Annotated Bibliography on Hans Hinterreiter

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Supplement to 2024 Bridges Conference paper: "Hans Hinterreiter's Flowing Fields"

There is relatively little technical detail available online about Hans Hinterreiter's use of mathematics in the "fields" that underlie his visual images, so as an aid to future researchers I have written these notes with some details about the books and other sources I have used as references. (Of course, online images of HH's work speak for themselves in the way that they exemplify his fields, but the depth of his mathematical foundations are not obvious from casual examination of them.) Most interesting and useful to me are the first five books below, namely the three books written by HH himself [H1, H2, H3], the 1982 monograph by Albrecht and Koella [AK], and the 2018 Jacob Bill catalog [B] that includes Spanish newspaper interviews and exerpts from HH's correspondence with Max Bill. These, several useful exhibition catalogs, and some other references I have consulted are detailed here.

[H1]   **Hans Hinterreiter, *Geometrische Schönheit – Entstehung und Technik*** [*Geometric Beauty – Creation and Technology*], Hostmann-Steinbergschen Farbenfabriken Celle, 1958. (In German)

This is a small (15×21 cm) 30-page stapled booklet packaged with thirty loose frameable color plates (each 21×30 cm). It includes a short mathematical summary of several field types, including ones based on sine curve spacing, tangent curve spacing, perspective grids, ellipse tangents, and parabola tangents. A number of two-color diagrams illustrate the details of some constructions. Several paragraphs provide a summary explanation of the forms and fields in Opus 23 and Opus 43. The thirty loose plates are high-quality color prints of Opus 3, 4, 7, 10, 12, 14, 18, 21, 22, 23, 25, 26, 27, 29, 30, 31, 33, 34, 36, 39, 41, 43, 44, 47, 51, 60, 64, 65, 101, and 106. The booklet begins with a Forward by Grete Ostwald, daughter of Wilhelm Ostwald. I am citing this like a book, but everything is packaged in a thin cardboard folder, giving the impression more of being a collection of plates with a small informative folder than a book. (I wouldn't be surprised if many owners framed the plates and tossed the booklet.)

[H2]   **Hans Hinterreiter, *A Theory of Form and Color*,** 1967, Ediciones Ebusus, Barcelona. 31 x 25 cm. (Color plates printed separately by Hostmann-Steinberg, Germany)

This is an English translation of *Geometrische Schönheit* [H1] in a larger hardcover bound format, but with only three plates of HH's artwork (instead of thirty in the original). It was printed as a signed and numbered limited edition of 500. Color plates of Opus 4, 51, and 30 are tipped-in. It describes the same fields as the original German version, but seems oddly conceived in that the text again describes the design underlying Opus 23 and 43, but now these works are not illustrated so I don't expect many readers to understand the details. Three of the pages are translucent overlays (printed on tracing paper) that replicate HH's overlays and indicate how three segments in a triangular grid combine to make the form of Opus 43 (before it is mapped to a field).

Sadly, most of this book (excluding the three plates) is printed on a heavy but brittle paper stock, which seems inappropriate for an art book. It feels like it is not acid-free and will crumble over time.

There is one addition in [H2], not in [H1]: a large fold-out "map" of segment adjacency in a hexagonal form, but only an insufficient caption to explain it, and no additional text in the body of the book. HH is aware that our freedom to choose the X and Y of each endpoint means the space of possible segments is intrinsically four-dimensional. He presents a 4D adjacency map of a sort, for segments in a hexagonal grid, where two segments are "adjacent" if they differ minimally, i.e., one endpoint moves one grid position. He comments on how the four parameters are mapped to 2D paper by using each dimension twice. (Analogous maps for segments in triangular and square forms are included in [H3].)

