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But From This Moment On We Know Nothing

A thesis submitted in partial fulfillment of the requirements
for the degree of Master of Fine Arts at Virginia Commonwealth
University.

by

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Abstract

BUT FROM THIS MOMENT ON WE KNOW NOTHING

By Jacob A. Vincent, MFA

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Fine Arts at Virginia Commonwealth University.

Virginia Commonwealth University, 2012.

Major Director: Jack Wax, Department of Craft/Material Studies

As a student enrolled in Virginia Commonwealth University's Department of Craft/Material Studies' Master of Fine Arts Graduate Degree program, Jacob A. Vincent's sole obligation to the world for the time period beginning in September of 2010 and continuing through April of 2012 was to dwell on things, and to eventually produce something tangible as a result.

Having charged himself with the burden of indulging in the task of re-contextualizing all of existence, and ensuring that his peers and professors knew how vitally important that is, this thesis outlines select aspects of his research methodologies and provides a glimpse into the resultant conclusions.

Finding my Peers and Embracing Indulgence

It's disappointing that I'll never meet my colleagues. Mister Blue, protagonist in Paul Auster's "Ghosts," lives in New York City, present day. Peter Stillman, protagonist in Paul Auster's "City of Glass," lives in New York City, present day. I live in Richmond, Virginia, present day. Mister Blue will never know Peter Stillman, and Peter Stillman will never know Mister Blue. Neither of them will ever know me. Peter Stillman has no access to the window in Mister Blue's apartment, and Mister Blue will never read Peter Stillman's findings once he's published his book. Peter Stillman isn't going to be able to add the object I've discovered to his data set and Mister Blue won't read my copy of Walden.

There is no greater chance that either of these folks would meet each other than there is they would have the pleasure of spending an afternoon with me. Which is quite unfortunate, really, because we're each three enamored of the same pursuit. And there's little doubt that we would enjoy a cup of tea together over a discussion of the broken world and our individual plans to set things right.

Having set out on our own to reinvent the world, we're each engaged essentially in the same task. We've found common ground in the recognition that answers really are available.

Though the paths that led us here couldn't be more dissimilar we're now living almost parallel lives. Each of us has found ourselves newly emancipated from a set of constraints that had squashed any opportunity for independence we might have sought in the thirty-some-odd years that led up to this point. We've each been presented with a unique set of circumstances that has nudged us aggressively toward embracing a reevaluation of the most fundamental values of our world. And we've each embraced the task of redefining the present.

It's all about recognizing potential, really. Stillman, Blue, and I recognize the need not to take what's been presented and make due, but to take that next step - or rather that FIRST step - toward creating a world that does what we need it to do, unobscured by the limitations of the world as we found it. There's no denying that our motives are lofty - I'm not totally delusional. It's no small task to reinvent everything.

The standard day to day is tough enough without treating every encounter as a chance to rewrite the whole of existence. But chances like these are too rich to pass up. Stillman has

been locked up for a good deal of time. Decades. He's just now reentered the world and has been met with true freedom: he has no job, he has no ties to others, he has no external responsibilities. Indeed, his only responsibility is to indulge himself at every turn.

Mister Blue has finally been able to achieve true introspective independence. Though it wasn't apparent at first, Blue has been spending his time observing a man nearly identical to himself. Looking into a mirror for months, he's been tracking someone whose life so closely parallels his own that the conclusions he draws about his subject become the foundation for his own reinvention. He's been afforded the freedom to view himself without the subjective bias that ordinarily clouds our view, facilitating true introspection with almost total objectivity.

I have no double to let me view myself objectively and I've not just been released from a decades long stay in a penitentiary, but I have recently been set free. For 31 years - thats several decades, you know - I had been burdened by the world just like everyone else. And now, suddenly, I find myself unencumbered. I'm no longer living in the world like everyone else; I'm a graduate student enrolled in Art School. For those of you who aren't aware of the consequences of being a graduate student enrolled in Art School, I can briefly sum up my

situation as follows: it is my job to dwell on things, and to eventually produce something tangible as a result. That's it. No Joke.

Speaking practically, this has some pretty significant ramifications with regards to the freedoms I'm afforded and the choices I can make. Peter Stillman spends every day working hard at whatever he needs to be working hard at. I, like Peter, am charged with the burden of indulging myself as I work hard at whatever it is I decide I need to be working hard at. It just so happens that for the time being, I've decided that the thing I need to be working hard at is reinventing the world, re-contextualizing all of existence, and making sure that my peers and professors know how vitally important that is.

Peter Stillman's stated goal is a reinvention of the language we've been passed down, noting that it no longer has the means to say the things that we need to say. Mister Blue has unwittingly been placed into a situation that requires him to watch another man and draw conclusions, and the conclusions that he is drawing help to define his own revised place within the world. I've charged myself with the fabrication of a universal understanding.

The format for understanding that we're asked to accept is lacking in so many arenas that a reinvention is the only

recourse remaining if we hope to make any progress at all. For the three of us, our current pursuits surround interpreting the world and making it our own, processing what's presented to us in a novel way. Thankfully we don't need to start from the beginning; instead we can take what's been left behind and reformat, reestablish, and renew the facts to build a model of the truth that more accurately reflects a more accurate truth.

From Now On, Everything That Happens Will Effect Everything Else¹

Anything can mean anything, as it turns out. Within our research we never stumble upon answers because the accurate answers haven't been figured yet. Instead we learn to take those bits and pieces of the inaccurate answers that seem reliable, we fit them together, and we end up with something better. But thankfully there's this thing called emergence, which means that we don't need to start from scratch².

Emergence tells us that we don't need new data to answer these new questions. Every piece of the puzzle is already here. Indeed if you're willing to accept as valid the first law of thermodynamics, then you're ready to believe that the pieces and parts that will eventually make up our answers are all around us. There is a finite amount of _____ out there. But the _____ that this _____ can represent is unending. While there may not be any new ideas out there, and certainly no new physical "stuff," the potential that this _____ carries is infinite. So we take this raw material and we build; we each create a novel existence from the same old building blocks. It all represents our desperate hope to simplify everything into

1 Paul Auster, Ghosts

2 It's 2012. I mean, where can you even find scratch these days? According to Hennessy Youngman, we ran out of scratch some time in the 1970's

something. Not using more to get something more, but using everything to get something less. Everyone shares the means and the materials, but we don't need to share the resultant ideals; we're all living in the same world but we're not all seeing the same stuff.

For my purposes, emergence has come to mean reinventing the world on my own terms. It's about reconciling what I'm presented with relative to what fits, what flies, what suits my needs. Because there's nothing out there, truly. The world only exists in our processing of it.

I wrote something in my notebook a while back: "You're nothing, but everything is yours." For the life of me, I can't remember if these words, in this order, came directly from my brain, or if these words, in this order, came from some piece of writing that I read or some bit of speaking that I heard. But the very meaning of this statement tells me that, in the end, the source of these words, in this order, is of no importance. The content is vital and the message has the potential to define an entire existence, and the fact that I found value in this statement means that it's mine. But it's not important where it came from. This is how it starts: we find a piece that resonates right and we work it into the model.

Chances are that what you expect to happen will happen most

of the time. But once in a while we're surprised. And that's all it takes. Once in a while, we just need to be confused, astonished, convinced that it's time to turn everything upside down.

Ample Opportunities to Be Confused Around Here

I've begun logging those moments when I find myself thinking in thoughts, and I've come to realize that they comprise more of my inner monologue than I knew. These are the moments when sentiments appear not preceded by words, or even completely flushed out as ideas. They just come to be, the way a dream appears in our heads; in a single moment there's nothing and then there's this enveloping understanding that the world is something different, something new. Suddenly I find myself filled with notions of time passing, of present, of recent past, of all these things that we're accustomed to experiencing along the standardized chronology of living.

