ORGANIZATION OF THE MARKETING MATERIALS

This document includes most of the desirable marketing materials mentioned by publishers and by literary agents.

I. ABOUT THE BOOK

FORMAT

Title -- *Humane Math: Fixing the inhumanity of twentieth-century math*

Alternative title -- *The Naked Queen: You are right, math does not make sense.*

Approximately 500 pages with 300 illustrations. See the sample chapters for how illustrations are used to provide multimedia access to the content of the text. Some additional technical content may be added as an Appendix.

STATUS

Four chapters are written. The research is completed, notes and supporting materials are collected for all chapters. Each chapter is centered around two or three essays that I have written previously, over the last three decades. It's fair to say that each chapter is over half-done.

I estimate about 20-30 manuscript pages per chapter, about 20 chapters, 400-600 pages total (plus contents, index, notes and references).

       Section I on math education   -- 150 pages
       Section II on math and computation   -- 100 pages
       Section III on media and virtuality   -- 100 pages
       Section IV on iconic math   -- 150 pages

Every chapter will include about 20 illustrations and a few tables. All will be line drawings, in a sketch style.   About 25% of the total page area will be illustration rather than text.

With support, I am free to take a sabbatical from my teaching job until the text is completed. My working speed (without distractions) is about one chapter per week, which means 4 to 5 months to completion, including illustrations.

RATIONALE

Humane Math (HM) is for people who dislike math, for people who resent the inadequacy and insecurity that math education has caused them to feel. The core idea of HM is unique: *math itself is to blame for math phobia*. Math anxiety is a sane reaction to being forced to do the degrading symbolic math tasks taught in schools. Those who rue math were right all along, math education is unreasonable, indeed inhumane, because math itself is built upon illusion and theology. Precollege math *does not work* as advertised, it is not connected to reality, to utility, or to clear thinking. For all but the approximately one-hundred-thousand math professionals, the ideas of math are irrelevant; for 80% of us, twentieth century math is an evil.

HM is not anti-math (!), rather it seeks to broaden our mathematical vocabulary to include familiar and friendly words, comforting and satisfying concepts, and especially concrete and visceral experiences. The mathematical content of HM is *foundational*, the book shows what math could be if it were built from an understanding of how people learn. HM explains *why* math works: math is a tool we use to limit the actual complexity of our world. Thus mathematical description is neither true nor accurate. HM redesigns this tool so that it can be used by non-professionals. The bulk of the book explains, from educational, historical, computational, and societal perspectives, why the tool needs to be redesigned.

The four sections of HM demonstrate, clearly and simply, why math does not work, what specifically is wrong, how pervasive and destructive this problem has become, and how specifically to modify math to make it work again for people. The content is simple grade school arithmetic (i.e. how to count and how to add) and elementary logic, not taught in grade school but an essential component of clear thinking. The issue is both timely and critical: the rapid spread of enforced symbolic computation is actively divorcing humanity from our authentic world of experience.

HM helps readers to regain confidence and perspective, but unlike all other math self-help books, HM *fixes math* while supporting rather than trying to fix those who have been damaged by math education. Self-help books proclaim: "Even *you* can learn to do math!"...but only if you are willing to abandon your common sense and your natural understanding of reality. HM is not a collection of tips and techniques, it is a closely reasoned and intuitively obvious discussion of how twentieth-century math has abandoned its historically human roots and its necessary connections to the human body. HM returns common math to its inherent simplicity.

The book's most significant disadvantage (other than having math as its content) is that it does not focus on personalities and their stories. The bulk of the content is about how math works, how it undermines us, how it has come to dominate modern culture, and how to fix the problems that this causes. Several personal stories and the lives of several important people are recounted, however the primary writing style is conversational/descriptive. HM shows with simple language and illustrations how authentic (as opposed to symbolic) math is built upon common sense.

NOVELTY

HM includes a plethora of innovative ideas, many carried to fruition. There are very few books currently addressing a general audience about what is wrong with math itself. The popular "How to Lie with Statistics"-type books show how conventional math can be misused. HM shows how conventional math misuses human intelligence.

Although there is plenty of criticism about math education, *mathematics* is apparently beyond criticism. Math is not recognized as physical activity, we think of it only as abstract symbolic concepts. So we do not hold math accountable for its impact on our physical world! HM shows us that the recently lost connection between body, earth and math can be regained by generalizing the communication of mathematical ideas to include iconic forms such as drawing, sculpture and interactivity. Iconic math frees mathematical concepts from the tyranny of their typography

simply by eliminating the restriction that math must be written as a string of symbols.   This broader perspective on communication allows a reconnection of mathematics to the Earth. Pre-symbolic communication becomes available. *Addition is putting stuff together; multiplication is ways of arranging stuff.*

The cold, harsh symbolic math we are taught in schools is just not realistic, it is a greater cost than benefit.   The last section of HM introduces *iconic math*, a non-symbolic alternative to symbolic math. Icons look like what they mean. Iconic math is simpler because it is directly relevant within our physical world. How arithmetic works is assumed to be beyond improvement.   HM pioneers an unexplored idea: *simple arithmetic really doesn't work all that well*.

