many ways with the American approach. While America was busy building mainframe computers and developing user interfaces suitable for the masses, post-war Germany began to theorize about cybernetic concepts of art, aesthetics, and pedagogy.*⁸²

The Macy Conferences between 1946 and 1953 focused on self-organized systems and shaped the theoretical framework of second-order cybernetics. Prominent figures at the time were Margaret Mead, Gregory Bateson, Heinz von Foerster, Ernst von Glasersfeld, Gotthard Günther, and Humberto Maturana.⁸³ The subtitle of the conference was "Feedback and Circular Causality in Biological and Social Systems. The ideas developed at the conferences, which were closely related to the general systems theory of Ludwig von Bertalanffy, were taken up by many disciplines.⁸⁴ In cyberneticist Bernard Scott's explanation of core cybernetic concepts, control means the influence of one system component over another, while communication, essential to control, involves the exchange of messages to exert influence. Two types of feedback are key: positive feedback, which amplifies deviations from a set norm, and negative feedback, which mitigates these deviations, both operating within circular feedback loops. This theory encompasses both animals, defined as living organisms, and machines, defined as human-created artifacts, and emphasizes the

81 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 9–14.

82 Vrachliotis, *Geregelte Verhältnisse*, 17.

83 Thomas Dreher, "Cybernetics and the Pioneers of Computer Art" (Basis Zwei, Sprengel Museum Hannover, October 16, 2016), https://dreher.netzliteratur.net/4_Medienkunst_Kybernetike.html.

84 Bernard Scott, *Cybernetics for the Social Sciences*, 1st ed. (Brill, 2020), 17–18.

inclusion of the human observer as an integral part of the system. First-order cybernetics focuses primarily on machine processes;⁸⁵ second-order cybernetics incorporates the observer into the observed system as another component influencing the system. This terminology comes from von Foerster, who defined first-order cybernetics as "the study of observed systems" versus "the study of observing systems."⁸⁶ The conferences played a pivotal role in broadening the scope of cybernetic theories, incorporating discussions into anthropological and philosophical contexts.⁸⁷ This evolution not only turned cybernetics into a dominant intellectual paradigm of the post-war era but also facilitated its integration into architecture and design theory.⁸⁸

85 Dreher, "Cybernetics and the Pioneers of Computer Art."

86 Scott, *Cybernetics for the Social Sciences*, 19.

87 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 346.

88 Ibid., 373.

In the rhetoric of the school, the political responsibility of the designer was often highlighted, especially in the founding documents and the school's annual magazine *Ulm*. Unlike its predecessor, the HfG's ambitions extended beyond the dissemination of knowledge, instead venturing into generating new *Grundlagenforschung* (basic research). *Grundlagenforschung* was part of the resurgence of 'pure science' that served dual purposes: as a critique of scientific overreach and as a distancing mechanism from the fascist past. The emphasis on independence in science symbolized democratic transformation in West Germany, aligning with the U.S. promotion of basic research. The school's political project, rooted in the founders' antifascist background, was deeply linked to scientization and generalist education, and technocratic methodologies converged into a complex project.⁸⁹

The school's political understanding was characterized by a critical stance towards state institutions and government support, favoring a decentralized power structure and local-level engagement over large-scale, utopian social projects. This is especially visible in the financial struggle as a private institution until its closure in 1968, which was defined by strong opposition against any state control or involvement in the educational project of the school. Within a predominantly conservative milieu of the CDU's dominance until 1969, especially under Chancellor Konrad Adenauer (in office from 1949 until 1963) and a failed denazification throughout all layers of society, the understanding of a decentralized political system comes as no surprise.⁹⁰ In this context, a distinction between politics and the political (*das Politische und die Politik*) is crucial: *Das Politische* ('The political') refers to a philosophical inquiry into the nature of politics

89 Désirée Schauz and Gregor Lax, "Professional Devotion, National Needs, Fascist Claims, and Democratic Virtues," in *Basic and Applied Research*, ed. Désirée Schauz and David Kaldewey, vol. 4, *The Language of Science Policy in the Twentieth Century* (Berghahn Books, 2018), 89, <https://doi.org/10.2307/j.ctv8bt0z7.8>.

90 V. Conze, "Adenauer, Konrad," bpb.de, accessed January 1, 2024, <https://www.bpb.de/kurz-knapp/lexika/das-europalexikon/176660/adenauer-konrad/>.

on an ontological level, whereas 'politics' pertains to empirical observations of concrete processes.⁹¹

According to Marco Walter, key figures in this discourse include Carl Schmitt and Hannah Arendt, whose interpretations stem from markedly different backgrounds and perspectives. Schmitt, affiliated with the NSDAP, and Arendt, a German-Jewish philosopher, offer contrasting definitions. Arendt viewed the political as engaging with a plurality of others in a space for free discourse, asserting that freedom is the essence, not the goal, of politics. This concept of freedom is achievable only in collective existence. Conversely, Schmitt's definition hinges on the distinction between friend and foe, suggesting that such differentiation allows for a discourse revealing opposing frontiers.⁹² Walter encapsulates this dichotomy: Das *Politische* is either present where many act in a public space through their plurality (Arendt), or where a distinction between friend and foe is made (Schmitt). Both definitions leave the nature of 'politics' somewhat ambiguous. Arendt focuses on internal politics (*Innenpolitik*), while Schmitt's perspective aligns more with foreign politics (*Außenpolitik*).⁹³ Inge Scholl's neo-humanistic worldview, underpinning the school's philosophy, aligns closely with Arendt's definition of the political where a pluralistic political space is tied together with an educational and scientific project that was based on the perception that the world can be designed on rationality and reason.⁹⁴

In a sense, the school reflected the broader trend in West Germany, where the shared belief propagated the importance of supporting basic research at universities, including the surge

91 Markus Gloe and Tonio Oeftering, "Das Politische als Kern der Politischen Bildung: Hannah Arendt," Bundeszentrale für politische Bildung, February 16, 2022, <https://www.bpb.de/lernen/inklusive-politisch-bilden/505229/das-politische-als-kern-der-politischen-bildung-hannah-arendt/>.

92 Marco Walter, "Das Politische – Eine Begriffsbestimmung Mit Hannah Arendt Und Carl Schmitt," *Leviathan* 44, no. 4 (2016): 516–20.

93 Ibid., 520–30.

94 Spitz, *Concise History of the Ulm School of Design*, 31.

in cybernetic research. In that context, the federal government followed the "U.S. promotion of the ideal of basic research among the Western allies."⁹⁵ The HfG's curriculum, with its *Grundlehre* and theoretical courses, came from an idealized Humboldt plan for education. The "Humboldt myth," from the early 1900s, made universities places for independent and free science, focusing on both research and teaching. This model aimed to combine learning and research, offer a wide-ranging education and bring together humanities and science. The post-war Humboldtian notion of science went further and not only represented science as a cultural asset but also envisioned higher education as a vehicle for democratic development and a defence against fascism.⁹⁶ This blends a holistic educational approach and scientific rigor into a broader humanistic ethos in Ulm. The curriculum prioritized objective and rational research – in that context cybernetic research formed the science to explain sciences and organization of systems, channeling it into political ends, and deliberately avoiding artistic expression or overwhelming emotions.⁹⁷

The school's avoidance of artistic expression and meaning came into confrontation at the 1954 Milano Triennale when Asger Jorn and Max Bill broke out in a heated discussion on the ideological divide in art and design during this era. Jorn advocated for the original Bauhaus philosophies from its early Weimar days and sought to create a new group of free, experimental artists called the *Imaginist Bauhaus* based on these early ideas. He criticized the recently opened HfG for lacking imagination, fantasy, and art. Two contrasting opinions clashed in this debate: Max Bill and his functionalist colleagues, Tomás Maldonado and Konrad Wachsmann, advocated for a comprehensive design concept based on objective research, linking industrial production with cultural production. Jorn, on the other hand, challenged this

95 Schauz and Lax, "Professional Devotion, National Needs, Fascist Claims, and Democratic Virtues," 89.

96 Ibid., 78.

97 Spitz, *Concise History of the Ulm School of Design*, 31–32.

functionalist reductionism and while they both recognized the importance of scientific research, the understanding of the involvement of this was vastly different where Jorn rejected the machine-like, automated, and "dictates of functionality."⁹⁸

The school exhibited a mistrust of spontaneous ideas and fashions, fearing unsystematic creativity. This skepticism was partly due to a rejection of subjectivity as valuable.⁹⁹ The systematic approach was believed to reduce the risk of arbitrary outcomes. This also meant blocking any genius or artistic solutions by subjecting them to a disciplined process.¹⁰⁰ This leads to broader questions: Which disciplines can claim objectivity if objectivity truly exists? In a sense, each form of objectivity is antonymic and censors some aspect of the personal, because the subjective was seen as dangerous. With technological innovation, in that case for the scientific image, the idiosyncratic subjectivity can get mechanized and, in a sense, neutralized, at least that is the assumption.¹⁰¹

Lorraine Daston and Peter Galison's paper, *The Image of Objectivity*, explores the question of scientific objectivity in relation to human nature and decision-making of scientists and researchers. The paper traces the modernization of scientific atlases from the depiction of idealistic synthesis by artists and engravers to the celebratory use of photography and X-rays that demonstrated a new understanding of subjectivity and objectivity. They introduce the discourse with a reference to E. J. Marey and the declaration to "let nature speak for itself" as "the watchword of a new kind of scientific objectivity of the second half of the nineteenth century."¹⁰²

The observations highlight the complex interplay between accuracy, morality, and objectivity in scientific endeavors. The

98 Schaad, "Performing Environmental Textures," 168–69.

99 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 36.

100 Ibid.

101 Lorraine Daston and Peter Galison, "The Image of Objectivity," *Representations* 40 (1992): 82.

102 Ibid., 81.

4
die Künstler die dieselbe schaffende inspiration haben wie das alte "Bauhaus",
können wieder von vorne anfangen. Es ist ihnen nicht gelungen die symmetrie der
schaffenden und lebendigen Künstler in Deutschland für ihr projekt zu erringen.
Sie suchen sie augenscheinlich auch nicht. Aber ohne diese symmetrie werden sie
auch nicht diejenige der Künstler des internationalen kunstlebens fangen. Was wird
dann das neue "Bauhaus" werden? - Das was man schon jetzt in Deutschland sehen
kann: "Nur eine schule für architektur und industrieform-gestaltung", wie sie schon
überall errichtet sind. Ehrlich gesprochen, herr Max Bill, es gibt wohl auch in Zü-
rich eine solche schule, in der sie direktor werden könnten und das neue "Bauhaus"
für andere zwecke frei lassen, wenn sie nicht grössere ambitionen haben.

Sie schreiben dass sie nur "positiv und konstruktiv aufbauen" wollen. Wissen
sie was das bedeutet? Das bedeutet, dass sie nur am schaffenden kampf der freien
Künstler schmerzen wollen, denn so wie es kein helles ohne dunkles gibt, findet
man nicht etwas positives ohne durch eine spannung mit negativem. Man muss zerstö-
ren um aufbauen zu können, und um diese doppelte aufgabe systematisch aufzunehmen
bleibt die einzige möglichkeit: das neue "Bauhaus" als kultureller und künstler-
tischer brennpunkt von Europa, ja, von der ganzen welt zu schaffen. Heute so
durchbar scheint ist: irgend ein platz wo die Künste und gestaltenden kräfte ein
kritisches und symmetrisches centrum haben. Wenn es so ist - kann die aufgabe sich
so gross zeigen, denn gibt es keine andere möglichkeit als alle kräfte zu verein-
igen um es zu realisieren, oder ganz und gar davon ~~xxxxxxx~~ ab zu sehen. Es gibt
keine zwischenschufen. Die Künsten, eben so gut verlieren, dass man in Ulm nur helle
farben braucht, statt zu färbeln, eben so gut verlieren, dass man "positiv aufbauen" soll. Bedeutet
das, dass sie den katolischen restaurations ideen unterliegen wollen? Es ist
das einzige was sie mit ihren puristischen calvinismus erreichen.

Ich habe ihnen ein zusammenarbeit angeboten. Sie werden doch enttäuscht sein,
wenn sie glauben, dass es genügen würde den bildkünstlern eine zusammenarbeit an-
zubieten, um sie schnell dabeizulocken. Es gibt unter den bildkünstlern eben so
viele vorurteile gegen die architekten, als in gegenseitiger richtung. Ich habe mehr
als 10 jahre dagegen gekämpft, und bin vielleicht heute noch der einzige, der einen
sinn darin sehen kann, diese verbindungen zu erstellen. Ich weiss aber, dass es eines
tages dringend sein wird, dass es alle einsehen werden müssen.

Sie verstehen vielleicht nicht warum ich dieser diskussion mit ihnen so viel
bedeutung schenke. Gegen meiner krankheit war ich einige jahre aus der europäische
kunstdiskussion ausgeschlossen, und jetzt sehe ich, dass die Künstler sich oft von
einander isolieren, bekämpfen, nur weil sie sich nicht verstehen. Was ihnen fehlt ist
irgend ein centrum, wo man gegenseitige auffassungen ausexperimentieren können.
Ein solches centrum könnte der kunstentwicklung in Europa wenigstens 20 jahre
el' ionisieren. Wollen sie also mit uns zusammenarbeiten? Das heisst nicht unsere
auffassung annehmen, im gegenteil, aber das neue "Bauhaus" als brennpunkt aller
neuen künstlerischen ideen zu öffnen. Es würde ein historisches ergebnis in der
künstlerischen welt sein, viel grösser vielleicht als die resultate des ersten
Bauhauses. Ich fühle es als meine pflicht mit ihnen zu diskutieren bis es ganz k-
klar ist ob diese möglichkeit accentuieren wollen, oder ob sie die volle verantwort-
lichkeit für eine andere entwicklung tragen wollen. Ich bin weder dadrast, noch zur
realist, konstruktivist noch etwas anderes. Ich bin nur Künstler. Aber, eben wenn ich
dadurch nicht als kunst sondern nur als methodik auffasse, dann ist es doch, mei-
ner meinung nach, die höchste entwickelte experimentelle methode der kunst, und also
solches von ständiger gültigkeit, so wie die konstruktiven methoden. Die frage ist:
wie man eine dynamische synthese der effektivsten künstlerischen methoden schaf-
fen kann, und das bedeutet erstens sich vom sektarismus zu befreien.