It's these moments that are so confusing. Timelines fall away and life just happens to you. Or happened to you. There's no time for it to happen to you, because in a moment, maybe less than a moment, it's already happened to you. Full of memories, engulfing the present tense. The whole thing. Words are too cumbersome, slow, and vague, to act as the vehicle for these instant experiences.

But words confound things in a deeper way than this. Words cannot convey the truth because they are one step too far

removed from true thought. We can't be expected to be able to use language to express thoughts, because the two are different things. The problem really, (and this is where things get muddled), is that words are the tool we're expected to use for expressing our thoughts if they are to live outside of us.

The hypothetical scenarios that we play out in our minds aren't hypothetical scenarios at all, as it turns out. Because everything happens. The world that we experience need not be confined to the physical, tangible, slightly ovoid thing that spins around on some confusing and inconsistent axis; the world exists in the space between our ears or behind our eyes. In truth there's a narrow delineation between the the tangible and the imagined. The dream state that we inhabit while we sleep need not be dismissed once we wake up.

The moment of confusion that can overwhelm us when we wake up, (as we inhabit the place between the physical and the imagined), is confounding only because it doesn't fit within "the rules." The reason is simple: we haven't been prepared for the fact that experience doesn't need to be tangible to be real. Whether it happens on a soccer field in New Jersey, aboard the space station orbiting Earth, or in that split second after you fall asleep, experience becomes real in the moment that it's processed, whether through our physical senses or in our heads. The myth that life is what takes place while we're awake has the

potential to rob us of the richest of experience.

What happens when you find out that all of the rules you'd been adhering to aren't actually the rules at all? When you discover that the constraints that have limited your experience are something different, new, and completely unexpected? The answer to this question is one that we come to terms with on a daily basis, but the question to this answer is something that is almost never spoken. The rules, you see, live in some other place. They're not something that we encounter on a level shallow enough in our consciousness to even be aware of.

All kinds of things are happening in our world, our universe, our brains and our bodies, that take place without us physically processing them at all. While incredible things are happening in the back rooms that we don't know about, it's the completely monotonous things that are happening in the forefronts of our minds that are so essential to our ability to get through the day. The passage of these monotonous things has become so commonplace that we don't bother to process them, or to recognize that they take place at all.

It's like that thing that happens right before I realize that I'm mistaken. It happens to me frequently. I'll glance at a newspaper headline and misread it slightly. Or I'll witness something happening or overhear something and I'll start to process

it. And in the next moment disappointment sets in as I finish processing whatever it was and I realize that I misheard. I misinterpreted the situation. But the misinterpreted notion is so much better than the "real thing." My standard reaction has traditionally gone something like this: "whoops." I realize that I'm mistaken and I categorize it as just that: it was a mistake, and it's time to get back on track.

But now that I can make this place whatever I want it to be, it's come time to embrace the mistakes that are so much better than the truth.

The rules don't count in the way that we're brought up to believe: we're quick to dismiss the things that don't seem to follow the guidelines of existence as some fluke of perception or the work of simple misunderstanding. Once we internalize the real truth that the rules aren't so sturdy after all, we discover that the pieces of our experience that don't fit might be the most important pieces of all. And recognizing that there are parts of life that live outside those confines is the first step toward giving ourselves permission to rewrite the rules to better match the reality we'd like to be living in.

Research Methods to Repair the World

Peter Stillman's research consists largely of collecting dead still objects, but they no longer serve the function that they were intended for. And as a result, we don't have the language to define them.

Stillman's attempt to reinvent language is a reevaluation of the whole thing. But it's not starting from scratch. This is a second try at getting it right by re-contextualizing everything. We're close, but whoever put this whole thing together didn't get it quite right. In form of objects. These objects could be anything. An old doorknob, a stick that seems important, the sleeve of an old denim jacket. They're objects that language and words have left behind. These objects are

All of the building blocks are here, it's just a matter of reassessing what things are, what they do, and most importantly what they CAN do. You certainly can't fault whoever was responsible for this first attempt. They came pretty close, but they didn't have the benefit of our genius, nor access to the clarity of our minds. It's true when Stillman says that nobody has understood things the way that he has. For that matter, no one has understood things the way that I have.

The most exciting part of all of this is realizing that for the first time I have the chance to embrace that thing that we all want but we're too scared or too lazy or too timid to enact: I'm gonna do some nesting. I'm gonna make the world exactly what I want it to be.

I get to watch Mister Black and decide for myself what he's up to. And I don't need to wait to find out if I'm right. I think he might be copying down Walden in a notebook and I play it out. Why would he be copying Walden into a notebook? Is he trying to memorize it? Is he editing it? Maybe Mister Black recognized some major oversight in the text and is gonna fix it.

So I investigate; I indulge. Perhaps if I start copying Walden down too, I'll uncover this new truth that Black has found. Something will happen, for sure. There's a moment when it comes time to make a choice. Do I follow this notion through, or do I let it slip away? Do I work this new piece of data into my set or do I dismiss it and move on?

"... But from this moment on we know nothing."³

The work I've presented is an indulgence. It's a merging of the research methods employed by the colleagues that I've taken on as a part of my team. Together with Peter Stillman and Mister Blue, I'm making my mark on the world by posing a question to viewers.

I've presented a physical venue for viewing an exercise in indulgence. When I learned that Mister Black had considered copying down the text of Henry David Thoreau's *Walden* in a notebook, I recognized it as an opportunity.

The act of transcribing can be many things: mediative, educational, monotonous to be sure. But more than any of these, I recognized that to copy down this tome was an opportunity to indulge a whim and to see where it might take me. In this new world that I'm building, taking this leap is just as logical as dismissing it.

The results of my indulgence are secondary - the impact of this exercise, this indulgence, on me personally is not something that viewers of the work will have access to. What's valuable, here, is the moment of confusion that a viewer

³ Paul Auster, *Ghosts*

experiences when they realize that the character copying all 347 pages of Walden into a notebook with a pencil isn't a character in a book but a person nearby. It's confusing to think that someone might have been motivated enough to carry this out, and it sets minds reeling.

I've also posed a question in the form of a physical thing inviting viewers to become participants in Stillman's research. Within a pristine tinted glass case, atop a beige velvet cushion, lies an enigmatic object.

We assign value to physical objects for lots of reasons. When we see an object that has been cared for the way this one has, literally resting atop a pedestal, we recognize that it must carry some deep and significant value. So we set out to determine why, precisely, we admire this object.

The source of this object is as confounding as it's existence. Some time ago I was enlisted by my friends Justin and Laila to help prepare for their move from Seattle to Boston. Beneath their piano I discovered a steel object. At first I thought it might be one of the casters meant to ease the brutal shoving that accompanies any attempts to move one of these outdated beasts with a cast iron plate hidden inside. I got down on my knees and took a look, because something didn't seem quite right. Beneath the piano were three other casters, yes, and a

naked corner, sure. But as I examined the mount that would hold this missing wheel in place, it was immediately clear that the object I held in my hand had not had it's home in the empty hole there.

This thing had no wheel to help a piano roll around a room, it had no way to mount to the piano, and it was of a different construction than the rest of this piano and the accompanying fittings. And here is where language fails us. Because we have no word to describe a steel object that resembles a caster but isn't. There's no place in our lexicon for a steel _____. Yet without fail, anyone who sees this object asks the same question. "What is it?" It's curious, the pull that this _____ carries with it. We're quite accustomed to seeing items that we can't immediately place and we rarely demand to know their purpose or their title. But no doubt because the object has been displayed with prominence since the moment I returned from Seattle, folks assume that is a _____ of significance.