HM has criticism, analysis, innovation, substance and uniqueness. Almost every chapter of HM includes provocative ideas, and then demonstrates that these ideas are both reasonable and descriptively accurate:

- Counting does not work.
- Counting is not the right place to begin to teach math.
- The ubiquitous place-value notation for numbers is clumsy and inefficient.
- We cannot trust what we are taught about simple arithmetic.
- Math education does not teach math.
- Symbolic math disassociates us from common sense and from intuition.
- Math is intuitive when the symbols are removed.
- We should stop teaching math as a subject until college.
- Western mathematical abstraction is a limited and bias perspective on what math is.
- The concepts of modern math are essentially theological.
- Symbolic math is ecologically unsound.
- The true/false duality of logic is unnecessary and destructive.
- Rational thinking is achieved by forgetting irrelevant information.
- Digital convergence is disassociating us from reality itself.

BREADTH

Our culture is in transition. Not only have we embraced the internet, our new virtual worlds provide dynamic, interactive, social, and visual communication and entertainment. Our antiquated schools still teach reading, writing and arithmetic, how to encode experience into symbolic knowledge. Our media culture has little need for symbolic codes, instead it provides simulation of experience, it shows us how to live, it involves us. Reading has evolved into video, film and active dialogue. Writing has evolved into tweets, crisp texting, and direct interaction. Math has not yet evolved. Rather math has split into three. It has become a powerful tool for shaping society, it has become the hidden digital language of computers, and it has become a symbolic torment forced upon us in schools.

Math phobia is a wicked problem. It is perpetuated by the very agency tasked with solving it. It splits parents and communities into warring factions. The blame for math phobia is placed upon

its victims. The schools and school districts that are expected to solve the problem are out-of-touch with the problem itself, as well as with the potential solutions. There is no central authority in the US school system that can lead a concerted effort into finding a solution. Once a person educated into math phobia leaves school that person is abandoned, there is no longer an institutional incentive to fix the problem.

HM explores the costs of symbolic math, from its abandonment of human values to its complete detachment from reality. It shows us why we dislike school math, and how we can repair the damage. But the danger of *symbolic detachment* is far greater, since mathematics underlies the digital convergence of electronic technologies. We are living in *virtuality*, the apparent world that we construct from mathematical abstraction. We electronically reduce our authentic reality to streams of zeros and ones. We transmit those streams to electronic devices that then mathemagically construct the virtual worlds of radio, television, video games, webpages, text messages, GPS tracking, and digital avatars. HM explores how the other-worldly abstraction of digital logic has led humanity to the brink of an ultimate alienation, our detachment from reality itself.

STYLE

HM includes some of my professional work, some personal experiences and some archival material. The descriptive thread is not autobiographical but rather observation of and conclusion about our ongoing cultural shift from text to imagery, from linear to parallel thinking, from encoded to experiential communication, and from symbolic to iconic math. The writing is not academic. I write as clearly and as explicitly as possible, I concretize rather than generalize. But the topic is math and equations do occur. My approach to ameliorate the potential avoidance of equations in a semi-popular book is to express these equations in concrete, physical and iconic images, to demonstrate that the symbolic abstractions that people avoid are in fact completely avoidable.

HM provides the details of a simple alternative that reunites math with effortless human understanding. The text is not evangelical.   The book demonstrates a simpler, more humane approach to pre-college math by expressing mathematical concepts with icons rather than with symbolic strings. This affront to twentieth-century symbolic math was widely forbidden up until a couple of decades ago. HM dives straight into the controversy by showing highly efficient iconic approaches to counting, arithmetic and logic.

ILLUSTRATIONS

The current illustrations and tables in the sample chapters are not polished. The particular style of these drawings can be changed if desirable. However illustration of the important ideas in the book is essential to the book's central premise, that the age of symbolic communication is coming to an end.

TECHNICAL CONTENT

The technical ideas in Section IV of the book are online at http://iconicmath.com, with specific technical content on these pages:

> Unit-ensembles
> Depth-value notation
> Container numbers
> Binary calculator
> Decimal unit calculator
> Decimal digit calculator
> Boundary logic

The book is not about these technical details, but rather about the historical, societal, electronic and conceptual circumstances that make these details relevant. The website is intended as a followup to the book for those who may want more detail about math than is mentioned in the book.

II. AUDIENCE

HM is a book about math that expresses the attitude of the general public: math is not a personal good. A primary audience is those who have been damaged by their experiences with math education, including parents of children experiencing these same difficulties. A secondary audience is those who are attracted to cutting-edge technical ideas.

