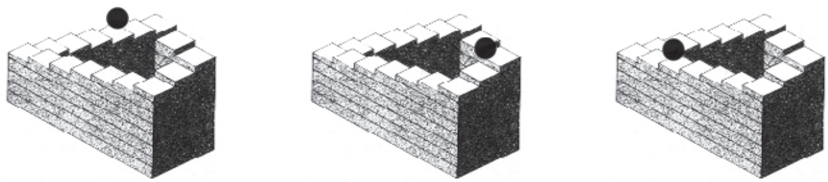
THE SAME LOCATION, FRIDAY NOVEMBER 31. 7PM.

INT. REORIENTED TO THE EAST. TONIGHT THE 2 LECTERNS ARE ACCOMPANIED BY AN EMPTY WOODEN EASEL TO THE LEFT AND AN OVERHEAD PROJECTOR AT CENTRE. IT IS HALLOWEEN, PUNCTUATED BY THE NOTES OF AN ENDLESSLY RISING CANON, ALSO KNOWN AS THE 'SHEPHERD'S TONE'.



etc.

D AND S ENTER THROUGH AN ARCH ON THE LEFT AND OCCUPY THEIR USUAL LECTERNS. THE RISING CANON ENDS ABRUPTLY. SILENCE. THEY PROCEED TO DELIVER, WORD FOR WORD, THE SAME INTRODUCTION AS THE PREVIOUS EVENINGS. S CONTINUES:

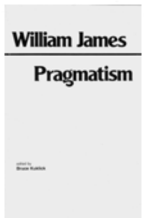
S: In tonight's first piece David is going to explain some elementary mathematics, and he'll use an overhead projector to walk you step by step through the idea. Now, although I know the title—not least because we've previously published a different piece under the same name—I'm not sure exactly where to place the emphasis; I'm not sure whether I should read it as NAÏVE SET THEORY, NAÏVE SET THEORY, or NAÏVE SET THEORY. In the end, I suspect it's all three at once, and I further suspect this is precisely the point of the talk. David ...

D PICKS UP THE RIGHT LECTERN AND MOVES IT ADJACENT TO THE OVERHEAD PROJECTOR PRECARIOUSLY BALANCED ON AN UPENDED WOODEN SHELF AT FRONT CENTRE OF THE AUDIENCE. TRANSPARENCIES ARE SHUFFLED, THOUGHTS COLLECTED. THE FIRST ACETATE IS LAID DOWN ON PROJECTOR BED. D BEGINS READING FROM IT.

> SOME years ago, being with a camping party in the mountains, I returned from a solitary ramble to find every one engaged in a ferocious metaphysical dispute. The *corpus* of the dispute was a squirrel — a live squirrel supposed to be clinging to one side of a tree-trunk; while over against the tree's opposite side a human being was imagined to stand. This human witness tries to get sight of the squirrel by moving rapidly round the tree, but no matter how fast he goes, the squirrel moves as fast in the opposite direction, and always keeps the tree between himself and the man, so that never a glimpse of him is caught. The resultant metaphysical problem now is this: *Does the man go round the squirrel or not?*

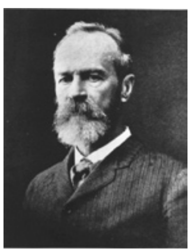
D CONTINUES.

He goes round the tree, sure enough, and the squirrel is on the tree; but does he go round the squirrel? In the unlimited leisure of the wilderness, discussion had been worn threadbare. Everyone had taken sides, and was obstinate; and the numbers on both sides were even. Each side, when I appeared therefore appealed to me to make it a majority. Mindful of the scholastic adage that whenever you meet a contradiction you must make a distinction, I immediately sought and found one, as follows: "Which party is right," I said, "depends on what you *practically mean* by 'going round' the squirrel. If you mean passing from the north of him to the east, then to the south, then to the west, and then to the north of him again, obviously the man does go round him, for he occupies these successive positions. But if on the contrary you mean being first in front of him, then on the right of him, then behind him, then on his left, and finally in front again, it is quite as obvious that the man fails to go round him, for by the compensating movements the squirrel makes, he keeps his belly turned towards the man all the time, and his back turned away. Make the distinction, and there is no occasion for any farther dispute. You are both right and both wrong according as you conceive the verb 'to go round' in one practical fashion or the other."