And then there's the title accompanying the work:

If you only knew how people have misunderstood me. My work has suffered terribly because of it: my projects, my investigations, my experiments. But who can fault them? For the world no longer fosters understanding. It's for this very reason that my motives are so vital; right now, I'm engaged in one of the most important things I've ever done. I'm on the verge of a significant breakthrough, and if all goes well I believe I'll hold the key to a series of major discoveries.

For the time being I'm merely collecting data, of course. Next I'll have to coordinate my findings. It's highly demanding work and it wears me out, to be sure. But it's worth it: anything for the truth. I realize that I've taken on quite a bit but if I can lay the foundation, other hands can do the mending. The important thing for now is to reveal the premise: the principle: that theoretical first step toward restoration. You see, no one has understood what I've understood. They don't recognize that the world is in fragments. I'm the only one.

I'm in the process of inventing a new language that will at last allow us to say what we have to say. When the world was whole, we felt confident that our words could express things. But little by little that wholeness has broken apart, shattered, collapsed into chaos. All the while our words have remained the same, and now every time we try to speak of what we see, we speak falsely. Our words no longer correspond to the world, and it's made a mess of everything.

But just as everything else, words are capable of change. The problem is how to demonstrate this. My brilliant stroke has been to confine myself to physical things, to the immediate and the tangible. Consider a word that refers to a thing - 'umbrella,' for example. When I say the word 'umbrella,' you see the object in your mind. You see a kind of stick, with collapsible metal spokes on top that form an armature for a waterproof material which, when opened, will protect you from the rain. This last detail is important. Not only is an umbrella a thing, it is a thing that performs a function - in other words, expresses the will of man. When you stop to think of it, every object is similar to the umbrella, in that it serves a function. A pencil is for writing, a shoe is for wearing, a car is for driving. Now, my question is this: What happens when a thing no longer performs it's function? Is it still the thing, or has it become something else?

When you rip the cloth off the umbrella, is the umbrella still an umbrella? You open the spokes, put them over your head, walk out into the rain, and you get drenched. Is it possible to go on calling this object an umbrella? In general, people do. At the very limit, they'll say the umbrella is broken. But this is a serious error. Because it can no longer perform it's function, the umbrella has ceased to be an umbrella. It might resemble an umbrella, it might once have been an umbrella, but now it's changed into something else. The word, however, has remained the same. Therefore, it can no longer express the thing.

It's imprecise; it's false; it obscures the thing it's supposed to reveal. And if we can't even name a common, everyday object that we hold in our hands, how can we expect to speak of the things that truly concern us? Unless we can begin to embody the notion of change in the words we use, we will remain lost.

Among the great many truths in the world is this one: a man named Digby once believed something false. To take an interest in that false belief is not to reject the truth, as 'they' have come to believe, but only to wish to fill out our picture of the truth with as much detail as possible. And not because of some aesthetic inclination to the baroque, but rather because false theories are an important part of the puzzle that we should be trying to complete: that of determining the range of ways

people conceptualize the world around them.⁴

The brokenness is everywhere, the disarray universal. You have only to open your eyes to see it. The broken people, the broken things, the broken thoughts. Our surroundings provide an inexhaustible storehouse of shattered things. And so each day I go out and I engage this brokenness. But I don't repair. Instead of adding things of one kind to other things of their kind, I've uncovered the co-operation of things of unlike kinds. And the emergent truth is that we no longer need something new to get something new, or something more to get something more⁵: the building blocks of the now are incommensurable - they can't be reduced to their sum or their difference.⁶

When I've finished, the results of my investigation will at last provide a means for communicating faithfully. That's the premise of the premise, so to speak. The world is bound by secret knots in need of revealing; vital things are happening in the back rooms and well-lit alleyways that we pass by without a second thought. But these are the places where we'll find our answers and our truths. Only in recognizing the interconnectedness of seemingly unlike things will we be able to reassemble the fragments that made up the old whole.⁷ And as a result, the parameters in the theory describing pieces of the old no longer differ from the parameters describing composites of the new.⁸ My data set will at last facilitate understanding: from now on, everything that happens will affect everything else.

Within my research I never make a mistake, it's a function of my genius. It won't be long now before I put my findings in order. Then great things will begin to happen. Once I've published my next book, you'll know. It will be the most important event in the history of mankind. Until then I have to keep it to myself. But from this moment on, we know nothing.⁹

Viewing artwork in the gallery setting we're accustomed to seeing words on the wall. It's not uncommon for an artist or an institution to include writing that is intended to contextualize what we're looking at, so it's not surprising that the majority of viewers recognize the writing on the wall as a descriptive text. But in truth, the 1,059 words on the wall are the title

4 Justin E. H. Smith, 2011.

5 Murray Gell-Mann, 2007.

6 G. H. Lewes, 1875.

7 Jacob Vincent, 2012.

8 Paul Dirac, 1963.

9 Peter Stillman. 1983.

to this piece, providing the most concise entry point possible. For we know that words are not nearly as concise as we had hoped.

So truly, the work presented here provides opportunities for viewers to be consistently confused, and to begin working things out for themselves. And the truth is that there is no answer, and there is no "getting it." This work does not provide any answers. Instead it provides a glimpse into the research methods of three individuals who are actively working to repair the world.

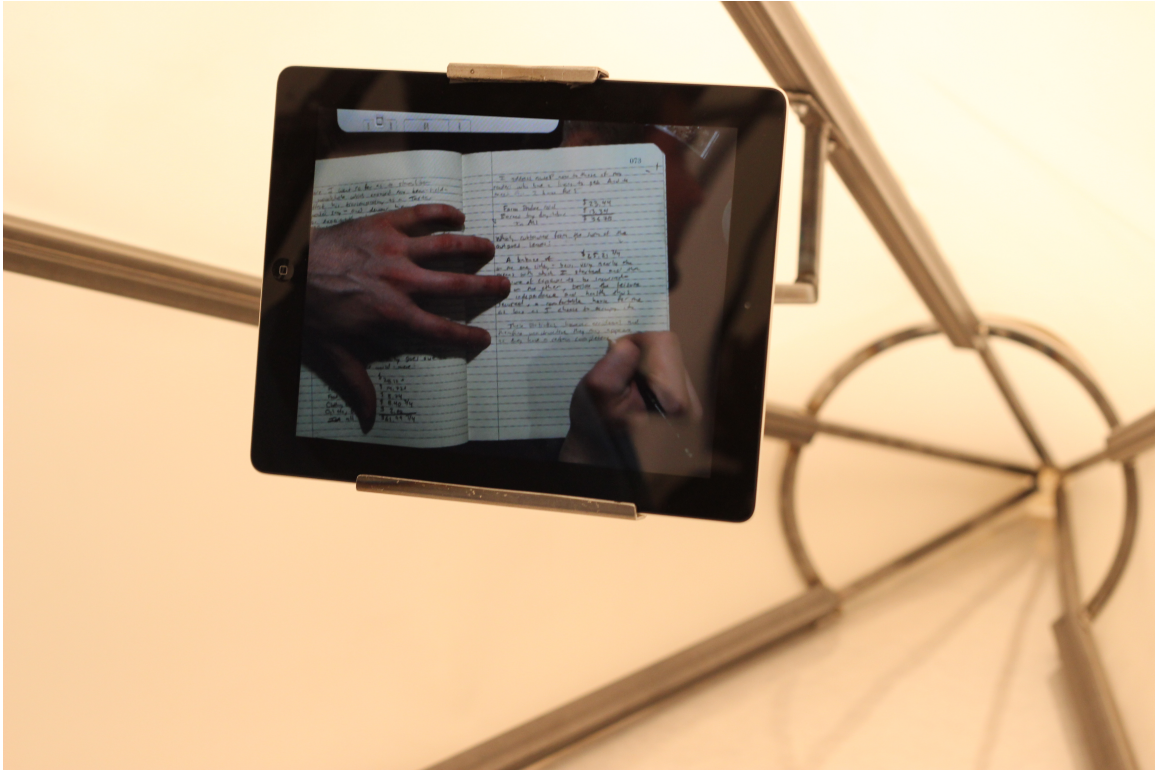
Appendix A:

**Masters Thesis Exhibition
Installation Images**









Appendix B:

Everything I Know is True
2nd Edition
Published October 2011

Everything I Know Is True

Very, very, important notes on the state of everything.