BOOK SECTIONS

HM addresses four separate but conceptually threaded topics. Each might attract a different audience. The Sections and their potential audiences:

I. **math education** (Bringing Math Education Back to Earth)
> educators, math students, parents, schools

II. **math and computation** (Seeking Humane Mathematics)
> technical folks in science, computing and applied math

III. **media and virtuality** (Getting Lost in Virtuality)
> those who care about the digital revolution, tech enthusiasts, gamers, media folks

IV. **iconic math and innovative thinking** (Building a Humane Foundation)
> those who are willing to think differently about what math is

Section I on **math education** (particularly in the US) is intended to attract a wider audience than may be interested specifically in math or in mathematical innovation. Math trauma is widespread, and appears to be the driving force behind many "math" books currently sold. HM's attention grabber: our problems in math education are not attributable to students, teachers, parents, educational systems, teaching methods, testing, or cultural differences. *The problem is with math*

itself. All of our current debates miss this point because all hold math beyond criticism. The audience includes teenagers in math classes, disgruntled students and educators, parents who wonder how school math can be so upsetting, folks who like controversial ideas, and others with a concern about the problems of math education.

Section II on **math and computation** describes what is wrong with math. By drawing the analogy between mathematical concepts and theological doctrines, I hope to attract both atheists and matheists (non-believers in math), both those who are willing to look at their own beliefs and those who are happy criticizing the beliefs of others. This section may draw a technical audience with interests in math and in computation, folks who find fascination in technical concepts, and others who may be intrigued, tickled or curious about finding fault in a cultural untouchable. The attention grabber: *symbolic systems disassociate us from our bodies and from our shared reality.*

Section III on **media and virtuality** appeals to a wide general audience: those who read about the digital revolution, those who wonder about how digital convergence works, and those who have a deeper interest in the nature of film, television, and entertainment technologies. The materials on *virtual reality* reach back to the fascination for this subject in the early 1990s, and extend outward to current day gamers, Kinect and Playstation enthusiasts, and technology futurists. It is also of interest to those who see digital media and the internet more philosophically, as humanity spends more time immersed in the virtual/digital. The attention grabber: *our culture is abandoning physical reality and authentic experience in favor of virtuality* (imaginary information transactions that are purely sensory/cognitive).

Section IV on **iconic math** is my primary motivation for writing HM. The preceding three sections are intended to lead up to the plethora of novel ideas here. This section rebuilds math both conceptually and computationally, constructing a new (for this century) foundation for mathematics based upon physical experience and interaction. Iconic math is a partial solution to the problems raised in the prior three sections. It is intuitive and easy to learn and teach. It is connected to our bodies. Computation becomes manipulation. Iconic math integrates virtuality with reality by providing conceptual tools that embody unity rather than duality and eco-realism rather than theology. And it was a prevalent form of mathematics prior to the beginning of the 20th century. The attention grabber: here's *a new form of familiar math* to help us understand our experiences with symbolic math.

Section IV references thirty years of work, mostly in Silicon Valley research labs, mostly not published. Many folks are familiar with what I've been doing under the name Boundary Math, and I'm just now taking it public. It's clear that a book solely on iconic math won't gain an audience, so HM includes connections to math education, high technology, and media. The book itself does not depend on the technical work. I'm open to advice, of course, as to whether or not this is a good strategy.

TARGET AUDIENCES

HM attracts its audience by providing unique and novel content, a cross-disciplinary and cross-genre style, and absence of multisyllabic academic/philosophical language. It might sell to

- folks who are confused, frustrated, or simply interested in what's wrong and what's right about school math
- folks who are fascinated by technological progress and the cutting edge of science (dark matter, quantum indeterminancy, bio-ethics, digital convergence, genetic engineering, ...)
- history of science buffs who wonder how we got where we are today
- puzzle solvers who want to figure out how math works
- math-friendly folks who value growth and change
- contrarians who are interested in entrenchment of dysfunctional ideas
- folks who carry math anxiety
- older students of math
- teachers of math at any level
- parents who care about their children's math education
- adults who believe that math should return to its cultural origins

Many of these audiences have little overlap. Those interested in technology, for example, would probably not be math adverse, while those who are math adverse may not be motivated by innovative concepts. The design choice to address a diversity of audiences comes from my own multi-disciplinary, generalist training.

ORGANIZATIONS AND ASSOCIATIONS

The larger US associations of mathematicians and mathematics teachers include:

NCTM: National Council of Teachers of Mathematics	(membership: 100,000)
MAA: Mathematical Association of America	(membership: ~50,000)
AMS: American Mathematical Society	(membership: 30,000)
SIAM: Society for Industrial and Applied Mathematics	(membership: 12,000)
NEA: National Education Association	(membership: 2,500,000)
AFT: American Federation of Teachers	(membership: 1,500,000)
AAE: Association of American Educators	(membership: 300,000)
NAEYC: National Association for the Education of Young Children	(membership: 70,000)
NSTA: National Science Teachers Association	(membership: 50,000)

Each of these organization may publish a review/critique of HM, building potential notoriety and sales. An advantage is that there is no "educational product" being marketed, and no direct claim that iconic math will measurably improve math performance in schools. (This is a subtle issue; changing a universal standard is not actually possible, but providing hope to those abused by the standard is readily achievable.)

QUANTIFYING THE US AUDIENCE *(data from WolframAlpha and YouTube)*

There are a vanishingly small number of working mathematicians in the US, about 3000. If we count statisticians, actuaries and the like, there are about 100,000 jobs that require working with math extensively, 1/10 of 1% of the workforce at most. Mathematicians are not the audience. There are ten times more scientists who use applied math, 1% of the workforce, than math workers. Scientists are a secondary audience.

