Extract of:

What Kind Of Thing Is A Number?
A Talk With Reuben Hersh

(...)

HERSH: Now, when you ask "What kind of a thing is a number?" you can think of two basic answers--either it's out there some place, like a rock or a ghost; or it's inside, a thought in somebody's mind. Philosophers have defended one or the other of those two answers. It's really pathetic, because anybody who pays any attention can see right away that they're both completely wrong.

A number isn't a thing out there; there isn't any place that it is, or any thing that it is. Neither is it just a thought, because after all, two and two is four, whether you know it or not.

Then you realize that the question is not so easy, so trivial as it sounds at first. One of the great philosophers of mathematics, Gottlob Frege, made quite an issue of the fact that mathematicians didn't know the meaning of One. What is One? Nobody could answer coherently. Of course Frege answered, but his answer was no better, or even worse, than the previous ones. And so it has continued to this very day, strange and incredible as it is. We know all about so much mathematics, but we don't know what it really is.

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HERSH: When you say that a mathematical thing, object, entity, is either completely external, independent of human thought or action, or else internal, a thought in your mind--you're not just saying something about numbers, but about existence--that there are only two kinds of existence. Everything is either internal or external. And given that choice, that polarity or dichotomy, numbers don't fit - that's why it's a puzzle. The question is made difficult by a false presupposition, that there are only two kinds of things around.

But if you pretend you're not being philosophical, just being real, and ask what there is around, well for instance there's the traffic ticket you have to pay, there's the news on the TV, there's a wedding you have to go to, there's a bill you have to pay--none of these things are just thoughts in your mind, and none of them is external to human thought or activity. They are a different kind of reality, That's the trouble. This kind of reality has been excluded from metaphysics and ontology, even though it's well-known--the sciences of anthropology and sociology deal with it. But when you become philosophical, somehow this third answer is overlooked or rejected.

Now that I've set it up for you, you know what the answer is. Mathematics is neither physical nor mental, it's social. It's part of culture, it's part of history, it's like law, like religion, like money, like all those very real things which are real only as part of collective human consciousness. Being part of society and culture, it's both internal and external. Internal to society and culture as a whole, external to the individual, who has to learn it from books and in school. That's what math is.

But for some Platonic mathematicians, that proposition is so outrageous that it takes a lot of effort even to begin to consider it.

JB: Reuben, sounds like you're about to push some political agenda here, and it's not the Republican platform.

HERSH: You're saying my philosophy may be biased by my politics. Well, it's true! This is one of the many novel things in my book-- looking into the correlation between political belief and belief about the nature of mathematics.

JB: Do you have a name for this solution?

HERSH: I call it humanistic philosophy of mathematics. It's not really a school; no one else has jumped on the bandwagon with that name, but there are other people who think in a similar way, who gave it different names. I'm not completely a lone wolf here, I'm one of the mavericks, as we call them. The wolves baying outside the corral of philosophy.

Anyhow, back to your other question. The second half of my book is about the history of the philosophy of mathematics. I found that this was best explained by separating philosophers of mathematics into two groups. One group I call Mainstream and the other I call Humanists and Mavericks. The Humanists and Mavericks see mathematics as a human activity, and the Mainstream see it as inhuman or superhuman. By the way, there have been humanists way back; Aristotle was one. (...) For instance, one main version of mainstream philosophy of mathematics is Platonism. It says that all mathematical objects, entities, or whatever, including the ones we haven't discovered yet and the ones we never will discover-all of have always existed. There's no change in the realm of mathematics. We discover things, so our knowledge increases, but the actual mathematical universe is completely static. Always was, always will be. Well that's kind of conservative, you know? Fits in with someone who thinks that social institutions mustn't change.

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I searched for a suitable label for my ideas. There were several others that had been used for similar points of view--social constructivism, fallibilism, quasi-empiricism, naturalism. I didn't want to take anybody else's label, because I was blazing my own trail, and I didn't want to label myself with someone else's school. The name that would have been most accurate was social conceptualism. Mathematics consists of concepts, but not individually held concepts; socially held concepts. Maybe I thought of humanism because I belong to a group called the Humanistic Mathematics Network. Humanism is appropriate, because it's saying that math is something human. There's no math without people. Many people think that ellipses and numbers and so on are there whether or not any people know about them; I think that's a confusion.

