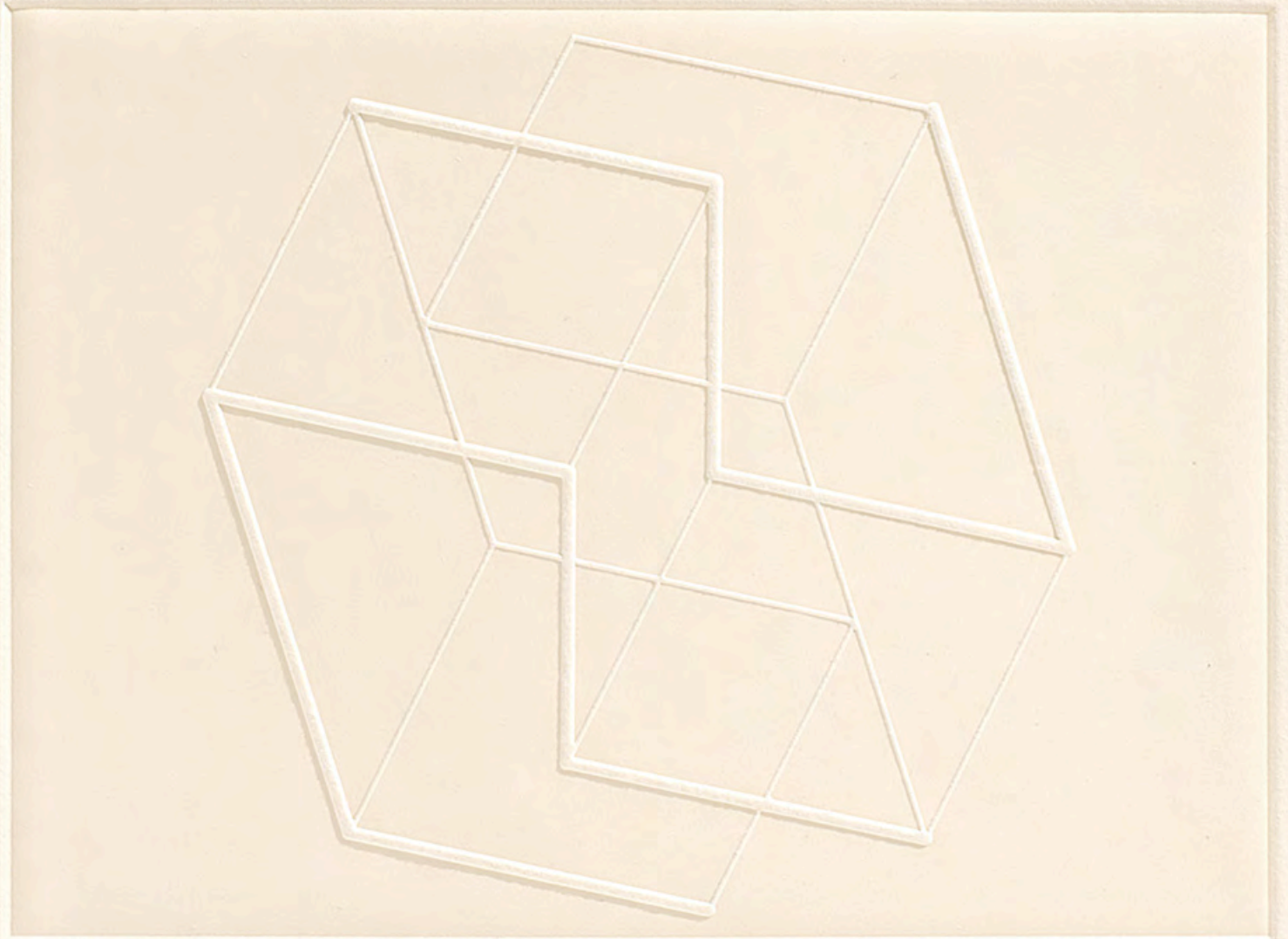


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*Intaglio Solo V 27/30*

*Albers 58*

## **‘THROUGH ONE’S OWN FINGERTIPS’?: HAPTIC PERCEPTION IN THE ART AND THINKING OF JOSEF AND ANNI ALBERS**

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Josef Albers, *Intaglio Solo V (27/30)*, 1958,  
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# ‘THROUGH ONE’S OWN FINGERTIPS’?: HAPTIC PERCEPTION IN THE ART AND THINKING OF JOSEF AND ANNI ALBERS<sup>1</sup>

*Charlotte Healy*

## **Abstract**

Over the course of the twentieth century, numerous artists and theorists sought to challenge the historical bias toward vision in Western culture by reclaiming touch as a key perceptual modality. At the Bauhaus, a revived emphasis on haptic perception became a fundamental component of the school’s philosophy and curriculum. Of the artists and educators associated with the school, Josef and Anni Albers were among the most committed proponents of touch. In some of their works on paper, they exploited the inseparability of visual and haptic perception: Josef attempted to emulate kinaesthetic experience in a series of photo-collage portraits; he thematised touch in several cork and wood relief prints; he and Anni replaced visually perceptible forms with haptically perceptible designs in their inkless intaglio prints; and she attempted to simulate the haptic manipulation of knots through vision in a number of drawings and prints. This paper considers the interplay of vision and touch in these works in relation to both artists’ larger ambition – reflected in their teaching and theoretical writing – of sharpening what they saw to be a deteriorating sense of touch in modern society. The multi-faceted notion of haptic perception in cognitive psychology is defined and applied to these artworks, and the central role of touch in Josef’s teaching and Anni’s theoretical writing is examined in the context of their pioneering Bauhaus colleagues Johannes Itten, László Moholy-Nagy, and Otti Berger.

**Key Words:** Josef Albers, Anni Albers, Bauhaus, Black Mountain College, haptic perception, artistic pedagogy, weaving, photo-collage, graphic art, knot theory

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Over the course of the twentieth century, numerous artists and theorists sought to challenge the historical bias toward vision in Western culture by reclaiming touch as a key perceptual modality.<sup>2</sup> At the Bauhaus, founded by Walter Gropius in 1919 in Weimar, Germany, a revived emphasis on haptic perception became a fundamental component of the school’s philosophy and curriculum.<sup>3</sup> Of the artists and educators associated with the school, Josef Albers (1888-1976) and Anni Albers (1899-1994) were among the most committed proponents of touch.

First enrolled as students at the Bauhaus in 1920 and 1922, respectively, Josef and Anni met in 1922 and were married in 1925 after Josef was appointed a Bauhaus master. In 1933, they left Germany for the United States to teach at Black Mountain College in North Carolina; they later moved to Connecticut in 1950, where Josef taught at the Yale University School of Art. Even before he joined the Bauhaus faculty, Josef began teaching the Bauhaus *Vorkurs* (preliminary course) in 1923 alongside László Moholy-Nagy; upon the latter’s departure from the school in 1928, Josef assumed full responsibility for the course. He continued to develop his innovative and influential teaching methods at Black Mountain and Yale. Entering the Bauhaus weaving workshop in 1923, Anni ultimately became one of the most important modern weavers and textile designers of the twentieth century. In the spirit of the Bauhaus connection between art and craft, Josef and Anni both created functional design objects as well as autonomous, largely two-dimensional artworks. Throughout his long and prolific career as an artist and designer, Josef produced and designed household objects, furniture, architectural murals and reliefs, stained-glass windows, sandblasted glass

constructions, paintings, drawings, prints, typography, photographs, and photo-collages.<sup>4</sup> In addition to her weaving practice, Anni created prints, drawings, and jewellery; in 1970, she abandoned weaving altogether and instead devoted herself to printmaking.

In a number of works on paper, both Josef and Anni seem to exploit the inextricability of visual and haptic perception. Specifically, Josef attempted to emulate kinaesthetic experience in a series of photo-collages. He also thematised touch in some of his cork and wood relief prints. Both Josef and Anni replaced visually perceptible forms with haptically perceptible designs in their inkless intaglio prints. Lastly, Anni attempted to simulate the haptic manipulation of knots through vision in numerous drawings and prints. Although all of these artworks clearly deal with haptic perception and its interaction with visual perception, due to the limitations of modern museum viewing practices, they were never meant to be touched. Instead, they must be experienced solely with the eyes. Thus, the sense of touch is mediated through vision in these two-dimensional artworks.

Much has been written about the centrality of perception – and particularly visual perception – in Josef’s art and pedagogy. Eva Díaz, for instance, recently asserted that Josef’s oft repeated statement ‘I want to open eyes’ ‘foregrounds the preeminence of a study of *vision* in his pedagogy and in Bauhaus teaching more generally’.<sup>5</sup> Yet, according to Jeffrey Saletnik, even if ‘seeing was integral’ to Josef’s instruction of the Bauhaus preliminary course, ‘Bauhaus pedagogic methods and practices cast vision as but one of many senses at the service of making’.<sup>6</sup> Although Josef’s emphasis on haptic perception is often mentioned in the large body of scholarship on his teaching principles and methods, this is the first study devoted to his career-long interest in haptic perception.<sup>7</sup> Given Anni’s equally enthusiastic preoccupation with touch in her practice and theorization of weaving, it only makes sense to study her haptic investigations alongside those of her husband. In fact, Helen Molesworth recently proposed *haptic* as the unifying quality of art at Black Mountain, due in large part to Josef and Anni’s teaching there.<sup>8</sup>

The goal of this essay is to consider the interplay of vision and touch in Josef and Anni’s works on paper in relation to both artists’ larger ambition – reflected in their teaching and theoretical writing – of sharpening what they saw to be a deteriorating sense of touch in modern society. To do so, I will first elucidate the multi-faceted notion of haptic perception as it is defined in cognitive psychology and discuss some of the ways it overlaps with visual perception, and then apply these perceptual concepts to Josef and Anni’s works on paper. Finally, I will examine and contextualise the central role of touch in Josef’s teaching and Anni’s theoretical writing.