Sales estimates

3,000 scientists: The formal nature of iconic math may attract some of the 1.3 million folks in the scientific community. Subjective guess: Perhaps 1 out of 500 might purchase the book.

500 college math teachers: There are 100,000 college instructors in math related subjects. 1 out of 200.

2,000 pre-college teachers: There are 4 million teachers in elementary and high schools. Almost all of the nearly 2 million elementary teachers teach math. This is the large natural audience. With successful exposure, this audience might be 1 in 2,000.

4,000 college students: The 18 million post-secondary students might "discover" the book, but this audience may not materialize. 1 out of 5,000.

10,000 households with kids: There are 50 million elementary and secondary school students, representing close to 20 million households. Almost all of the kids are taking (or have recently taken) a math course. The book is targeted for the parents of these math students. Half may be preemptively appalled by the content. A penetration of this market at 1 out of 2,000 would mark success and provide a base for further growth.

1,000 high school students and graduates: By current estimates, 80% of students who are taking or who have taken math courses (i.e. all elementary and secondary students) have experienced math trauma. That's 40 million people, most of whom are too young to buy directly but who may contribute to sales. The estimate of 1 in 20,000 is for secondary students and high school graduates only.

8,000 general interest in new science: Generally interested technological public, including folks who follow new ideas. A guess.

1,500 institutions: The US has about 16,000 public libraries. I'm not familiar with penetration rates and profit margins for institutional copies, so this is a low estimate.

This tally suggests an initial audience of about

> ### *30,000 expected first-edition sales.*

Several of the above audience sub-groups provide room for substantial growth should the book (or its concepts) become popular, meme-like, or viral. The *parents of math students* group has the greatest growth potential, with a base of 50 million. *Post-secondary students* may find some philosophical/practical interest in the text, a base of 18 million. But the most promising sub-group would be the *general interest public*. This audience may add around 25 million more

potential readers to those already counted above. The Marketing Section includes ideas about how to reach these sub-groups.

THE INTERNATIONAL AUDIENCE

The ides of iconic math has much greater traction in Europe, although still with only a very few academics. The concepts are closely related to Eastern philosophies and may find traction in Asian markets. Without trying to quantify this audience explicitly, I'll guess that there are just as many potential sales outside of the US as inside the US, i.e. approximately 30,000 for the first-edition.

REALISTIC EXPECTATIONS AND THE POTENTIAL FOR VIRAL GROWTH

Math is not a subject that can be expected to find a large audience. Nor is there a great expectation for the attendant topics of computation, virtuality, digital convergence, or iconic principles. There is a significant possibility that HM may not crack the Amazon top one hundred thousand books. Thus marketing and advertising is essential, with particular emphasis on wide exposure to the non-fiction and technical reading audiences. There are several appealing reasons why HM might find a viral following, and thus may break into the national non-fiction best-seller list. These reasons include:

A unique critical stance on math and its desirability: Math has been an untouchable societal value, yet a huge percent of our population avoid it. HM speaks to a widely spread frustration, anger, and confusion. HM empowers a large population that has been abused and shamed by clearly explaining how math works, its strong and weak points, and the positive and negative contributions that math has made to our culture and to our cultural decision making.

A unique critique of math itself: Simple arithmetic is universally believed to be without flaws, math is unquestionably solid. HM shows clearly that math as it is taught in elementary school is *wrong* for humans and for the description of our reality. School math does not work, it does not correspond to our world or to our common sense about how numbers should work. HM describes simple changes in perspective that can re-anchor math to our physiology and to the authentic world. This perspective was universal a century ago and has only recently been lost.

Iconic math is visual and manipulable: HM's solution to humanize math can be demonstrated in YouTube videos, by iPad apps, and online by free iconic calculators. Addition and multiplication can be achieved with cups and beans on the kitchen table. It is easy to expose the perspective of HM to a large internet audience. What they will see and what they can experience for themselves requires no text and no explanation. It's also easy to contrast iconic math to conventional approaches, demonstrating advantages explicitly.

The content is provocative: It's rare that the flaws of a cultural universal can be exposed. It's rare that math can be shown to be both pretty and easy to understand. It's also almost always the case that substantive innovations in mathematical thought are rejected by the mathematical establishment. Math innovation comes with significant career risks.

III. ABOUT THE AUTHOR

Both a short resume and a longer curriculum vitae are available on the book's private web-page. For the record,

Education: PhD in Mathematical Methods of Educational Research, Stanford University 1987, with emphasis on Computer Science, Artificial Intelligence and Educational Psychology. MS, Statistics, Stanford 1983.

Academic faculty: at different times, Social Psychology, Education, Industrial Engineering, Computer Science, Software Engineering, and Mathematics.

Research labs: Atari Research Lab (Wizard), Advanced Decision Systems (Principal Research Scientist), Autodesk Research Lab (Director), Human Interface Technology Lab at University of Washington (Principle Scientist), Interval Research, Bricken Technology Corporation.