The excerpt that I just read comes from this book 

, which is relevant here tonight for a couple of reasons. First—the book is the printed translation of a series of spoken lectures that William James gave at Harvard University in 1907. It's unclear whether the texts published in this book are transcriptions of his speech or scripts for his speeches. Most likely it is some synthesis of the two. The second reason this book is important tonight is for its subtitle—PRAGMATISM, A NEW NAME FOR SOME OLD WAYS OF THINKING—which I think is quite nice. Why this title is directly relevant should become clear over the course of this talk.

This book was given to me by Anthony Huberman, a curator and friend in New York as part of a group reading project that he and Larissa Harris initiated for their ongoing exhibition series, The Steins. For one exhibition, this volume was passed around through a number of readers, all of whom left their notes in the margins. I'll be showing some of these noted pages. My talk tonight is organized around three books—this one is the first—with some notes, diagrams and equations inbetween. Although the talk will be at least substantively about mathematics and logic, I hope it is at least equally about something else at the same time.

William James  was a professor at Harvard University where he helped to define and develop the discipline of psychology.

He was trained as a medical doctor. He was widely read. He was born into a substantial New England family, the son of Henry James, Sr. and the brother of the novelist Henry James, Jr. His studies and free-ranging mind led him from psychology into logic, theology and mathematics. He might even be called America's first philosopher, if that's not a contradiction. (As an American, I'm allowed to say that.)

In PRAGMATISM, James makes an important distinction between two classes of thinking central to his argument and offers terms for each. He names the pair of terms 'rationalist' and 'empiricist,' 'empiricist' meaning your lover of facts in all their crude variety, 'rationalist' meaning your devotee to abstract and eternal principles. No one can live an hour without both facts and principles, so it is a difference rather of emphasis. The RATIONALIST sees the world as Eternal, Fixed, Complete, Total and Absolute. By contrast, the EMPIRICIST believes that the world is Temporary, Changing, Incomplete, Partial and Contingent. William James' PRAGMATISM wholeheartedly embraces the EMPIRICIST view. Following from the idea that the world is unfinished, James borrowed the name PRAGMATISM from another philosopher (a close friend, 30 years his senior) because he believed that the idea was incomplete.

PRAGMATISM was originally described by the mathematician Charles Sanders Pierce in his article 'How to Make Our Ideas Clear,' in the 'Popular Science Monthly' for January of that year[1] Mr. Peirce, after pointing out that our beliefs are really rules for action, said that, to develop a thought's meaning, we need only determine what conduct it is fitted to produce: that conduct is for us its sole significance. And the tangible fact at the root of all our thought-distinctions, however subtle, is that there is no one of them so fine as to consist in anything but a possible difference of practice. To attain perfect clearness in our thoughts of an object, then, we need only consider what conceivable effects of a practical kind the object may involve — what sensations we are to expect from it, and what reactions we must prepare. Our conception of these effects, whether immediate or remote, is then for us the whole of our conception of the object, so far as that conception has positive significance at all. Pierce named this method of producing truth PRAGMATISM and he equated it directly with EMPIRICISM. William James took Pierce's PRAGMATISM plus David Hume's EMPIRICISM to describe a RADICAL EMPIRICISM that forms the basis of his PRAGMATIC METHOD. He describes it crisply here where I've marked an asterisk

No particular results then, so far, but only an attitude of orientation, is what the pragmatic method means. *The attitude of looking away from first things, principles, 'categories,' supposed necessities; and of looking towards last things, fruits, consequences, facts.* *

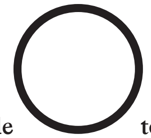
A SMALL BREATH. CONTINUING:

The PRAGMATIC METHOD then actually PRODUCES TRUTH by considering what practical consequences in the world a particular condition being either true or false will have. It is ONLY based on these effects that a given condition is said to be either true or not. (James describes this calculus as the practical cash-value of an idea.) And, this method for uncovering truth necessarily progresses OVER TIME and, crucially, ONLY IN ONE DIRECTION as a process that unfolds irrevocably FORWARD. James quotes Søren Kierkegaard saying:

We live forwards, a Danish thinker has said, but we understand backwards.*

*[James is referring to Sören Kierkegaard (1813-1855).]

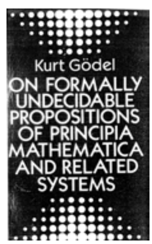
Please take special note of this—as we're going to come back to it later.