Mit freundlichsten grüssen

Jager Jorn.

sich hochverehrender, sich selbst Künstler nennender,

Ulrich 15-2-1 54.

herr jorn.

die copie ihres briefes vom 12-2-54 habe ich an meine ulmer freunde gesandt. sie
werden sich jetzt, während dem fesching bestimmt besonders darüber freuen - denn
irren ist menschlich und narren sind eine nütige form von mensch sein.
sie brauchen sich aber nicht mehr die mühe zu nehmen und nochmals zu schreiben,
denn ihre auffassung stimmt nicht mit meiner überein, das werden sie mit ihrem
grössten holzopokus nicht ändern können. Max Bill.

authors note that scientists, in their pursuit of objectivity, diligently avoided letting their personal biases, expectations, or aesthetic preferences influence their understanding of nature. When human discipline falls short in this regard, automated processes or machines are seen as more impartial arbiters. This notion of 'noninterventionist' or 'mechanical' objectivity from the late 19th century has evolved into our contemporary understanding of objectivity, which now includes empirical research, procedural correctness, and emotional detachment.¹⁰³

This brings into focus the contrasting relationship between objectivity and subjectivity at the HfG. Subjectivity, back then often associated with the arts, carried meaning and emotion and was frequently employed in ideological contexts. Design, on the other hand, was envisioned as aligning more closely with scientific objectivity.¹⁰⁴ This delineation underscores the differing roles and perceptions of the arts and design, particularly in how they contribute to and are influenced by ideological frameworks. Coming back to the Hochschule für Gestaltung, Gerhard Curdes summarizes the pedagogies at the department building as follows:

*The methodology at the department was roughly identical to the methodology of the whole school: taming creativity through systematics. A system that [...] borrowed concepts and elements from cybernetics and heuristics to structure problems and organize their solution process, [...].*¹⁰⁵

Connecting this with Daston's and Galison's reference to Marey with the 1950s context of the Hochschule für Gestaltung, this transforms the exclamation "let nature speak for itself" into "let data speak for itself," where the idea of automated data processing excludes the "scientists will from the field of discourse."¹⁰⁶ In the case of the school's political project, the "profound fear of willful interpretation" that is diagnosed in the atlas makers of the 19th

¹⁰³ Ibid.

¹⁰⁴ Ibid., 82.

¹⁰⁵ Curdes, *Die Abteilung Bauen an der hfg Ulm*, 36.

¹⁰⁶ Galison, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision," 117.

century, is replaced by a political duty or importance on informed decision due to the impact of the Second World War, where posthuman qualities in the machine interlace with human action and decision making.¹⁰⁷ Therefore, the emerging cybernetics as a trend science was incorporated into the school's curriculum by figures like Max Bense, Gui Bonsiepe, Abraham Moles, and Horst Rittel.

¹⁰⁷ Daston and Galison, "The Image of Objectivity," 112–20.

In 1959, Siemens released the film *Impuls unserer Zeit* (Impulse of Our Time), a pioneering work that combined documentary-style storytelling with cutting-edge electronic music. Premiering on November 23rd in Berlin's congress hall, following its internal debut at Siemens in July, the color film emerged as a representation of electronic technology's impact on contemporary society.¹⁰⁸ *Impuls unserer Zeit* showcased various domains of electrical engineering, serving essentially as an advertisement for Siemens' global production capabilities in electrical power engineering, communications, information technology, and semiconductor technology. Interwoven with nature shots of Siemens' hydroelectric projects in Mexico and high-voltage power lines in Nicaraguan jungles, it exemplifies the romanticization of technological advances and their relationship to the *Umwelt* (environment) in the advent of a new information and consumer age.¹⁰⁹ The innovative soundscape was created at the Siemens Studio for Electronic Music, established in 1955 in Munich. In contrast to the manual techniques employed by contemporaries at the WDR in Köln, Siemens incorporated punch card technology for electronic music production, a pioneering approach in the field.¹¹⁰

However, the laboratory-like, electronic music studio faced financial difficulties despite its promising technological explorations and initial success. Gerd Kalow (1921-1991), who briefly led the Department of Information at the HfG in 1960 and established a small sound studio in Ulm in 1962,¹¹¹ initiated the integration of the Siemens Studio for Electric Music into the HfG Ulm. This integration, facilitated by the Geschwister Scholl Foundation, was

108 Stefan Schenk, *Das Siemens-Studio für elektronische Musik: Geschichte, Technik und kompositorische Avantgarde um 1960*, Münchner Veröffentlichungen zur Musikgeschichte, Band 72 (Tutzing: Verlegt bei Hans Schneider, 2014), 47.

109 Taeger, "Neues aus Forschung, Industrie und Wirtschaft. Buchbesprechungen. Export-Anfragen. Patentschau.," *Frequenz* 13, no. 12 (1959): 405–6, <https://doi.org/10.1515/FREQ.1959.13.12.405>.

110 "Unterlagen zum Studio für elektronische Musik" (GSS, 1966 1963), AZ 387, HfG-Archiv Ulm.

111 David Oswald, "Die Abteilung Information der HfG Ulm. Vorgeschichte und Entwicklung," in *Rückblicke. Die Abteilung Information an der hfg ulm*, ed. Christiane Wachsmann and Petra Keller, Schriftenreihe club off ulm eV (Ulm: Verlag Dorothea Rohn, 2015), 19.



fig.15



fig.16

[7] Cybernetics at HfG

completed on September 30, 1963. Despite the integration of new technology, this period coincided with the dissolution of the Information department and a paradoxical shift in the school's focus.¹¹²

The fascination for mathematical research and computer technologies, as noted by Gui Bonsiepe (1934 -), is highlighted by what he sees as a "sort of halo effect." Bonsiepe details the ambition to transform design into a scientific discipline, an endeavor marked by the incorporation of game theory and cybernetic theory.¹¹³ The pedagogies of scientific theory, computer technologies, sound experimentations, and especially cybernetics were mainly present up until then at the department information at the school, but due to the generalist approach in the *Grundlehre* and mandatory theoretical studies, as part of the "cultural integration", students from all departments came together, which constituted to the scientization at the school. Nonetheless, the small department was the most connected to the foundational concept to *inform* the citizen, which in a sense formed the most literal translation of the initial concept of Scholl, Aicher, and Werner.¹¹⁴

In 1975, Otl Aicher first put forward the thesis that the history of the HfG could be divided into eight phases, [...]. He structures the history of the HfG according to the leading tendencies in terms of content but does not name any fixed periods: after the founding (1) and the collaboration with Max Bill (2), the Ulm model was created (3). The following phases were dominated by Technological Design (4), Cybernetic Design and Positivism (5) and Value-Driven Design (6). After the discovery of the content (7) and the program design (8), the HfG was closed, [...] Regardless of how this view is to be evaluated today, the bottom line is that the HfG is so important for the history of

112 This additional facility in Munich did not help the financial problems of the school. Overwhelmed by the financial burden of the Siemens studio, it was from the start already in a precarious situation, dealing with various other hurdles. Schenk, *Das Siemens-Studio für elektronische Musik*, 67.

113 Gui Bonsiepe, "Anti-Utopie," *Ulm: Journal of the Hochschule Für Gestaltung* 7 (January 1963): 22–24.

114 Oswald, "Cybernetics, Operations Research and Information Theory," 1046–47.

*design because it programmatically scientized design.*¹¹⁵

Building on Aicher's categorization of the HfG's history, the progression of cybernetic pedagogies at Ulm can be outlined in three distinct phases, reflecting the attempted interplay of scientific theories and design practices. This categorization is summarized by David Oswald as an initial introduction phase into the artistic institution, followed by a scientific overshoot under Maldonado and Aicher, that then was synthesized into a method-led and scientifically informed design, that cannot be completely objective.¹¹⁶

Initially, Max Bense's courses on methodology, information aesthetics, and his *Ein Experimenteller Lehrplan für Information an der Hochschule für Gestaltung/Klasse Prof. Max Bense* marked the incubation phase, laying the groundwork for integrating scientific methodologies into design. With the departure of Max Bill and Bense, the school entered a new era, emphasizing the scientization of design. Horst Rittel's introduction accelerated this development, which was combined with the specialization of the departments which abolished the Grundlehre. This corresponds to the phases of "Technical Design (4)" and "Cybernetics Design and Positivism (5)." The third phase appears at the advent of the *quasi-coup d'état* by Otl Aicher. This formed the pinnacle of the tensions between scientific rigor and the creative autonomy of designers, prompting a reevaluation of the role of subjectivity and the antonymic relationship to the myth of objectivity in political design. This phase was crucial in acknowledging the complex interplay between objective scientific methods and the subjective nature of design. This comes at the cost of the financial stability of the school, which inherently was tied to the support of the West German government for *Grundlagenforschung*. Abraham Moles' tenure symbolized the synthesis of cybernetics with architecture and design, introducing a more nuanced understanding of

¹¹⁵ René Spitz, *The Political History of the Ulm School of Design (1953-1968)*, n.d., 17.

¹¹⁶ Oswald, "Cybernetics, Operations Research and Information Theory," 1046.

cybernetics that tried to account for the subjectivity of both the designer and the observer while increasing the focus on novel computer technologies as a tool for complex design tasks. In the following, we will follow this development and dive further into the course content and how this played into the self-perception of the school.

[8] Max Bense

The first lecture Max Bense held in the Hochschule für Gestaltung at the department information was titled *Einführung in die Philosophie, in die Semantik und in die Kybernetik* (Introduction into Philosophy, Semantics and Cybernetics,” while the school was still in provisional rooms of the city in 1954.¹¹⁷ It was during this phase, that the school still had to orient itself and develop the teaching concepts, while the iconic building was still being constructed - informing the first year at the school, especially for students of the department building and product design. The core themes of Bense's practice in the 1950s are already reflected in the title of this first lecture. Starting in 1955 he became the first head of the Department information and with that influenced both the pedagogies of the department and the whole school.¹¹⁸ David Oswald, who researches Bense in connection with the information department, sees Bense as the most influential protagonist in the formation of the department and identifies in his tenure the first introduction to logical systems, cybernetics, and information theory.¹¹⁹ Besides his teaching activity in Ulm, he held a regular professorship at the TH Stuttgart, where he had been teaching philosophy since 1950. He also taught in Hamburg, Rio de Janeiro, Japan, and Israel.¹²⁰

Bense came from a field of interest that developed early on during his studies in Cologne and Bonn, which constituted his interest in the department Information in Ulm: philosophy, sciences, and literature. While studying physics, mathematics, geology, and philosophy from 1930 until 1937, he began his

117 Christiane Wachsmann, David Oswald, and Petra Keller, eds., “Chronologie 1953-1958: Die Erste Generation,” in *Rückblicke. Die Abteilung Information an der hfg ulm*, Schriftenreihe club off ulm eV (Verlag Dorothea Rohn, 2015), 26.

118 David Oswald, “Zur Benennung der Abteilung Information,” in *Rückblicke. Die Abteilung Information an der hfg ulm*, ed. Christiane Wachsmann and Petra Keller, Schriftenreihe club off ulm eV (Ulm: Verlag Dorothea Rohn, 2015), 25.

119 David Oswald, “The Information Department at the Ulm School of Design” (ICDHS 2012 - 8th Conference of the International Committee for Design History & Design Studies, São Paulo, Brasil, 2012), 46, <https://doi.org/10.5151/design-icdhs-011>.

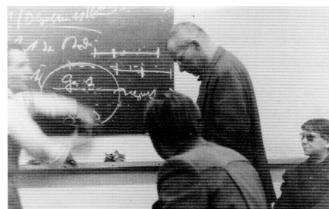
120 Elisabeth Walther, “Das Schöne und das Genaue: Über Max Bense (1910–1990),” *Zeitschrift für Literaturwissenschaft und Linguistik* 25, no. 4 (December 1995): 137, <https://doi.org/10.1007/BF03396144>.



fig.17



fig.18



[8] Max Bense

writing activities, which eventually cumulated in more than 80 pieces throughout his life – surrounding the themes of aesthetics, mathematical calculation, and semiotics.¹²¹ Bense came first into contact with Aicher, Scholl, and Bill in 1952, after being invited to the Volkshochschule to hold a lecture.¹²² The following year he arrived at the HfG as a guest lecturer and taught at the department information from 1954 to 1958.¹²³

Influenced by his earlier efforts to establish a workers' and peasants' school in Jena, his approach at the HfG reflected this aspiration in the cultural education of students from diverse educational and social backgrounds, which would aim to educate students in the fields of philosophy, logic, technology, the arts, scientific theory, and aesthetics.¹²⁴ He concretized this in "*Ein Experimenteller Lehrplan für Information an der Hochschule für Gestaltung/Klasse Prof. Max Bense*" ("An Experimental Study Plan for Information at the Hochschule für Gestaltung/Class Prof. Max Bense"), which was first published in the Magazine *Texte und Zeichen* in 1959.¹²⁵

The study plan was ambitious. It was divided into theoretical information pedagogies and experimental information pedagogies. The theoretical part was to establish fundamental knowledge that would underly the practical application, whereas the experimental information courses were intended as discourse-oriented seminars with experimental exercises. As an overarching motif, Bense abstracts text and language away from the "object of use" and its *Gestalt*, towards a consideration of its degree of information content. The general principle of abstraction is reflected in

121 Ibid., 132–33.

122 Oswald, "Zur Benennung der Abteilung Information," 25.

123 Holt, "Ulm Aesthetics," 8.

124 David Oswald, "Max Bense und die Informationsästhetik," in *Rückblicke. Die Abteilung Information an der hfg ulm*, ed. Christiane Wachsmann and Petra Kellner, vol. 7, Schriftenreihe club off ulm eV (Ulm: Verlag Dorothea Rohn, 2015), 116.

125 Max Bense, "Ein Experimenteller Lehrplan," in *Rückblicke. Die Abteilung Information an der hfg ulm*, ed. Christiane Wachsmann, David Oswald, and Petra Keller, Schriftenreihe club off ulm eV (Verlag Dorothea Rohn, 2015), 30–31.

tropisms and functions. Some key points cover information theory, mathematical theories, communication technologies, communication and information schemata, theory of perception, and communication theory based on Claude Shannon and Warren Weaver. To highlight a few courses from the plan:

12. *Sign aesthetics, information aesthetics, basics of visual semantics and visual communication*

16. *General cybernetic problems of information and constructive language design*

The matter of study was analyzed, dissected, and experimentally reassembled, reflecting the overarching methodology of the school. Although the plan has not been fully realized, it still significantly informed the general concept of both the department and the school.¹²⁶ In 1955, Max Bense introduced courses like *Philosophie und Methodologie, Weltanschauungen und Systeme* (Philosophy and methodology, world views and systems) and *Allgemeine Ästhetik* (General Aesthetics) as part of the "Kulturelle Integration" (Cultural Integration) course group. The curriculum further expanded in 1956 to include "Theorie und Methoden der Kommunikation und Information," enhancing the school's diverse academic offerings. In the academic year 1957/58, Bense focused on teaching the philosophy of science, while Maldonado brought semiotics to all departments, contributing to the school's growing interdisciplinary scope. Additionally, Kalow arrived in Ulm in 1957, who would later initiate the integration of the Siemens Studio at the department information.¹²⁷

Cybernetics here appears always in an agglomeration of theories that were tied to the overarching project of rational design of society. In Germany, Max Bense was one of the earliest adopters of cybernetic fascination in the *Geisteswissenschaften* (Arts and Humanities).¹²⁸ Oswald points out that Bense's cybernetic

¹²⁶ Oswald, "Die Abteilung Information der HfG Ulm. Vorgeschichte und Entwicklung," 18.

