Education of the Senses: Hugo Kükelhaus’ empirical methodology

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Who was Hugo Kükelhaus?

Because Hugo Kükelhaus is not well-known outside Germany and Switzerland, a short bio of his life is appropriated. He was born in Essen (Ruhr district), Germany on 24 March 1900 to a father of a tradesman who helped revive the old crafts of Westphalia. After passing the examination for university entrance (the Abitur), Kükelhaus was asked by his father what profession he was going to take up. Temperamentally and philosophically resistant to the boundaries of disciplinary studies, his answer was: “None.” He completed an apprenticeship with a carpenter, became a master craftsman and, always a natural pedagogue, began lecturing to common carpenters on Proportion, Harmony and the Golden Section using only a sunflower and a dandelion as objects for demonstration. Once settled in Berlin he enrolled at the university where his studies included sociology, philosophy, mathematics (logic) and physiology. “It is not easy to put a man like Kükelhaus into a pigeonhole. He is known by some for his work as educator, carpenter, and artist, by others for his publication on embryology and sense physiology, while those who have heard his radio-lectures might well call him a philosopher. Although thought much of by scientists like Einstein and Heisenberg, v. Weizsäcker, Spranger, Otto Hahn and Robert Jungk, his own reputation has been until recently modest.”

Fig. 1. Illustrated life career of Hugo Kükelhaus work
As a designer and theorist Kükelhaus' various activities stood always in correspondence with one another. He was undisciplined in the best sense of the word: accepting no barriers to inquiry and looking for connections between the most diverse disciplines. Throughout his working life he engaged in intensive parallel activities all of which contributed to his overarching interest in the psychobiology of learning (Fig. 1). Kükelhaus’ commitment was based on to the aesthetic dimension as an essential quality of auto-didacticism and the deep meaning in everyday forms.⁴

In 1934 he published his first book titled Urzahl and Gebärde (Prototypal Number and Gesture), in which he tried to show the fundamental importance of numerical relations in any living system. The book was to pave the way for a new consciousness of proportion and measure in order to counteract the devastating influence of the emerging mass-production and mass-consuming culture. In his words: “Nicht Gewalt, sondern Gestalt,” not violence, but form is what we need.⁵ The already eminent Albert Einstein was stunned by this book and invited the young writer to a private discussion during which the physicist asserted that we had no real technology yet: “All our technology is based on violence and the exploitation of energy; we need a technology on a large scale like that of sailing boats, which use head wind to their purpose.”⁶

**Thesis 1**

Our senses are occupied by the endless encounters we have with ourselves and with the world. The object of human life is, accordingly: movement, migration, and transformation. The desire for total insurance among people of modern times is diametrically opposed to this.⁷

Thesis 1 describes Kükelhaus investigation driven by experimentally of the diverse relations between the environment and sensory organs in order to determine a somatically-founded method for analysis, synthesis, differentiation and intuitive contemplation.⁸ Two German words: bildung and erfahrbar summarize his ideas and intentions. Kükelhaus was intent on form (vis superba formae) but was also keenly aware that this expression required abstracting from what is in constant flux a collection of parts we call an identity, fixed and finished in its character. The German word Bildung, appropriately enough, means both the form produced and the process of formation. For Kükelhaus, consideration of natural form made it clear that nowhere does anything stable or complete occur, rather everything is suspended in precarious balance (“life is oscillation”), and an understanding of the relative vs. the absolute is a crucial fact of personal existence. The second word, erfahrbar, means understanding something physically as well as intellectually: to explore, discriminate and interpret reality through senses. This concept of erfahrbar or embodied cognition was central to Kükelhaus’ intention to maintain a living connection to experience in the search for form and understanding. It was through lived experiences, he felt, that one could maintain a relationship to the reality which lay behind the scaffolding of hypotheses and intellectual models.