### **Haptic Perception, Some of its Properties, and its Relationship to Visual Perception**

Cognitive psychologists have divided the modality of touch into multiple sensory systems, including the cutaneous, kinaesthetic, and haptic systems. The cutaneous system derives knowledge from sensory receptors – mechanoreceptors, thermoreceptors, and nociceptors – embedded in the skin, which receive information about pressure (mechanical stimulation), temperature, and pain, respectively. The kinaesthetic system gathers information from sensory receptors (mechanoreceptors) in the body’s muscles, joints, and tendons, resulting in the sense of limb position and the body’s movement through space. Finally, the haptic system combines the information obtained by the cutaneous and kinaesthetic systems. Thus, haptic perception relies on inputs from the skin, muscles, joints, and tendons.

In contrast, tactile perception is generally thought to draw information solely from the cutaneous system, and specifically from mechanoreceptors in the skin (which sense pressure).<sup>9</sup> Unlike tactile perception, which is largely passive and proximal, haptic perception is typically associated with the active exploration of space and surfaces.<sup>10</sup> Proprioception – the perception of the movement and position of the limbs and body in space, drawn from the

vestibular system (which perceives balance and head position from canals in the inner ear), along with the cutaneous and kinaesthetic systems – is often included within the comprehensive idea of haptic perception as well.<sup>11</sup>

Cognitive psychologists have also categorised the kinds of physical properties of objects that are perceived by the haptic system, distinguishing between geometric properties (size and shape) and material properties (texture, compliance, and temperature). Texture includes a number of different perceptual properties, like roughness, spatial density, and stickiness.<sup>12</sup> In a classic 1987 study, two leaders in the field of haptic perception, cognitive psychologists Susan Lederman and Roberta Klatzky, found that people use different haptic 'exploratory procedures' in order to discern different material or geometric properties of objects. For instance, the exploratory procedure of 'lateral motion', characterised by rubbing one's fingers along an object's surface, is most often used for extracting information about texture.<sup>13</sup>

Many of the physical properties perceived by the haptic system can also be perceived by vision. In 1985, Susan Lederman, Georgie Thorne, and Bill Jones found that both touch and vision contribute to texture perception, with vision dominating the assessment of spatial density and touch dominating the assessment of roughness.<sup>14</sup> In fact, in everyday perception, the modalities of touch and vision operate cooperatively in order to gather information about our surroundings. Although the information extracted by touch and vision is largely redundant, these two modalities often serve complementary functions: while touch is better at perceiving information about material properties, vision better captures spatial and geometric properties.<sup>15</sup> Moreover, experimental research over the past few decades has challenged the early assumption that vision always dominates interactions between haptic and visual perception.<sup>16</sup>

Some of the works on paper by Josef and Anni Albers (in particular Josef's photo-collages and prints and Anni's graphic work) demonstrate that both artists understood many of the properties of haptic and visual perception.

### **The Interplay between Touch and Vision in Works on Paper by Josef and Anni Albers**

First taking up photography in 1928 while teaching at the Bauhaus in Dessau, Josef began making photo-collages that feature his friends and colleagues. In most of these arrangements, he would take two or more shots of his sitters, often moving around them, successively closer to them, or further away from them. He would then juxtapose these images on a single mount. The experience of each collage is shaped by the way these discrete images interact. This technique enabled Josef to capture various spatial and temporal aspects of a single portrait, as in one of the three photo-collages from 1929 portraying his close friend and fellow Bauhaus master Paul Klee in the latter's studio (fig. 1). A sense of temporal progression is evident in this photo-collage due to the series of seven parallel contact strips in which a cigar and the smoke exhaled from it make fleeting appearances.

In a 1987 catalogue essay on Josef's photographs, John Szarkowski claims that he 'can find no clear precedent' for Josef's unique juxtaposition of distinct yet related images, and sees them to be 'of a fundamentally different nature' than those of his contemporaries like Moholy-Nagy and El Lissitzky.<sup>17</sup> Szarkowski does see a potential connection to Eadweard Muybridge's composite images of temporal progressions, although he finds these much more serial and logically unidirectional.<sup>18</sup> More recently, Dominique Szymusiak has suggested that the cinema inspired Josef to create these successions of images that leave 'the spectator to imagine the intermediate stages' and 'give an illusion of movement'.<sup>19</sup>

Given Josef's keen awareness and understanding of perception of all kinds, it also seems possible that he was attempting to emulate proprioception through the optical medium of photography.<sup>20</sup> By juxtaposing images of a relatively immobile subject, taken from different spatial positions and at different moments in time, Josef recaptures his own kinaesthetic

experience of taking the photographs. In turn, the viewer is able to mentally simulate this temporal and spatial movement of the body through vision alone.

Just as Josef captured kinaesthetic experience through vision in his portrait photo-collages, in a number of relief prints (from 1933, 1944-48, and 1968) he simulated tactile perception through vision (figs. 2-3). In these prints, he experimented with highly textured printing surfaces – specifically cork and wood. Although the final printed sheet of paper, unlike the printing surface, is essentially flat, the irregular mottled and woodgrain patterns (created by cork and wood respectively) appeal to the tactile sense. The one-to-one correspondence between the actual cork and wood surfaces and the patterns they create draws the viewer's attention to the two-dimensional plane of the paper, thus breaking down any illusion of spatial recession within the plane that the linear and geometric designs would have otherwise produced.<sup>21</sup> Instead, these forms often seem to float in front of the trompe l'oeil solid cork or wood plane, as in *High Up* of 1948 (fig. 2). *Easterly* of 1933 (fig. 3) functions differently from the later cork relief prints and woodcuts due to the large areas of paper uncovered by ink that produce a confusion of figure and ground.<sup>22</sup>

The physical contact between printing surface and paper required by the printing process is heightened by the indexical relationship between the printed pattern and the texture of the printing surface, which works to thematise tactile perception in these images. This kind of indexical correspondence between object and image also occurs in a photogram, a photographic method Josef introduced as an exercise in his Bauhaus preliminary course around 1930.<sup>23</sup> The photogram technique entails placing objects directly on light-sensitive photographic paper so that covered areas remain white and areas exposed to light darken. The resulting image is the index of the referent, a mark of its physical contact with the surface. Thus, both photograms and relief prints literalise the act of touching.

In a set of inkless intaglio prints from 1958-62 (part of his *Structural Constellations* series) and his *Embossed Linear Constructions* portfolio of 1969, Josef incorporated actual three-dimensional, haptically perceptible texture in the form of embossed lines of varying thickness (fig. 4). Although the lack of colour makes the embossed image hard to see except in raking light (which produces thicker shadows below the low relief lines), the viewer would benefit little from being able to touch the surface. The open-sided boxes in the design seem to move into three dimensions, but are actually impossible to construct in real space. Therefore, such images are far too complicated to be understood and visualised through the sense of touch alone, given that perceptual psychologists have found that spatial information is fairly difficult to extract by the haptic system (compared to the visual system).<sup>24</sup>

Both Josef's cork and wood relief prints and his inkless intaglios demonstrate his passion for (optical and haptic) illusion and his nuanced understanding of the potential interplay between vision and touch. Anni also made a series of inkless embossed prints, *Mountainous I-VI* of 1978. The all-over, maze- or puzzle-like designs of these prints, like the illogical boxes of Josef's inkless intaglios, are much too complex to be comprehended by touching the surface.

Anni addressed the interchange between visual and haptic perception even more convincingly in a number of drawings and prints of knots, which include her 1964 *Line Involvements* suite of lithographs.<sup>25</sup> Varying in complexity, these knots consist of one or more fibres, and sometimes continue beyond the frame of the picture. The simplest of her depictions, such as *Line Involvement I* (fig. 5), resemble images of knots found in the branch of topology known as knot theory.<sup>26</sup> One basic problem in knot theory is determining the sequence of simple deformations, or Reidemeister moves, required to untangle a tangled unknot (the term for a simple closed loop). Knot theorists can determine this sequence by drawing a series of knot diagrams and by visualizing the necessary deformations. Thus, they are able to simulate the manual process of untangling a knot in three-dimensional space

through a visual and mental process. Analogously, the ubiquity of the knot motif in Anni's works on paper can be understood in light of her own manual (and likely mental) dexterity with twisting and tangling fibres honed over decades of weaving experience, as well as her Black Mountain weaving instruction that included how to tie knots. Her two-dimensional representations of knots are activated by the viewer's visualization of their haptic manipulation.