¹²⁷ Wachsmann, Oswald, and Keller, "Chronologie 1953-1958: Die Erste Generation."

¹²⁸ Holt, "Ulm Aesthetics," 8.

influence on the Ulmer pedagogies is already recognizable in the early drafts of the informational brochure of the school in 1955 when the department Information was still in its formation phase:

*The information department, which is currently being set up, deals with the problems of information technology and communication. Its field of work ranges from simple press releases, advertising and broadcasting to the effects of cybernetics.*¹²⁹

Bense's contributions to cybernetics in Germany led to an invitation to the World Design Conference in 1960 by Kenzo Tange, who wished to include a "true cybernetician." Tange remained unsuccessful in convincing Bense to attend as a guest speaker and instead his colleague Tomás Maldonado attended.¹³⁰ Cybernetics in the humanities was concerned with the "formalization and mathematization of psychological phenomena," which dealt with "aesthetics, pedagogy, language theory, sociology, and organizational cybernetics," which is reflected in Bense's curriculum.¹³¹

Shortly after he departed from Ulm in 1958, Bense founded the journal *Grundlagenstudien aus Kybernetik und Geisteswissenschaft* at the TH Stuttgart. From 1960, the editors of the journal spanned prominent figures of the cybernetic discourse in Germany, such as Helmar Frank, Felix von Cube, Gerhard Eichhorn, Gotthard Günther, his wife Elisabeth Walther, as well as his successor in Ulm, Abraham Moles. Starting in 1961, the journal was published by the publisher *Verlag Schnelle*. The central theme followed the claim to develop a quantitative analysis method for creativity and aesthetics, essentially in search of the objectivization of cognitive processes. The loose network of authors sustained the hope, that a theory could be developed that would be universally valid, both for human networks as well as technical and biological

¹²⁹ Oswald, "Die Abteilung Information der HfG Ulm. Vorgeschichte und Entwicklung," 16–18.

¹³⁰ Schaad, "Performing Environmental Textures," 175.

¹³¹ Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 346–47.

systems. In the end, the theories all appeared vague, and the journal failed to develop a clear theory or quantitative standards.¹³²

Information aesthetics

During his tenure at Ulm, Bense began developing his pivotal theory on information aesthetics, which he sought to integrate into his coursework and would be further developed with the *Grundlagenstudien aus Kybernetik und Geisteswissenschaft* and the series *Aesthetica*. His initial course in this area was listed in the study program as “Ästhetik” (Aesthetics) and “The Study of the Beautiful and the Nature of Art”¹³³

Following his exposure to Norbert Wiener’s work *Cybernetics or Communication and Control in the Human and the Machine* in 1948, Bense was drawn to Wiener’s materialistic and atheistic approach to abstracting animal, human, and machine interactions, and the idea of designing and controlling the human environment. The idea of a designable environment was linked to the atheistic thought that humans could take their fate into their own hands independently from any god.¹³⁴ This notion resonated in an era before the recognition of technological limitations. The invitation of Norbert Wiener to the HfG coincided with Bense’s activities at the TU Stuttgart in July 1955, attracting mainly students from mathematical-scientific backgrounds. Due to its popularity, he was also convinced to attend the HfG Ulm, merely 95km away.¹³⁵

Margit Staber-Weinberg reflected on Wiener’s influence:

The 1948 publication of the book ‘Cybernetics’ was like fuel for Bense’s information aesthetics engine. It served us a challenging intellectual feast. It was often demanding, and there were aspects we didn’t fully grasp, but it helped us perceive

132 Ibid., 347–55.

133 Oswald, “Die Abteilung Information der HfG Ulm. Vorgeschichte und Entwicklung,” 16.

134 Oswald, “Max Bense und die Informationsästhetik,” 120.

135 Elisabeth Walther, “Max Bense Und Die Kybernetik,” in *Computer Art Faszination*, 1999, 360, <https://www.netzliteratur.net/bensekybernetik.htm>.

*thinking as an open, interactive playground for the adaptable human mind. A school of life!*¹³⁶

The “information aesthetic engine” was essentially driven by the idea that it “would weaken the god-like position of an artist-creator, suggesting non-expressive design as a permutational playground resulting in authentic situations.”¹³⁷ To free aesthetics of its speculative qualities, aiming to unite scientific and artistic production, a visual or linguistic artwork would be perceived by its “complexity” of the visual “information” and the “orderliness.” Bense determined aesthetic measures based on the American mathematician George David Birkhoff. In 1933, Birkhoff developed a formula to measure aesthetics in a work of art in his publication *Aesthetic Measures*, by evaluating the three levels of perception: effort of the sensual apparatus, the feeling of pleasure, and redundancy in perception. Bense adopted George David Birkhoff’s measure, $M = O/C$ (where M stands for aesthetic measure, O for order, and C for complexity), to quantify aesthetic information. In this formula, greater order and simplicity in a piece enhance its aesthetic value, while disorder diminishes it. In the mid-1950s, Bense connected this theoretical framework to the communication model of Weaver and Shannon, which is structured as Sender - Channel - Receiver. This model for communication technology was transferred onto human communication on the assumption that both could be abstracted to common denominators.¹³⁸

In contrast to Birkhoff, Bense distinguishes between measure and value in aesthetic calculation to obtain a purely statistical value. However, the resulting value, which measures the information content of a work through the influence of Shannon and Weaver, raises the question of its actual utility. The resulting abstract number, even if it is based on objectivity, itself says little about

136 Staber-Weinberg, “Hätte ich doch damals ein Tagebuch geführt!,” 38–39.

137 Schaad, “Performing Environmental Textures,” 173.

138 Claus Pias, “Hollerith ‘Feathered Crystal’: Art, Science, and Computing in the Era of Cybernetics,” *Grey Room* 29 (October 2007): 116–20, <https://doi.org/10.1162/grey.2007.1.29.110>.

the actual perception of a work of art or a text. In Ulm, students like Bonsiepe analyzed their paintings for aesthetic information content, calculating specific values, such as 191.02 in Bonsiepe's case. However, it remains unclear what significance or application should follow from these calculated values. The application of this theory to human communication raised questions, particularly its potential disregard for order and meanings, elements that are integral to human interaction and understanding.¹³⁹ Therefore, It was never really established in universities.¹⁴⁰ Bense's approach was to cultivate an objective discourse in literature, aesthetics, and art, reflecting the era's push for quantifiable, data-driven analysis in a technology-driven society. Even though the general spirit of the school fostered an application of such theories, even at the HfG, information theory failed to connect with the students, as it was of no use in design practice.¹⁴¹

With Ideology

Max Bense's tenure in Ulm represents the incubational phase of developing objective and calculatable aesthetics and design. His journey through rationalism, cybernetics, and information aesthetics is deeply influenced by his humanistic beliefs that Elisabeth Walther, who was teaching together with Bense both in Ulm and in Stuttgart, summarizes as follows:

Max Bense defended man as a holistic being, on the one hand as a spiritual being, but on the other hand also as a feeling, acting, deciding being. For him, mind, action and feeling were equal, complementary components of the human being. Rationalism and Sensibility, the title of another book, and his manifesto of existential rationalism reinforce this attitude.¹⁴²

¹³⁹ Oswald, "Max Bense and the Aesthetics of Information," 117–18.

¹⁴⁰ Pias, "Hollerith 'Feathered Crystal,'" 111.

¹⁴¹ Oswald, "Max Bense und die Informationsästhetik," 119.

¹⁴² Walther, "Das Schöne und das Genaue," 134.

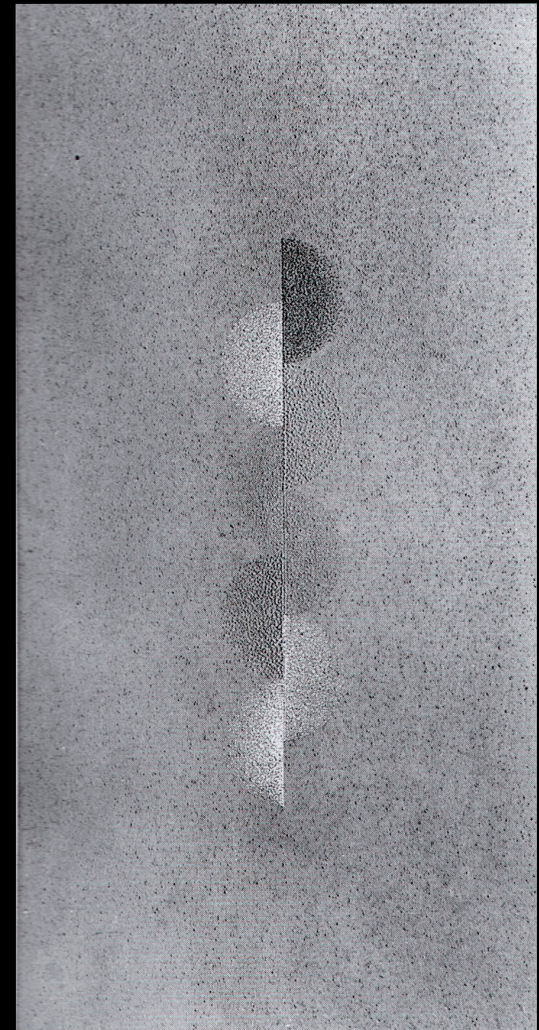


fig. 19

berechnung der ästhetischen information

die gesamtzahl der mikroelemente (punkte) ist K
 die zahl der elemente mit dem merkmalswert i (z.b. öölin-blau)
 ist Zi
 die relative häufigkeit der elemente mit dem merkmalswert i ist P

$$P = \frac{Z_i}{K} = \frac{900}{7200} = \frac{1}{8}$$

die zahl der punkte in einem halbkreis beträgt durchschnittlich 900

die gesamtinformation der 8 halbkreise mit ihren 8 verschiedenen mikroelementen ist gleich der summe der relativen häufigkeiten der elemente mit dem merkmalswert 1 bis 8 multipliziert mit dem logarithmus digitalis der relativen häufigkeit

$$\text{Inf} = - \text{summe } P_i \log_d P_i = - 8 \cdot \frac{1}{8} \log_d \frac{1}{8} = + 3$$

die maximale information als unwahrscheinliche verteilung, die jenseits der apperzipierbarkeit liegt, ist der reziproke wert der wahrscheinlichen verteilung

$$\text{Inf}_{\max} = + \text{summe } \frac{K}{Z_i} \cdot \log_d \frac{K}{Z_i} = 8 (8 \cdot \log_d 8) = 192$$

die redundanz wird nach der formel bestimmt :

$$\frac{\text{Inf}_{\max} - \text{Inf}}{\text{Inf}_{\max}} = \frac{1 - (- 8 \cdot \frac{1}{8} \cdot \log_d \frac{1}{8})}{192} = 1 - \frac{1}{64}$$

$$R (\text{redundanz}) = 0,98$$

die ästhetische information wird nach der formel bestimmt :

$$\text{Inf}_{\text{ästh}} = \text{Inf}_{\max} - R = 192 - 0,98 = 191,02$$

Further, she states, that Bense saw the mind as essentially form and form as essentially mathematized, whether in poetry, music, painting, or sciences. The cybernetic focus in Ulm formed the intellectual core and Bense is often quoted as having attempted to “pump” in as much knowledge and intellect into the school as he could, connecting to Inge Scholl's and Otl Aicher's educational project motivated by anti-fascism.¹⁴³ To distance oneself from subjectivity and symbolism meant to free oneself from ideologies. In the early 1930s, he had been part of the “Rheinische Gruppe,” a loose group of artists and writers. Their publications, though not particularly radical, nevertheless shared anti-fascist sentiments.¹⁴⁴ In 1944, Bense wrote a pamphlet against Adolf Hitler – Information as Enlightenment against Ideological Actions. The pamphlet “Anti-Klages” challenged Ludwig Klages's 1929 publication *Der Geist als Widersacher der Seele* (The Intellect as Antagonist of the Soul). Bense's critique of Klages placed him at odds with groups sympathetic to the National Socialists, effectively making him a persona non grata in those circles.¹⁴⁵ Frieder Naake, a student of Bense in Stuttgart, diagnoses this objective as a symptom of the confrontation with fascism.

*In this way Bense reacts, in my interpretation, to his experience with fascism: everything that tends towards meaning also tends towards emotion. In addition, as soon as you manage to throw the people into emotions, you can play with them perfectly.*¹⁴⁶

Bense's work during the 1940s and his later academic pursuits show his belief in information as a tool of enlightenment against subjectivity and ideology. With this, he essentially ties into the political – or antipolitical – and scientific project of the school.

His connection to the students sometimes lacking and his big

143 Oswald, “Max Bense und die Informationsästhetik,” 116.

144 Walther, “Max Bense Und Die Kybernetik,” 132.

145 William Stewart, “‘The Higher Forms Are Also the Weaker Ones’: Technics and Humanism in Max Bense's ‘Technical Existence,’” *Grey Room* 81 (December 2020): 41, https://doi.org/10.1162/grey_a_00308.

146 Frieder Naake in an interview with the author. As quoted in Oswald, “Max Bense und die Informationsästhetik,” 119.

subject of "information aesthetics failed to connect to the students and was barely of any use in the design praxis at the school. His work, often mistakenly equated with the school's ascetic style, sought to bridge the gap between scientific objectivity and artistic creation, a quest that continued to evolve and influence the discourse in aesthetics and cybernetics well beyond his time at Ulm. Despite challenges in translating his theories into practical applications, Bense's legacy in shaping the intellectual landscape of design and art theory remains significant, reflecting a continuous pursuit of objective discourse in an increasingly technological society.¹⁴⁷

¹⁴⁷ Ibid., 117.

In the Spring of 1958, Max Bense and his wife Elisabeth Walther also left the school. This followed the shift in the school's pedagogies after Max Bill left Ulm. The mathematician Horst Rittel (1930-1990) assumed Bense's courses, including 'Information Theory,' 'Philosophy of Science,' and 'Mathematical Surgical Analysis.' Between 1958 and 1963 he was one of the most important theoreticians of the school and in the center of an increasing conflict on the question of objectivity in design.¹⁴⁸ Rittel would propagate an informed design approach - the "*Ulmer Methodik*."¹⁴⁹

Rittel came from a background in mathematics and theoretical physics, which he studied at the University of Göttingen until 1954. After a short diversion into cost predictions, and operation research at the Maschinenfabrik Deutschland, his 30-year-long academic career in the intersection of sociology, mathematics, and planned design would start in 1958. His most notable contributions were in Ulm, at the Department of Architecture at the TH Stuttgart from 1973 until 1990, and at the University of California, Berkeley starting from 1963, where "he had the good fortune to participate in the development of the science of design from its beginning."¹⁵⁰ From 1958 until 1963 worked as a tenured docent at the HfG, where he "served as a sort of funnel transferring knowledge [...] from the sciences and engineering to the design profession."¹⁵¹

Rittel's arrival connects with the previous tensions that played out in Ulm between Max Bill and Tomás Maldonado. Maldonado joined the HfG in the same year as Bense. Max Bill, who rose from being appointed the architect of the school in 1950, to the school director until 1956, was mainly responsible for the close resemblance of the HfG to the Bauhaus in the early years and the

148 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 37.