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This book cements the recognition that the stuff in my head holds as much import as the stuff in their heads. The only things are the things that I know, the things that I think, and the things that I believe to be true. I wrote it down.

The world is in my head.
My body is in the world.

- Jon Kessler

In my attempts to make sense of it all, I vacillate between hoping desperately to understand how everything works and learning to accept that I don't understand how anything works. That I likely never will understand how anything works. And that that's alright. Knowing that I don't know is, perhaps, the most important thing I know.

TAKING ON FAITH

Since the minute the clock started ticking, from the very moment that I became an individual aware that there was such a thing as a thing, the sciences have been presented as a source of truths. In support of these truths, I've always assumed that there existed some data set representative of the most fundamental principles: 'The Facts,' I supposed, were based on a few static measurements, plain and simple.

We know that the unknown is what drives exploration; the quest for knowledge is obviously fueled by the notion that there's more to learn. But at the core of this quest, it's appropriate to expect that there would exist a sturdy foundation - a starting point from which we could launch our endeavors.

As I dive deeper into the framework for understanding that natural philosophy has laid out, I am at once dismayed and encouraged by my discovery of the unknowns all around us. As it turns out, even the simplest truths are up for debate. But still, I believe. I accept the explanations provided by the sciences wholly.

And not because they're consistent or reliable: we know that they're not. The rules governing the sciences flex constantly. Even in those brief moments when the majority of our credible sources are in agreement over which natural force makes things 'go,' or which particle dominated after that big crash that maybe might have set all of this craziness in motion, there will always be a camp of equally credible experts nagging in the corner, yelling "Hey! No! That's not it at all. It was this other thing that made all of this stuff into stuff." And still there's another guy next to them, bewildered, ranting. "Hey! Wait a minute! That big smash y'all are talking? That's bull!"

So it's not reliability that makes science credible. It's the thrill of the hunt accompanying our attempts to explain that sets the sciences apart. While the 'facts' we

can convincingly justify are pretty exciting (or at least the method we've developed for explaining them is exciting), it's the way we talk about the unknown that makes me want to believe.

Elusive conclusions drawn from theories loosely based on the master data set would seem to be the least believable. Evidence exists nowhere and subjectivity is everywhere. But in all of this uncertainty, I recognize stability. Because when we admit that we don't know much, we earn some credibility. There's something going on out here that we don't understand. It's wild, weird, unpredictable stuff, and so it's only appropriate that they can't explain it away.

There's an interesting category of ideas that exists in a constant state of flux these days. It consists of notions about the mechanics of our universe, about the way things work, that is backed up by few true measurements. These theories about the fundamental concepts that define mechanics are supported instead by other theories. They're not based on conclusions drawn from recorded observation. These notions exist because they must exist; because if the theories in question aren't

valid, the framework that we've fabricated to support our understanding of existence would crumble.

The big unknowns in science provide the impetus for investigation; the answers are always right around the corner from being understood just a little bit better. The truths behind these unknowns are knowable, we think. We're pretty sure that there are answers available, they just happen to be out of reach at the moment.

THEY AND THEM

Before I move on, I should address what I'm sure will continue to frustrate you. I freely use a pronoun makes you uneasy. I know. When I speak about 'them,' folks always want to know who I'm talking about. Well, to be honest I don't know who they are. I've never met them, I don't know their names, and I don't know what they're doing tonight. But I do know that they're the authorities on all kinds of stuff.

When we turn to authorities for reassurance, we take on faith that they've earned their authority and that they really are reliable. We assume that the surgeon who removed our appendix learned the "right way" to do it while she was in medical school. We assume that the people who designed the airplanes we ride in knew what they were doing when they decided where to put the wings. The Large Hadron Collider at CERN, in

Switzerland, is the first device engineered for scientific endeavors that has a non-zero chance of undoing everything. I assume that the physicists who designed it have a pretty solid understanding of what will happen when they push that big red button¹

This leap of faith pops up in places that we don't always expect. And it's usually easier to simply take for granted that 'they' know what they're doing, that they actually are experts, than it is to question their competence. Not because we don't have the time to fact-check every bit of data that drifts past us. No, it's because if we couldn't take for granted that the person who designed the building we work in knew how to make sure it wouldn't just fall down one day, we'd never leave the house. And even the unbelievable stuff becomes true when we trust our source.

"They" are the experts. They're the people quoted in the New York Times who we turn to when we want to get the straight dope on something or other. It's a pretty good system, but it can start to fall apart when we catch a glimpse of fallibility.

¹ Yes... there is actually a big red button that makes the collider at CERN "go."

NEUTRINOS

Director Werner Herzog as narrator introduces the scene unfolding before us in his film "Encounters at the End of the World," in which we see a team slowly filling a *giant* balloon with gas. The balloon will float a wild looking apparatus, a neutrino detector, to 40 kilometers above earth's surface. Once there it will scan thousands of square miles of ice, free from the electrical interferences that litter the inhabited world.

Physicist Dr. Peter Gorham, of the University of Hawaii, is as excited as someone can be about what they do. Doctor Gorham begins to describe his project but is quickly sidetracked by his own enthusiasm surrounding the particle that these folks are attempting to measure. I can see in his eyes how incredibly cool he thinks this stuff is, and it's totally contagious:

What we're trying to do with this instrument is to be the first scientific group to detect the highest energy neutrinos in the universe. We hope. The neutrino is the most ridiculous particle you can imagine. A billion neutrinos went through my nose as we were talking. A trillion. A trillion of them went through my nose just now and they did nothing to me. They pass through all of the matter around us continuously in a huge huge blast of particles that does nothing at all. They almost exist in a separate universe but we know as physicists we can measure them. We can make precision predictions and measurements. They exist but we can't get our hands on them because they seem to just exist in just another place. And yet without neutrinos, the beginning of the universe would not have worked. We would not have the matter that we have today because you couldn't create the elements without the neutrinos. In the very very earliest few seconds of the big bang, the neutrinos were the dominant particle. And they actually determined much of the kinetics of the production of the elements we know. So, but the universe can't exist the way it is without the neutrino, but they seem to be in their own separate universe. And we're trying to actually make contact with that otherworldly universe of neutrinos. And as a physicist even though I understand it mathematically, and I understand it intellectually, it still hits me in the gut that there is something here, around, surrounding me, almost like some kind of spirit or god, that I can't touch but I can measure it. I can make a measurement. It's like measuring the spirit world or something like that.

When he's asked what the physical collision of a neutrino would look like, I get more:

You would see a lightning bolt about 10 meters long about that thick [makes a circle by touching his thumb to his forefinger] and it would blast at the speed of light over a 10 meter distance and you would see the most beautiful blue

light your eyes have ever seen. It happens in about, um, the entire impulse of radio waves is up and down in probably one one-hundred billionth of a second.²

Gorham's enthusiasm rubbed off. That's all, there's no other way to put it. Just watching him speak for five minutes set me free. Here I began to recognize the importance of at least trying to understand.

The universe would not exist [as we know it] without neutrinos. These particles, he tells us, were the catalyst for everything. None of the maths that ground physics would work without them. And while Gorham postulates that they were paramount in the development of 'the everything' in the very first moments of our universe, it seems that they no longer serve any purpose: they don't do anything, as far as we can tell.