The optical emulation of kinaesthetic experience in Josef's photo-collages, the thematization of touch in his relief prints, the incorporation of haptically perceptible texture in his and Anni's inkless intaglios, and the visual simulation of a manual process in her knot drawings and prints all demonstrate that both artists were keenly aware of the inseparability of haptic and visual perception. These works also relate to Josef and Anni's mutual conviction that art and artistic training should aim to improve society's declining haptic sensitivity to materials, a belief that was informed both by the innovative pedagogical ideas that helped shape Bauhaus teaching methods in general and by their pioneering Bauhaus colleagues Johannes Itten, Moholy-Nagy, and Otti Berger.

### **A New Emphasis on Touch in the Bauhaus Preliminary Course**

In the 1920s, the masters of the Bauhaus aimed to challenge the traditional Western academic emphasis on visual perception. Instead, they believed that physical contact with materials and the handling of objects was central to experience. In formulating the school's curriculum, founder and first director Walter Gropius drew on the progressive nineteenth-century pedagogical ideas of Johann Heinrich Pestalozzi and Friedrich Fröbel, who advanced the ideas that children learn best through concrete and direct observation and through play with materials.<sup>27</sup> All Bauhaus students were required to complete the two-semester-long *Vorkurs* (preliminary course) before they could join a specific workshop. From the school's inception, the preliminary course included sensory training.

Johannes Itten – hired by Gropius in 1919 – designed the innovative and experimental preliminary course, which he modelled after Fröbel's principle of education through play with materials. Itten gave his students exercises in which they had to touch a variety of textures with their eyes closed, in order to improve their sense of touch and their ability to distinguish between materials without the aid of vision. He later described the emphasis on tactility in his teaching method:

In the Basic Course at the Bauhaus exercises with materials and textures were found particularly stimulating. As an introduction long lists of the various materials, such as wood, glass, fabrics, bark, furs, metals, and stones were compiled. I then had the visual and tactile sensations of these materials entered against them in further columns. But knowledge of the words describing the properties was not enough; it was necessary to experience and to demonstrate the character of the materials. Contrasts such as smooth-rough, hard-soft, light-heavy had not only to be seen, but also felt.<sup>28</sup>

Itten would also have his students closely examine a natural material through touch and vision until they could draw it from memory. Other exercises he assigned were material montages and assemblages, in which students juxtaposed different materials, investigated the essence of materials, and honed their haptic and visual senses.<sup>29</sup>

Josef enrolled in Itten's preliminary course when he entered the school as a student in 1920. Upon Itten's departure from the Bauhaus in 1923 after a dispute with Gropius over the use of mysticism and meditation in his teaching, Gropius selected Josef and a newly appointed faculty member, Hungarian émigré László Moholy-Nagy, to take over the instruction of the preliminary course. Josef conducted the materials workshop section of the

course, referred to as *Werklehre* (the study of how to work). Whereas Itten had stressed self-expression and intuition, Josef focused on sharpening his students' perception and teaching them formal principles.

The keystone of Josef's teaching was the principle of 'learning by doing'.<sup>30</sup> Even before coming to the Bauhaus, he had embraced this concept while teaching primary school between 1908 and 1913, during which time he encountered Pestalozzi's progressive pedagogical theories.<sup>31</sup> In his essay 'Werklicher Formunterricht' (which has been translated to 'Teaching Form Through Experience', or more simply, 'Teaching Design') published in *bauhaus* magazine in 1928, Josef wrote that the result of his students' experiments was their 'own experience and possession, because it has been *learned* rather than taught'.<sup>32</sup>

By 1929, Josef was distinguishing *Materialstudie* (material studies) from *Materiestudie* (matter studies). Whereas the latter were derived from the various exercises investigating and juxtaposing different materials assigned by Itten, the former were Josef's own innovation, in his mind marking a decisive break from Itten's approach to the preliminary course. In the *Material* studies, students developed an understanding of the inherent properties and characteristics of materials by making small constructions out of a single everyday material, like paper, wire, or wood. One of the criteria upon which Josef judged his students' *Material* exercises was the concept of *Materialgerecht*, or 'doing justice to the nature of the material'.<sup>33</sup> In 'Werklicher Formunterricht', Josef described the haptic component of the *Material* studies: 'In order to achieve intimate contact with the material through one's own fingertips, the use of tools is initially limited.'<sup>34</sup>

In the *Materie* studies, students combined different materials as a means of exploring and becoming sensitive to the 'external appearance' (that is, the texture) of each.<sup>35</sup> When he introduced the *Materie* studies to his students, he identified three different aspects of the 'appearances of the materials' epidermis (outer layer): 'structure, facture, and texture'.<sup>36</sup> In his 1929 publication of his preliminary course lectures, *Von Material zu Architektur* (From Material to Architecture), Moholy-Nagy proposed nearly the same terminology to discuss the appearance of materials: structure (*Struktur*), texture (*Textur*), surface aspect or surface treatment (*Faktur*), and massing or mass arrangement (*Häufung* or *Haufwerk*).<sup>37</sup> For both Josef and Moholy-Nagy, structure relates to the natural growth or composition of the material; facture, in contrast, is the result of external manipulation or handling of the material.<sup>38</sup> For Josef, texture is the external appearance in general, combining structure and facture.<sup>39</sup>

In 'Werklicher *Formunterricht*', Josef described one of the *Materie* exercises he assigned to sharpen his students' haptic and optical perception of surface textures:

The systematic ordering of materials into suites with rising or falling values between two polarities sensitizes one to the finest gradations and subtlest transitions (tactile scales from hard to soft, smooth to rough, warm to cold or hard-edged to amorphous, smoothly polished to sticky-absorbent. Optical scales, e.g. finely meshed-coarsely meshed, transparent-translucent-opaque, clear-cloud-dense).<sup>40</sup>

Designed 'to take up this multifaceted task of developing the finest possible *feeling for the material*', the *Materie* studies were intended to counteract what he saw as the 'longstanding practice of neglecting the natural surface of materials'.<sup>41</sup>

In other *Materie* exercises, Josef had his students gather materials with contrasting textures, and then combine them in assemblages: 'The skins of the materials are brought into relationship with each other.'<sup>42</sup> Josef's realization that the juxtaposition of two materials intensifies the character of each was central to the *Materie* studies. In 'Werklicher *Formunterricht*', he compared this perceptual phenomenon to the interaction of colours:

Just as colors enter into relationships with each other [...], the superficial forms we note with our fingertips and with our eyes enter into relationships with each other. In the way that red complements green, and is simultaneously its contrast and balance, materials such as brick and burlap, glass and stearin, wire mesh and wool 'stand' in the same relationship.<sup>43</sup>

In fact, Josef's observation of the perceptual illusions created by the juxtaposition of different textures has been confirmed by cognitive psychology. According to Michael Landy and Norma Graham, the visual appearance of texture depends on its context.<sup>44</sup>

Josef was aware of all kinds of perceptual illusions, as is evident from the course on colour that he developed throughout his career and recorded in his book *Interaction of Color* (1963).<sup>45</sup> Much of the book deals with various optical deceptions such as the illusion of space (through colour gradation, for instance), simultaneous contrast, and after-image.<sup>46</sup> In order to explain the optical illusion of the relativity of colour, Josef described the 'haptic illusion' that occurs when a person dips one hand into cold water and the other hand into warm water, and then dips both hands into lukewarm water: Rather than both hands perceiving the same temperature in the lukewarm water, there is a perceived reversal of the original temperatures so that the hand that was in cold water is now warm, and the hand that was in the warm water is now cold.<sup>47</sup>

Herewith one experiences a discrepancy between physical fact and psychic effect called, in this case, a haptic illusion — haptic as related to the sense of touch — the haptic sense. In much the same way as haptic sensations deceive us, so optical illusions deceive. They lead us to 'see' and to 'read' other colours than those with which we are confronted physically.<sup>48</sup>

Related to his interest in the fallibility of human perception was his challenge to his preliminary course students to transform the appearance of materials in their *Materie* exercises so as to fool the eye of the viewer. This could be done by making two different materials appear identical (fig. 6). He delighted in his students' inventive 'Schwindels', and observed that *Materie* 'is more intriguing when you are not sure what materials are in it'.<sup>49</sup> For him, in an effective *Materie*, a soft material would appear hard, a rough material would appear smooth, or a dry material would appear wet, for instance.<sup>50</sup>

Soon after the Bauhaus was forced to close in 1933, Josef and Anni accepted teaching positions at Black Mountain College in North Carolina. There, Josef taught a 'Basic Design' course, which differed from his Bauhaus preliminary course in its greater emphasis on training perception and discussing perceptual issues. At Black Mountain and later at Yale University (where he was appointed the chairman of the School of Art's new Department of Design in 1950), Josef often alluded to the divergence of 'actual facts' or 'psychic effects' (how forms or colours are perceived by the viewer) from 'physical facts' (how forms and colours physically exist).<sup>51</sup> In his Black Mountain course, he maintained the distinction between *Material* and *Materie* studies. However, for his English-speaking students he renamed the *Material* studies 'construction', 'constructive', or 'structural' studies and the *Materie* studies 'combination', 'combinative', or 'comparative' studies (underlining their combination of disparate materials). He eventually renamed the *Materie* studies *matière*, a French term that indicates the external appearance or character of a material, as it is perceived by both touch and vision.<sup>52</sup>

In a lecture presented in Havana in 1935, Josef explained the rationale behind his *matière* exercises:

All materials have a physiological effect on us.... We perceive [material] qualities partly with the eyes, and speak of 'optical perception' of *Materie*. But more, and



much better, we perceive *matière* through the fingertips. We call this ‘tactile perception’. We recognize the importance of fingertip feeling. Today, we have to re-conquer this feeling anew, because we have almost lost it.<sup>53</sup>

Josef sought to achieve this ‘re-conquering’ through the emphasis on tactile sensation and perception in his *matière* studies.