[H3]   Hans Hinterreiter, *Die Kunst der reinen Form* [*The Art of Pure Form*], Ibiza; Ámsterdam: Ediciones Ebusus, 1978. Libro: impresión fotomecánica. 29×20 cm. (In German)

This is the essential reference on HH's mathematical thinking about forms, fields, and color, laying out in detail his methods and aspirations. (My Bridges paper tries to convey a sense of its contents.) It is a massive photographic facsimile of his typed working notes and ink/blueprint diagrams, compiled over several decades, roughly 1936-1948. This is the only comprehensive source for mathematical details on his forms and fields, with detailed explanation of his notations. It is an expensive rare book, a large 770-page paperback, printed as a signed and numbered limited edition of 500. Thousands of blueprint images are reproduced along with detailed instructions for straightedge and compass constructions. It reads much like a math textbook, filled with notation, general principles, and thousands of worked out diagrams. It contains not a single example of a finished artwork, but it is addressed to working artists and scattered throughout are guidelines for applying his methods, comments on his philosophy of art, and a short autobiographical sketch explaining how he came to develop his style. It makes clear the strength of his artistic discipline, the depth of his geometric knowledge, and his hopes that others would follow his lead in creating concrete art.

[AK] Hans Joachim Albrecht and Rudolf Koella, with Istvan Schlegl (editor) *Hans Hinterreiter: A Swiss Exponent of Constructive Art*, Waser Verlag, 1982. (In both German and English)

Hardcover monograph with excellent images and two substantial essays: "Geometric Beauty: Life and Work of Hans Hinterreiter" by Koella and "Logic and Poetry in the Work of Hans Hinterreiter" by Albrecht. It includes many images, much background information, detailed references, biographical chronology, list of exhibitions, etc. Shows HH's construction diagrams for Opus 1, 3, 60, 77, 83, and 84.

[B] Jakob Bill et al., *Hans Hinterreiter 1902-1989*, Fundacion Juan March, Madrid, 2018.

Exhibition catalogue in Spanish with many images, much background information, and texts by several authors: HH (abridged text from "Geometrische Schönheit" [H1, H2] without the mathematical material about fields), Max Bill ("The work of HH on the occasion of his 75th birthday"), Karl Gerstner ("Don Hans or the Love of Geometry"), Rudolf Koella ("HH: a pioneer of concrete art"), Timo Niemeyer ("HH and Hispano-Muslim Ornamentation"), and Jakob Bill ("HH and Max Bill in Dialog"). It includes three very interesting Ibizan newspaper interviews of HH (1977, 1973, and 1974, no bylines), and decades of written correspondence between HH and Max Bill. The text is available online but with low-resolution images at https://www2.march.es/arte/catalogos/ficha.aspx?p0=cat:295&p1=263&l=2 I found that the physical book was required to read the newspaper interviews.

[] Karl Gerstner, "Don Hans oder Die Liebe zur Geometrie," *Weltwoche Magazin*, No. 46, Nov. 17, 1982, pp. 32-36.

Five-page article (in German) includes some construction diagrams. It is shown as a readable image in Bill's HH catalog [B], pp. 144-146, with the text separately included (but translated into Spanish) on pp. 19-25. It includes the construction diagram for Opus 91C.

[SV] István Schlégl and Carl van der Voort, *Hans Hinterreiter*, 1977.

Catalog in English and German for traveling exhibition that visited ten cities in Europe. Introductory essay "The works of HH on the occasion of his 75th birthday" by István Schlégl and preface by Rudolf Koella. Includes abridged text from "Geometrische Schönheit" [H1, H2] by HH, without the mathematical material about fields.

[CMDP] *Hans Hinterreiter: Retrospective Exhibition Works 1930-1985*. No author listed. Not dated.

Catalog for travelling exhibition that visited Cornell University, MIT, Duke University, and Penn State University in 1986 contains many useful images with introductory Essay "The Work of HH" by István Schlégl. Includes abridged text from "Geometrische Schönheit" [H1, H2] by HH, without the mathematical material about fields. Almost identical to catalog for 1988 Guggenheim exhibition [G], but different cover image and title page.