149 Ibid.

150 C. West Churchman et al., "In Memoriam: Horst W.J. Rittel," *Design Issues* 23, no. 1 (2007): 89–91.

151 Chanpory Rith and Hugh Dubberly, "Why Horst W.J. Rittel Matters," *Design Issues* 23, no. 1 (2007): 72.

adoption of the *Grundlehre*.¹⁵² Bill's understanding of design was a "certain reconciliation of art and sciences" that bore a strong resemblance to Bauhaus masters like Paul Klee. Bill's "Concrete Painting," as well as the concrete poetry by Gomringer, emphasizes geometric shapes, precise forms, and a strict adherence to visual rules. The term "concrete" denotes the tangible, non-referential nature of the art, focusing on the inherent qualities of color, shape, and composition. This style was based on mathematical calculation and rules, while also embracing artistic expression. Characterized by its objective and non-representational approach, it highlights the visual language itself, rather than any symbolic or emotional content. Rittel mirrored this by stating that "design is also "cultural policy" because every object in our environment is a representative of 'culture.'"¹⁵³

Bill's "classic 1920s modernist stance"¹⁵⁴ was contested by other faculty members like Maldonado, and Aicher. The dissatisfaction with Bauhaus idealism and design education as art¹⁵⁵ peaked in a controversy over the artist atelier "Studio Bill" which split the school into two camps – those who followed the conservative tradition of a master and his students, and those who aimed for the anti-hierarchical and scientific discourse on design and architecture, which in their perspective would be the only solution in tackling the hurdles of the time.¹⁵⁶ Due to "irreconcilable differences of opinion", the most prominent figure of the school, Max Bill, left Ulm in 1956.¹⁵⁷ Together with Max Bense's departure two years later, this marks the paradigm shift in the school's scientization.

152 Spitz, "Die politische Geschichte der Hochschule für Gestaltung Ulm," 36–37.

153 "Auszüge aus dem Vortrag von H. Rittel vor der Gesellschaft 50," 14.

154 Paul Betts, "Science, Semiotics and Society: The Ulm Hochschule Für Gestaltung in Retrospect," *Design Issues* 14, no. 2 (1998): 72, <https://doi.org/10.2307/1511852>.

155 Ibid., 73.

156 Spitz, "Die politische Geschichte der Hochschule für Gestaltung Ulm," 38.

157 Christiane Wachsmann, David Oswald, and Petra Keller, eds., "Chronologie 1958-1962: Die Zweite Generation," in *Rückblicke. Die Abteilung Information an der hfg ulm*, Schriftenreihe club off ulm eV (Verlag Dorothea Rohn, 2015), 27.

In comparison to Max Bense, Horst Rittel diverged fundamentally in his perspectives: Bense prioritizes objective calculation and measurement, underscoring the importance of quantifiable data in understanding systems. This plays into the pedagogical direction under Bill. Cybernetics, information theory, and information aesthetics serve to understand the arts and science. In contrast, Rittel's focus lies in the rationalization of planning processes which he views through an ethical lens.¹⁵⁸ His publications at that time are almost exclusively focused on cybernetics together with sociology, politics, and economics.¹⁵⁹ The scientific method is viewed as a tool, and he emphasizes not just the procedural aspects, but also the intricate interplay of production, perception, and their ensuing economic, social, and cultural impacts within planning frameworks.¹⁶⁰

Rittel's courses

Otl Aicher and Maldonado promoted a new program of scientificization at the school. The curriculum, introduced in 1958,¹⁶¹ was designed to shift design from instrumental value to normative design goals.¹⁶² A forward-looking optimism emerged, focusing on an accelerating scientization of the teaching methods, which also specialized the work of the departments and subsequently slowly abolished the *Grundlehre* until 1961.¹⁶³ This shift in perspective brings the theoretical courses at the HfG closer to the design practice of the students.

In Rittel's courses, design practice was more directly connected to student work, as opposed to the limited engagement of students with information aesthetics, redefining the role of the designer from

158 Horst Rittel, transcript S. Eppinger 7.10.59 in Curdes, *Die Abteilung Bauen an der hfg Ulm*, 38.

159 Chanpory Rith et al., "Bibliography of Horst W.J. Rittel," *Design Issues* 23, no. 1 (2007): 78–88.

160 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 37.

161 Betts, "Science, Semiotics and Society: The Ulm Hochschule Für Gestaltung in Retrospect," 77.

162 Spitz, *Concise History of the Ulm School of Design*, 38.

163 Staber-Weinberg, "Hätte ich doch damals ein Tagebuch geführt!," 33–39.

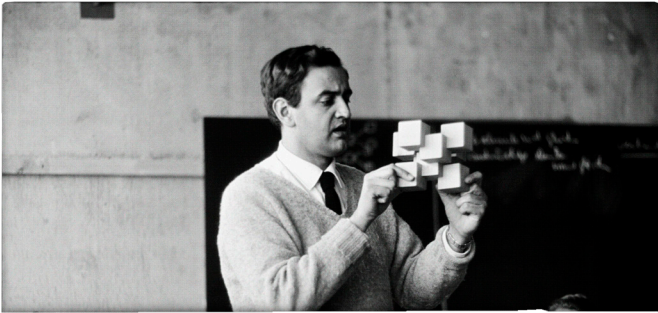
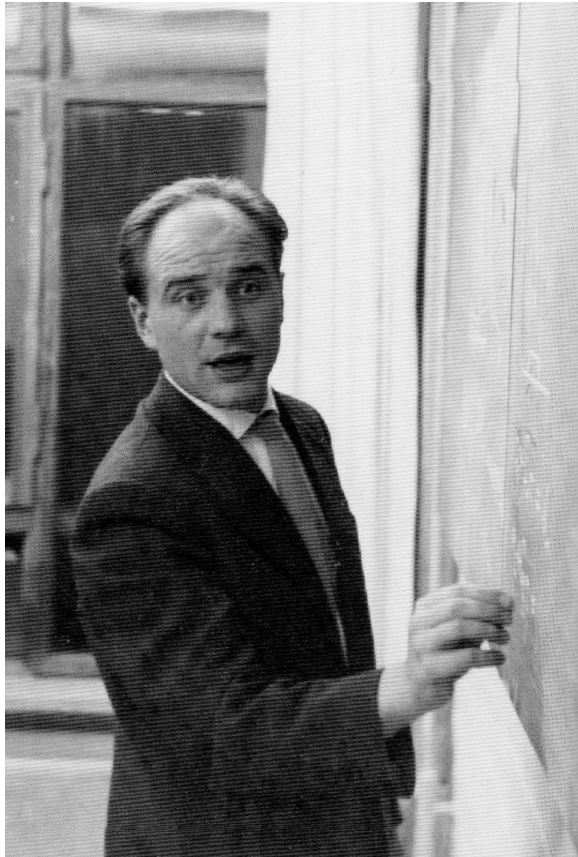


fig.21

fig.22



artist to “coordinator” working with industry professionals.¹⁶⁴ Early on, Rittel recognized the challenges of holistic planning and sought diverse approaches, leading to his concept of “wicked problems” - complex issues with no clear solutions or definitive conclusions.¹⁶⁵ Building on the foundational work of Max Bense, his teaching spanned a range of disciplines, including cybernetics, semiotics, sociology, statistics, stochastics, mechanics, materials science, and engineering design, reflecting a multidisciplinary approach to these intricate design challenges.¹⁶⁶

Contradictory to second-order cybernetic views, Rittel stood for a linear understanding of planning. It is generally characterized by its proponents as having two distinct phases: problem definition and problem solution. In the problem definition phase, there's an analytical approach where the designer identifies all elements of the problem and specifies the necessary criteria for a successful design. Following this, the problem-solution phase involves a synthetic sequence, where these requirements are amalgamated and balanced against each other, culminating in a final plan ready for production.¹⁶⁷ This approach also had a huge effect on the school and continued to teach at TU Stuttgart. Interestingly, his work alongside Max Bense at the TH Stuttgart is seen as a precursor to computer science in German academia.

In a sense, Bruce Archer, who was teaching in Ulm from 1961 until 1962 summarizes this as the purpose of creating the best conditions for the subjective decision, acknowledging that there is no true or objective method. Instead, the designer has to be aware of the factors influencing him and his decision and engage in a constant self-evaluation of the context and method.¹⁶⁸

¹⁶⁴ Betts, “Science, Semiotics and Society: The Ulm Hochschule Für Gestaltung in Retrospect,” 74.

¹⁶⁵ Curdes, *Die Abteilung Bauen an der hfg Ulm*, 37.

¹⁶⁶ Spitz, “Die politische Geschichte der Hochschule für Gestaltung Ulm,” 38.

¹⁶⁷ Richard Buchanan, “Wicked Problems in Design Thinking,” *Design Issues* 8, no. 2 (1992): 15, <https://doi.org/10.2307/1511637>.

¹⁶⁸ Bruce L. Archer, “Zu Aktuellen Problemen Des Designs,” *Output* 4+5 (June 1961): 31.

1962 / A Crisis on Objective Design

In 1961, Aicher abruptly changed attitude. Having seen the development of design into a seemingly objective scientific discipline, which he supported up until then, he realized that this overshoot had suppressed any kind of artistic genius. The myth of objectivity that Rittel and his colleagues of the theoretical courses conjured left no space for a subjective. Aicher realized that, in design, not everything could be rationalized. Design could only be seen as a natural science up to a certain point.¹⁶⁹

Aicher, alongside other designers like Walter Zeischegg and Hans Gugelot, found themselves in opposition to the theoretical teachers at the school. Although there was an initial consensus on the necessity of distancing from Bauhaus ideologies, the design faculty felt that the emphasis had shifted excessively towards a technological orientation. The rectorate council was composed entirely of theorists. Tomás Maldonado was re-elected, joining forces with Herbert Ohl and Horst Rittel. The situation worsened when Rittel, along with sociologist Hanno Kersting, proposed the establishment of a new department focused on planning and organization. Rittel became the strongest antagonist against the designers.¹⁷⁰

In a kind of *coup d'état*, Aicher removed the power of the theoretical actors by changing the school's constitution. These circumstances allowed his undemocratic election as rector of the school so that he could avert a continuing technologization of education.¹⁷¹ Even in 1966, the impact of this was lasting, as a pamphlet for the architecture department described. Maldonado belonged more towards the theoretical complex at the school, but he also saw the "problematic aspects of a subcomplex over-scientization of design praxis."¹⁷² Rittel left Ulm in 1962.

169 Spitz, *Concise History of the Ulm School of Design*, 38.

170 Spitz, "Die politische Geschichte der Hochschule für Gestaltung Ulm," 176.

171 Spitz, *Concise History of the Ulm School of Design*, 39.

172 Oswald, "Cybernetics, Operations Research and Information Theory," 1053.

Gerhard Curdes draws a final balance under Rittel's influence at the school. Even if the methodological approach was sometimes difficult to translate into design practice, the influence of Rittel and Maldonado in the rectorate council had a lasting effect on the school's pedagogies.¹⁷³ Rittel's main contribution was to the intersection of architecture, the industrialization of construction, and automation. Bense's Cartesian worldview propagated the use of logic to achieve certain knowledge. The central "positivist approach originating in the sciences" was essentially continued and further developed by Rittel, who compared "various epistemological approaches" and "showed which working hypotheses they each lead to and how these can be combined in models."¹⁷⁴

The attempts to apply cybernetic theory to social design potentially diminish *das Politische* due to their perceived instability and subjectivity.¹⁷⁵ In cybernetic theory in design, social and spatial processes are reduced to abstract data and patterns, often overlooking the human element, with humans seen as disruptive factors. The quirks of an individual and freedom of will were not regarded in the heterogeneous image of the cybernetics approach to the humanities.¹⁷⁶ Aicher seemed to have put a stop to the fear of the "*Vergottung der Vernunft*" ("deification of reason"), as the sociologist Erich Franzen put it,¹⁷⁷ by acknowledging subjective qualities of the design process, at the price of ideological tendencies. At Berkely, Rittel would later come to the "insight that complex design decisions always are subjective, political, and cannot be based on a linear understanding of problem-solving."¹⁷⁸

173 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 40.

174 Elke Koch-Weser Ammassari, "Was habe ich der Ulmer Hochschule für Gestaltung zu verdanken?," in *Rückblicke. Die Abteilung Information an der hfg ulm*, ed. Christiane Wachsmann, David Oswald, and Petra Keller, Schriftenreihe club off ulm eV (Ulm: Verlag Dorothea Rohn, 2015), 101.

175 David Buckermann, Anne Koppenburger, and Schaupp Simon, eds., *Die Kybernetische Hypothese und das Ende des Politischen* (Münster: UNRAST Verlag, 2018).

176 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 352–65.

177 Wachsmann, Oswald, and Keller, *Rückblicke. Die Abteilung Information an der hfg ulm*, 102.

178 Oswald, "Cybernetics, Operations Research and Information Theory," 1053.

After Aicher shifted his focus, the years leading up to 1968 can be viewed as a synthesis of the school's previous ideas. The key figures during this time were Abraham Moles (1920-1992), a French sociologist, Tomas Maldonado, who was at the school from 1955 to 1966, and Gui Bonsiepe, who studied under Horst Rittel, Max Bense, and Tomás Maldonado at the Information Department before becoming a teacher in Ulm. Rittel, Kersting, and Maldonado applied semiotics, seen as a continuation of functionalism, to design and consumer society in the 1960s.¹⁷⁹ It involves an exchange of information between the design object and the user.¹⁸⁰

Abraham Moles (1920-1992) taught in Ulm from 1961 to 1966, where he combined the cybernetic model of communication with the humanities. He explored the same information aesthetics as Bense in 1958 with *Théorie de l'information et perception esthétique*, and through their joint work on *Grundlagenstudien aus Kybernetik und Geisteswissenschaft*.¹⁸¹ Together with *Introduction Cybernetique aux Sciences Humaines* from 1963,¹⁸² these works informed his classes in Ulm. Moles became a full-time professor in 1965.¹⁸³ In this phase, the understanding of the artist as a programmer is combined with the Bauhaus ideology of the *Gesamtkunstwerk* into a meta-design.¹⁸⁴ The artistic action here is programming and organizing itself. Cybernetics would usher in an era based on the modeling and simulation of social processes, which would allow the designer to create an environment that could not only be read as an idiosyncratic expression of the designer but was intended to satisfy the masses.¹⁸⁵

179 Betts, "Science, Semiotics and Society: The Ulm Hochschule Für Gestaltung in Retrospect," 80.

180 Larry Busbea, "Metadesign: Object and Environment in France, c. 1970," *Design Issues* 25, no. 4 (2009): 104.

181 Pias, "'Hollerith 'Feathered Crystal,'" 116.

182 Abraham Moles, *Introduction Cybernetique Aux Sciences Humaines*, 1st ed., 1963.

183 Matthew Holt, "Ulm Aesthetics," *Journal of Design History* 33, no. 2 (2020): 9, <https://doi.org/10.1093/jdh/epz038>.