In the ‘sensory training’ component of his preliminary course, Moholy-Nagy also attempted to sharpen his students’ haptic perception. In *Von Material zu Architektur*, he described the ‘tactile exercises’ he assigned:

The Bauhaus student in his initial exercises studies the material principally by means of his sense of touch (which is likewise the medium for pressure, pricking, temperature, vibration and other sensations). The student gathers a great variety of materials together, so that he may register as many different sensations as possible with them. He puts them together into tactile tables, which contain some related and some contrasting tactual sensations.<sup>54</sup>

Moholy-Nagy illustrated this explanation with photographs of some of his students’ inventions, including the tactile table of threads made by weaving student Otti Berger in 1928. Like Itten before him, Moholy-Nagy then had his students, while blindfolded, try to identify the different materials included in the tactile tables – such as ‘fabrics, metals, bits of bread, leather, paper, porcelain, sponge, etc.’ – through the sense of touch alone.<sup>55</sup>

However, Moholy-Nagy considered the possibility that photographs, such as those illustrating the various material properties described in *Von Material zu Architektur*, could stand in as substitutes for actual physical contact with materials and objects: ‘The exact, sharply defined photograph is the best approach to a new education in materials, since its concentration of emphasis offers a quick, though an indirect, approach to actual experience with the material.’<sup>56</sup>

The emphasis on haptic perception in the preliminary course curricula of Itten, Josef, and Moholy-Nagy helped solidify the centrality of touch within the Bauhaus. This is particularly apparent in the theoretical writings of weavers Otti Berger and Anni Albers, who both stressed textiles’ haptic properties.

### **Theorizing the Haptic Qualities of Textiles**

After the move of the Bauhaus to Dessau in 1925, the weaving workshop had been gradually shifting its emphasis away from the design of gridded compositions (which relate to the inherent structure of weaving) based on optical colour theory principles, to the production of functional textiles with distinctive textural characteristics intended for mass production. The latter approach to textiles is epitomised by Anni’s 1929 design for a soundproofing fabric made of cotton, cellophane, and chenille for the curtains of the Bundesschule Auditorium in Bernau. The weaving workshop’s new direction was very much in line with director Hannes Meyer’s technology-driven design doctrine. His replacement of Gropius in 1928, as well as Moholy-Nagy’s concurrent departure, led to a radical change in the school’s philosophy and leadership.

Like many of the Bauhaus weavers, Otti Berger was interested in legitimizing her craft by harnessing the language generally applied to painting, architecture, and photography.<sup>57</sup> In particular, as T’ai Smith has argued, Berger wielded the perceptual terminology employed in Moholy-Nagy’s preliminary course in order to articulate her own theory of weaving in the essay ‘Stoffe im Raum’ (Fabrics in Space), published in 1930 in the special Bauhaus issue of the Czech journal *ReD*.<sup>58</sup> In her repetitive, manifesto-like text, Berger emphasised the material properties as well as the haptic (both tactile and kinaesthetic) experience of fabric:

Most important in cloth is its tactility. The tactile in cloth is primary. A cloth should be grasped. One must be able to 'grasp' [its structure] with the hands. The value of the fabric should above all be recognized tactilely, through the sense of touch. The understanding of a cloth can just as well be felt with the hands, as a color can be with the eyes, or a sound can be in the ear.<sup>59</sup>

Berger further highlighted the importance of experiencing fabrics haptically, as opposed to just visually: Although silk and viscose silk look nearly identical, if one 'grasps' each fabric, 'Then one will know about the particularity of silk, which is warmth, or of artificial silk, which is called cold', due to the fact that each fabric conducts heat differently through cutaneous contact.<sup>60</sup>

In two unpublished texts written in the early 1930s, 'Weberei und Raumgestaltung' (Weaving and the Design of Space) and 'Stoffe und neues Bauen' (Fabric and the New Architecture), Berger continued to stress the inherently haptic nature of fabric, suggesting that the design of modern textiles should focus not on their visual properties but on their place in three-dimensional environments.<sup>61</sup> For instance, in 'Weberei und Raumgestaltung,' she highlighted the tactile perception of textiles: 'A textile is not only an optical object. We come into perpetual contact with it, so it is recognized through our tactile sense'.<sup>62</sup> In the same text, Berger suggested that the design of fabric wall coverings should deal with sensory considerations besides the visual: 'When wall-fabrics are well developed, they must not only achieve for the space an appropriate optical effect, but also under certain circumstances insulate sound and temperature.'<sup>63</sup>

Decades later, in the essay 'Tactile Sensibility' published in 1965, Anni echoed both Berger's attention to the haptic quality of textiles and Josef's aspiration to revive the haptic appreciation of materials (which he aimed to achieve through the *Materie/matière* studies of his Bauhaus preliminary course and Black Mountain Basic Design course):

But we certainly have grown increasingly insensitive in our perception by touch, the tactile sense. No wonder a faculty that is so largely unemployed in our daily plodding and bustling is degenerating. [...] No need — alas, also little chance — to handle materials, to test their consistency, their density, their lightness, their smoothness.<sup>64</sup>

In order to best describe the tactile properties of objects, Anni turned to the same term that Josef had ultimately selected at Black Mountain in place of *Materie*:

*Matière* is the word now usually understood to mean the surface appearance of material, such as grain, roughness or smoothness, dullness or gloss, etc., qualities of appearance that can be observed by touch and are consequently not concerned with lightness or darkness.<sup>65</sup>

In addition, she explained how one can describe the tactile properties related to the 'inner structure' of materials (such as 'pliability, sponginess, brittleness, porousness').<sup>66</sup> Surface quality (or *matière*) and inner structure together determine the look and feel of textiles.

Just as Berger accentuated the haptic quality of textiles, Anni proposed the 'medium' of 'surface characteristics' (that is, surface quality or *matière*) – perceived primarily through touch – as 'a distinctive textile trait': 'If a sculptor deals mainly with volume, an architect with space, a painter with color, then a weaver deals primarily with tactile effects.'<sup>67</sup> This statement aptly describes what Anni called her 'pictorial weavings': their highly tactile quality results from her integration of materials with diverse textural characteristics; her application of techniques such as the Andean 'supplementary, or floating, weft' that push the woven surface into three dimensions; and her frequent use of a muted palette.<sup>68</sup> However,

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unlike Berger, Anni did not mention the kinaesthetic interaction one has with textiles that contributes to their haptic quality in ‘Tactile Sensibility’.

How do Josef and Anni’s photographic and graphic investigations into the inseparability of haptic and visual perception relate to each artist’s larger project? Díaz and Saletnik recently posited the idea that Josef saw the exercises produced in his courses as well as his own artworks as means to an end, rather than ends in themselves. Díaz has suggested that Josef understood both artworks and artistic education as experiences (rather than simply objects or outcomes) that could move visual perception beyond ‘routine habits of seeing’.<sup>69</sup> More broadly, she argues that Josef employed experimentation in his pedagogical approach ‘as a forceful corrective against stagnant perceptual habits in the culture at large’, which he believed could contribute to ‘cultural transformation and growth’.<sup>70</sup> Saletnik, on the other hand, has examined how Josef’s inductive teaching method, which ‘encouraged the creation of objects that functioned pedagogically’ and ‘required an active and engaged viewer’ (therefore drawing ‘one’s attention to the act of viewing’), was incompatible with American critic Clement Greenberg’s formalist mandate of medium specificity and preference for a ‘disinterested relationship between work and viewer’.<sup>71</sup> Saletnik argues that Josef intended for his own artworks to function, like the objects made by his students, as didactic demonstrations of the perceptual phenomena taught in his courses.<sup>72</sup> Saletnik also draws attention to Josef’s insistence that the fundamental design principles he taught were not limited to the visual arts, but ‘could be applied across disciplines’.<sup>73</sup> In a similar vein, Josef and Anni’s teaching and theoretical writing reveal their shared aspiration to ‘re-conquer’ society’s ‘degenerating’ tactile appreciation of materials.<sup>74</sup>

Following Díaz and Saletnik’s argument, Josef and Anni’s photo-collages, prints, and drawings can be interpreted as didactic objects meant to hone the viewer’s haptic sense. However, paradoxically, their works on paper that are imbued with haptic qualities were never meant to be handled, but rather were meant to be experienced purely through eyesight. This view corresponds to the protocols of modern museums of art, where touch is generally not part of one’s experience of the artworks on display. Instead, vision has replaced touch as the primary means of appreciating artworks; museum visitors have become ‘viewers’.<sup>75</sup> Consequently, museum objects – particularly two-dimensional artworks like paintings, drawings, prints, and photographs – are commonly conceived of as images, to be comprehended with vision alone. Nevertheless, Josef and Anni were aware of the ability to perceive haptic and material qualities ‘with the eyes’.<sup>76</sup> Just as Moholy-Nagy saw the photographs illustrating material properties in the publication of his Bauhaus pedagogical program as substitutes for actual physical contact with materials, the Alberses must have realised that the inextricability of touch and vision enabled the visual perception of their works on paper to sharpen their viewers’ haptic sense.