[G] **Solomon R. Guggenheim Museum, Hans Hinterreiter: A Leading Swiss Exponent of Constructive Art**, 1988.

Catalog for solo Exhibition in NYC. Introductory Essay "The Work of HH" by István Schlégl. Includes abridged text from "Geometrische Schönheit" [H1, H2] by HH, without the mathematical material about fields. Almost identical to the above catalog [CMDP] for the Cornell-MIT-Duke-Penn exhibition, but different cover image and title page. Available online at https://archive.org/details/hanshin00hint

[SS] Hans Hinterreiter: Constructivist Compositions 1932-1982.

Catalog for 2017 exhibition at Senior and Shopmaker Gallery in NY City includes an introductory essay by Gail Harrison Roman. Shows HH's notation for many works. Not printed; available only in PDF and online form at https://www.calameo.com/read/0045073285886f2bab1d7

[A] Hans Joachim Albrecht, "Zwischen Wissenschaft und Kunst. [Between Science and Art] **Wilhelm Ostwald und Hans Hinterreiter"**, Mitteilungen der Wilhelm-Ostwald-Gesellschaft e.V., 24. Jg. 2019, Heft 2

Discussion of color and design in HH's work.

[HHF] The Hans Hinterreiter Foundation, Zurich, Switzerland, https://www.hinterreiter-stiftung.ch/2nd-project,

"The main aim of the Hans Hinterreiter Foundation is to support the artistic legacy of Hans Hinterreiter and to promote and disseminate his ideas in Switzerland and abroad." Their website contains images, biography, list of exhibitions, list of museums with his work, list of published references, etc.

The Swiss Institute for Art Research, https://recherche.sik-isea.ch/en/

Authoritative website with images, biography, list of exhibitions, list of museums with his work, list of published references, etc.

Max Bill, *Ein eigenschöpferischer Künstler: Hans Hinterreiter zum Gedächtnis*, [A Self-creative Artist: Hans Hinterreiter in Memory] Neue Zürcher Zeitung, Sept. 27, 1989, p. 27, https://zeitungsarchiv.nzz.ch/read/8970/8970/1989-09-27/27

Zurich newspaper obituary of HH written by Max Bill.

[M1] Emil Makovicky, "The crystallographic art of Hans Hinterreiter," in: *Zeitschrift für Kristallographie* 150 (1979), pp. 13-22.

Short article (4 pages text plus 4 pages of illustrations) discussing the symmetry groups underlying HH's works.

[M2] Emil Makovicky, "Hans Hinterreiter's non-linear transformations," 26th European Crystallographic Meeting (ECM26, MS47-P01) Darmstadt, Acta. Cryst. 2010. https://journals.iucr.org/a/issues/2010/a1/00/a46535/a46535.pdf

Short abstract for conference poster session describing four examples of HH's process.

[M3] Emil Makovicky, "Symmetrology of Art: Colored and Generalized Symmetries", *Computers and Mathematics with Applications,* Vol. 12B, pp. 949-980, 1986.

A cross-cultural exploration of symmetry and color symmetry in arts and crafts includes several Hinterreiter examples.

[M4] Emil Makovicky, *Symmetry: Through the Eyes of the Old Masters*, De Gruyter, 2016.

Highly illustrated book on tessellations in art includes two paragraphs briefly presenting HH.

[] Peter Moeck, "Genuine Plane Symmetries versus Pseudosymmetries in two Crystal Patterns of Graphic Artwork", https://arxiv.org/abs/2304.03915

One of several papers by this author analyzing symmetry of images that uses HH works as an example.

[]   Karl Schawelka , ″Wilhelm Ostwald's „Harmony of Colours" (1918) and Its Mixed Reception - a Reassessment″, Óbuda University e-Bulletin, Vol. 8, No. 2, 2018.