184 Busbea, "Metadesign: Object and Environment in France, c. 1970," 105.

185 Pias, "'Hollerith 'Feathered Crystal,'" 121–25.

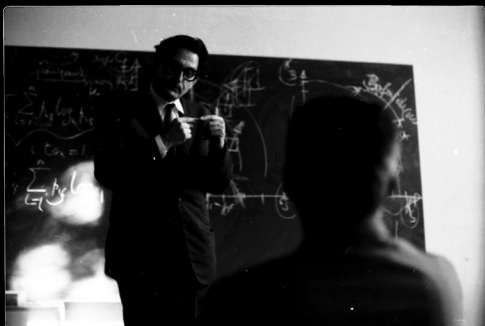


fig.23

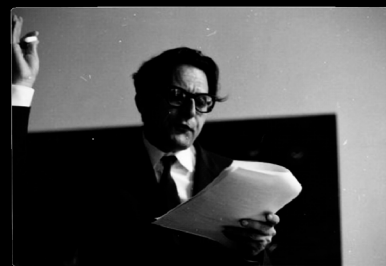


fig.24

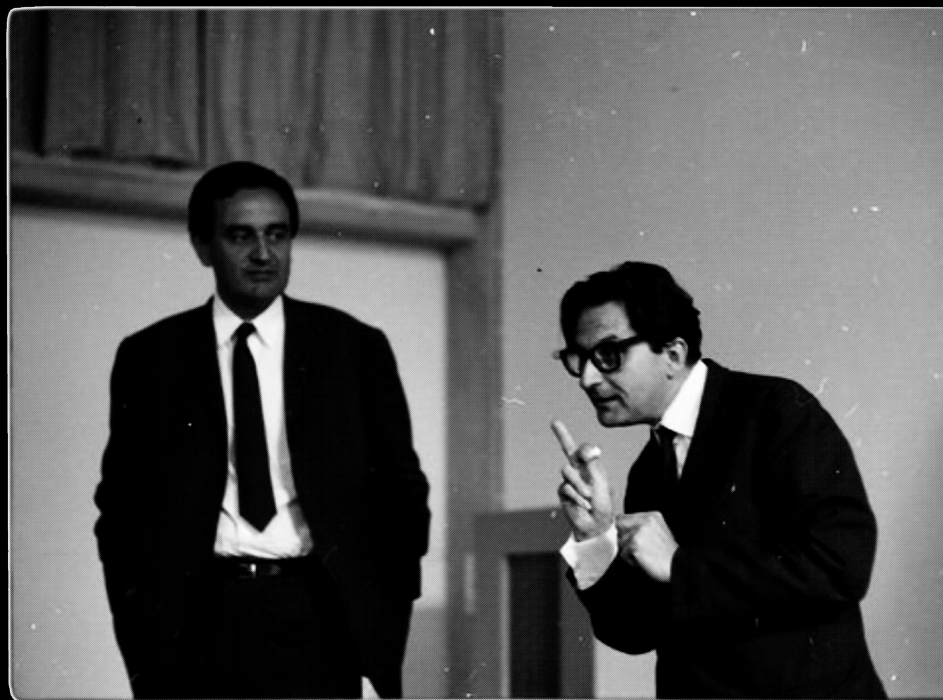


fig.25

The courses Moles taught at Ulm ranged from cybernetics and systems theory, information theory, communication theory, the computer, sociodynamics of culture, introduction to mathematics and computer systems, to game theory. In addition, they were supported by seminars on mathematics, statistics, punch card technology, and introductory computer courses to establish a computer-oriented way of thinking.¹⁸⁶ Moles said of his lectures that he had developed three main doctrines:¹⁸⁷

- 1 *an information theory of design*
- 2 *a systems theory with an extensive model of the simulation of artificial organisms up to social processes*
- 3 *a theory of culture, concerning the role of the designer and artist in modern consumer society*

Systems theory was based on the distinction between open and closed systems of varying complexity - for example, social organisms such as groups, computers, a car, office organizations, or that of a biological metabolic process.¹⁸⁸ Central to his cybernetic understanding of the human sciences was the human being at the center, and cybernetics was used as a science of the sciences to understand the underlying processes of the human sciences. Bonsiepe and Maldonado in comment *Ulm 10/11* on the pluralistic methodology of design:

*[...] System theory and theory of control could be useful for a designer in combination with mathematical logic as a general background for the understanding of a machine theory. Information theory may furnish the designer with a vocabulary of terms to analyze and to quantify the structural relationships of products.*¹⁸⁹

186 Abraham Moles, "Gedanken zur pädagogischen Konferenz 1967" (Ulm, 1967), Se 49.023, HfG-Archiv Ulm.

187 Abraham Moles, "Bericht Moles an Aicher, Kapitzki, und Krampen Bericht Prof Moles an Aicher, Kapitzki, Krampen, o.D.," 1967, 1, Se 49.024, HfG-Archiv Ulm.

188 Abraham Moles, "Protokoll zum Seminar: Kybernetik und Systemtheorie vom Dienstag, 23.11.1965" (1965), 2, AZ 221, HfG-Archiv Ulm.

189 Gui Bonsiepe and Tomás Maldonado, "Science and Design," *Ulm: Journal of the Hochschule Für Gestaltung 10/11* (May 1964): 13.

Added to this is Moles' understanding of cybernetics as a tactic for decision-making, essentially a reformulation of the political, and in a sense a design ideology - simulation and analysis as the basis for a political decision.¹⁹⁰ In this third phase of the Ulm designers' cybernetic understanding, the constant reference to the German biologist Jakob von Uexküll's concept of the environment is striking. The designer himself immersed in a system is indistinguishable from the observed system. This means a constant re-evaluation and self-explanation of the designer and the designed system breaks down the boundary between designer and user.¹⁹¹

*To clarify this attitude, we might suppose the individual to be imprisoned in a bubble of glass upon which messages are projected from the Umwelt, which is considered as a source of information. [...]. Our environment thus appears to the cybernetician as an immense assembly of organisms, and we know already that eidetic reduction is easier for the human being in the case of artifacts, for with them, it is easier for him to apprehend their irreducible otherness' (Verfremdung).*¹⁹²

In his 1965 lecture on communication theory, Abraham Moles discussed how external perturbations are perceived within a space-time system. Citing Edmund Husserl, Moles explored the concept of man-made environments in relation to individual perception, offering a contrast to the Cartesian system. He emphasized the communication through channels in this environment, from sender to receiver, and emphasized that the observer is an integral part of the system and thus influences his or her perception of the environment.¹⁹³ Bernard Scott adds to this understanding of Uexküll's environment that external perturbations to a system can be interpreted as 'signifying' events, a key idea in semiotic interpretations where such events are seen as 'signs'. The crucial understanding of the interaction of systems with their environment

190 Abraham Moles, "Protokoll zum Seminar: Kybernetik und Systemtheorie vom Dienstag, 12.10.1965" (1965), 4, AZ 221, HfG-Archiv Ulm.

191 Holt, "Ulm Aesthetics," 9.

192 Moles, "Products: Their Functional and Structural Complexity," 7.

193 Abraham Moles, "Protokoll zum Seminar: Rechenanlagen vom Montag, 11.10.1965" (1965), AZ 221, HfG-Archiv Ulm.

suggests that events or stimuli in an environment carry specific meanings or information that are interpreted differently depending on the context of the receiving system.¹⁹⁴

In Tomás Maldonado's pedagogies, this sentiment is apparent as well. The term *Umwelt* gained prominence in his courses on semiotics, where the environment forms an open system of relationships between objects. By recognizing the interrelatedness of different design disciplines, the designer, and the user, it furthered the dissolution between those boundaries. The human-made environment finds its origins in modern philosophy and the discoveries in ecological sciences.¹⁹⁵ His approach promised critical methodologies in architectural training, emphasizing human ecology. He conceptualized the environment as a system of artifacts shaped by circular causality, intertwining the utilitarian and the symbolic, function and meaning. Both Maldonado and Bonsiepe discern that this calls for a certain methodological theory to deal with these environments. Steven Holt argues, that "at this point, perhaps there is reconciliation to be had with the Bauhäusler Max Bill and the 'hard-driven' semantics, semiotics and information theory of Ulm. Perhaps aesthetics understood as the universal logic of interconnections and relations, while not necessarily scientific by nature, is

precisely the 'environmental' knowledge field most suited to the contemporary designer."¹⁹⁶

The cyberneticians at the HfG recognized the role of subjectivity in this systemic interaction, aligning itself with the second-order cybernetic understanding based on Uexküll's *Umwelt*. This contrasts with the ideal of objectivity in previous pedagogies at the school, which seek to eliminate the designer's

194 Scott, *Cybernetics for the Social Sciences*.

195 Simon Sadler, "A Container and Its Contents," *Room One Thousand: Re-Reading Tomás Maldonado's Design, Nature, and Revolution: Toward a Critical Ecology* (1970, Trans. 1972) 1 (2013): 51, <https://escholarship.org/uc/item/25f1r08h>.

196 Holt, "Ulm Aesthetics."

presence and subjectivity in the designed system.¹⁹⁷ Daston and Galison, quoting Goethe, aptly summarize this perspective: "For the observer never sees the pure phenomenon with his own eyes, but much depends on his mood, the state of his senses, the light, the air, the weather, the physical object, how it is handled, and a thousand other circumstances."¹⁹⁸

Computational transition / Architecture of systems

For environmental planning in a consumer society, Moles saw the new electronic data processing (EDP) and computer technology as central, and with it the emerging big data design.¹⁹⁹ In the protocol of his course *Rechenanlage* (Computer), he observed that computing systems had become indispensable in various fields, including urban planning, construction, architecture, and design. He noted that this reliance on mechanical computation is a hallmark of the Mid-century, paralleling the significance of the development of atomic energy. Moles emphasized that all elements, from digits to symbols, are unified under the concept of "data," which is integral to every industrial process. He emphasized that computing systems are critical to solving today's grand challenges, and their use and demand continue to grow.²⁰⁰ Coming back to Daston and Galison, the virtuous machine, in this case, the computer, offers the potential to surpass the human, being able to replace complex tasks laboriously, and at times faulty, performed by humans.²⁰¹

In the 1960s context, the increasing accessibility of computers was responsible for the general rise of the computer as a tool for performance optimization and creative endeavors that began to emerge. Automation was the key topic of the day, especially

197 Johann Wolfgang Goethe, "Erfahrung und Wissenschaft" (1792; 1823), in *Werke*, 13:24; trans. in Miller, *Goethe 24*. As quoted in Daston and Galison, "The Image of Objectivity," 82.

198 Ibid., 88.

199 Pias, "'Hollerith' 'Feathered Crystal,'" 121–25.

200 Moles, "Protokoll zum Seminar: Rechenanlagen vom Montag, 11.10.1965," 1.

201 Daston and Galison, "The Image of Objectivity," 83.

with the massive economic growth. Magazines and technical literature propagated the widespread use of the new EDP to “link, coordinate and control industrial production processes of all kinds [...]”²⁰² Among the files of Abraham Moles in the HfG-Archiv Ulm, for instance, was an early article by Joseph Licklider titled “Man-Computer Partnership.” This article predicted a future where humans and computers would interact directly, anticipating the development of servers, the Internet, and cloud computing.²⁰³ So, Computers arose with the potential as a mechanical lingua franca to turn specific knowledge into shareable and consumable across diverse practitioners, contributing to the formation of epistemic cultures.²⁰⁴

In the department building, Moles taught the courses Methodology I & II - Diving into the Use of Computers and Programming in the academic year 1966/1967, which was complemented at the department by the course “Cybernetics.”²⁰⁵ A detailed description of the course contents states that topology, symmetry, combinatorics, team theory, and design methods were taught, as well as design methodology, programming technology, systems theory, and cybernetic theory. The courses were co-taught with Kurt Alsleben.²⁰⁶ Despite these advances and visions, HfG Ulm faced a tangible gap: a lack of infrastructure to fully explore and implement these theoretical and technological translations. This limitation underscored a disconnect between the conceptual potential of computational tools and their practical application within the school’s environment.²⁰⁷

202 Otto Heillingbrunner, *Technik Der Automatisierung* (München: Verlag Moderne Industrie - München 23, 1958), 11.

203 J. C. R. Licklider, “Man-Computer Partnership,” *International Science and Technology*, May 1965, 19–24.

204 Andrew Witt, *Formulations: Architecture, Mathematics, Culture*, 1st ed. (Cambridge, Massachusetts - London, England: The MIT Press, 2022), 30–52.

205 “Prospekt: Architekturausbildung an der HfG.”

206 “Lehrprogramm” (Ulm, 1966), AZ 007.8, HfG-Archiv Ulm.

207 Licklider, “Man-Computer Partnership.”

Nonetheless, the computer was seen as a tool for problem-solving for the human environment. The industrialized post-war context was described by Maldonado in “The Emergent World: A Challenge to Architecture and Industrial Design Education” as follows: “Never has human environment been more chaotic and irrational, never richer in objects and poorer in coherent and orderly structure.” This chaotic environment he describes is diagnosed with a lack of housing and an abundance of objects in the face of “electro-domestication”, overrun with architecture for the sake of sublimation à la Corbusier and unable to offer a solution, instead escaping into utopias.²⁰⁸ He advances the narrative in the article, that “what interests us today is not to depict New Babylons [...] but on the contrary, to try to establish what is to be the task of architecture and of industrialized design in the age in which we live: that is the age of the struggle against food and housing destitution.” This encapsulates the general stance that the school took. During the school’s existence, the department increasingly focused on industrialized construction, especially after the departure of Max Bill as rector.²⁰⁹ This shifted attention away from individual buildings and their contexts to the production processes of the building industry and their development into industrial operations, leading to an emphasis on housing, office buildings, schools, and industrial complexes.²¹⁰

It is important to contextualize though, that the school faced a constant struggle to establish a clear and distinctive teaching policy that would set it apart from other institutions. The diplomas at the school at least tried to break free of the restricting program of the school.²¹¹ The self-chosen topics only sparsely reflect industrialized buildings, and many students did not follow this direction even after leaving Ulm.²¹² The increase of focus on industrialized building that

208 Tomás Maldonado, “The Emergent World: A Challenge to Architectural and Industrial Design Training,” *Ulm: Journal of the Hochschule Für Gestaltung* 12–13 (March 1965): 12.