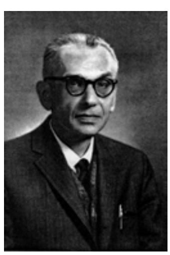
NOW. If I were to try to translate this distinction between RATIONALIST and PRAGMATIST into another system as a simple graphic diagram, I might reasonably use this circle  to stand for the RATIONALIST. The RATIONALIST insists that the world is one sealed, perfect and knowable system. Truths are eternal and absolute—they need only to be discovered through reasoned and logical investigation. Meanwhile, for the PRAGMATIST the world looks more like this .

DRAWING CIRCLE CONTINUOUSLY, IMPERFECTLY, ON THE O-H-P WHILE CONTINUING:

The PRAGMATIST insists that the world is always becoming and that truth CAN ONLY BE PRODUCED THROUGH PRACTICE. For the PRAGMATIST, time is an arrow that marches forward and truth comes along for the ride.

BRIEF SHUFFLING OF ACETATES WHILE REACHING BELOW TO PICK UP THE SECOND BOOK.

The next book I'd like to talk about is 

. Written in 1931 by Austrian mathematician Kurt Gödel, this book has been said to contain the largest idea of the 20th century. Gödel spent the majority of his academic career at the Institute for Advanced Studies at Princeton University, a free-thinking playground for fellows paid to produce original research with no particular publishing or teaching responsibilities. Albert Einstein, a fellow fellow at the Institute famously said the best thing about being there was the walk home each day with Kurt . Now, I'm going to try roughly explain the idea which is at the center of Gödel's paper to you. We will be passing through some advanced mathematics and I can assure you that I understand it just well enough to get through this talk here this evening. But first, it is important to have a little background on the state of mathematics (and METAMATHEMATICS.) leading up to 1931 and Kurt Gödel's paper ON FORMALLY UNDECIDABLE PROPOSITIONS OF PRINCIPIA MATHEMATICA AND RELATED SYSTEMS . British mathematician-philosophers Bertrand Russell and Alfred North Whitehead published PRINCIPIA MATHEMATICA (1910–13) and exhibited the fundamental parts of mathematics, including arithmetic, as a *deductive system* starting from a limited number of axioms, in which each theorem is shown to follow logically from the axioms and theorems which precede it according to a limited number of rules of inference. The PRINCIPIA MATHEMATICA attempted to capture all of mathematics in one complete, total and RATIONAL system. In this classically epic project (and its correspondingly large volume) Russell and Whitehead were convinced that they had reconciled all branches of mathematics into one coherent and total AXIOMATIC framework. AXIOMATIC is a term used to describe a mathematic system that proceeds from first overall rules through deductive reasoning, to account for all possible results. So, this system begins with a set of first rules or AXIOMS from which THEOREMS are derived and used to account for all possible STATEMENTS. The entire AXIOMATIC system is calculated, top-down, through a chain of logical deductive reasoning and a sequence of formulas (also known as a CALCULUS.)

But this correspondence between calculus and deductive system may be viewed in reverse, instead of marching from AXIOM to THEOREM to STATEMENT through a series of equations, you can proceed from STATEMENT to THEOREM to AXIOM through IN-ductive, rather than DE-ductive calculations. You begin at the simplest mathematical STATEMENT (for example, 1 + 1 = 2 (which is also nicely called a mathematical SENTENCE)) and proceed step-by-step to greater and greater abstraction (STATEMENT >> THEOREM >> AXIOM) ARRIVING AT FIRST RULES, LAST.

As opposed to a deductive, logical and complete AXIOMATIC approach, this inductive, from zero and incomplete method might reasonably be called NAÏVE. (We'll use this term anyway—as often in mathematics, a generically descriptive word is given a precise meaning.)

Then, the simplest way for me to explain the distinction between an AXIOMATIC and NAÏVE approach is by talking about how each would attempt to describe the set of whole numbers (in other words, all of the whole positive integers). In an AXIOMATIC system, the set of whole numbers would be defined as

WHOLE NUMBERS = { 0, 1, 2, 3 ... }

In this way, the whole set of whole numbers is assumed to contain infinitely many members. By contrast, a NAÏVE approach to the same definition of the set of WHOLE NUMBERS would mean Starting with 0, 1 is defined as the immediate successor of 0, 2 as the immediate successor of 1, and so on.