The idea that such a tiny entity could be responsible for the establishment of what amounts to everything is tough to wrap the mind around. The details behind modern physics feel entirely absurd, and if the information wasn't delivered by one of 'them' I'd never believe it. Take this one: Just trying to get an impression of the scale of one of these particles is almost impossible. Internalizing an understanding of just how tiny a

² here Dr. Gorham is describing Cherenkov Radiation

neutrino actually is goes something like this: imagine a proton. Quite small. Now blow it up until it's the size of the earth. Relative to this earth-sized proton, a neutrino would be the size of... a proton. Tiny. And responsible for everything. They think. Maybe.

We've invented all of this science to make the framework that we've laid out continue to "work." If it ever did. But if my life will carry on just the same whether the maths add up or not, the importance of our equations zeroing out somehow fades away.

It all just seems so fantastical and ridiculous. It sounds like fiction, but I'm told that it's true. It's incredible. I started thinking about what it would take to get hold of these tiny particles that don't recognize matter. Peter Gorham is trying to detect them, to measure them, but I don't need to do that. I don't want to measure them; I just want to catch some. Just a few. And in my research toward figuring out how I might go about doing this I discovered that people have been trying to do just that for some time.

THE GREAT NEUTRINO HUNT

Neutrinos were first suggested as hypothetical entities in 1931 after it was noted that a small amount of mass seemingly vanished during the radioactive decay of certain nuclei. Wolfgang Pauli suggested that the mass was 'spirited away' in the form of energy by mass-less particles, for which Enrico Fermi proposed the name neutrino (little neutral one).³

The earliest neutrino trap was built relatively recently, in 1969. In a surprising and almost alarmingly simple fashion physicists decided that these particles existed, they named them, and they set out to find them. These things had to have a neutral charge, so while they figured that it might not be possible to physically catch them, it could be possible to measure the trace of light that they left behind when they smashed into other stuff.⁴ So they began building a device which would encourage neutrinos to collide with other charged material, and they set out to measure the byproduct of these collisions. A 100,000 gallon storage tank filled with electron-rich

³ John N. Bahcall, "Neutrinos from the Sun," *Scientific American*, Volume 221, Number 1, July 1969, 28-37.

⁴ It's worth noting here that this is a tactic physicists often employ for collecting data: they smash stuff together. Which I think is cute.

household cleaning fluid (tetrachloroethylene) was placed 4,850 feet below the ground in an abandoned mine in Lead, South Dakota near the Brookhaven National Laboratory.⁵

The physicists who set up this experiment were genuinely surprised when their test didn't yield the results they expected⁶. Genuinely surprised that a big tank of kitchen disinfectant hadn't provided results pointing to our solid understanding of the mass-less particles that were responsible for creating all of the matter in the universe!

So how can something that we decided is so crucial be so far out of reach? I recognize now that our grasp on the physical world and it's properties is not as secure as I once imagined. There is plenty left to discover, and it doesn't have to happen, this discovery, in such a complex way. I was overcome by the thrill of adventure - a thrill that I imagine these creative thinkers attempting to find these things must have felt. And the thrill that I now felt reading of this wacky intangible thing that in my mind can't be intangible because it is so, so, so, important

helped to redefine my understanding of scientific discovery.

MAKING IT UP AS WE GO ALONG

I was taken aback when I learned that these particles were 'invented' simply because they need to have existed, and that the method for attempting to measure them seems so straightforward. Suddenly the experts that I've entrusted to provide answers were exposed as a bunch of people taking shots in the dark.

Recognizing that science has as much to do with creative play as it does academic inquiry changed the game for me. Suddenly, I recognized that the problem solving I do is not so distant from the problem solving that they do. We use whatever we have, what's familiar, and we purpose it to fit our goals.

When the maths didn't fit, we invented a particle that made solutions out of a problem. The fact that we don't know what the particle is or how it behaves is secondary. So even if our new theory betrays the previously accepted laws that have governed our activities, it's worth investigating. It's the theories that challenge our

⁵ Bahcall, "Neutrinos from the Sun"

⁶ S. Thiele, of RBJ Laboratories, in particular, wrote of how frustrating this inconsistent data had been for the team.

accepted laws that are the most important ideas to pursue: these are the ideas that lead to an expansion of our data set. Sir Ken Robinson says "If you're not prepared to be wrong, you'll never come up with something original."⁷ So we take a guess and we see what happens. And as a result the laws that govern physics - these rules that govern the way we contextualize our experience - change every day.

So a crate, propped by a stick on a string, with a tray of bait inside - in this case an enticingly elegant blown glass cake plate filled with the electrons that neutrinos crave, turns out to be incredibly effective for trapping neutrinos.

I know that I can't trap neutrinos: they travel at near light speed and don't recognize matter, so to presume that I could actually hold on to them in a glass box on the floor is ridiculous. But I know that these things exist. And I know that they're everywhere. How do I know? Peter Gorham told me. And I believe him. So with the understanding that they're everywhere - flying through the universe in unfathomable quantities - I can pull my string, watch my box fall, and know that it's full. I don't

⁷ Sir Ken Robinson, "Do Schools Kill Creativity," Feb. 2006

know how many are in there, and to be sure the individual particles that I trap don't hang around for even the fraction of a second that I could count. But the moment they leave... new neutrinos replace them.

Is it important that I can take a measurement with this thing? No. Not even a little bit. Physicists have spent billions of dollars producing research and writing that lets me guess, give or take a few trillion, how many occupy my trap.

There are fundamental components of our universe whose existence we recognize as absolutely essential for completing our understanding of the physical world. But at the same time their existence is purely theoretical. We've never seen, measured, or experienced them. They have no rational reason to accept their influence apart from this notion that without them, there would be holes in our explanations. I have no rational reason to accept their existence outside of a total unquestioning faith in some scientists who I've never met. I've been trained to believe them. And they believe. So I believe.

NEUTRINO TRAP, 2010

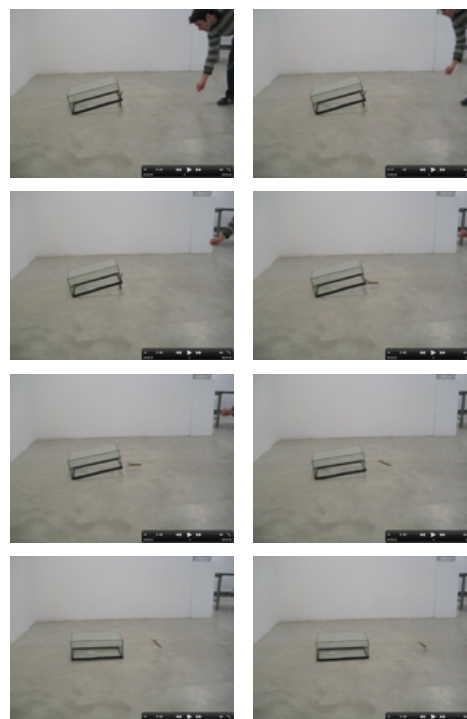
glass, rubber gasket, wood, string, electrons
7" x 13" x 19"/4"

In 1930 Wolfgang Pauli had no evidence that would point to the existence of the neutrino, only the recognition that without the addition of a tiny, massless, neutral, entity to our maths, there would be gaping holes in the framework used by physicists to define existence. Having only a faint idea about where it might come from, where it might be going, and how it might behave, it was assigned a value and the neutrino hunt began.

There are fundamental components of our universe whose existence, while purely theoretical, is absolutely essential for completing our model of the physical world. To govern our lives by a data set reliant on hypothetical entities requires a leap of faith that we rarely consider.