209 Curdes, *Die Abteilung Bauen an der hfg Ulm*, 5.

210 Ibid., 16.

211 Ibid., 21.

212 Ibid., 23.

would lend sometimes obscure terminologies from cybernetics and system theory, was the hopeless attempt to establish new pedagogies in contrast to other schools like the TH Stuttgart.²¹³

“Méthode. – Ne sert à rien” (G. Faubert)²¹⁴

One year before the closure of the school, Gui Bonsiepe evaluated the intricacies of a rational methodology, stating that the methodology of design can only be criticized from within. Bonsiepe had been at the school almost the longest. In him, the connection to cybernetics is most apparent. He studied from 1955 until 1959 in the department information under Bense, Maldonado, and Rittel. From 1960 to 1968, Gui Bonsiepe served as an assistant professor at the Ulm School of Design. Following the closure of the school in 1968, Bonsiepe moved to South America, where he continued his career as a design consultant.²¹⁵

During that time, he was a witness to the school's constant need for legitimacy, both internally and externally. Bonsiepe recalls that Maldonado had been especially influential. The programmatic combination of politics and design method that set the school apart from others at the time, and which had awakened an “interest in emancipation and the dismantling of power structures,” “remained abstract until 1971, despite the student rebellion that also gripped the HfG in 1968 [...]”²¹⁶

In “Arabesques of Rationality,” Bonsiepe critically evaluates the challenges and implications of using rational methods in design. He begins by quoting Gustave Faubert's aphorism: “Méthode. - Ne sert à rien”, suggesting skepticism about the actual usefulness of the methods in design developed in Ulm. The main criticism revolves around the discrepancy between design methods and

actual practice. The scientization of design, which goes back to Hannes Meyer's Bauhaus, implied two things: an instrumental interest or a quietist deference to what designers perceive as science. Rationality in design is described as a double-edged sword-it can be both liberating and repressive, sometimes even obscuring the true goal of design, which is to create a humane environment.

For Bonsiepe, the political dimension only revealed itself through his work in socialist Chile in the 70s. He names a direct connection to the pedagogies under Max Bense and Horst Rittel during his studies.²¹⁷ The *Cybersyn* project, which Gui Bonsiepe worked on under Salvador Allende from 1970 to 1973, aimed to create a cybernetically controlled planned economy informed by real-time big data, as opposed to traditional five-year plans.²¹⁸ Together with Stafford Beer, he aimed to solve the hurdles of socialist bureaucracy through feedback loops.²¹⁹ Linear planning causality would be replaced by dynamic feedback systems and their subsystems.²²⁰ This system view of information presented a non-hierarchical approach to governance and power, which is informed by the political understanding at the HfG prior. “To place decision on a firm basis, data is collected and may pile up mountain high,”²²¹ is the motto of this approach and accompanies the HfG during the teaching under Bense, Rittel, Maldonado, Moles and Bonsiepe. In connection with Wiener's concept embedded in this view, it becomes not just a technical proposition but also a vision for an egalitarian, democratic social structure. Although computers raised concerns about top-down automation, Wiener's theory simultaneously suggested a metaphor for bottom-up, democratic order.²²²

213 Curdes, *Die Abteilung Bauen an der hfg Ulm*.

214 Gustave Faubert, *Dictionnaire des idées reçues*, Paris 1953 As quoted in Gui Bonsiepe, “Arabesques of Rationality,” *Ulm: Journal of the Hochschule Für Gestaltung* 19/20 (August 1967): 9–23.

215 Oswald, “Max Bense und die Informationsästhetik,” 120.

216 Bonsiepe, “Ein persönlicher Rückblick auf die Abteilung Information,” 44–46.

217 Ibid., 56.

218 Medina Eden, *Cybernetic Revolutionaries Technology and Politics in Allende's Chile* (Cambridge, Massachusetts - London, England: The MIT Press, 2014).

219 Schaupp, “Radikale Demokratie und Kybernetik,” 768.

220 Gui Bonsiepe, “Information / Maschine / Bewußtsein,” *Ulm: Journal of the Hochschule Für Gestaltung* 7 (January 1963): 22–24.

221 Bonsiepe, “Arabesques of Rationality,” 14.

222 Turner, *From Counterculture to Cyberculture*, 24.

Similar concepts were discussed in the GDR, where another former student of Bense, Georg Klaus, a philosopher, cybernetician and semiotic, developed a plan at the Humbolt University in Berlin.²²³ In West Germany, the *Quickborner Team*²²⁴ envisioned a similar potential of cybernetics for democracy. Best known for their work as a planning team in the 1950s and 1960s and their concept of the *Bürolandschaft* (office landscape), they envisioned the use of computers in the design of the Bonn Chancellery. They attempted to apply cybernetic planning in collaboration with office workers and spatial organizations that would promote feedback loops in office communication.²²⁵ These projects highlight the intersection of cybernetics with political and economic planning, albeit with varying degrees of implementation and success.²²⁶ In the end, the *Cybersyn* project was abruptly halted due to a military coup, which was supported by Nixon and Kissinger. Similarly, Georg Klaus' project was suppressed early in the authoritarian GRD government. It remains uncertain whether the projects would have been successful in their goals., and the Chancellor's Office merely resembled a pale image of high expectations.

Returning to Bonsiepe's article "Arabesques of Rationality," however, he also warns that while methodologies help deal with the complexities of industrialized society, they often leave the core of design – decisions - untouched. No matter how rigorous the methodology or how much data can be collected, human decisions cannot be removed from the process. Moreover, even a decision based on "hard data" means that the designer's decision was

223 Oswald, "Max Bense und die Informationsästhetik," 120.

224 The team was founded by Eberhart and Wolfgang Schnelle, who also established the publisher *Verlag Schnelle*. This was one of the most relevant publishers at that time regarding cybernetic theory. Amongst lexica, they also published the periodica *Grundlagenstudien aus Kybernetik und Geisteswissenschaft* and *Kommunikation Zeitschrift für Planung und Organisation* of Bense and Moles. Vrachliotis, *Geregelte Verhältnisse*, 115.

225 Merle Ziegler, "Bauen ohne Vergangenheit. Staatsarchitektur und Kybernetik in Bonn," in *Zwischen Sputnik und Ölkrise: Kybernetik in der Architektur, Planung und Design*, ed. Oliver Sukrow (Berlin: DOM Publishers, 2018), 48–65.

226 Oliver Sukrow, ed., *Zwischen Sputnik und Ölkrise: Kybernetik in der Architektur, Planung und Design* (Berlin: DOM Publishers, 2018).

involved in the selection of the data in a constant act of balancing various conflicting interests. To be objective and rational, he argues, is instead to be consistent.²²⁷

227 Bonsiepe, "Arabesques of Rationality."

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Allgemeines Vorlesungsprogramm zu:

"Kybernetik und Systemtheorie"

- 1) Definition der Kybernetik. Organismen- und Zeichenlehre.
Flußdiagramm und Schema.
Die kybernetische Methode: Theorie der Modelle
- 2) Die allgemeine Philosophie der Organismen. Geschichte der
Kybernetik. Einwände gegen die Kybernetik.
- 3) Die Gesetze der Organismen:
Nahordnung und Fernordnung. Stabilität und Ultrastabilität.
Komplexität der Organismen. Prinzipien der Regulierung.
- 4) Die Atome der Organismen: Klassifikation und Eigenschaften.
- 5) Die Rückkopplung und ihre Eigenschaften. Positive und negative
Beispiele.
- 6) Das Gesetzbuch der kybernetischen Wissenschaft: die Axiomatik.
- 7) Der systematische Aufbau der Organismen:
1) der individuelle Organismus
- 8) Der systematische Aufbau der Organismen (Fortsetzung):
2) Kollektive Organismen
- 9) Mikrosoziometrie
- 10) Makrosoziometrie und Organisationslehre
- 11) Theorie der menschlichen Menage. Die Komplexität der sozio-
metrischen Organismen.
- 12) Die komplexen und komplizierten Organismen.
- 13) Simulierungsverfahren und Erkennungsmaschine.
- 14) Ausdehnung der Systemtheorie:
Die automatische Fabrik
Die schöpferische Maschine.

II

Protokoll zum Seminar: Kybernetik und Systemtheorie
vom Dienstag, 9.11.1965

Die Symmetrie die man zwischen Kommunikationstheorie und Kybernetik feststellte, schuf die Grundlage für die Wissenschaft der Kybernetik im Jahre 1945 (Wiener).

Es gibt 2 Arten von Definitionen:

1. Die abstrakte Definition
2. Die Definition der Nachbarschaft

Man kann die Kybernetik als Kreuzpunkt zwischen den Wissenschaften der Kommunikationstheorie, Psychologie, Physiologie, Soziologie, Automation, Biologie etc., bezeichnen. (siehe Zeichnung).

Die Kybernetik kann auch als ein gemeinsamer Teil dieser Wissenschaften betrachtet werden (s. Zeichnung).

Die Kybernetik ist eine Wissenschaft komplexer Organismen.

Das Problem ist das folgende: Wie kann man komplexe Organismen oder Phänomene studieren?

Dazu gibt es 3 hauptsächliche Methoden:

1. Die Experimentelle Methode (so wie sie von Galilei) während der Renaissance entwickelt wurde):

Ein Problem wird von verschiedenen Gesichtspunkten aus beleuchtet. Man macht experimentelle Versuche, um von den Ergebnissen Gesetze abzuleiten bzw. zu finden.

2. Die Empirische Methode

Man sucht in der Welt der Phänomene nach meßbaren oder skalierbaren Aspekten oder Größen. Dann berechnet man eine Reihe von Kombinationen zwischen diesen n Variablen. Das bringt uns auf die Formel:

$$\frac{n(n-1)}{2} \text{ Korrelationen.}$$

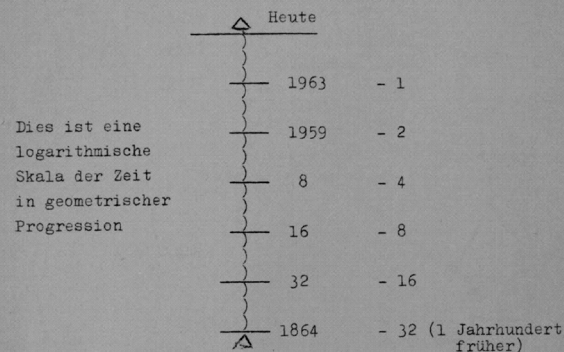
3. Die Kybernetische Methode.

Man versucht analoge Modelle herzustellen.

fig.28

- 2 -

Ein kurzer Überblick der Geschichte der Kybernetik.
Wir gehen von heute aus zurück bis zur Vergangenheit.
Die Häufigkeit der Ereignisse wird regelmäßig vermindert.



Im 18. Jahrhundert wurden zahlreiche Systeme von Automaten entwickelt. Descartes z.B. hatte viele Ideen zur Entwicklung eines Maschine-Tier-Systems. Diderot, Goethe, etc. haben diese Philosophie später weiterentwickelt.

fig.29

2

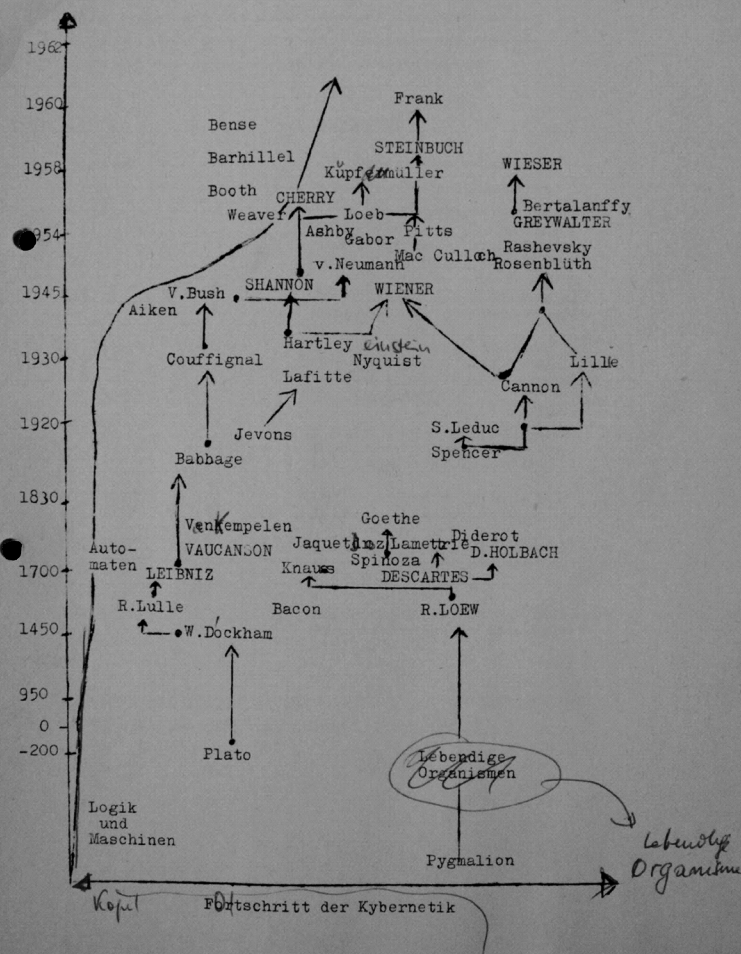


fig.30

Hier wollen wir die Namen einiger Wissenschaftler anführen, die durch Ihre Erkenntnisse mit zur Begründung der späteren Kybernetik beitrugen:

Name	Fachgebiet
Spencer	- Philosophie der Biologie
Leduc	- Bio-Chemische Experimente
Jevons	- Versuche Probleme der Logik automatisch zu lösen. Entwicklung der 1. Maschine zur Lösung logischer Sätze.
Lafitte	- Betrachtete die Mechanik als Wissenschaft der Mechanismen
Lillie	- Baute künstliche Modelle für Nervenfasern - Einführung elektrischer Impulse in das Nervensystem.
Cannon	- Gesetz über das chemische Gleichgewicht im Körper - Prinzip der Homeostanie.
Couffignal	- Hat wieder das Prinzip von Leibniz aufgegriffen
Hartley	- Prinzip von der Informationsquantität als Universalcharakteristik der Botschaft
Nyquist	- Prinzip der spontanen Ordnung, die der Mensch in die Arbeit einführt.

Der Zeitraum 1945 - 54 ist die Periode, in der die Kybernetik als autonome Wissenschaft erscheint.

fig.31

Organismus }
Gestalt } - Es gibt eine enge Verbindung zwischen diesen beiden Begriffen

Der Organismus ist mit dem Begriff der Ganzheit, eines Systems, verbunden.

Die westliche Wissenschaft hat dazu 3 sogenannte Stützen:

1. Die griechische Idee der Rationalität
2. Die Gesetze des Universums (die befolgt werden müssen)
3. Systematische, empirische Experimente, durch die wir diese Gesetze erhalten können.

Die deutsche Philosophie beeinflusst dieses Gebiet durch ihre Idee der Ganzheit, des Globalismus:

Das Ganze ist mehr als die Summe seiner Teile

Im 19. Jahrhundert war man jedoch noch sehr an Details interessiert.