JB: Sounds like we're talking about an anthropic principle of mathematics here.

HERSH: Maybe so; I never thought of that. I had a serious argument with a friend of mine at the University of New Mexico, a philosopher of science. She said "There are nine planets; there were nine planets before there were any people. That means there was the number nine, before we had any people."

There is a difficulty that has to be clarified. We do see mathematical things, like small numbers, in physical reality. And that seems to contradict the idea that numbers are social entities. The way to straighten this out has been pointed out by others also. We use number words in two different ways: as nouns and adjectives. This is an important observation. We say nine apples, nine is an adjective. If it's an objective fact that there are nine apples on the table, that's just as objective as the fact that the apples are red, or that they're ripe, or anything else about them, that's a fact. And there's really no special difficulty about that. Things become difficult when we switch unconsciously, and carelessly, between this real-world adjective interpretation of math words like nine, and the pure abstraction that we talk about in math class.

That's not really the same nine. Although there's of course a correlation and a connection. But the number nine as an abstract object, as part of a number system, is a human possession, a human creation, it doesn't exist without us. The possible existence of collections of nine objects is a physical thing, which certainly exists without us. The two kinds of nine are different.

Like I can say a plate is round, an objective fact, but the conception of roundness, mathematical roundness, is something else.

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Let me state three possible philosophical attitudes towards mathematics.

Platonism says mathematics is about some abstract entities which are independent of humanity.

Formalism says mathematics is nothing but calculations. There's no meaning to it at all. You just come out with the right answer by following the rules.

Humanism sees mathematics as part of human culture and human history.

It's hard to come to rigorous conclusions about this kind of thing, but I feel it's almost obvious that Platonism and Formalism are anti-educational, and interfere with understanding, and Humanism at least doesn't hurt and could be beneficial.

Formalism is connected with rote, the traditional method which is still common in many parts of the world. Here's an algorithm; practice it for a while; now here's another one. That's certainly what makes a lot of people hate mathematics. (I don't mean that mathematicians who are formalists advocate teaching by rote. But the formalist conception of mathematics fits naturally with the rote method of instruction.)

There are various kinds of Platonists. Some are good teachers, some are bad. But the Platonist idea, that, as my friend Phil Davis puts it, Pi is in the sky, helps to make mathematics intimidating and remote. It can be an excuse for a pupil's failure to learn, or for a teacher's saying, "Some people just don't get it."

The humanistic philosophy brings mathematics down to earth, makes it accessible psychologically, and increases the likelihood that someone can learn it, because it's just one of the things that people do. This is a matter of opinion; there's no data, no tests. But I'm convinced it is the case.

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JB: Earlier you mentioned the word beauty. What's with beauty?

HERSH: Fortunately, I have an answer to that. My friend, Gian-Carlo Rota, dealt with that issue in his new book, "Indiscrete Thoughts." He said the desire to say "How beautiful!" is associated with an insight. When something unclear or confusing suddenly fits together, that's beautiful. Maybe there are other situations that you would say are beautiful besides that, but I felt when I read that that he really had something. Because we talk about beauty all the time without being clear what we mean by it; it's purely subjective. But Rota came very close to it. Order out of confusion; simplicity out of complexity; understanding out of misunderstanding; that's mathematical beauty.

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BOOKS: The Mathematical Experience (National Book Award, w. Phil Davis) (Birkhauser)
Descartes' Dream (w. Phil Davis) (Dover)
What Is Mathematics, Really? (Oxford)
18 Unconventional Essays on the Nature of Mathematics (edited) (Springer)
Loving and Hating Mathematics (w. Vera John-Steiner) (AK Peters)

Quelle: http://www.edge.org/3rd_culture/hersh/hersh_p1.html
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JB: JOHN BROCKMAN is a cultural impresario whose career has encompassed the avant-garde art world, science, books, software, and the Internet. In 1973, he formed Brockman, Inc., the international literary and software agency specializing in serious nonfiction. He is the founder of the nonprofit Edge Foundation, Inc. and editor of *Edge* (www.edge.org), the highly acclaimed website devoted to discussions of cutting edge science by many of the world's brilliant thinkers, the leaders of what he has termed "the third culture". Brockman has the distinction of being the only person to have been profiled on Page One of both *The New York Sunday Times* "Arts & Leisure" (1966), and *The New York Times* "Science Times" (1997).