As much as Josef and Anni believed that their students and society at large would benefit from contact with materials ‘through one’s own fingertips’, they did not expect viewers to handle their fragile works on paper; therefore, they adhered to the viewing conditions prescribed by modern museums.<sup>77</sup> Yet, perhaps Josef and Anni saw these conditions not as constraints but as a challenge – his photo-collages, his cork and wood relief prints, their inkless intaglios, and her knot depictions each employ a different strategy to convey the haptic sense through vision.

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## Notes

- <sup>1</sup> Josef Albers, 'Teaching Design', trans. by Frederick Amrine, Frederick A. Horowitz, and Nathan Horowitz, in *Josef Albers*, ed. by Marco Pierini (Milano: Silvana Editoriale, 2011), pp. 94-97 (p. 94).
- <sup>2</sup> Over the past few decades, many scholars have drawn attention to the primacy of vision over touch in Western culture. See Mark Paterson, *The Senses of Touch: Haptics, Affects and Technologies* (Oxford and New York: Berg, 2007); Margaret Olin, *Forms of Representation in Alois Riegl's Theory of Art* (University Park, PA: Penn State University Press, 1992), pp. 132-37; Janine Mileaf, *Please Touch: Dada and Surrealist Objects after the Readymade* (Hanover, NH: Dartmouth College Press, 2010), pp. 7-12; Martin Jay, *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought* (Berkeley, Los Angeles, and London: University of California Press, 1993); and Caroline A. Jones, *Eyesight Alone: Clement Greenberg's Modernism and the Bureaucratization of the Senses* (Chicago: The University of Chicago Press, 2005).
- <sup>3</sup> See, for instance, 'Tactility', in Leah Dickerman, 'Bauhaus Fundamentals', in *Bauhaus 1919-1933: Workshops for Modernity*, ed. by Barry Bergdoll and Leah Dickerman (New York: The Museum of Modern Art, 2009), pp. 32-34.
- <sup>4</sup> During his tenure at the Bauhaus, he was associated with the glass, metal, furniture, and wallpaper design workshops.
- <sup>5</sup> Eva Díaz, 'Josef Albers and the Ethics of Perception', in *The Experimenters: Chance and Design at Black Mountain College* (Chicago: University of Chicago Press, 2015), pp. 15-52 (p. 16). Hal Foster examines the importance of vision in the Bauhaus teaching of both Josef Albers and László Moholy-Nagy. Hal Foster, 'The Bauhaus Idea in America', in *Albers and Moholy-Nagy: From the Bauhaus to the New World*, ed. by Achim Borchardt-Hume (New Haven: Yale University Press, 2006), pp. 92-102.
- <sup>6</sup> Jeffrey Saletnik, 'Pedagogic Objects: Josef Albers, Greenbergian Modernism, and the Bauhaus in America', in *Bauhaus Construct: Fashioning Identity, Discourse and Modernism*, ed. by Jeffrey Saletnik and Robin Schuldenfrei (London: Routledge, 2009), pp. 83-102 (pp. 97-98).
- <sup>7</sup> For the most comprehensive analyses of Josef's pedagogy, see Rainer K. Wick, *Teaching at the Bauhaus* (Ostfildern-Ruit: Hatje Cantz, 2000), pp. 164-185; Frederick A. Horowitz and Brenda Danilowitz, *Josef Albers: To Open Eyes. The Bauhaus, Black Mountain College, and Yale* (London and New York: Phaidon Press, 2006); and Samuele Boncompagni, ed., *Josef Albers. Art As Experience: The Teaching Methods of a Bauhaus Master*, (Milano: Silvana Editoriale, 2013).
- <sup>8</sup> 'Haptic', in Helen Molesworth, 'Imaginary Landscape', in *Leap Before You Look: Black Mountain College, 1933-1957*, ed. by Helen Molesworth and Ruth Erickson (New Haven: Yale University Press, 2015), pp. 66-71.
- <sup>9</sup> Roberta L. Klatzky and Susan J. Lederman, 'Touch', in *Experimental Psychology*, 2nd edn, ed. by Alice F. Healy and Robert W. Proctor, iv, *Handbook of Psychology*, ed. by Irving B. Weiner (Hoboken, NJ: John Wiley & Sons, 2013), pp. 153-55; Paterson, *The Senses of Touch*, p. ix.
- <sup>10</sup> Jeremy M. Wolfe et al., *Sensation & Perception*, 3rd edn (Sunderland, MA: Sinauer Associates, 2012), p. 463.
- <sup>11</sup> Paterson, *The Senses of Touch*, p. ix; Mileaf, *Please Touch*, p. 10.
- <sup>12</sup> Klatzky and Lederman, 'Touch', p. 158. Yet, according to Klatzky and Lederman, experimental data generally confirm that 'touch is particularly adapted for receiving and processing information about the material out of which the world is constructed, more than its form'. *Ibid.*, p. 173.
- <sup>13</sup> *Ibid.*, p. 161-62.
- <sup>14</sup> Susan J. Lederman, Georgie Thorne, and Bill Jones, 'Perception of texture by vision and touch: multidimensionality and intersensory integration', *Journal of Experimental Psychology: Human Perception and Performance*, 12, no. 2 (1986), 169-80.
- <sup>15</sup> Klatzky and Lederman, 'Touch', p. 152.
- <sup>16</sup> *Ibid.*, p. 169.
- <sup>17</sup> John Szarkowski, 'Introduction', in *The Photographs of Josef Albers: A Selection from the Collection of the Josef Albers Foundation*, by Nicholas Fox Weber and John Szarkowski (New York: The American Federation of Arts, 1987), pp. 11-16 (p. 13).
- <sup>18</sup> *Ibid.*, p. 15.
- <sup>19</sup> Dominique Szymusiak, 'Albers and Photography', in *Josef Albers: Vitraux, Dessins, Gravures, Typographie, Meubles*, ed. by Oliver Barker and Dominique Szymusiak (Paris: Éditions Hazan, 2008), p. 90. For other interpretations of Josef's photo-collages, including their serial quality, see Brenda Danilowitz, 'Portraitphotographien', in *Josef Albers: Photographien 1928-1955*, ed. by Marianne Stockebrand (Cologne: Kölnischer Kunstverein, 1992), pp. 20-29.
- <sup>20</sup> Molesworth mentions proprioception as an aspect of the haptic that various figures at Black Mountain, including John Cage and Charles Olson, incorporated into their work. Molesworth, 'Imaginary Landscape', pp. 66-71.

<sup>21</sup> In their indexical correspondence with the printing surface, Josef's relief prints differ slightly from a drawing of wood grain in a *Matière* exercise by one of his students reproduced in his book *Search Versus Re-Search*. Josef Albers, *Search Versus Re-Search* (Hartford, CT: Trinity College Press, 1969), pp. 77. Díaz explains how this exercise confuses haptic and visual perception in a manner similar to Josef's relief prints: 'A trompe l'oeil representation of wood grain on paper gave the optical appearance of wood but the tactile experience of paper. [...] The trompe l'oeil woodgrain drawing on paper, however naturalistic, cannot be mistaken for actual wood in its strength or durability.' Díaz, 'Josef Albers and the Ethics of Perception', pp. 22, 24.

<sup>22</sup> Josef's teaching of perception was influenced by Gestalt investigations into the relationship between figure and ground. Frederick A. Horowitz, 'Albers the Teacher', in *Josef Albers: To Open Eyes. The Bauhaus, Black Mountain College, and Yale*, by Frederick A. Horowitz and Brenda Danilowitz (London and New York: Phaidon Press, 2006), pp. 72-252 (p. 92).

<sup>23</sup> Today, the photogram is inextricably linked to the Bauhaus due to Moholy-Nagy's pioneering efforts with this technique.

<sup>24</sup> Klatzky and Lederman, 'Touch', p. 164. For a discussion of the haptic recognition of two-dimensional and three-dimensional shapes represented in the form of raised-line drawings, see Klatzky and Lederman, 'Touch', p. 166.

<sup>25</sup> These images recall a number of works by Paul Klee (most strikingly, his 1930 pen-and-ink drawing of four knots *Wege zum Knoten* [*Paths to the Knot*]) and Josef Albers (such as his drypoint *Eh-De* of 1940).

<sup>26</sup> See Colin C. Adams, *The Knot Book: An Elementary Introduction to the Mathematical Theory of Knots* (Providence, RI: American Mathematical Society, 2001).

<sup>27</sup> Horowitz, 'Albers the Teacher', p. 84.