- a) Die Kartesianische Geometrie. alle Teile werden einzeln studiert
daraus folgt:
- b) Das Ganze wird als die Summe seiner Teile betrachtet

Man vermutet, dass die verschiedenen Eigenschaften der Einzelteile eine bestimmte Ordnung in das Gesamte, Ganze bringen. Heute weiss man aber, dass die Struktur des Gesamten die Eigenschaften der Einzelteile beeinflusst. Also genügt es nicht allein, nur jedes Einzelteil zu studieren.

Der Organismus ist einer Gestalt der materiellen Welt ähnlich, mit folgenden Eigenschaften:

1. Transponierbarkeit (Isomorphie)
2. Widerstand gegen Verzerrung
3. Widerstand gegen Störungseinflüsse
4. Abgeschlossenheit einer Gestalt oder eines Organismus (Kontur. Grenze zwischen Innen und Aussen)
5. Hierarchische Kraft

fig.32

Heute ist man der Meinung, dass die Beziehung der einzelnen Teile untereinander wichtiger ist wie die Gesamtgestalt der Materie selbst. Es gibt die sogenannte "Hierarchische Ordnung": In jedem Organismus oder Gestalt gibt es Teile die wichtiger sind wie andere Teile. (siehe Zeichnung). z.B. bei einem Quadrat sind die Eckteile wichtiger wie die Seitenteile. Es ist als ob es hier eine organisierende Kraft der 4 Eckteile gabe, die auf die anderen Teile bzw. Seiten der Gestalt oder des Quadrats (um bei dem Beispiel zu bleiben) ausstrahlt.

Die Komplexität der Organisation:

Organismen können auf rein psychologische oder nach empirischer Methode je nach Komplexitätsgrad geordnet werden. (siehe Zeichnung).

fig.33

[11] Recontextualizing a scientific approach

As explained at the beginning, the start-up financing of the Hochschule für Gestaltung was already causing difficulties from the beginning. The school's refusal to be nationalized over the years meant that, as a private institution, it was always dependent on political support from the state of Baden-Württemberg and other financial backers. With the ever-changing pedagogical directions of the school, these financial struggles never stabilized. The Siemens Studio only made them worse. Due to the reorientation in 1962 under the newly elected Otl Aicher as rector extensive support was withdrawn. Otl Aicher asserted that design was not a science, and the HfG was not a scientific institution.²²⁸ The limited basic research, which was replaced by applied research into for example pre-fabricated building components, meant that state support for *Grundlagenforschung* ceased from 1966 onwards. Even though the school was still supported by the State Parliament with 900,000 marks a year, this was not enough to fully finance the school. As a result, a "proclamation of a "self-resolution" was issued as a defiant act against the lack of support, which was partly attributed to a conservative and ignorant attitude of policy makers.²²⁹

Another factor contributing to the demise of the school was the aspiration for an unarchivable objectivity that cultivated an ascetic design that conflicted with the rise of consumer society. In 1962, Claude Schnaidt described this era as follows: "The Cold War followed, and finally neo-capitalism with its consumer society, another nightmare, but this time fully air-conditioned."²³⁰ The school, labeled as the "cool training ground" by Banham, sought to connect the funding ruling class with the mass-serving projects through science.²³¹ Continuously, teachers at HfG stressed the importance of using scientific methods for decision-

228 Spitz, "Die politische Geschichte der Hochschule für Gestaltung Ulm," 187.

229 Spitz, *Concise History of the Ulm School of Design*, 41–42.

230 Abraham Moles, "Functionalism in Crisis," *Ulm: Journal of the Hochschule Für Gestaltung* 19/20 (August 1967): 24–25.

231 Reyner Banham, "Cool Training Ground," *Ulm: Journal of the Hochschule Für Gestaltung* 6 (October 1962): 37.

making for functionalism in this modern society. In *Ulm* magazine, Maldonado argues that schools should not combat manifestos with new manifestos or ideologies with other ideologies.²³²

Science vs Ideology

From the perspective of both the school and the broader Federal Republic of Germany, science was distinctly separated from ideology, including Nazi and Communist ideologies. At the height of the scientization of the school, Maldonado formulated the following: “Rational in the honest sense means: thinking and acting in the way that is done within the framework of science - distrust of any kind of ideology, impartiality, elimination of arrogance and thorough knowledge of the relevant subject areas.”²³³ This separation between science and ideology became more pronounced in the post-1950s, when aligning with the principles and ideals of pure, independent science. Further, this was part of a Western integration through science policy as Cold War politics²³⁴ assumed that the communist and NS systems were anti-scientific, which is not true.²³⁵

In 1967, Werner Hofmann stated: “What is the relationship between ideology and science? The answer must be: both are mutually exclusive. Ideology claims, it does not prove, ideology appears affirmatively, and science is methodized doubt. Ideology justifies, science interprets.”²³⁶ Ideology is wrongful thinking and judging based on an incomplete truth – a *gesellschaftliche Rechtfertigungslehre* (social doctrine of justification).²³⁷ According

232 Maldonado, “The Emergent World: A Challenge to Architectural and Industrial Design Training.”

233 Maldonado, “Maldonado: Eröffnungsrede 1957/58.”

234 Schauz and Lax, “Professional Devotion, National Needs, Fascist Claims, and Democratic Virtues.”

235 Margit Szöllösi-Janze, “Wissenschaftsgesellschaft in Deutschland: Überlegungen Zur Neubestimmung Der Deutschen Zeitgeschichte Über Verwissenschaftlichungsprozesse,” *Geschichte Und Gesellschaft* 30, no. 2 (2004): 277–313.

236 Werner Hofmann, “Wissenschaft Und Ideologie,” *ARSP: Archiv Für Rechts- Und Sozialphilosophie / Archives for Philosophy of Law and Social Philosophy* 53, no. 2 (1967): 205.

237 Ibid., 201.

to Adorno, an ideology doesn’t negate scientific knowledge or method but represents a flawed consciousness derived from that knowledge. It uses partial truths to legitimize and maintain existing power structures.²³⁸ Ideologies blur the constant, interpretive judgment of being with the evaluative, normative judgment of value.²³⁹

The contradiction at the HfG lies in the pervasive suspicion of ideology, which, despite the claims of Maldonado and his colleagues, ironically bordered on being an ideology itself. While the school offered courses such as “Referat: On Karl Mannheim - Ideology and Utopia,” to which Hofmann refers, it was not immune to the social reformist theoretical trends of the time. These trends idealized qualitative industrial production as a means of improving the quality of life for large segments of the population.²⁴⁰

This tension is echoed in Aureli’s critique of the Italian mentality of the 1960s. He observed that the reformist ideology of the era not only accepted but glorified production as a scientifically reformable aspect of development, labeling reformism as the latest manifestation of capitalist power and ideology. Aureli’s analysis thus underscores the role of reformism as a subtle but potent means by which capitalism exerted its influence, masking its dominance under the guise of scientific progress and social development.²⁴¹

In the context of the HfG, a re-evaluation of ideology’s role in planning methodology emerged from the realization that design lacks a purely scientific method. When methods fall short, political decisions, carrying elements of subjectivity and ideology, come into play.²⁴² This perspective aligns with Bruce Archer’s 1960 assertion

238 Sandy Gisa, *Der Ideologiebegriff in der Kritischen Theorie. Definition und Befreiungsansätze*, 2017, <https://www.grin.com/document/353145>.

239 Hofmann, “Wissenschaft Und Ideologie,” 205.

240 Baur, “HfG Ulm: Von der Stunde Null bis 1968.”

241 Pier Vittorio Aureli, “Recontextualizing Tafuri’s Critique Of Ideology,” *Log* 18 (2010): 91.

242 Bonsiepe, “Arabeques of Rationality,” 9.

that finding a truth independent of human judgment is impossible, a viewpoint echoed in the environmental concepts explored by Moles and Maldonado.²⁴³

243 Bruce L. Archer, "The Designer in Society" (protocol, Ulm, May 10, 1960), 2, AZ 234, HfG-Archiv Ulm.

fig.34

Heft 5 4S6475F
Erstes Quartal 1968

Ulmer Forum



**HfG kämpft um ihre Existenz.
Aufbauphasen der Universität Ulm.
Ein altes neues Hochschulgesetz.
Sechs Interviews:
Ist das Abitur ein alter Zopf?
Günter Eich:
Geometrischer Ort, Erstabdruck.**

[12] Conclusion

But perhaps the department with this focus was also a product of a very specific time. It was no coincidence that the end of the HfG corresponded with 1968, the year that marked the break with the narrow technicist, unhistorical, and placeless worldview of modernity in Germany and Europe. Consequently, the students who remained without leadership after the closure of the HfG asked themselves about the needs of society, the responsibility of politics, and a broad theoretical foundation for planning [...].²⁴⁴

The “long sixties” came to a head around the early 1970s, marked by the oil crisis and widespread student protests and movements. 1973 signaled the end of the *Wirtschaftswunder*, or economic miracle, bringing the rising prosperity of German society to a halt. This meant economic downturns and rising unemployment, leading to a widespread reassessment of the unquestioned faith in technology and the possibilities of the future.²⁴⁵ This shift in thinking reflected broader societal changes in attitudes toward economic growth, technology, and progress. As a result, the 1970s also saw a critical reassessment of architecture and its theoretical underpinnings, leading to a period of reform in which modernism was increasingly questioned, largely spurred on by the student movements of the time.²⁴⁶ Claus Schnaidt, an alumnus and teacher at the HfG, described the 1968 symposium on architectural theory organized by Oswald Matthias Ungers in *Arch+*. This event highlighted not only the key figures of the era in architectural academia but also the student protests.²⁴⁷ In both Germany and the United States, elements of cybernetic ideas were assimilated into countercultural concepts, while others

²⁴⁴ Curdes, *Die Abteilung Bauen an der hfg Ulm*, 41.

²⁴⁵ Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 14.

²⁴⁶ “Arch+ Studienhefte für architekturbezogene Umweltforschung und -planung: Struktur- und Optimierungsmodelle” 1 (January 1968).

²⁴⁷ Claude Schnaidt, “Architektur Forschung,” *Arch+: Studienhefte für architekturbezogene Umweltforschung und -planung* 1 (January 1968): 72, https://digibus.ub.uni-stuttgart.de/viewer/image/1571051867188_1968/1/LOG_0003/.

were rejected, as evidenced in Berlin, at the TU Stuttgart.²⁴⁸ A critical moment in the symposium was Jörn Janssen's intervention, in which he divided the problem into two parts and suggested renaming the symposium "Secrets of Ideology and the Taste of Architecture". Janssen also characterized architecture as the anti-scientific branch of civil engineering and planning.²⁴⁹

The HfG rhetoric's blend of design with scientific principles, notably cybernetics, had marked a fundamental shift in both the perception and role of design in society. The ethos of HfG Ulm, eloquently summarized in the belief that "science, the essential form of understanding the world, will simultaneously provide us with both measures and forms that will serve us to structure the world,"²⁵⁰ revealed the school's core operational concept - the application of science as a fundamental political ideology driving its project.

However, the school's utopian vision often clashed with the complex realities of social and political dynamics, sparking debates and internal conflicts. It is crucial to note that this analysis primarily examines the rhetorical discourse of the school.²⁵¹ As Moles himself also points out, the courses faced a huge disconnect from the practical work of the students. The lack of computers at the school confined the dreams of computational or parametrical design to the theory. In essence, there was an extensive teaching of cybernetics and system theory, but a struggle to transfer this to architecture and design.²⁵²

The debate between Joseph Beuys and Max Bense, broadcast on German television in 1970, further exemplified a paradigm shift

248 Nina Gribat, "From Study Reform to University without Professors," in *Radical Pedagogies*, ed. Beatriz Colomina et al. (Cambridge, Massachusetts - London, England: The MIT Press, 2022), 25–28.

249 Schnaidt, "Architektur Forschung," 72.

250 Abraham Moles, "Products: Their Functional and Structural Complexity," *Ulm: Journal of the Hochschule Für Gestaltung* 6 (October 1962): 4.

251 Aumann, *Mode und Methode die Kybernetik in der Bundesrepublik Deutschland*, 379.

252 Moles, "Bericht Moles an Aicher, Kapitzki, und Krampen Bericht Prof Moles an Aicher, Kapitzki, Krampen, o.D."

in postwar German intellectual discourse.²⁵³ Beuys argued for the vital role of free creativity and artistic subjectivity, in stark contrast to Bense's neo-Cartesian, objectively judgmental view of art – the information aesthetics. This clash underscored the dialectic between the subjective and the objective: Beuys' approach versus Bense's disciplined background in philosophy and physics.²⁵⁴ The debate questioned the objectivity that Bense and his Ulm colleagues such as Horst Rittel, Tomás Maldonado, and Abraham Moles sought, often policing the artistic and subjective elements in design and beyond. Here, Beuys emerged more favorably. By 1970, the movement of information aesthetics, which Bense had fervently supported, had lost its momentum. The student movement, drawing on neo-Marxism, actionism, and a radical critique of science, criticized Bense's technocratic approach as disjointed.²⁵⁵

The narrative of the Hochschule für Gestaltung (HfG) in Ulm, especially its integration of cybernetics into design and architecture, gains renewed relevance in today's era of pervasive information technology. Kenneth E. Boulding's 1966 remark, "that tomorrow is not only very close, but in many respects, it is already here,"²⁵⁶ aptly describes the current landscape where feedback loops, interactive systems, and overproduction of data have evolved to underpin our daily digital interactions. Cybernetics, once a forefront theory at HfG Ulm, can be seen as the precursor to today's computer science, with figures like Abraham Moles, Horst Rittel, and Max Bense being pivotal in its development in Germany. The dreams of technology were far more ambitious than was possible, but as Bonsiepe noted, "the computer as a design instrument will affect the content of design."²⁵⁷ The advent of the internet and personal

253 Pias, "'Hollerith 'Feathered Crystal,'" 112–13.

254 Schaad, "Performing Environmental Textures," 174.

255 Pias, "'Hollerith 'Feathered Crystal,'" 115–16.

256 Kenneth E. Boulding, "The Economics of the Coming Spaceship Earth," in *Environmental Quality in a Growing Economy*, ed. Jarrett, 3–14 vols. (Baltimore: John Hopkins University Press, 1966), https://arachnid.biosci.utexas.edu/courses/thoc/readings/boulding_spaceshipearth.pdf.

257 Bonsiepe, "Arabeques of Rationality," 20.

computers in the mid-90s catalyzed the rise of cyberculture, further orienting society around information and information technology. This shift is profoundly evident in contemporary architecture and design practices, which now intertwine deeply with computer technology.²⁵⁸

Today's technology goes beyond the "clerical tasks"²⁵⁹ of computers in the post-WWII era and brings back the perspective of data-driven objectivity. However, this pursuit also brought to light the inherent limitations and biases in striving for objective design. Even with rigorous scientific methods, design decisions are ultimately influenced by human values, perspectives, data bias, and cultural contexts.²⁶⁰ This tension between the objective and subjective realms in design continues to be relevant today, particularly in the context of big data technologies and AI, where the quest for objectivity often encounters the complexities of human subjectivity and ethical considerations.