The NAÏVE approach does not assume that the set contains an infinity of members, but rather that it simply contains all of the members (numbers) that have (so far) been counted. In another minute, the set will contain more numbers, and so on and so on and so on. The AXIOMATIC approach assumes instead that the set arrives all at once, COMPLETE, with infinitely many members—all of the WHOLE NUMBERS—infinity in the palm of your hand. (Perhaps this distinction between AXIOMATIC and NAÏVE may remind you of the previous difference between RATIONAL and PRAGMATIC a little while back.)

NOW, Kurt Gödel had an intuition that the complete and rational system that Russell and Whitehead had laid out in PRINCIPIA MATHEMATICA was not nearly as rational or as complete as they claimed. And he was pretty sure that he could prove that even the simplest of all mathematics—plain whole number arithemetic (1 + 1 = 2) was INCOMPLETE and relied on at least assumption from outside of its own mathematical system. However, in order to PROVE (rigorously and mathematically) this idea within mathematics, Gödel could use only mathematic reasoning. However, mathematical statements have a funny quality—that is, any statement about mathematics is only a statement OF mathematics and never a statement ABOUT mathematics. For example, a mathematical sentence such as

1 + 1 = 2

means only what it says and can only use this limited (well, actually, infinitely limited) alphabet of the set of whole numbers to express itself. However, Gödel found his way out of this bind by DEVISING A 2ND SET OF NUMBERS. What he does is to provide a co-ordinating rule according to which a different number (which I shall call a *Gödel number*) is assigned to each string in his formal system. The rule also works in reverse: of every number 0, 1, 2, 3, etc. the rule determines whether the number is the Gödel number of a basic sign, or of a series of basic signs, or of a series of series of basic signs, so, together with the set of whole numbers

{ 0, 1, 2, 3 ... }

which can be used to form the sentence

1 + 1 = 2

Gödel introduced the second set of numbers, the Gödel numbers (which I'll write from here on with "quotes") refer instead to an entire mathematical sentence so

"3" = (1 + 1 = 2).

And, following from that, then you could say

"3" + "3" = (1 + 1 = 2) + (1 + 1 = 2)

and so on and so on. Gödel used his second set of meta-numbers to create a self-referential mathematical statement. And although I'll admit that I only partially understand what this means, I can, however, intuitively understand why it has been called the biggest idea of the 20th century. By using mathematics to talk about itself, Gödel was able to use the same mathematical logic to PROVE, rigorously and WITHIN ITS OWN SYSTEM that all mathematical logic is INCOMPLETE. All mathematics, even simple arithmetic, ALWAYS RELIES ON AT LEAST ONE ASSUMPTION THAT CANNOT BE PROVED WITHIN ITS OWN SYSTEM. Gödel found at the centre of mathematics—that temple of rational thought and logical abstract reasoning—a gaping hole. MATHEMATIC TRUTH WAS ABSOLUTELY NOT ABSOLUTE.

Gödel's self-referential mathematic statement is easier to understand translated into English. So the sentence

This statement is false.

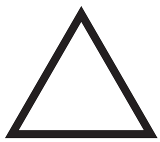
has a similar logic. As soon as you agree that "This sentence is false" is true, then it cancels itself. Try it yourself—it sets off a repeating loop with no obvious exit. It is a self-referential, but also self-contradicting, statement. Even extending this statement over two sentences as in

The following statement is true.
The previous statement is false.

only lengthens the loop. But, Gödel's mathematical sentence translated into English could be

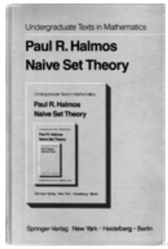
This statement is neither true nor false.

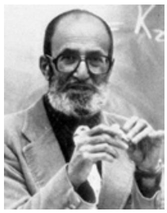
which is of course neither true nor false. By creating a pretzel logic that is both itself and truly about itself, Gödel found a way out of this infinite loop and in the process he described another way of understanding the world, the whole world, as absolutely, radically incomplete. Mathematical truth MUST ALWAYS BE PRODUCED (through practice) and NEVER SIMPLY DISCOVERED.