Instructions:

- Set trap on non-porous level surface
- Prop front lip on pronged stick
- Extend attached string 55 cm from base of containment device
- Fill bait tray with electrons
- Place tray beneath trap 15 cm from rear interior wall
- Pull string



So thoroughly and sincerely are we compelled to live, reverencing our life, and denying the possibility of change. This is the only way, we say; but there are as many ways as there can be drawn radii from one centre. All change is a miracle to contemplate; but it is a miracle which is taking place every instant. Confucius said, "To know that we know what we know, and that we do not know what we do not know, that is true knowledge." When one man has reduced a fact of the imagination to be a fact of his understanding, I foresee that all men at length establish their lives on that basis.⁸

⁸ Henry David Thoreau, *Walden*, 1854

UNCERTAINTY

It's not so straightforward, this business of not knowing. As it turns out it takes a lot of work to not know. Because it's one thing to not know, and it's something entirely different to recognize the value of not knowing. Ignorance can beget knowledge. It's when we stop looking, when we've fabricated enough confidence to suppose that we've squashed our ignorance, that we doom ourselves to remain ignorant.

The pathway to answering our very big questions emerges from the investigation of our very basic questions, as long as we're paying attention. So we start with something simple:

All of our stuff - matter - is made up of very tiny stuff - atoms. This tiny stuff is in constant motion. And hard as we may try, we can't precisely determine the location of any one atom at any given time.

I know this because in the 10th grade my physics teacher, Mrs. Thompson, recognized that I was struggling with the material we had been covering in class. So she sat me down and told me not to worry, we would figure it out together. It's tough to wrap your head around some of these ideas, she said. But there were a few things I needed to know, and it was alright if I didn't really understand. She told me that nobody really understood.

Atoms, she said, make up everything. They're very small, and they're always moving. Because of this movement their location cannot be determined to any great precision. For her example she used the black soapstone-topped lab table that we sat at. She told me we can postulate that a single atom within this table probably exists somewhere 'right around here,' as she waved her hand over the corner of the table top. But we can't be sure.

But the beauty of the physical world, of perception, is that the universe will keep on doing what it does whether we understand it or not. So although we can't determine the true physical location of that one atom inside our table, it's safe to assume that it exists more or less where

we'd expect it to. For all practical purposes, the atoms comprising that table are usually right where they should be. As a result, our 'stuff' appears to occupy a single spot in physical space.

More or less.

But, she told me, it's possible that each and every atom in that table - either by chance, coincidence, or something else - could decide at the very same moment to move just slightly up, for example, and to the left. The result would be a table that simply shifted location for a brief moment. Autonomously. The chances are slim, she assured me, but they're there.

In the 10th grade, then and there, my mind was blown. Because if this can happen then anything can happen. If I couldn't be sure, couldn't be absolutely certain, that my table was going to be exactly where I left it when I came back from lunch, then I would need to seriously reconsider my concept of stability. For me, this changed everything.

TRYING TO FIGURE IT OUT

Everything is amazing all of the time. This notion challenges everything I know, or thought I knew, about consistency and reliability. In a world that seems at times quite finite, there is a whole mess of 'unknown' going on around us that we can't see, can't measure, and don't even feel the effects of. What's more, there's a whole lot going on out here that even *they* can't explain.

As it turns out, the atoms in my table could indeed decide to move slightly up and to the left. But they could just as likely move, for example, slightly up and to New Zealand, for just a moment. What's more, I'm learning that not only *might* this happen, but that it more than likely *is* happening, constantly.

The universe does all sorts of wild things while we're not paying attention. Plenty of very intelligent people believe with all of their hearts that this universe of ours is folding in half, bending around, turning inside out, constantly. So while New Zealand is usually half-way around the world from me, as it appears on our nice neat maps, it's sometimes right outside my door. Every now and then, molecules from tables and sheep and lawn

mowers in Scotland switch places with molecules from my pillow for a very brief moment. Everything is made from the same stuff, and it's all interchangeable.

So I decided that it would be worthwhile to conduct an experiment. Some observational research to earn a better grasp on what exactly is going on. It's time for me to begin adding to the data set that the sciences have been building.

I set up a table and I began to monitor it's movements. So much of science seems to be putting things together and observing, waiting for the expected, and being prepared to accept the unexpected. This seemed like a good place to start.

While the experiment was installed and the video recorder was engaged, little seemed to be happening. The screen flickered sporadically but I quickly attributed this to faulty technology: I was using a \$30 surveillance camera wired to an old tv/vcr combo procured from craigslist. This TV is weathered, having been put through it's paces recording daytime television 'stories'

for years, and so is not to be considered an instrument of precision.⁹

But upon reviewing the visual data collected, I was surprised to find that the camera had captured what appears to be a table that 'jumps' rapidly and frequently. At times, only individual legs of the table would shift, at times only a few 'pixels' leapt up and down or side to side. Groups of pixels existed outside, most often above, the confines of the physical table.

I've been conditioned to believe that we have a pretty good understanding of what's going on, and that those things we experience that don't seem to 'fit' are simply flukes: inconsistencies are easily attributed as mistakes of perception.

But when I try to put this in perspective, to make it mesh with what I'm discovering about our true inability to understand what goes on, I realize that to dismiss the data that I initially passed off as a byproduct of shoddy technology would be irresponsible. Not so long ago, everybody knew that the earth was flat. Someday soon, when our data set has grown to include a better

understanding of the physical properties of 'stuff,' they'll surely say 'once upon a time, people knew that their tables didn't jump around all the time.'

We put so much energy into controlling our experience that we dismiss what might be the most interesting things going on around us. I read recently that while the brain receives 4 billion bits of data every second, it only processes and presents to us 2,000 of them. The world we take in is only a tiny slice of what there is to experience.

The simple fact that something I experience doesn't mesh with what I've been trained to expect does not negate it's potential. We seem to think that we've figured it out. But it makes me giddy that we can fly to Mars but nobody can tell me for certain where the table I'm sitting at will be in ten minutes.

In the end there is something to be said for accepting the filters that edit out the weirdest stuff: we fabricate a reality to let us function without freaking out. Because I'm not prepared to understand most of this stuff. If I awoke to a pillow that was all mixed up with lawnmower parts and grass clippings, I think I'd lose it.

⁹ When I picked up the TV/VCR combo from the craigslist seller and brought it back to my studio, I found a tape still inside. On the tape was an episode of *General Hospital* and an episode of *Days of Our Lives*, both from 2004.

“This observation entitles me to assert that during a certain period, this pencil was on the table. And even if my right to do so is not absolute, it is nevertheless reasonable and well-grounded. It is obviously absurd to suppose that this right can be undermined by “an expansion of our principles of definition” – as if new moments of time, overlooked by my intuition could be added to this interval, moments in which the pencil was, perhaps, in the vicinity of Sirius or who knows where. If the temporal continuum can be represented by a variable which “ranges over” the real numbers, then it appears to be determined thereby how narrowly or widely we must understand the concept “real number.” And the decision about this must not be entrusted to logical deliberations over principles of definition and the like.”¹⁰

¹⁰ Hermann Weyl, 1927. *Philosophy of Mathematics and Natural Science*, (Princeton: Princeton University Press, 2009).

UNCERTAINTY IS EVERYTHING, 2010

table, wireless video camera and receiver, monitor, video recorder, VHS tape
dimensions variable

All of our stuff [matter] is made up of very tiny stuff [atoms]. I know this because in the 10th grade my physics teacher, Mrs. Thompson, told me so. And apparently, the atoms that make up our stuff switch places with the atoms that make up all kinds of other stuff. Constantly.

The simple fact that we might not perceive this switch doesn't negate it's potential; our brains receive 4 billion bits of data every second but process only two thousand of them.

Accepting the non-zero chance that our stuff, or parts of our stuff, could autonomously shift location in physical space is a simple step towards recognizing that our experience is not as finite as it might seem. We can take comfort in the notion that uncertainty is acknowledged as a fundamental principle of existence.





Missing Micrograms Set a Standard on Edge

New York Times, February 12, 2011

by Sarah Lyall

SÈVRES, France — No one knows exactly why the international prototype of the kilogram, as pampered a hunk of platinum and iridium as ever existed, appears to weigh less than it did when it was manufactured in the late 19th century.