We see a revitalization of cybernetic principles in concepts like smart cities and grids, adaptive architecture, or big-data governance. In these contexts, big data is increasingly seen as a substitute for the political, with data ostensibly speaking for itself. This modern landscape echoes the explorations and ambitions of HfG Ulm, demonstrating the enduring influence of its approach and the ongoing relevance of its lessons in the intersection of design, technology, and society. To respond to Boulding, tomorrow arrived already by yesterday.

258 Vrachliotis, *Geregelte Verhältnisse*, 8.

259 Bonsiepe, "Arabeques of Rationality," 20.

260 Jacek Sosnowski, "Datament" (Exhibition, Biennale Architettura 18, Venice, May 20, 2023), <https://labiennale.art.pl/en/wystawy/datament/>.



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List of figures

- fig.01. Plotter print on cover.** Ernst Gomringer, Herbert W. Kapitski, and IBM Deutschland GmbH, *Hommage an Paul Klee*, 1988, Plotter color print, 40.5cm x 50.5 cm, 1988.
- fig.02. Aerial view of the HfG building with Fort Oberer Kuhberg.** HfG-Archiv Ulm. "HfG-Ar Sti Neg 55/0008.14: Luftaufnahme des HfG-Gebäudes mit Fort Oberer Kuhberg" last modified 2023-10-05. <https://bawue.museum-digital.de/object/70936>
- fig.03. Plotter print.** Ernst Gomringer, Herbert W. Kapitski, and IBM Deutschland GmbH, *Hommage an Paul Klee*, 1988, Plotter color print, 40.5cm x 50.5 cm, 1988.
- fig.04. Prospekt.** "Hochschule für Gestaltung. Ulm (Ulm School of Design)" 1963. Se 130. © HfG-Archiv Ulm.
- fig.05. Visualization of concepts: kitsch /modern, right / technical.** Mayrshofer, Veronica. "Visualisierung von Begriffen" *Ulm: Journal of the Hochschule Für Gestaltung* 21 (October 1968): 46-47. Ze AZ 472.25. © HfG-Archiv Ulm
- fig.06. Description of the Hochschule für Gestaltung by Banham.** Banham, Reyner. "Cool Training Ground." *Ulm: Journal of the Hochschule Für Gestaltung* 6 (October 1962): 37. Ze AZ 472.6. © HfG-Archiv Ulm
- fig.07. Diagram illustrating the education system at the Bauhaus, developed by German architect Walter Gropius in 1922.** Wong, Shaw Chiang & Idris, Muhammad Zaffwan & Chuen, Tan. "What Makes an Gndergraduate Graphic Design Education Valuable?" (2018). *Journal of Education & Social Sciences*. 11. 74.

- fig.08. **Diagram depicting the seven parts of cybernetics.** Stumpp, Horst. *Konstruktionssystematik* 1968. 77. Diplom 68.26. © HfG-Archiv Ulm.
- fig.09. **Diagram of the initially planned departments and topics of the Ulm School (Scholl and Aicher 1951, redrawn by the David Oswald).** Oswald, David. "Cybernetics, Operations Research and Information Theory at the Ulm School of Design and Its Influence on Latin America." *AI & SOCIETY* 37, no. 3 (September 1, 2022): 1047. <https://doi.org/10.1007/s00146-021-01339-1>.
- fig.10. **Tour of the university rooms of the Hochschule für Gestaltung, left: Max Bense; center: Norbert Wiener; right: Max Bill, 14.7.1955.** Spitz, René. *hfg ulm. der blick hinter den vordergrund*, Stuttgart/London, 2002. 173. © HfG-Archiv Ulm, Foto: Hans Conrad
- fig.11. **Binia Bill, Max Bill, Norbert Wiener and Tomás Maldonado at the Ulm School of Design / Hochschule für Gestaltung HfG Ulm. 12 July, 1955.** Photo by Hans G. Conrad. Copyright by René Spitz. HGC Collection Inv. No 0795-3.
- fig.12. **Max Bill with Max Bense, Norbert Wiener, and Inge Aicher-Scholl at the Ulm School of Design / Hochschule für Gestaltung HfG Ulm. 12 July, 1955.** Photos by Hans G. Conrad. Copyright by René Spitz. Original film archive card with contact sheet. HGC Collection Inv. No 0794.s
- fig.13. **Invitation from Max Bill on the occasion of Norbert Wiener's visit to Ulm. 14.7. 1955** © Universitätsarchiv TU Darmstadt. Vrachliotis, Georg. *Geregelte Verhältnisse: Architektur und technisches Denken in der Epoche der Kybernetik*. Wien: Springer, 2012. 82.
- fig.14. **Page 2 of a letter from Asger Jorn to Max Bill.** "Letter from Asger Jorn to Max Bill - Articles – Bauhaus Imaginista." Accessed January 14, 2024. <http://www.bauhaus-imaginista.org/articles/5988/letter-from-asger-jorn-to-max-bill>.
- fig.15. **Picture 4 Control room.** "Unterlagen zum Studio für elektronische Musik" 1963-1966. AZ 387. © HfG-Archiv Ulm.
- fig.16. **Picture 11 Production of the punch cards.** "Unterlagen zum Studio für elektronische Musik" 1963-1966. AZ 387. © HfG-Archiv Ulm.
- fig.17. **Max Bense in lessons at the HfG, circa 1956,** Photo: Hans G. Conrad. in Oswald, David. "Max Bense und die Informationsästhetik." In *Rückblicke. Die Abteilung Information an der hfg ulm*, edited by Christiane Wachsmann and Petra Kellner, 7:116–23. Schriftenreihe club off ulm eV. Ulm: Verlag Dorothea Rohn, 2015.
- fig.18. **Max Bense in lessons at the HfG, 1955,** Photo: Hans G. Conrad. in Oswald, David. "Max Bense und die Informationsästhetik." In *Rückblicke. Die Abteilung Information an der hfg ulm*, edited by Christiane Wachsmann and Petra Kellner, 7:116–23. Schriftenreihe club off ulm eV. Ulm: Verlag Dorothea Rohn, 2015.
- fig.19. **From a lesson with Max Bense in 1956: A picture painted by Bonsiepe: analyzed in the color distribution to calculate the aesthetic "information content".** Oswald, David. "Max Bense und die Informationsästhetik." In *Rückblicke. Die Abteilung Information an der hfg ulm*, edited by Christiane Wachsmann and Petra Kellner, 7:116–23. Schriftenreihe club off ulm eV. Ulm: Verlag Dorothea Rohn, 2015.

- fig.20. **From a lesson with Max Bense in 1956: “Report about a picture. Representation of an aesthetic production in the form of photographs drawings, texts.” Student: Gui Bonsiepe. A picture painted by Bonsiepe: analyzed in the color distribution to calculate the aesthetic “information content”. 191.02 bit., Oswald, David. “Max Bense und die Informationsästhetik.” In *Rückblicke. Die Abteilung Information an der hfg ulm*, edited by Christiane Wachsmann and Petra Kellner, 7:116–23. Schriftenreihe club off ulm eV. Ulm: Verlag Dorothea Rohn, 2015.**
- fig.21. **Tomás Maldonado with geometric, white model in his hand.** Guoyin, J. “Il Bauhaus e Tomás Maldonado | February 4th.” Stefano Boeri Architetti (blog), February 3, 2020. <https://www.stefanoboeriarchitetti.net/en/news/il-bauhaus-e-tomas-maldonado-february-4th/>.
- fig.22. **Horst Rittel, 1959. Foto: Wolfgang Siol.** Koch-Weser Ammassari, Elke. “Was habe ich der Ulmer Hochschule für Gestaltung zu verdanken?” In *Rückblicke. Die Abteilung Information an der hfg ulm*, edited by Christiane Wachsmann, David Oswald, and Petra Keller, 104. Schriftenreihe club off ulm eV. Ulm: Verlag Dorothea Rohn, 2015.
- fig.23. **Abraham Moles and Tomás Maldonado in class, 1964. Photo: Wolfgang Siol.** “HfG-Archiv Ulm (@hfg.Archiv.Ulm) Instagram Photos and Videos.” Accessed January 15, 2024. <https://www.instagram.com/hfg.archiv.ulm/>.
- fig.24. **Abraham Moles and Tomás Maldonado in class, 1964. Photo: Wolfgang Siol.** “HfG-Archiv Ulm (@hfg.Archiv.Ulm) Instagram Photos and Videos.” Accessed January 15, 2024. <https://www.instagram.com/hfg.archiv.ulm/>.
- fig.25. **Abraham Moles and Tomás Maldonado in class, 1964. Photo: Wolfgang Siol.** “HfG-Archiv Ulm (@hfg.Archiv.Ulm) Instagram Photos and Videos.” Accessed January 15, 2024. <https://www.instagram.com/hfg.archiv.ulm/>.
- fig.26. **Literature list for the 1966/67 academic year by Abraham Moles.** Moles, Abraham. “Unterrichtsprogramm für das Stj.1966/67 von Prof. Moles” 1965. AZ 387. © HfG-Archiv Ulm.
- fig.27. **General Lecture Program Cybernetics.** Moles, Abraham. “Allgemeines Vorlesungsprogramm Kybernetik” 1965. Se 220. © HfG-Archiv Ulm
- fig.28. **Page 1 the course protocol.** Moles, Abraham. “Protokoll zum Seminar: Rechenanlagen vom Montag, 11.10.1965,” 1965. AZ 221. © HfG-Archiv Ulm.
- fig.29. **Page 1 the course protocol.** Moles, Abraham. “Protokoll zum Seminar: Rechenanlagen vom Montag, 11.10.1965,” 1965. AZ 221. © HfG-Archiv Ulm.
- fig.30. **Page 1 the course protocol.** Moles, Abraham. “Protokoll zum Seminar: Rechenanlagen vom Montag, 11.10.1965,” 1965. AZ 221. © HfG-Archiv Ulm.
- fig.31. **Page 1 the course protocol.** Moles, Abraham. “Protokoll zum Seminar: Rechenanlagen vom Montag, 11.10.1965,” 1965. AZ 221. © HfG-Archiv Ulm.
- fig.32. **Page 1 the course protocol.** Moles, Abraham. “Protokoll zum Seminar: Rechenanlagen vom Montag, 11.10.1965,” 1965. AZ 221. © HfG-Archiv Ulm.
- fig.33. **Cover of the booklet *Ulmer Forum*, which highlights the chronology of the crisis in 1968. *Ulmer Forum*. 1968. Se 130. © HfG-Archiv Ulm.**
- fig.34. **Image of a street sign pointing towards the HfG building.** “HfG-Archiv Ulm Facebook.” Accessed January 15, 2024. https://www.facebook.com/photo.php?fbid=797591419038558&set=pb.100063631209536.-2207520000&type=3&locale=zh_EN

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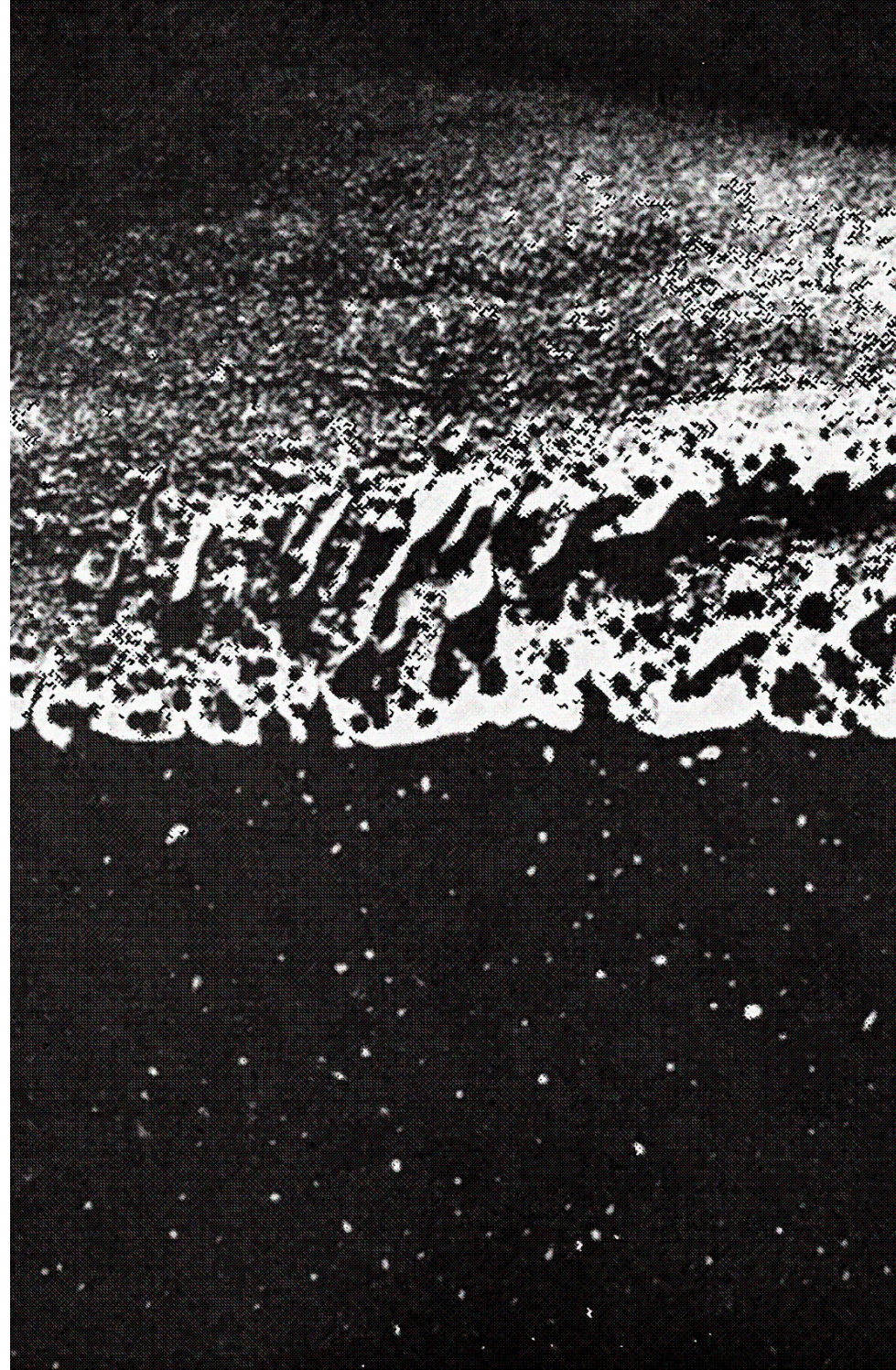
Inside Cover /

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2023 / 2024