Excellent introduction to Ostwald's theory of colors, its history and reception. (Not specifically about HH.) Available online at https://uni-obuda.hu/e-bulletin/Schawelka_13.pdf

[K1]   Eva Knoll, "Transfert de 2-D en 3-D de l'Opus 84 de Hans Hinterreiter,″ 1997 Masters thesis, Université de Montréal. (In French)

Explores 3D graphics designs inspired by HH's Opus 84. See [K2] below.

[K2] Eva Knoll, "Developing a Procedure to Transfer Geometrical Constraints from the Plane into Space,″ Journal for Geometry and Graphics, Vol. 2, No. 2, pp. 123–131, 1998.

Summary (in English) of her masters thesis [K1]. HH's Opus 84 is ″re-interpreted in space″ with the conclusion ″not only is it so complex that the human eye and mind cannot grasp it and therefore reads it as a single more or less homogenous mass, but it could only really be assimilated in its 3-D form. It is therefore useless, unfortunately, to illustrate it in this context.″ (Does not pertain to HH's bi-angular transformation in Opus 84.)

[] Matilde Marcolli, *Lumen Naturae,* MIT Press, 2020.

In a brief section mentioning Hinterreiter, the book incorrectly claims: ″The geometry of the hyperbolic plane was explored in depth by the artist Hans Hinetrreiter, who produced a series of drawings and paintings based on the use of different tessellations of the hyperbolic plane and patterns obtained from walks along parts of various hyperbolic tessellations.″ This is a complete misreading of HH's images. There is no reference to hyperbolic tessellations, the Poincare disk, or the hyperbolic plane in any of HH's writings. In personal communication, the author could provide no supporting evidence for the claim. (Note in contrast that M.C. Escher did design artwork in his *Circle Limit* series based on the Poincare disk model of the hyperbolic plane and it is well documented how this was directly due to communication with H.S.M. Coxeter.)

Note 1: I have not been able to locate a book supposedly called ***The Summerbrides*** by the Australian playwright, painter, and novelist **Paul Ritchie** (1923-1996), reportedly published in London in the 1960s or 1970s. According to HH in an Ibiza newspaper interview in [B, p. 137], it is a fictional work inspired in part by HH's summer wife tryouts. His first wife, Mina Salm, died in childbirth in 1939. For a dozen years or so before meeting his second wife, Inge Van Carlovitz in 1963, HH reportedly ″tested″ visiting candidates requested through a German marriage agency [B, p. 21]. A number of published works by Ritchie are listed online but I have found no trace of ″The Summerbrides.″ See, for example: https://www.goodreads.com/author/show/237395.Paul_Ritchie For background information on Ritchie see [B, pp. 25, 197] and the obituary: https://www.independent.co.uk/incoming/paul-ritchie-obituary-5601895.html

Note 2: I have not obtained several exhibition catalogs with original essays, e.g., a 1997 catalogue by Gallery Schlégel cited in [A] with an essay by Hans Glattfelder on HH's construction drawings.

Note 3: Works by HH are labeled with one of: (a) an Opus number, (b) a Study number, (c) a SW or SWF number, or (d) an ME number. I understand SWF abbreviates ″schwarz-weiße (farb)″ as these items are black, white, and grey-level works. I have not been able to determine what ″ME″ signifies; these tend to be tempera studies on paper, so I thought at first ME might abbreviate something about the medium, but then I noticed ME 279 [AK, p. 77] is described as acrylic on canvas.

Note 4: Opus numbers occasionally vary or conflict across different references. For example, what is called Opus 21 in [H1], [SV], and [AK, p. 107] is different from that on [B, p. 66]. Similarly, Opus 106 in [H1] and [AK, p. 102] is different from what's shown on [B, p. 112]. [B] is published later; is it a correction? See also [B, pp. 202-203 and A, p. 22] for some information on Opus renumberings.