“Your guess is as good as mine,” said Dr. Terry Quinn, emeritus director of the International Bureau of Weights and Measures in this town on the fringes of Paris.

It is here that the kilogram — the universal standard against which all other kilograms are measured — resides in controlled conditions set out in 1889, in an underground vault that can be opened only with three different keys possessed by three different people.

The change, discovered when the prototype was compared with its official copies, amounts only to some 50 micrograms, equal to the mass of a smallish grain of sand. But it shows that the prototype has fallen down on its primary job, to be a beacon of stability in a world of uncertainty.

And it means, scientists say, that it is time to find a new way to calculate the kilogram, which currently enjoys a delightfully frustrating definition: “a unit of mass equal to the mass of the international prototype of the kilogram.”

The idea would be to base the future kilogram on a fundamental physical constant, not an inconstant object, said Dr. Peter J. Mohr, a theoretical physicist at the National Institute of Standards and Technology in Gaithersburg, Md. “We want to have something that’s not changing, so that we can have a stable system of measurement,” he said.

The kilogram is the last base unit of measurement to be expressed in terms of a manufactured artifact. (Its cousin, the international prototype of the meter, was retired from active duty in 1960, when scientists redefined the meter. They redefined it again in 1983; a meter is now officially “the length of the path traveled by light in a vacuum during a time interval of 1/299,792,458 of a second,” for those who would like to try it at home.)

Scientists now have similarly bold plans for the kilogram, and indeed for several other base units of measure. A draft resolution to be considered at the General Conference of Weights and Measures in October includes new and improved definitions for the ampere, the mole and the kelvin.

“This would be the biggest change in metrology since the metric system was introduced during the French Revolution,” Dr. Quinn said.

Which is all very exciting and very revolutionary. But it is easier said than done. The proposed new kilogram definition is based on a physical quantity known as Planck’s constant — a constant beloved by quantum physicists but not yet as precisely expressed as it might be.

Half a dozen teams around the world have been toiling for years to measure Planck’s constant to an acceptably low degree of uncertainty. A resolution could take 5 to 10 more years, or maybe not, said Prof. Michael Kühne, the current director of the measures bureau. “While everyone hopes the experiments will yield excellent results, I don’t have a crystal ball.”

None of this is meant to denigrate the un-kilogram, still resting in its safe, beneath three cheese-plate-style bell jars. Until a new definition takes effect, the prototype remains the Platonic ideal — so precious that it is has been removed from the safe only three times in its life (to be measured against all the copies), so singular that the French call it Le Grand K, and so iconic that writers of scientific papers sometimes designate it simply by the Gothic letter K.

“Despite all its shortcomings, the reason it hasn’t been redefined before now is that nobody has come up with something better,” said Professor Kühne, who has a fetching model of the prototype in his office. (He also has one of the keys to the safe, which he keeps in a different safe. The second key is held by the president of the International Committee for Weights and Measures; the third is in the French National Archives.)

There are about 100 working copies of the international prototype in countries around the world. These are periodically brought back to Sèvres to be compared with the original.

This is a fraught and delicate undertaking.

Because of a legendarily horrifying incident in which one of the national kilograms was wrested from its casings by a customs agent and exposed to a hostile environment teeming with airborne detritus, not to mention the agent’s organic matter, countries are advised to ship their kilograms in diplomatic pouches.

Dr. Mohr and his colleague Dr. David Newell, who was recently charged with escorting the American kilogram to Sèvres, opted for a backpack and an official Do Not Touch Our Kilogram letter from the standards and technology institute. They made it through, after some harrowing moments.

“At one point, there were about a dozen people standing around the screen looking at it,” Dr. Mohr said of the kilogram. “Of course, it’s platinum, so the X-rays can’t go through it, and you can’t see inside it.”

The most obvious argument for the prototype’s eventual obsolescence is the tautological underpinning of its existence, which calls to mind the question, “How long is a piece of string?”

Because a kilogram is defined as whatever the mass of the prototype is, it does not, for definitional purposes, matter if the prototype loses mass, or indeed packs on the micrograms by spending all its free time gorging on éclairs: it is still a kilogram. Like Norma Desmond in “Sunset Boulevard,” the prototype could plausibly argue that it has not gotten lighter — the other kilograms have gotten heavier.

(That hypothesis is theoretically possible — these questions are all relative — but highly unlikely, scientists say.)

The new definition should render unnecessary such frustrating intellectual exercises. Even still, it is a little sad to contemplate the demotion of the prototype, which has served so valiantly for so many years and which now seems destined to spend its retirement on a shelf somewhere, its glory days behind it.

Dr. Quinn did not seem very sentimental about the prospect.

“The old kilogram will still exist,” he said. “But a fundamental constant is much more fundamental than an artifact in a vault.”¹¹

¹¹ Lyall, New York Times, February 12, 2011

from: Jake Vincent <jakevincent@gmail.com>
to: Sarah Lyall <seanloftis@gmail.com>
date: Wed, Feb 16, 2011 at 4:23 PM
subject: Autonomous Shifts in our Standard of Measure, Romantic Writing for the New York Times, and the General Amazingness of Everything

Dear Mrs. Lyall,

I’m writing regarding your article on the almighty Kilogram that appeared in the Times a few days ago. Several things struck me while I was reading the piece, and asking for your advice seemed appropriate. I should start by mentioning that I’m not in the habit of contacting journalists in response to their work - this is a first for me.

Reading about our standard of measure and the implications of its mysterious value-shift was exhilarating in a way that surprised me.

I’m an artist currently exploring the fantastical paths that the sciences have blazed in our efforts to define existence. Recently this has been fueled by an investigation into the established and accepted laws of particle physics. From the widespread acceptance of subatomic particles that we’ve never measured but rely on to complete our maths to the inside jokes embedded in the descriptors of the quark, the truth behind physics is more whimsical and less finite than I could ever have imagined. To govern our lives by an incomplete data set - one reliant on hypothetical entities and theoretical properties - requires a leap of faith that I have seldom associated with the sciences.

Your piece in the Times approached the standard of measure in a tone that was at once romantic and authoritative. These are the same traits I recognize in the creative approaches that physicists have employed for centuries to contextualize existence. Reading your story inspired me to begin research for a new piece of work - a sculpture that might address the import of basing so much on so little, and what happens when we take for granted that there are true constants out there - when in fact even our constants act inconsistently.

Regarding a recent installation work of mine that dealt with the Theory of Indeterminacy, I wrote “I take comfort in the notion that uncertainty is acknowledged as a defining principle of existence.” Needless to say, I was moved when you referred to Le Grand K as “a beacon of stability in a world of uncertainty.”

I’m wondering if you uncovered any other fantastic information in your research for this story that wasn’t included in your article but that you might be willing to share. It is clear that your investigation of the Kilogram and the current drama surrounding it was thorough, and to get a deeper glimpse into your research or your personal take on the matter would be an honor.

I loved reading your piece. It gave me hope and presented me with more romance than I’ve seen in writing in a long, long, time.

Thanks so much,
Jacob Vincent

--

JakeVincent@gmail.com

from: Sarah Lyall <lyall@nytimes.com>
to: Jake Vincent <jakevincent@gmail.com>
date: Fri, Feb 18, 2011 at 11:33 AM
subject: Re: Autonomous Shifts in our Standard of Measure, Romantic Writing for the New York Times, and the General Amazingness of Everything

Dear Mr. Vincent:

Thank you so much for this lovely note. I am charmed and flattered and really r pleased that you’ve been inspired by the story of the kilogram. I thought it was a marvelous thing to stumble on, and I also think that I just scratched the surface of the tale, which winds all the way back to the French Revolution, when the metric system was first devised (there was an earlier kilogram prototype, superseded by the 19th century one, that is now in the French National Archives -- it’s called le kilogram des archives.)