Kükelhaus was inspired by what seem to be specifically Goethean views. He embraced Goethe’s delicate empiricism: which required both active engagement and a proper reticence about applying preconceived notions to what is new. It was through the systematic development of experiential relationship that Kükelhaus sought insight about the whole complexity of conscious existence.⁹ Kükelhaus considered Goethe as one of the last European individuals to bridge the abyss of the Two Cultures and to react to the threat of losing the power to determine one’s own life.¹⁰

**Thesis 2**

The science of humans is not a closed set, nor is it a finished system of theories. Anthropology is constant only in the sense that it is a constantly evolving, “living” theory. It should be noted,
however, that human development conforms to universal laws of life. If a person understands this, he will acknowledge universal laws and patterns symbolically in the work he produces for himself, and the world.\textsuperscript{11}

Thesis 2 explains Kükelhaus’ design methodology based on his own personal experience of the immediate nondiscursive quality of universal, historical essences. He was committed to openness and independence of inquiry and never sought the enforcement of some prior theoretical conception. His learning tools were the componential, the experiential and contextual facets of intelligence. One of the central features of his research and aesthetics is its naturalism and its insistence on the physical and neural substratum of cognition. Though Kükelhaus’ ideas aroused interest among artists and critics as well as philosophers, they were eclipsed by instrumental philosophies of education, which by and large dismisses Kükelhaus’ work as undisciplined speculation. A common criticism from academic quarters made of Kükelhaus’ work is that his theories derive rather more strongly from his own intuitions and reasoning than from a comprehensive and full grounding in empirical research. However, Kükelhaus empirically validated his ideas about physical skills the psychomotor domain and through successive tryout and revision Kükelhaus’ theories are based on a belief that life is only possible through a certain amount of disorder, which means tension between security and insecurity. In history the search for security has ended in a state where environment and man himself are completely at man’s mercy through a technology based on the illusion that it treats dead matter. In Goethe’s world-conception polarity is the condition for life itself and it has been argued that dissymmetry is the prime mover for the astronomical, biological and even semiotic organization of the universe. It is a well-established fact in biology that only difference can rigger response; in order “to stay alive you have to be able to hold out against equilibrium, maintain imbalance.”\textsuperscript{12} For Kükelhaus there was the physicality of the body, the role of intuition, and the fear of the irrational. As Gregory Bateson put it, “rigour and imagination are the two great contraries of mental process, either of which by itself is lethal.”\textsuperscript{13} Rigors alone is paralytic death, but imagination alone is insanity. As Kükelhaus noted life is not constituted of the carrying out of orders that are sent out by a centre in linear sequence but is attained in processes that works in a self-regulating way, in spirals and circles that ensure continuous feedback.”\textsuperscript{14} Recent developments in cognitive science have largely vindicated Kükelhaus’ ideas about the sense-based processes of knowing and being. There is an increased awareness of how important this perceptual information is for constructing a complex mental image, a more stable memory, more complete learning, and richer connections and references. For example, the brain, it is now know, transforms sensory messages into conscious perceptions almost instantly chaotic, collective activity involving millions of neurons seems essential for such rapid recognition.\textsuperscript{15}

**Thesis 3**

To be alive means to be “in oscillation.” Human nature allows for oscillation, but a person needs to understand that the entire world is also “in oscillation.” If a person, through his activities, rejects this notion, he damages himself, the earth and the whole universe.\textsuperscript{16}

Thesis 3 refers Kükelhaus searching for a practical and methodological conversion of Goethe’s chromatics theories to a wider range of physical phenomena. It resulted in the concept of “experience field for the development of the senses” explicated the laws of outside nature: the force of gravitational oscillations, sound, color, and the physiological laws of internal nature: sense procedures of seeing, hearing, touching, balance etc.\textsuperscript{17} It was with this project that Kükelhaus was introduced to a broad public, though his research and voluminous writing had been the interest of scientists since the 1930s.
The deeper sense of the individual stations lies in the “empirical” proof that an absolute analogy between outside nature (the physical features) and internal nature (the human organism) is to be experienced. Each experience releases feelings and memories which are to be seized not necessarily rationally, but intuitively. The visitors who are interacting with those play stations are steered away from stimulation that re-enforces the dominance of vision at the expense of the other senses (Fig. 2). Raucous, physical, shimmering, profound and funny are only some of the adjectives that come to mind. Each experience releases feelings and memories, which are to be seized not necessarily rationally, but intuitively. What governs the project is the direct and subjective understanding of reality, and also the sense of a mysterious world that we

Fig. 2. Hugo Kükelhaus' rotational study. Source: Hugo Kükelhaus Archiv, City of Soest, Germany.

realize exists outside our experience, that alternates between exclusion in the condition of solitude and the desire for exploration in the condition of sociality.