Expertise: Classroom teaching and instructional design, software design, computation, programming, distributed virtual environments, silicon optimization, educational innovation.

The life projects that have keep me occupied until now are, in chronological order: childhood, college, marriage, kids, professor, build a school, build a home, get a PhD, software researcher, lab director, principle scientist, chief technical officer, professor, second marriage, chief technical officer, professor. *Author* will be a welcome new addition to break the repetitive cycle that is beginning, especially so since I've accumulated thousands of pages of technical writing.

I travelled around the world a couple of times, attended 17 different schools before college, changed my major each quarter while in college, conflicted with each of my graduate school advisors in three different institutions, taught in half-a-dozen different academic departments, hand-built a 3000 sq ft home in an Hawaiian forest, failed in three separate start-up companies, and am a first-class theoretical software programmer. It's fair to say that technical writing is a hobby.

I've been on the national stage twice, once as the architect and Principal of one of Australia's first innovative schools (Coonara School, 1969), and once as the architect of one the first immersive virtual reality systems in the US (Autodesk Research Lab, 1988).   In the late 80's, virtual reality was highly visible, with national media attention. I was on the ground floor as a VR architect and advocate. I've never been a theoretical mathematician, but I have contributed as a recognized computer scientist to innovations in computational math, as both a software and a hardware designer. Throughout, I've been teaching. I'm comfortable with public speaking.

What's unusual is that since the early 1970s, I've studied and developed an obscure and completely misunderstood (and consequently ignored) type of math that is based Charles S. Peirce's Existential Graphs circa 1900 (amazon sales rank ~300,000) and on Spencer-Brown's Laws of Form circa 1970 (amazon sales rank ~800,000). There are only a couple of dozen people working in this field; in this small group I'm an international authority. Most of my work was

behind the closed doors of research labs and start-ups, so this topic has seen very little popularization.

I'm writing HM primarily to gain a wider audience for the idea that math is experience as well as concept. A galvanizing question: why should math be any different than our other cultural foundations such as music, dance, literature and art? I began working in the field of iconic math solely because it suggests major changes in how we think about math. My strategy has been to demonstrate that iconic math is both relevant and viable by developing it in software tools that address very challenging problems such as optimization of semiconductor circuitry and the anxieties attendant to math education. The technical work is thus both pragmatic and at the *foundations of mathematics*, a research area that is widely ignored by both applied and pure mathematicians. HM is intended to open this field to a semi-popular reading audience.

The table below shows the relationship between sections of the book and my professional life. The book incorporates much of my professional career.

Section I on Math Education

DipEd, Math Education	Monash	1972
Principal	Coonara School	1972-75
Assistant Professor , Education	State College of Victoria	1973-75
Lecturer in Education	University of Hawaii at Hilo	1976-79
Teaching and Research Associate	Stanford University	1983-84
PhD, Math Methods in Education	Stanford University	1987

Section II on Math and Computation

Assistant Professor, Computer Science	Seattle University	1996-2001
Math Faculty	Lake Washington Institute	2006-present

Section III on Virtuality

Intern and Consultant	Atari Research	1983-84
Research Scientist	Advanced Decision Systems	1984-88
Research Lab Director	Autodesk	1988-89
Principal Scientist	University of Washington HITL	1990-94
Chief Technical Officer	Virtual Express	1994

Section IV on Iconic Math

Software Developer	ADS and Autodesk	1984-89
Computer Science Consultant	Interval Research	1993-2000
Chief Scientist	Bricken Technology	2000-2005

HM Sections aligned with the author's experiences.

IV. COMPETITION AND ESTABLISHED INTEREST

Humane Mathematics is a book about math that takes the perspective of the general public. It is unique because it does not advocate that math is good or necessary. This differentiates it from the many books that address the sorry state of math education (especially in the US):

> Diane Ravitch (2011), *The Death and Life of the Great American School System*, Basic
> (amazon sales rank in January 2012: 370)

> Linda Darling-Hammond (2010), *The Flat World and Education*, Teachers College (amazon 2006)

> Paul Lockhart (2009), *A Mathematician's Lament*, Bellevue Library (amazon 30991)

> Howard Wainer (2011), *Uneducated Guesses*, Princeton (amazon 79671)

The critique is unlike books that identify how people misuse math, since a central theme is how math misuses people:

> Charles Seife (2010), *Proofiness*, Viking (amazon 27896)

> Joel Best (2001), *Damned Lies and Statistics*, U. California (amazon 41582)

> John Allen Paulos (2001), *Innumeracy*, Hill&Wang (amazon 74328)

The wide-ranging critique is rather like those that question the state of physics and other sciences:

> Lee Smolin (2007), *The Trouble with Physics*, Mariner (amazon 29704)

> Peter Woit (2007), *Not Even Wrong*, Basic (amazon 29867)

The unique content makes HM non-comparable to books that concentrate on the history and personalities of math. Although HM does trace math history, it is not from a perspective that glorifies the growth of a magnificent edifice. Rather HM describes how modern math has abandoned its physical and physiological origins. HM includes the stories of people who invented modern *iconic math*, stories that have not yet been told to a popular audience.