Translating Gödel's idea into a third system as a simple graphic figure, one might begin with a simple triangle  which, with a few more lines added here and there becomes the Penrose or Impossible Triangle  which Stuart mentioned in his introduction as some kind of possible mascot for this set of talks, this issue. The impossible triangle also appears in the photogram by Walead Beshty that's hanging on the wall behind me [gestures over left shoulder and is on the cover of this issue. If you begin to follow this quasi-three-dimensional figure from any corner proceeding around its surface, the surface appears continuous and correct. However, if you consider the entire figure, you may quickly conclude that it is an impossible shape! The Penrose Triangle has been called "impossibility in its purest form."

At every moment along its tracing, the figure is possible, but as soon as you attempt to reconcile the entire shape, you realize that it's not possible. Kurt Gödel would say simply, it is INCOMPLETE.

AGAIN, REACHING DOWN BELOW THE BASE OF THE OVERHEAD PROJECTOR, PULLS OUT THE THIRD BOOK AND HOLDS IT UP FOR THE AUDIENCE.

The final book that I'd like to talk about tonight is 

. Completed in 1960, Paul R. Halmos' NAÏVE SET THEORY is an introductory textbook for aspiring mathematicians to the complexities of Set Theory. Paul Halmos  was a Hungarian mathematician who spent the largest part of his academic career in southern California at UC-Santa Barbara. A distinguished mathematician in his own right, Halmos is best known for series of three pop-mathematic books called HOW TO WRITE MATHEMATICS, HOW TO READ MATHEMATICS and HOW TO SPEAK MATHEMATICS. As an exemplary explainer of abstract logic, Halmos was at least equally interested in how to communicate this abstract body of knowledge in a manner equal to its inherent beauty.

Paul Halmos is also remembered as a typographical sign. This is a mathematic proof of the statement 1 + 1 = 2 :

$$*54{\cdot}43.\quad \vdash :. \alpha, \beta \in 1 . \supset : \alpha \cap \beta = \Lambda . \equiv . \alpha \cup \beta \in 2$$

Dem.

$$\vdash . *54{\cdot}26 . \supset \vdash :. \alpha = \iota`x . \beta = \iota`y . \supset : \alpha \cup \beta \in 2 . \equiv . x \neq y .$$

$$[*51{\cdot}231] \qquad \equiv . \iota`x \cap \iota`y = \Lambda .$$

$$[*13{\cdot}12] \qquad \equiv . \alpha \cap \beta = \Lambda \qquad (1)$$

$$\vdash . (1) . *11{\cdot}11{\cdot}35 . \supset$$

$$\vdash :. (\exists x, y) . \alpha = \iota`x . \beta = \iota`y . \supset : \alpha \cup \beta \in 2 . \equiv . \alpha \cap \beta = \Lambda \qquad (2)$$

$$\vdash . (2) . *11{\cdot}54 . *52{\cdot}1 . \supset \vdash . \text{Prop}$$

From this proposition it will follow, when arithmetical addition has been defined, that $1 + 1 = 2$. ∎

The mark at the end of this proof (after the sequence of largely unintelligible symbolic manipulation which proceed the final result) is a solid black rectangular box (∎), set flush right. This mark (it can also appear in various sizes, filled or unfilled) typically follows the final statement of a proof and replaces the conventional "Q.E.D." (or QUAD ERAT DEMONSTRANDUM in Latin, which simply translated means THAT WHICH HAS BEEN DEMONSTRATED.) Halmos began replacing the Latin with this simple box and the typographical symbol now has his name—it is called the "Halmos".

Halmos begins his PREFACE with a curiously formed sentence:

Every mathematician agrees that every mathematician must know some set theory; the disagreement begins in trying to decide how much is some.

Now, in this simple sentence, Halmos has placed a paradox, or at least a productively complicated idea, that we will return to—if every mathematician agrees that every mathematician must know, then every mathematician agrees (ALSO and AT THE SAME TIME) that he/she must know some Set Theory. This idea of self-reference and self-inclusion is at the center of the mathematics of NAÏVE SET THEORY, which I will try to describe now.