Fig. 3. A child interacts with a rotational platform that has been exhibited at the EXPO 67 in Montreal. Source: Hugo Kükelhaus Archiv, City of Soest, Germany.

The individual stations and the environment as a whole create situations that elicit questions about process, perception, association, etc. Visitor's participatory role is encouraging by physically active interaction through objects that can be touched, manipulated (Fig. 3). There are no instructions directing when and how to interact. No answers to the questions raised. There are no
indications as to what the viewer/participant can expect. Only an invitation to be incorporated in the activity and an open a view to the creative processes of consciousness. In this way we are transformed each into scientists or technologists.

From the ‘Field for the Senses’ at the 1967 World’s Fair to the ‘Sensorium’

To “live with the senses” was his believe for active living and learning based upon a variety of experiences. It build the base for the ‘Field for the Senses’ that were made up of “play machines” designed to introduce young children and adolescents into the complicated world of technology (Figs. 4). Kükelhaus saw the ‘Field for the Senses’ simply as providing an impulse to remind people of their sensual potential but admitted that that was a “task difficult enough.” Captivating to children and adults alike, Nobel Prize winner Otto Hahn often played with one of the prototypes at his Max Planck Institute, where the first generation were being built for exhibition at EXPO 67 (Montreal), and EXEMPLA 75 (Munich). Specifically one of the popular play station the vortex/swirl machine has been included in the MOMA exhibition, Century of the Child: Growing by Design 1900-2000 in 2012 (Fig. 5).

Fig. 4. Hugo Kükelhaus’ vortex and sound studies. Source: Hugo Kükelhaus Archiv, City of Soest, Germany.

In his text on the experience of nature’s laws within play written for the EXPO 67 Handbook he wrote: “The principle demonstrated here, the discovery and development of which can be attributed to Goethe, has two very particular consequences. Firstly: so-called ‘art education’ must be recognized and handled as a part of a systematic training for the ability to experience. This is not concluded with the maturation of the organism but is pursued and contributes to the conceptual processing of experiences, which

Fig. 5. A child interacts with a vortex cylinder that has been exhibited at the EXPO 67 in Montreal. Source: Hugo Kükelhaus Archiv, City of Soest, Germany.
sets in at the same time as puberty. Secondly: This processing takes place once again in vocational schools and schools of applied arts, in community colleges and — in museums. For the experience of art is founded in the great distinction of the organism’s capability to experience life.”

After his experiences in Montreal, Kükelhaus went on to further develop and refine the ‘Field for the Senses’ into the ‘Field for the Development of the Senses’ with an assortment of attractions meant to stand in direct confrontation to the pervasive illusory experiences of a world saturated with “new” media, and to combat the physical and mental impoverishment that accompanies common contact with artifice, abstraction and inactivity (Fig. 6). While the “play” machines are defined and repeatable models, they seek to transform into a more complex process of primary and immaterial qualities that are open to a real relationship between adults and children, rather than a traditional scholastic function defined by the distributive characteristics of the building. In a metabolism of the transformations in use and function. The experience fields have been implemented as plans for a different type of building especially useful in the educational and certain sense, he tried to introduce the variable of time permanently into an architectural theorem, transforming this theorem into an easily practicable “hypertext” where the configuration of the space is never definitive, but follows the clinical fields in order to give people impulses to use their own senses.

From the mid-1970s onward the experience field became an itinerant exhibition visiting numerous locations at home and abroad but since 1989 “Field for the Development of the Senses” has been also known under the name Sensorium.

Located in the rolling countryside outside of Bern,

Fig. 6. Hugo Kükelhaus’ proposals for sound and balance playroom. Source: Hugo Kükelhaus Archiv, City of Soest, Germany.
Switzerland the visitor finds today most of the forty stations each of which offers physical material/phenomena the interaction with which affords a different Ur-experience according to different sense experiences. In the same way that the individual stations do not refer consistently to only one sense but rather to senses working ganzheitlich (integritely), the individual stations work together to constitute an architectural and atmospheric ecos evocative of C.S. Peirce’s synechism, the doctrine that the world contains genuinely continuous phenoome.