> Eli Maor (1991), *To Infinity and Beyond*, Princeton (amazon 3009)

> Eli Maor (2009), *e*, Princeton (amazon 47843)

> Alex Bellos (2011), *Here's Looking at Euclid*, Free Press (amazon 72400)

Math and philosophy can reach a general audience

> Edwin Abbott (1880), *Flatland*, Dover (amazon 3125)

> Clifford Pickover (2012), *The Math Book*, Sterling (amazon 13137)

> George Gamow (2000), *One, Two, Three...Infinity*, Dover (amazon 17016)

HM does have equations, however they are restricted to elementary school arithmetic. Several semi-popular books show folks how to understand conventional math. From the perspective of HM, all fall short since all others accept that math is the same as symbolic math.

Danica McKellar (2008), *Math Doesn't Suck*, Plume (amazon 4683)

Hans Enzensberger (2000), *The Number Devil*, Holt (amazon 7885)

Sherry Parrish (2010), *Number Talks*, Math Solutions (amazon 8387)

Suzanne Chapin (2006), *Math Matters*, Math Solutions (amazon 10272)

Thomas Carpenter (1997), *Making Sense*, Heineman (amazon 35263)

Jo Boaler (2009), *What's Math Got to Do with It?*, Penguin (amazon 44836)

Recently many math books have combined semi-popular exposition with historical context. HM does describe math and how it is used, but it does not attempt to teach the beauty of the subject. HM is about the dark side of symbolic math and the lighter side of experiential math.

Ian Stewart (2011), *The Mathematics of Life*, Basic (amazon 7481)

Keith Devlin (2011), *The Man of Numbers*, Walker (amazon 8175)

Keith Devlin (2000), *The Language of Mathematics*, Holt (amazon 12733)

William Dunham (1991), *Journey through Genius*, Penguin (amazon 23357)

Ian Stewart (1996), *What is Mathematics?*, Oxford U. (amazon 26384)

Paul Nahin (2011), *Number-crunching*, Princeton (amazon 38052)

Paul Nahin (2010), *An Imaginary Tale*, Princeton (amazon 43258)

Luetta Reimer (1994), *Mathematicians Are People Too*, Seymore (amazon 67186)

Tobias Dantzig (2007), *Number*, Plume (amazon 219625)

HM does have intellectual content, which most resembles

Douglas Hofstadter (1979), *Godel-Escher-Bach*, Basic (amazon 2224)

Charles Seife (2000), *Zero*, Penguin (amazon 26955)

Robert Kaplan (2000), *The Nothing that Is*, Oxford (amazon 109392)

HM directly addresses logical thinking from a new perspective. It covers some of the same territory as

Daniel Kahneman (2012), *Thinking, Fast and Slow*, Farrar, Straus & Giroux (amazon 61)

Cooper & Patton (2011), *Writing Logically, Thinking Critically* 7th ed., Longman (amazon 8717)

Seay & Nuccetelli (2011), *How to Think Logically* 2nd ed., Prentice Hall (amazon 25941)

HM addresses the impact of modern technology on math education, but it goes deeper into the relationship between math and digital technology:

Collins & Halverson (2009), *Rethinking Education in the Age of Technology*, Teachers College (amazon 12635)

Christensen, Johnson & Horn (2010), *Disrupting Class*, McGraw-Hill (amazon 32676)

There is an established curiosity about new scientific ideas. These books have little of the content of HM, but share a style and perspective.

Jim Holt (2012), *Why Does the World Exist?,* Liveright (amazon 448)

Keith Devlin (2012), *Introduction to Mathematical Thinking*, Devlin (amazon 770)

Nicholas Carr (2011), *The Shallows: What the Internet is Doing to Our Brains*, Norton (amazon 882)

The content of iconic math can be found only in quite esoteric texts:

Houser & Kloesel (eds) (1992), *The Essential Peirce*, Indiana U. (amazon 71392)

Spencer Brown (2008), *Laws of Form*, Bohmeier (amazon 939241)

The internet should also be considered as competition to books sales. Internet strategies are included next under Marketing.

V. MARKETING AND PROMOTION

Why should anyone want to buy a book about iconic math, particularly since people actively avoid buying any books about math? Well, that's the design dilemma I've been wrestling with. The short answer is that it is a new way of thinking, a humane math. Iconic math is also an old way of thinking, it reflects the cultural forms that people have used for thousands of years.

Two-sentence summary: *Humane Math* reconnects math to our bodies by replacing the symbols we have grown to hate with pictures we can easily understand. Find out why school math is bad for us, how it went wrong, what we are risking if we don't change, and how we can make math real again.

Quick pitch: Today's math is not built for humans, no wonder it hurts. Here's how to get rid of your math-anxiety, fix school math so that it is no longer destructive, and help math to make sense again.

Cognitive marketing: Our minds would benefit from a simpler, more natural math, a math integrated with our senses and our intuitions. Our sciences would benefit from a grounded math that is parallel, visual, manipulable and non-symbolic.