Set Theory is the study of individual things (numbers, ideas, objects) and how these are collected into sets of things, sets of sets of things, sets of sets of sets of things and so forth. Halmos begins by laying out a few fundamental ideas necessary for working with sets. He begins with EXTENSION, which determines how additional members may be included within any particular set. He describes

If A and B are sets and if every element of A is an element of B, we say that A is a *subset* of B, or B *includes* A, and we write

$$A \subset B$$

or

$$B \supset A.$$

(You'll notice the additional symbols that this introduces here.) Halmos continues to describe SPECIFICATION, or how any item is said to be belonging to a set. So,

Let A be the set of all men. The sentence "x is married" is true for some of the elements x of A and false for others

and it can be written

$$\{x \in A: x \textit{ is married}\}.$$

A LARGER BREATH. D ASKS THE AUDIENCE IF THEY ARE INDEED FOLLOWING ALL OF THIS. THEN, CONTINUING:

Set theoretical notation is again added here. These simple principles can be followed to their logical end, to build towers of set theoretical logic and corresponding symbology, such as

$$A \cap \varnothing = \varnothing,$$
$$A \cap B = B \cap A,$$
$$A \cap (B \cap C) = (A \cap B) \cap C,$$
$$A \cap A = A,$$
$$A \subset B \textit{ if and only if } A \cap B = A.$$

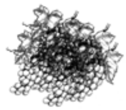
It is important however, that this logic is ALWAYS built incrementally, from simple assertions to more complex arrangements. This NAÏVE approach to set theory is in contrast to the AXIOMATIC Set Theory which proceeds from defining rules in a top-down fashion to generate consequent results. A NAÏVE Set Theory assumes always an incomplete accounting of all sets and therefore works its way out of the logical twister that stymied Bertrand Russell: GIVEN a set whose members are defined as all those members that are not members of that set, THEN is that set a member of itself? The NAÏVE SET THEORY that Halmos describes in this book finds a way out by acknowledging, even embracing, the idea that THE SET OF ALL SETS IS ALWAYS, ITSELF, INCOMPLETE.

Halmos then gracefully ends his preface with a suggestion which follows logically from his previous arguments: In other words, general set theory is pretty trivial stuff really, but, if you want to be a mathematician, you need some, and here it is; read it, absorb it, and forget it.

P. R. H.

Maybe a less abstract way to understand what Halmos is saying would be through analogy. So, let's take grapes: ONE GRAPE  can be reasonably thought of as a MEMBER. And, it belongs to the SET,

A BUNCH OF GRAPES  which, is itself a member of the SET,

A BUNCH OF A BUNCH OF GRAPES  and so on and so on.

At Gavin Brown's Enterprise gallery in Greenwich Village in New York, I've admired for a while the painted statement that wraps round the façade of the corner building. It says

the whole world + the work = the whole world

It is Work Number 300 by Martin Creed and implies a worldview in the form of a simple mathematical equation that seems to embed the logic of NAÏVE SET THEORY. Underlying this simple sentence is again simple Set Theory. The set of the WHOLE WORLD contains everything in the whole world and the WORK is a thing in the WHOLE WORLD, so then the WHOLE WORLD must necessarily completely contain the WORK. Adding the WORK back to the WHOLE WORLD leaves you again with only the WHOLE WORLD. This idea of art making echoes the ideas of James, Gödel and Halmos. The WORK is PRODUCED ONLY BY PRACTICE and IS ONLY ADDED to the WHOLE WORLD which, although it contains every thing in the WHOLE WORLD, is also, by definition incomplete. VERY lovely.

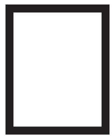
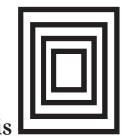
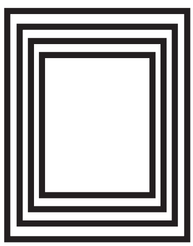
This is a photograph by Jason Fulford 

which Stuart commissioned about a year ago or so. It's an album cover from an obscure German popstar Ulrich Roski, made sometime in the 1970s.

And this is a photograph 

Jason sent me a few

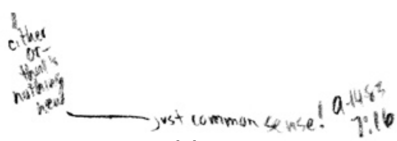
weeks ago that he made while cleaning out his files. I'm not sure if you can see this clearly, but on top of the original album cover is the Polaroid proof that Jason made for that final image. I suppose, or I hope anyway, that it is clear at this point in my talk why this might be interesting. Certainly, the recursive containers of Ulrich Roski's are interesting. But what is even more compelling to me is the way that this photograph immediately reveals a specific process of it's own construction that can ONLY HAPPEN FORWARD IN TIME—the original image, then the collaged cover image, then the Polaroid proof and finally this collapsed composite photograph. Time moves in one direction and this final result is ONLY PRODUCED BY PRACTICE.