Note 5: My copy of [H2] (purchased used online) came with a partially transparent plastic ″slider″ that is a mystery to me and to the Hans Hinterreiter Foundation [HHF]. See Figure A below. It appears to have an inner slider and an outer sleeve that were designed to slide along each other (like a slide rule), but

mine does not slide. (I don't want to force it and cause damage.) Printed in black on clear plastic, it appears to be marked "Opus 9c" on the inner component and "Opus 41" on the outer component. As far as I can tell, it is not original to the book, so apparently was simply stored in this copy of the book by a previous owner.

   Note 6: In 1986, a travelling exhibition of HH's work visited four universities in the US [CMDP] and then the Guggenheim Museum [G] in New York City. I saw the exhibit at MIT, where I was a graduate student at the time, and was intrigued by the geometric structure and flowing transformations that I could see in his work. In the gift shop I bought a poster which features a version of Opus 80 and a stamped hanging metal ornament, illustrated in Figures B and C below. (I have found no examples of either the poster or the ornament online.) The ornament is based on HH's Figure 89 of *Die Kunst der reinen Form* [H3] (Figure D) which is reproduced in the catalogs [CDMP and G] and is sized exactly to the original image scale. At the center on one side, the ornament is stamped "MIT" in small letters, so presumably it was produced as local merchandise. I have had the poster framed on the wall near my desk for almost 40 years and had often looked at it thinking to myself that one day I would delve deeper into his work and understand exactly what HH was doing, leading to this project...

Figures Accompanying Notes 5 and 6

Fig. A. *Plastic slider with HH images (21 x 8 cm)*

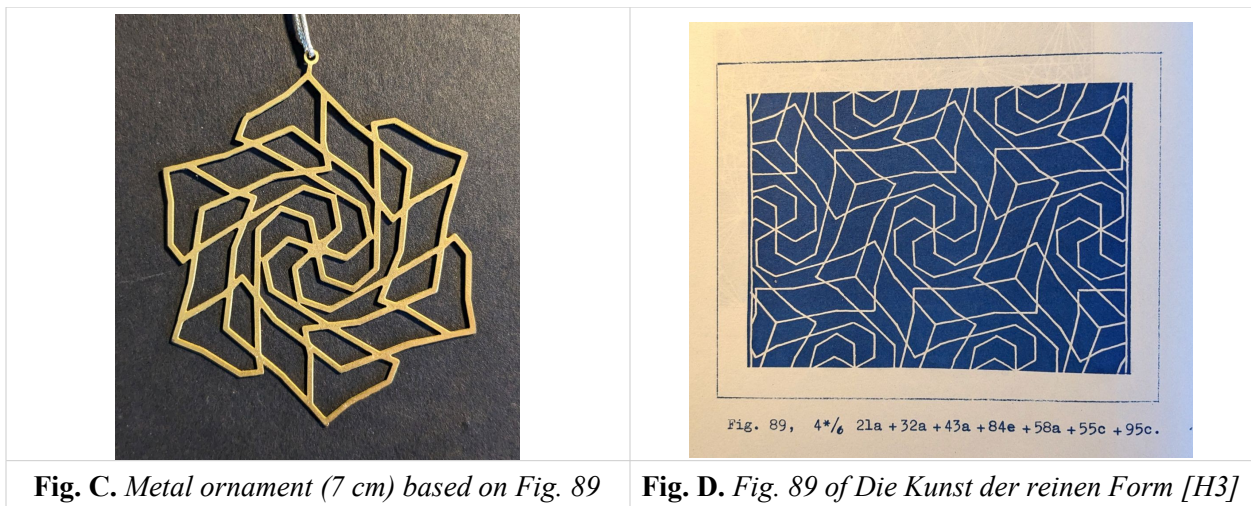

Fig. B. *Poster from 1986 Exhibition*

Fig. C. *Metal ornament (7 cm) based on Fig. 89*

Fig. D. *Fig. 89 of Die Kunst der reinen Form [H3]*