Personal growth marketing: Expressed "in pictures" math is utterly simple and intuitive. Both math education and math itself are destructive to confidence and to understanding. These problems can be corrected not by learning modern math but by relying on common sense and intuition.

Game and puzzle marketing: *Humane Math* provides a new way to look at common math, new tools for solving math problems, and new puzzles that illustrate how narrow our current view of math actually is.

Philosophical marketing: Math is alienating us from reality, disassociating us from what we experience and leading us into an ultimately self-destructive virtual reality of digital information and entertainment.

Historical marketing: The ideas in *Humane Math* were wide-spread prior to the twentieth century. Iconic math is a return to our cultural heritage, it is the *natural* way to do math that has evolved since the beginning of civilization.

MARKETING HUMANE MATH

HM shows people a different way to figure and a new way to think. The medium of written text, however, fails to convey the dynamic, interactive way that math works. The book will be supplemented with YouTube videos, Twitter bumper-stickers, downloadable apps that let people use iconic math directly, suggestions for manipulables that help folks do math with their hands, and a children's book about how math really works. These marketing extensions are described in the next section, **Extensions**.

The four Sections of HM appeal to different groups of people. Thus the marketing plan should be customized to reach each of these groups separately, as well as to reach a general audience who may be interested in any of the four focus areas (math education, math itself, digital media, innovative thinking). There are, of course, the traditional avenues of book reviews and print advertisements. The content of HM is also well modularized so that popular articles can be released in:

Forward looking popular magazines such as

New York Review of Books	Utne Reader
Atlantic Monthly	Science Digest

Web-based technology/culture magazines and blogs such as

Wired	Post Modern Culture
Extreme Tech	Huffington Post
Information Week	Technology Review

Education magazines such as

Chronicle of Higher Education	Rethinking Schools
Education Review	Technical Horizons in Education
Home Education Magazine	Tech and Learning
Media and Methods Magazine	

In addition to those above, review articles are likely in

New Scientist	Wall Street Journal
Scientific American	Science News
The Guardian	Choice
Discover	Publishers Weekly

Over the last three decades I've written literally hundreds of articles that might be adapted for these different outlets. The great majority of these articles are related to iconic math, so I'd think

it appropriate to release book selections from Sections I through III, and related articles for Section IV. The new math in Section IV is *formal* (i.e. legitimately mathematical), so that it may be of interest to technical readers as well as to educators. Since this content is simpler than grade school math, it may also reach the general audience. HM can be publicized independently from each of its different perspectives.

SOCIAL MEDIA

The new thinking introduced by iconic math is sufficiently motivating that an electronic media blitz may be worthwhile, in an attempt to achieve meme/viral status. This would require significant effort by building outlets such as a

> Facebook page, stocked with articles, commentary and puzzles
> Twitter feed, stocked with one-liners and bumper-stickers.
> A Pinterest board stocked with visual math images.
> A blog and discussion log about the ideas contained in the book.

The iconicmath.com website is a beginning.

Managing a viral campaign requires choreography, a campaign that would appropriately start once the book contract has been established. Once the book is underway, I'll contact old colleagues who might contribute to spreading information about the book, and who would be an excellent source-pool for recommendations, reviews and endorsements.

HUMANE MATH WEBSITE

I will be building a Humane Math website in support of the book, as a context for discussion of the ideas it presents, and as a responsive channel for technical questions or concerns. The current iconicmath.com website supports *only* content in Section 4. Iconicmath.com does provide a template for further website development, such as the underlying page layout infrastructure, social media options, and page analytics to improve both design and appeal. The blog and forum options on iconicmath.com are currently suppressed; they will be activated for the humane math site.

POTENTIAL YOUTUBE EXPOSURE

Counting YouTube video hits for content similar to or supportive of HM can provide a ballpark assessment of potential audience interest.   The largest group of views is young children's counting videos, ala Sesame Street. Several "Counting Numbers 1-10" videos have reached 5 million views. This indicates that there is a widespread parental interest in teaching counting to their children, a proportion of whom would be receptive to the ideas in HM.

The Khan Academy "Basic Addition" video has 1 million views, while "Basic Multiplication" has 350 thousand views. The methods that these two videos show resemble those in HM.

A teenage cartoon called "Algebra Aversion" has 6 million views. Successful math tricks and math songs draw about 1 million views each. The Ma and Pa Kettle satire on arithmetic also has about 1 million views. TED talks that criticize math come in at about 2 million views.

This analysis suggests that there is an incipient market of about a million people that can be reached via YouTube distribution of iconic math animations.