Now, to translate Halmos' logic into a simple, graphic form we could draw this rectangle . Remember this is also the typographical mark, the "Halmos", used to mark the end of a proof. However, as Gödel (and William James) proved conclusively, every proof ALWAYS relies on an assumption outside of itself. This symbol could also reasonably stand for a set. So, we could draw a series of boxes like this  to describe a subset of the first set, and a subset of the subset of the set, and so on. Likewise, we could draw a series of expanding boxes around our original to represent the sets (proofs, truths) that surround and embed our original like this . Again, this idea that one proof, one truth, one set of truths necessarily contains a multitude of other (proofs, truths, sets of truths) returns on pages 6 and 7 of NAÏVE SET THEORY. My copy has been heavily, even manically, noted by the original reader. By way of concluding one of his arguments, Halmos admits that

The set A in this argument was quite arbitrary. We have proved, in other words, that

nothing contains everything,

But along with Halmos' argument, a second text runs parallel. And it is all marked clearly with readers' notes and even times indicating when the notes were made. As we read back through these pages, not only can we put back together Halmos' argument, but also reassemble the original reader's progressive comprehension of the argument. So for example, at 7:16 PM on September 14, 1983, noting the paragraph that appears above, the reader writes



9:52 aren't we mixing levels in the hierarchy? i.e. are B and A on the same level of the hierarchy?

And follows up with (at 9:52 PM), a question before

10:02 / assume that elements can belong to themselves!

realizing (10 minutes later) that we can Finally, by 10:10 PM, the reader has realized the elegance of Halmos' argument

and notes, congratulatorily 10:10 cute! Halmos follows his assertion "nothing contains everything" with

or, more spectacularly,

there is no universe.

And we get to watch as the reader comes to grips with that assertion

10:00 Maybe I'm not prepared for the philosophical implications of the above,

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but I am prepared for the philosophical implications of

or, more spectacularly,

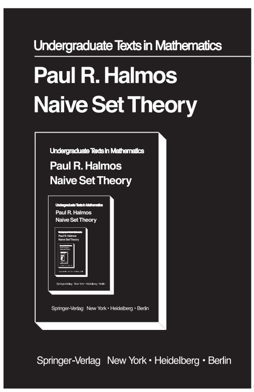
there is no universe.

Finally, to say what's already concrete in the writing, reading and noting

"Universe" here is used in the sense of "universe of discourse," meaning, in any particular discussion, a set that contains all the objects that enter into that discussion. 9-14-83 Very Impt! 7:18 ok!

A SLIGHT PAUSE WHILE PREPARING FOR THE CONCLUSION:

Now the talk here this evening, and the printed article when it appears (in a month or so) on the pages of DOT DOT DOT 17, is titled

NAÏVE SET THEORY 

. As Stuart mentioned, we've already published an article with the same name by Anthony Huberman in a previous issue, DOT DOT DOT 15. This is not an accident. Anthony's article fundamentally deals with the relationship between the amount of information provided about a work of art and the corresponding curiosity that results. He argues that too much information limits the potential power of an artwork and he lays out a number of strategies for stopping the flow of information. I suppose that his thesis is, roughly, that complete understanding kills any curiosity and produces a dead end. But instead, the ongoing process of attempting to understand (though never really understanding completely) is ABSOLUTELY PRODUCTIVE. The relentless attempt to understand is what keeps a practice moving forward. (I'm pretty certain that William, Kurt and Paul would agree with Anthony.) So then, this article both swallows and frames the original article with the same title, providing both a container and a retroactive context for the original.

In what seems like an unavoidable ending, we now return to the Man, the Squirrel and the Tree that they continue to circle and circle around, stuck in an infinite loop with no absolute answer to their metaphysical question forthcoming . But while they continue to go 'round and 'round, I'd like to come back to something that I said earlier we would come back to. You'll remember that William James quotes Søren Kierkegaard as saying

> We live forwards,
> but we understand backwards.

Well then, THIS IS TO LIVING. ∎

AN AWKWARD SILENCE HANGS FOR APPROX. 15 SECONDS, THEN APPLAUSE.