<sup>28</sup> Johannes Itten, 'Materials and Texture Studies', in *Design and Form: The Basic Course at the Bauhaus and Later*, revised edn (New York: Litton Educational Publishing Inc., 1975), pp. 34-61 (p. 34).

<sup>29</sup> Horowitz, 'Albers the Teacher', pp. 84, 89.

<sup>30</sup> This expression was the catchphrase of American educational reformer John Dewey. The influence of Dewey's call for participatory rather than passive learning on Josef's pedagogical approach (as well as the educational philosophy of Black Mountain College more generally) is widely acknowledged. See, for instance, Díaz, 'Josef Albers and the Ethics of Perception', 15-52; Saletnik, 'Pedagogic Objects', p. 100 fn32; Marco Pierini, 'A Spiritual Documentation of Life', in *Josef Albers*, ed. by Marco Pierini (Milano: Silvana Editoriale, 2011), pp. 39-56 (p. 47).

<sup>31</sup> Horowitz, 'Albers the Teacher', p. 85.

<sup>32</sup> Albers, 'Teaching Design', p. 95. For the original essay in German, see Josef Albers, 'Werklicher Formunterricht', *Bauhaus*, 2, no. 3 (1928), 3-7.

<sup>33</sup> Horowitz, 'Albers the Teacher', p. 94.

<sup>34</sup> Albers, 'Teaching Design', p. 95.

<sup>35</sup> *Ibid.*, p. 96.

<sup>36</sup> *Ibid.*, p. 97.

<sup>37</sup> An English translation entitled *The New Vision* was first published in 1930. László Moholy-Nagy, *The New Vision: Fundamentals of Bauhaus Design, Painting, Sculpture, and Architecture* (Mineola, NY: Dover Publications, 2005), p. 35. According to Josef, Moholy-Nagy did not recognise Josef's role in the development of this classification system, but instead asserted that it was his own innovation. Saletnik, 'Pedagogic Objects', p. 101 fn40; Horowitz and Danilowitz, *To Open Eyes*, p. 255 fn69.

<sup>38</sup> Horowitz, 'Albers the Teacher', p. 108; Moholy-Nagy, *The New Vision*, pp. 35, 42.

<sup>39</sup> Horowitz, 'Albers the Teacher', p. 108. For Moholy-Nagy, however, texture is 'the organically resulting outward surface'. Moholy-Nagy, *The New Vision*, p. 40.

<sup>40</sup> Albers, 'Teaching Design', p. 97.

<sup>41</sup> *Ibid.*

<sup>42</sup> *Ibid.*, p. 96.

<sup>43</sup> *Ibid.*, pp. 96-97.

<sup>44</sup> For instance, according to a 2001 study by Frank Durgin, the perceived density of a texture patch is dependent on the densities of surrounding textures. Michael S. Landy and Norma Graham, 'Visual perception of texture', in ii, *The Visual Neurosciences*, ed. by Leo M. Chalupa and John S. Werner (Cambridge, MA: The MIT Press, 2003), pp. 1106-18.

<sup>45</sup> In addition, Josef's interest in Gestalt psychology, particularly Max Wertheimer's perceptual investigations, is widely recognised. According to Horowitz, 'Albers found in Wertheimer's diagrams support for his idea that art happens (or, at least, begins to happen) when the viewer "reads" something at variance with what's actually there: something more.' Horowitz, 'Albers the Teacher', 88.

<sup>46</sup> As much as his goal was to help students train their eyes to become aware of such illusions, he also admitted that, 'The fact that the after-image or simultaneous contrast is a psycho-physiological phenomenon should prove that no normal eye, not even the most trained one, is foolproof against color deception'. Josef Albers, *Interaction of Color*, revised and expanded edn (New Haven and London: Yale University Press, 2006), p. 23.

<sup>47</sup> Ibid., p. 8.

<sup>48</sup> Ibid.

<sup>49</sup> Josef Albers, 'Fundamental Design of Today', transcript of a 5-day workshop for art teachers presented at the Museum of Modern Art, New York (July 16-22, 1941). Quoted in Horowitz, 'Albers the Teacher', p. 129.

<sup>50</sup> Horowitz, 'Albers the Teacher', p. 130.

<sup>51</sup> Ibid., pp. 88-89. For instance, he mentions these opposing terms in *Interaction of Color*. Albers, *Interaction of Color*, p. 8.

<sup>52</sup> Horowitz, 'Albers the Teacher', p. 125.

<sup>53</sup> Josef Albers, 'Kombinative Gestaltung' (Combinative Form), lecture presented at the Lyceum, Havana (2 January 1935). Quoted in Horowitz, 'Albers the Teacher', p. 127.

<sup>54</sup> Moholy-Nagy, *The New Vision*, p. 24.

<sup>55</sup> Ibid. For a more detailed account of the sensory training component of Moholy-Nagy's course, see Oliver A. I. Botar, 'Sensory Training', in *Sensing the Future: Moholy-Nagy, Media and the Arts* (Zürich: Lars Müller Publishers, 2014), pp. 17-38.

<sup>56</sup> Moholy-Nagy, *The New Vision*, p. 39.

<sup>57</sup> For a full account of the weavers' theoretical efforts of this kind, see T'ai Smith, *Bauhaus Weaving Theory: From Feminine Craft to Mode of Design* (Minneapolis: University of Minnesota Press, 2014).

<sup>58</sup> T'ai Smith, 'Limits of the Tactile and the Optical: Bauhaus Fabric in the Frame of Photography', *Grey Room*, no. 25 (Fall 2006), 6-31. For Berger's original essay in German, see Otti Berger, 'Stoffe im Raum', *ReD*, 3, no. 5 (1930), 143-45.

<sup>59</sup> Berger, 'Stoffe im Raum', p. 145. Translation by Smith in Smith, 'Limits of the Tactile and the Optical', p. 16.

<sup>60</sup> Berger, 'Stoffe im Raum', p. 145. Translation by Smith in Smith, 'Limits of the Tactile and the Optical', p. 20.

<sup>61</sup> Smith, 'Limits of the Tactile and the Optical', p. 19.

<sup>62</sup> Otti Berger, 'Weberei und Raumgestaltung' (unpublished essay), p. 3. Translation by Smith in Smith, 'Limits of the Tactile and the Optical', p. 19.

<sup>63</sup> Berger, 'Weberei und Raumgestaltung', p. 5. Translation by Smith in Smith, 'Limits of the Tactile and the Optical', p. 22.

<sup>64</sup> Anni Albers, 'Tactile Sensibility', in *On Weaving* (Middletown, CT: Wesleyan University Press, 1965), p. 62.

<sup>65</sup> Ibid., p. 63.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid., p. 64.

<sup>68</sup> Virginia Gardner Troy, 'Thread as Text: The Woven Work of Anni Albers', in *Anni Albers*, ed. by Nicholas Fox Weber and Pandora Tabatabai Asbaghi (New York: The Solomon R. Guggenheim Foundation, 1999), pp. 28-39 (p. 31).

<sup>69</sup> Diaz, 'Josef Albers and the Ethics of Perception', p. 18. See also Eva Diaz, 'The Ethics of Perception: Josef Albers in the United States', *The Art Bulletin*, 90.2 (June 2008), 260-85.

<sup>70</sup> Diaz, 'Josef Albers and the Ethics of Perception', pp. 18-19.

<sup>71</sup> Saletnik, 'Pedagogic Objects', pp. 83-88.

<sup>72</sup> Ibid., p. 97.

<sup>73</sup> Ibid., p. 94.

<sup>74</sup> Josef Albers, 'Kombinative Gestaltung', quoted in Horowitz, 'Albers the Teacher', p. 127; Anni Albers, 'Tactile Sensibility', p. 62.

<sup>75</sup> In her cultural history of touch, Constance Classen has traced the gradual progression from the 'established place of touch in early museums' to 'its elimination in modern museums' by the late nineteenth century. In her account, such a 'taboo on touch' could only be accepted by the general public once museum visitors embraced the ideas that 'to touch museum pieces was disrespectful and damaging', and that 'touch had no cognitive or aesthetic uses and thus was of no value in the museum, where only cognitive and aesthetic benefits were sought'. Methods of display, such as protective railings, cases, and glazing, further emphasise the shift from touch to vision in art museums. Constance Classen, *The Deepest Sense: A Cultural History of Touch* (Urbana, Chicago and Springfield: University of Illinois Press, 2012), pp. 144-45. Fiona Candlin has also considered the various forces that transformed the modern museum into 'a paradigmatically visual institution'. Fiona Candlin, *Art, Museums, and Touch* (Manchester and New York: Manchester University Press, 2010), p. 1.

<sup>76</sup> Albers, 'Kombinative Gestaltung', quoted in Horowitz, 'Albers the Teacher', p. 127.

<sup>77</sup> Albers, 'Teaching Design', p. 94.