KEYWORDS FOR BRANDING

This is a summary of words/concepts that have already been mentioned. Many of these are rather technical; here I'm naming concepts that may have more desirable common names.

humane math   (have humanemath.com)
iconic math   (have iconicmath.com)
boundary math   (have boundarymath.com)

authentic math	authentic numbers	iconic numbers
boundary numbers	authentic addition	the Addition Principle
authentic multiplication	mathematical imperialism	the Multiplication Principle
ethnomath	diagrammatic math	parallel math
virtuality	symbolic detachment	mathematical mediation
virtual meaning	virtual semantics	iconic notation
unit ensembles	depth-value notation	calculating without counting
iconic algebra	iconic logic	boundary logic
unary logic	virtual pervasion	dominion, involution, pervasion
thinking by forgetting	void-equivalence	void-substitution

VI. EXTENSIONS

When HM is taken as a gentle introduction to iconic mathematics, marketing can be extended to include other avenues of popularization, rather like the action figures that are sold in hamburger stores to popularize the heroes in a forthcoming movie. These extensions relate only to Section IV of HM, where an alternative approach to school math is presented.

Here are several possible extensions, each marked subjectively with my personal thoughts about the quality of the idea. Each of these extensions has been developed in prototype, none require extensive development or refinement effort. A fair estimate is that all are 70% complete. I'll emphasize that each of these ideas is a marketing approach, none are necessary for the book to succeed.

YouTube Visual Computation   (exposure rather than profit; excellent potential)

A theme of the book is that math can be anchored to physical experience. Iconic math "computation" is inherently visual, physical and manipulative. The acts of addition, subtraction, multiplication, and division can be illustrated as dynamically changing images, rather than as

mental manipulation of symbols. The main idea is to appeal to elementary and secondary students, both as a simpler way to understand math and as a way to voice concern about the symbolic math taught in schools.

Several preliminary prototypes of this type of YouTube video are available on the iconicmath website on these pages:

>   Container numbers
>   Network numbers

The technical paper Syntactic Variety in Boundary Logic (on the page Varieties) shows a dozen ways that iconic arithmetic can be expressed as physical interaction. Some are 2D drawings, some are 3D manipulables, and some are 3D immersive experiences.

The Iconic Arithmetic Calculator (a $2 downloadable app; excellent potential)

The above work is not of salable quality, however I've built the same ideas into a calculator that works like a normal calculator, but shows dynamically each computation being performed as a visual manipulation. Sample shots of the iconic arithmetic calculator are at

>   Binary calculator
>   Decimal unit calculator
>   Decimal digit calculator

The calculator works in decimal as well as binary notation so that familiarity is assured. The display of numbers can be conventional numerals or unit-ensembles (tallies) that suppress the symbolic structure of digits. Calculations are performed using iconic arithmetic with depth-value notation, a mouth-full but visually very close to conventional notation. However, iconic form allows *much simpler* arithmetic concepts and calculations. These calculations include remarkable features not available with symbolic arithmetic (for example, addition and subtraction are the same thing; multiplication as well as addition is just putting units into specific places). The idea would be to advertise these features, as well as to advertise the essentially subversive nature of this *new approach to arithmetic that matches how we think* and is thus much easier to understand and to do.

It is feasible to bundle this calculator app (or at least an access code to download it) with the hardback edition of HM. It can also be sold separately as a novelty item to impress friends, as an educational tool, as a reminder of the simplicity of computation, or as a subversive device for math classrooms.

The Iconic Logic Calculator (a $2 downloadable app; slight potential)

Similar to the iconic *arithmetic* calculator app, we could develop and market an iconic *logic* calculator app. A description of some possible display formats is on the Varieties page. The difficulty with this idea is that people rarely need to do logic computations. Thus this app is more of a novelty than a useful tool. It does illustrate how logic itself can come in very different conceptual varieties while still leading to the same rational conclusions. Prototypes already exist.

Simple Arithmetic (a $10 children's book, heavily illustrated, 30 pages; moderate potential)

HM itself provides a map for adults to teach their kids sensible math. An illustrated book for children ages 6-9 showing how math can be easy and intuitive may have excellent sales potential. *Simple Arithmetic* is a grade-school primer on how non-symbolic arithmetic works. It returns common sense to math, removes the trauma of abstract symbols, makes sense to young children and to adults alike, and is greatly empowering.

Over the last decade, I've developed a strategy of writing and publishing *Humane Math* first, and then following it with the three technical volumes described below. I'm not particularly interested in an academic reputation, so these books are *in support of* the more culturally relevant ideas expressed in HM. While HM is intended to be profitable, these three books are not expected to appeal to a sufficiently wide audience. I have in mind a minimal sales target of 5,000 each.

Iconic Math Primer (a $30 semi-technical reference book; slight potential)

This is a how-to manual for the details of iconic math, including arithmetic, algebra, logic, and some other math application areas. It would include several of the more powerful technical concepts about using iconic math (such as void-equivalence and virtual logic). The Primer is mainly a textbook with many practice problems and several illustrations of applying iconic math to both easy and difficult problems.

Boundary Mathematics: Structure and Style (a $80 technical book; slight potential)

A collection of my technical papers, organized as a reference. Clear and detailed explanations of the technical details of how and why iconic math works, how it differs from conventional approaches, and how math can be reconnected to physical reality.

Boundary Mathematics: Hardware and Software (an $80 technical book; slight potential)

This book would include my software implementation and hardware design work on computational iconic math systems. Another collection of technical papers, this one for the Computer Science and technology communities.