Today approximately 40 experience and play stations are being offered at Sensorium to the visitors to experience the laws of ‘external nature’ (oscillation, gravity, polarity and color) in their interrelationships with the physiological laws of their ‘internal nature’ (sensorial processes and bodily movements). The stations serve to extend one’s capability to experience with one’s senses such that one is able to experience things in a different way, as eyes see – ears hear – noses smell – skin feels – fingers touch – feet (under)stand – hands grasp – the brain thinks – lungs breath – blood pulses – the body swings.

For, as Kükelhaus added: “It is not the brain that thinks but the human that experiences with their skin and limbs!”

_Everything new is old_

Hugo Kükelhaus died on October 5th, 1984. His great gift for posing fundamental, yet non-obvious, questions in such a way that we find some of our most deeply held assumptions up for grabs. Kükelhaus understood human cognition a unitary process, which leads without break from the elementary acquisition of sensory information to the most generic theoretical ideas.

The function and value sense-based learning was not a specialized, particular end but in satisfying the live creature in a more global way, by serving a variety of ends, and most important, by enhancing our immediate experience, which invigorates and vitalizes us, thus aiding our achievement of whatever further ends we pursue.

And what is his significance to design research today? Kükelhaus’ approach challenges the fixed separation of sense and reason. The distinction between some elements as rational and others as sensible is, he argues, always intermediary and transitive. Due largely to economics and time, the process of making has more to do with assembly than with making. The implications for meaning and substance being increasingly more banal, owing much to the rational necessity of economics and very little to thoughts, hopes and dreams of our culture and civilization. We must find ways to activate the physicality of the body and the critical nature of its irrational, intuitive imagination. Kükelhaus calls us back to ourselves, to our physical ness, to the cross-linking’s in us, and in the long run to our relation to the environment and to our capacity for empathy toward humans and other life forms.

Perhaps the most profound implication of Kükelhaus’ work for design research is that it is more realistic to educate toward knowing how to look for information and rather than impart a body of knowledge, acknowledging that the relationship between the observer and the observed is dynamic and inseparable, the implication for the student is that he begins to develop criteria on an much broader basis. Information can be found in books and databases, but the ability to “see” is reserved for the human scientists. Every attentive investigation of experience implies the transformation of self, and, indeed, scientific and aesthetic discovery presume such a transformation of self. “Every new object, well contemplated, opens up a new organ within us.”

Here lies the thrill that makes it all worthwhile like the intended and the serendipitous at the Sensorium each of us develops the ability to develop a meaningful question of investigation. Kükelhaus and the Sensorium are a timely and fascinating focus for further study.
Notes


6 Ibid., p 63.


10 Bäumi-Rosnagl, op. cit. [7], p. 268.


16 Bäumi-Rosnagl, op. cit. [7], p. 275.


19 Ibid.

20 12 active stops/play stations were positioned in a gallery within the German Pavilion in Montreal: roundabouts, swings, spring boards, rolling balls, swinging ropes, loops, a bicycle that drove a water vortex, a bell tower and more. These prototypes were intended for the first International School Exhibition in Dortmund. Information provided by Jürgen Münch, Chairman of the Hugo Kükelhaus Society to author, July 2012.

21 The principle idea behind Expo 67 was “Man and His World” but also highlight the education of tomorrow’s citizens. In addition to Hugo Kükelhaus’ play stations the Canadian landscape architect Cornelia Hahn Oberlander designed an environment for creative play and learning documented in the book by Susan Herrington, University of Virginia Press, 2013.


24 Münch, J. op. cit. [20].


26 His working premises in Soest has been kept intact first by the city of Soest, Germany and since 1988 by the Hugo Kükelhaus Society http://www.hugo-kuekelhaus.de/website/index.php/en/ and since 2002 at the Hugo Kükelhaus Foundation in Lützelflüh, Switzerland.