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## Bibliography

- Adams, Colin C., *The Knot Book: An Elementary Introduction to the Mathematical Theory of Knots* (Providence, RI: American Mathematical Society, 2001).
- Albers, Anni, 'Tactile Sensibility', in *On Weaving* (Middletown, CT: Wesleyan University Press, 1965), pp. 62-65.
- Albers, Josef, *Interaction of Color*, revised and expanded edn (New Haven and London: Yale University Press, 2006).
- *Search Versus Re-Search* (Hartford, CT: Trinity College Press, 1969).
- 'Werklicher Formunterricht', *Bauhaus*, 2, no. 3 (1928), 3-7.
- Anger, Jenny, 'Paul Klee, Anni and Josef Albers, and Robert Rauschenberg: Weaving and the Grid at Black Mountain College', in *Klee and America*, ed. by Josef Helfenstein and Elizabeth Hutton Turner (Ostfildern Ruit: Hatje Cantz, 2006), pp. 239-53.
- Barker, Oliver, and Dominique Szymusiak, eds., *Josef Albers: Vitraux, Dessins, Gravures, Typographie, Meubles* (Paris: Éditions Hazan, 2008).
- Bergdoll, Barry, and Leah Dickerman, eds., *Bauhaus 1919-1933: Workshops for Modernity* (New York: Museum of Modern Art, 2009).
- Berger, Otti, 'Stoffe im Raum', *ReD*, 3, no. 5 (1930), 143-45.
- Berggruen, Olivier, ed., *Paul Klee: The Bauhaus Years. Works from 1918-1931* (New York: Dickinson Roundell, 2013).
- Boncompagni, Samuele, ed., *Josef Albers. Art As Experience: The Teaching Methods of a Bauhaus Master* (Milano: Silvana Editoriale, 2013).
- Borchardt-Hume, Achim, ed., *Albers and Moholy-Nagy: From the Bauhaus to the New World* (New Haven: Yale University Press, 2006).
- Botar, Oliver A. I., *Sensing the Future: Moholy-Nagy, Media and the Arts* (Zürich: Lars Müller Publishers, 2014).
- Candlin, Fiona, *Art, Museums, and Touch* (Manchester and New York: Manchester University Press, 2010).
- Classen, Constance, *The Deepest Sense: A Cultural History of Touch* (Urbana, Chicago and Springfield: University of Illinois Press, 2012).
- Classen, Constance, ed., *The Book of Touch* (Oxford, UK: Berg, 2005).
- Danilowitz, Brenda, *The Prints of Josef Albers: A Catalogue Raisonné 1915-1976* (Manchester and New York: Hudson Hills Press, 2010).
- Díaz, Eva, 'The Ethics of Perception: Josef Albers in the United States', *The Art Bulletin*, 90.2 (June 2008), 260-85.
- *The Experimenters: Chance and Design at Black Mountain College* (Chicago: University of Chicago Press, 2015).
- Dudley, Sandra H., *Museum Objects: Experiencing the Properties of Things* (London and New York: Routledge, 2012).
- Hansen, Tone, and Milena Hoesberg, eds., *Josef Albers: No Tricks, No Twinkling of the Eyes* (Köln: Buchhandlung Walther König; Oslo: Henie Onstad Kunstsenter, 2014).

Healy, Charlotte, 'Between Weaving and Photography: Paul Klee's Haptic Surfaces' (unpublished master's thesis, Institute of Fine Arts, New York University, 2013).

Horowitz, Frederick A., and Brenda Danilowitz, *Josef Albers: To Open Eyes. The Bauhaus, Black Mountain College, and Yale* (London and New York: Phaidon Press, 2006).

Itten, Johannes, *Design and Form: The Basic Course at the Bauhaus and Later*, revised edn (New York: Litton Educational Publishing Inc., 1975).

Jay, Martin, *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought* (Berkeley, Los Angeles, and London: University of California Press, 1993).

Jones, Caroline A., *Eyesight Alone: Clement Greenberg's Modernism and the Bureaucratization of the Senses* (Chicago: The University of Chicago Press, 2005).

Klatzky, Roberta L., and Susan J. Lederman, 'Touch', in *Experimental Psychology*, 2nd edn, ed. by Alice F. Healy and Robert W. Proctor, iv, *Handbook of Psychology*, ed. by Irving B. Weiner (Hoboken, NJ: John Wiley & Sons, 2013), pp. 152-78.

Landy, Michael S., and Norma Graham, 'Visual perception of texture', in ii, *The Visual Neurosciences*, ed. by Leo M. Chalupa and John S. Werner (Cambridge, MA: The MIT Press, 2003), pp. 1106-18.

Lederman, Susan J., and Roberta L. Klatzky, 'Hand movements: A window into haptic object recognition', *Cognitive Psychology*, 19 (1987), 342-68.

Lederman, Susan J., Georgie Thorne, and Bill Jones, 'Perception of texture by vision and touch: multidimensionality and intersensory integration', *Journal of Experimental Psychology: Human Perception and Performance*, 12.2 (1986), 169-80.

Mileaf, Janine, *Please Touch: Dada and Surrealist Objects after the Readymade* (Hanover, NH: Dartmouth College Press, 2010).

Miller, Jo, *Josef Albers: Prints 1915-1970* (Brooklyn, NY: The Brooklyn Museum, 1973).

Moholy-Nagy, László, *The New Vision: Fundamentals of Bauhaus Design, Painting, Sculpture, and Architecture* (Mineola, NY: Dover Publications, 2005).

Molesworth, Helen, and Ruth Erickson, eds., *Leap Before You Look: Black Mountain College, 1933-1957* (New Haven: Yale University Press, 2015).

Olin, Margaret, *Forms of Representation in Alois Riegl's Theory of Art* (University Park, PA: Penn State University Press, 1992).

Paterson, Mark, *The Senses of Touch: Haptics, Affects and Technologies* (Oxford and New York: Berg, 2007).

Pierini, Marco, ed., *Josef Albers* (Milano: Silvana Editoriale, 2011).

Saletnik, Jeffrey, 'Pedagogic Objects: Josef Albers, Greenbergian Modernism, and the Bauhaus in America', in *Bauhaus Construct: Fashioning Identity, Discourse and Modernism*, ed. by Jeffrey Saletnik and Robin Schuldenfrei (London: Routledge, 2009), pp. 83-102.

Smith, T'ai, *Bauhaus Weaving Theory: From Feminine Craft to Mode of Design* (Minneapolis: University of Minnesota Press, 2014).

— 'Limits of the Tactile and the Optical: Bauhaus Fabric in the Frame of Photography', *Grey Room*, no. 25 (Fall 2006), 6-31.

Stockebrand, Marianne, ed., *Josef Albers: Photographien 1928-1955* (Cologne: Kölnischer Kunstverein, 1992).



Weber, Nicholas Fox, *Josef Albers Prints 1916-1976* (London: Alan Cristea Gallery, 1999).

Weber, Nicholas Fox, *The Prints of Anni Albers: A Catalogue Raisonné, 1963-1984* (Bethany, CT: Josef and Anni Albers Foundation, 2009).

Weber, Nicholas Fox, and Pandora Tabatabai Asbaghi, eds., *Anni Albers* (New York: The Solomon R. Guggenheim Foundation, 1999).

Weber, Nicholas Fox, and Martin Filler, *Josef + Anni Albers: Designs for Living* (London and New York: Merrell Publishers, 2004).

Weber, Nicholas Fox, Mary Emma Harris, Charles E. Richart, and Neal Benezra, *Josef Albers: A Retrospective* (New York: The Solomon R. Guggenheim Foundation, 1988).

Weber, Nicholas Fox, Mary Jane Jacob, and Richard S. Field, *The Woven and Graphic Art of Anni Albers* (Washington, DC: Smithsonian Institution Press, 1985).

Weber, Nicholas Fox, Fred Licht, and Brenda Danilowitz, *Josef Albers: Glass, Color, and Light* (New York: The Solomon R. Guggenheim Foundation, 1994).

Weber, Nicholas Fox, and John Szarkowski, *The Photographs of Josef Albers: A Selection from the Collection of the Josef Albers Foundation* (New York: The American Federation of Arts, 1987).

Wick, Rainer K., *Teaching at the Bauhaus* (Ostfildern-Ruit: Hatje Cantz, 2000).

Wolfe, Jeremy M., Keith R. Kluender, Dennis M. Levi, Linda M. Bartoshuk, Rachel S. Herz, Roberta Klatzky, Susan J. Lederman, and Daniel M. Merfeld, *Sensation & Perception*, 3rd edn (Sunderland, MA: Sinauer Associates, 2012).

## Figures

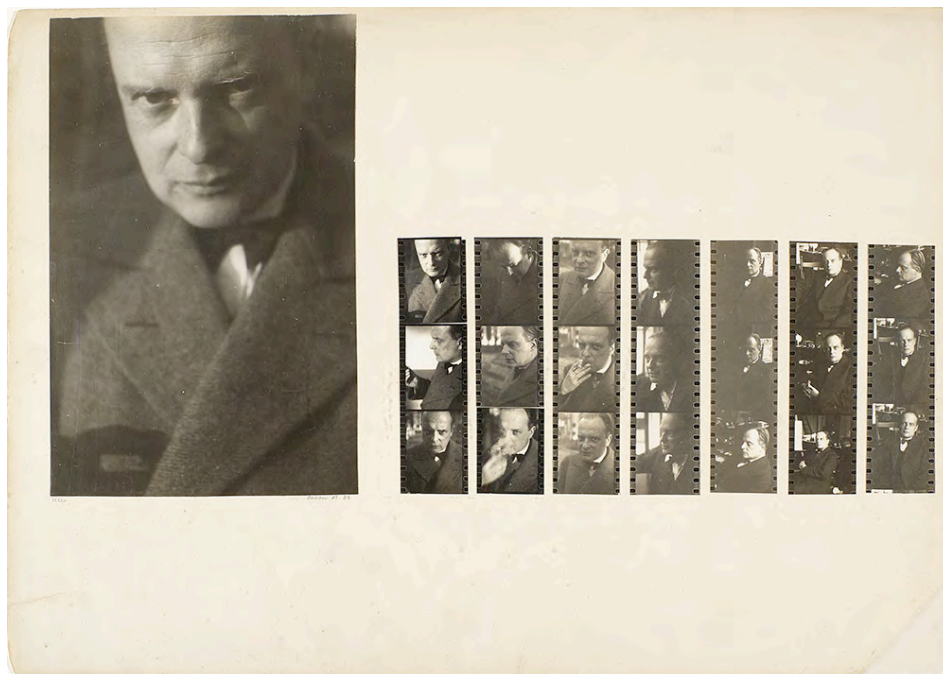


Fig. 1: Josef Albers, *Paul Klee, Dessau XI*, 1929, gelatin silver prints mounted on cardboard, 29.5 x 41 cm, The Josef and Anni Albers Foundation, Bethany, Connecticut

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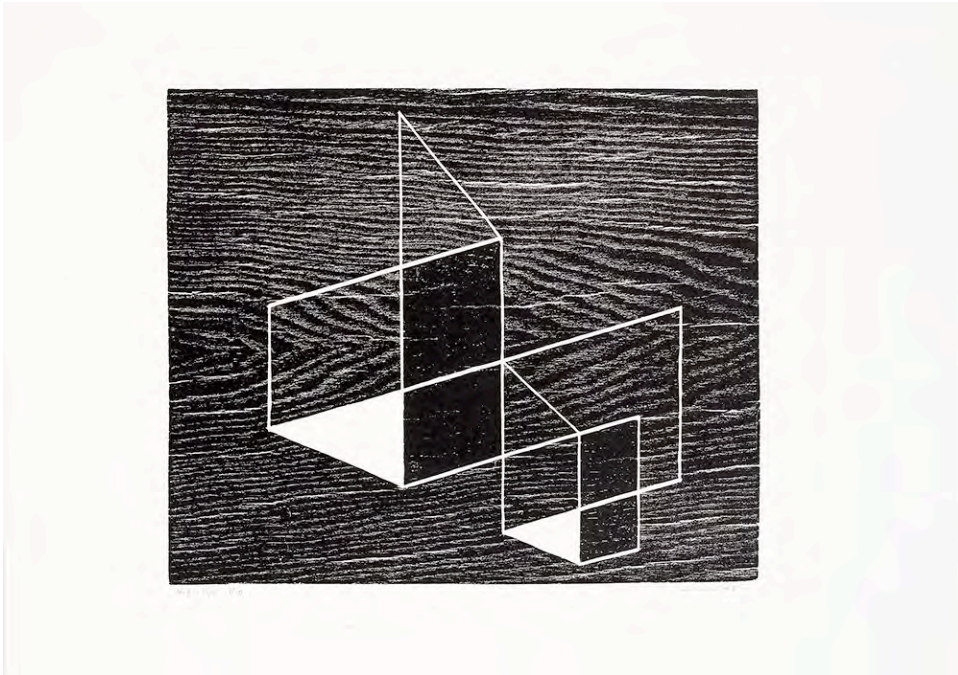


Fig. 2: Josef Albers, *High Up*, 1948, woodcut, 27.9 x 39.3 cm, The Josef and Anni Albers Foundation, Bethany, Connecticut

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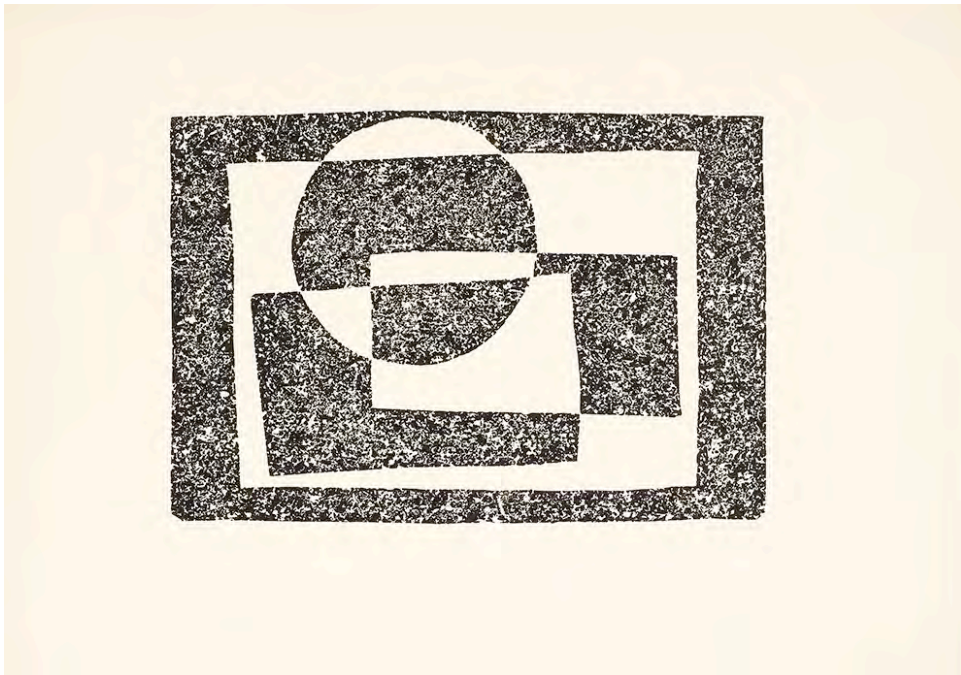


Fig. 3: Josef Albers, *Östlich (Easterly)*, 1933, cork relief, 21 x 30.8 cm, The Josef and Anni Albers Foundation, Bethany, Connecticut

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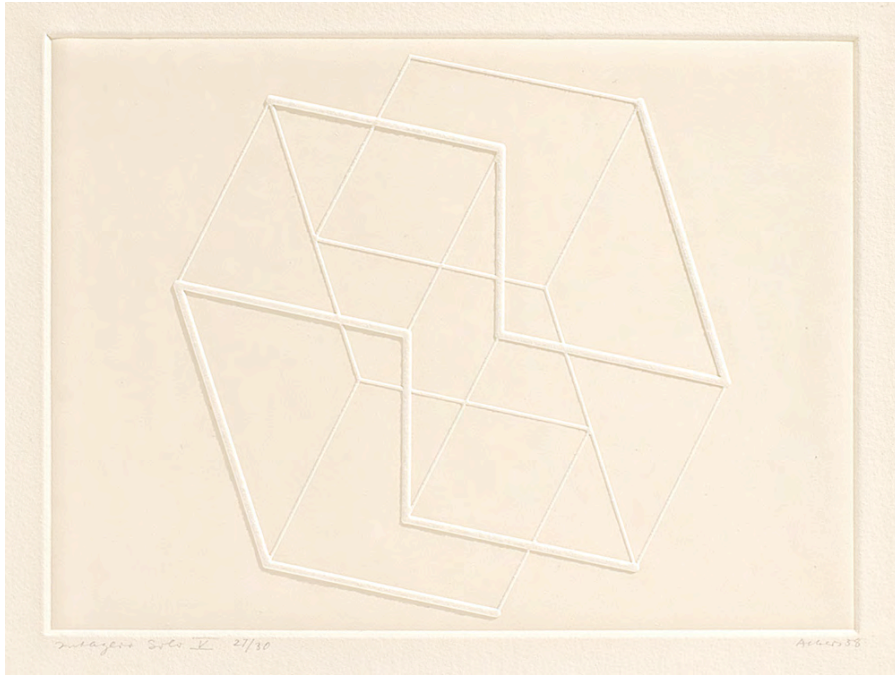


Fig. 4: Josef Albers, *Intaglio Solo V (27/30)*, 1958, inkless intaglio from brass plate, 38.1 x 56.5 cm, The Josef and Anni Albers Foundation, Bethany, Connecticut  
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Fig. 5: Anni Albers, *Line Involvement I*, 1964, lithograph, 50.2 x 37.5 cm, The Josef and Anni Albers Foundation, Bethany, Connecticut  
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Fig. 6: Black Mountain College student work, *Matière* exercise with weathered wood and crumpled paper, ca. 1934-40, black and white film negative, 6 x 9 cm, The Josef and Anni Albers Foundation, Bethany, Connecticut

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### Biography

**Charlotte Healy** is a doctoral candidate at New York University's Institute of Fine Arts, where she specialises in issues related to the materials and techniques of modern art. She is currently writing her dissertation on the ways that artists in Weimar Germany began to prioritise touch and the interplay between touch and vision in their artworks, theoretical writing, and pedagogy.