I found a lot of material on the Internet, some of which led me to scientific papers and other things, and if you’re interested in learning more, that’s a great place to start. In addition, Terry Quinn - former director of the weights and measures institute in Seves, who I spoke to for the piece, has a book coming out in the fall about the institute and the kilogram. I can pass his details on to you, if you’d like.

Thanks again for writing, and best of luck with your work!

Sarah Lyall

--

The New York Times
66 Buckingham Gate
London SW1E 6au
U.K.

LE K, 2011

kilogram, brass, glass, lexan
12' x 12' x 42'

In 1889 it was decided that our standard of measure would be a chunk of metal: a cylindrical plug of platinum and iridium alloy machined to weigh exactly one kilogram. This was to be the common denominator, the baseline, the basis by which we would define consistent measurement.

This is the chunk of stuff that we've used to guide all manner of physical measurement, tangible and intangible. But when the object was weighed recently, for only the third time since it was locked away in a vault in Sevres, France, over a century ago, a startling discovery was made. Somewhere along the way, our most basic standard for reliability lost just under 50 micrograms of mass.

The newton, the pascal, the joule, the watt, the ampere, the lumen, the force of gravity, the speed of light, Planck's Constant: these base standards for measure are each defined relative not to the mathematical constant of a *kilogram* but to the actual mass of this single physical object. So while 50 micrograms may not sound like much, any hopes for consistency, reliability, and stability have vanished. A pound no longer weighs a pound, and gravity isn't what it used to be.



TACHYONS

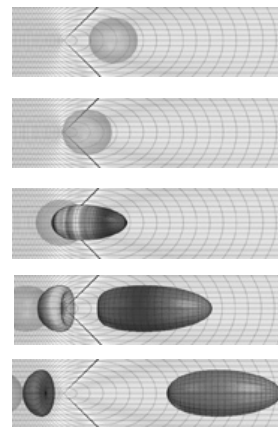
AN INSTABILITY OF THE SYSTEM

Data pointing to the existence of a subatomic particle capable of traveling at speeds exceeding that of light would shake things up, plain and simple: a direct violation of our theories of relativity. The mere idea that a particle exists with properties similar to those of the tachyon challenges our most fundamental views of space-time. In short, these things just don't mesh with our model. Nevertheless, we've been scrambling after them for nearly a century.

A particle moving faster than light has the unique ability to exist in two places simultaneously. In the moment of observation the 'thing' has already come and gone. Given that within our current model of relativity our perception of an object dictates its location, to say

that we're not equipped to understand this visually would be an understatement.

Even when stated in the simplest of terms, it's a tough concept to actually wrap our minds around. It challenges our understanding of the way that we perceive light and the way that we think about physical location. It challenges our base understanding of the way that the universe works. And it challenges nearly every concept of physics that we accept as given. In the instance of the tachyon, existence exists not only in two separate places but also in two separate arenas: visual information tells us that the particle is one place, while it's true physical location is elsewhere.



Because a tachyon moves faster than light, we cannot see it approaching. After a tachyon has passed nearby, we would be able to see two images of it, appearing and departing in opposite directions. The black line is the shock wave of Cherenkov radiation, shown only in one moment of time. This double image effect is most prominent for an observer located directly in the path of a superluminal object (in this example a sphere, shown in grey). The right hand [darker] shape is the image formed by the blue-doppler shifted light arriving at the observer— who is located at the apex of the black Cherenkov lines— from the sphere as it approaches. The [left-hand image] is formed from redshifted light that leaves the sphere after it passes the observer. Because the object arrives before the light, the observer sees nothing until the sphere starts to pass the observer, after which the image-as-seen-by-the-observer splits into two— one of the arriving sphere (to the right) and one of the departing sphere (to the left).¹²

¹² Tachyon, <http://en.wikipedia.org/w/index.php?title=Tachyon&oldid=422565444>

Testing and experimentation to prove or disprove the existence of the tachyon particle has come up short so far. Most people assume that this is simply because these bits of stuff don't exist; in our world of answers and understanding, we readily dismiss the really weird stuff that doesn't fit within the model.

But while we seem to think that we have a good understanding of our surroundings, it's easy to forget that everything we use to describe reality has been fabricated. Every particle, every constant, every theory that we have was at some point just a wacky notion in someone's head. Even the atom was 'invented' by us, was named by us; its properties were written by a human. And as a result, it's all up for debate.

When you're trained within a discipline with guidelines as strict as those of scientific endeavor, you have the burden of following those guidelines during investigations into unknown territory. The math and the model say that these things can't exist. The math and the model would stop me from looking before I started looking. But as someone who exists on the fringes, someone who doesn't even know what the rules are, I

have the freedom to work unencumbered by the limitations of the math and the model.

With that in mind, I decided that it would be worthwhile to try my hand at finding some tachyons. Because they move so quickly, those squirrely little suckers, the first thing I had to do if I was going to be able to take any measurements at all was to slow them down. I was able to find a wealth of information on how the movement of subatomic particles is being slowed these days. To my surprise, many of the techniques in use are relatively straightforward and don't require a heap of massively expensive equipment.

There is a varied group of processes recently developed. Some involve altering the temperature of the particles: cooling the environment that they'll enter or shepherding them through an environment of heated gas:

Bose-Einstein condensate can act as a filter for slowing the velocity of photons but requires a 0.1 mm 'lump' of atoms cooled to just above absolute zero. Lene Vestergaard Hav of Harvard University uses this method to slow light waves significantly, and even to 'freeze a pulse' and then release it.¹³

¹³ Jon Marangos, "Slow Light in Cool Atoms," *Nature Magazine*, February 18, 1999.

Heated Cesium Gas Technology developed to slow photons to below the speed of light opened new doors for particle physicists in 1997 at the University of Rochester. While their work with cesium gas was not the first successful attempt to slow photons, it is the simplest to date. Using a 4-inch long glass chamber filled with cesium gas heated to 212 f slows photons without alteration of imbedded waveform structures.¹⁴

But the simplest process for slowing these things down, and what seems for my purposes to be the most logical, involves directing them through a filter tuned specifically for the tachyon. In the industry these are called "metafilters," structures designed to "force particles through a matrix that does not allow for a head-on trajectory."¹⁵

The first stage of my decelerator employs a metafiltering material whose subwavelength microstructure has a negative permeability value. In essence, the filter forces the tachyons to bounce around within the substrate, losing a good deal of their velocity along the way. Metamaterials gain their properties from structure rather than composition, using small

14 Erin Biba, "Harvard Physicist Plays Magician with the Speed of Light," *Wired Magazine*, October 23, 2007.

15 Rick Weiss, "Putting the Brakes on Light Speed: Researchers Slow Waves While Maintaining Their Ability to Carry Information," *Washington Post*, January 19, 2007.

inhomogeneities to create effective macroscopic behavior.¹⁶

A surprisingly straightforward substrate being used today is comprised of loosely packed "microspheres." To the naked eye, these miniscule hollow Borosilicate bubbles look like talc or powdered sugar. These things float around as if suspended in liquid, and they do this because of their form: spherical grains don't adhere to one another the way that grains with flat or rough edges do.¹⁷

Building a metafilter from these microspheres is pretty straightforward: we pour them into a chamber that the particle we're attempting to slow will be passing through. For my decelerator I'll be using blown glass cones to contain the filtering substrate. The cones will direct the particles toward the business end of the device where the actual measuring takes place.

Using glass as a containment material poses some of its own problems. Glass is one of those materials that the really little stuff, subatomic particles, don't generally

16 Nader Engheta, ed., & Richard W Ziolkowski, ed., *Metamaterials: Physics and Engineering Explorations* (NJ: Wiley-IEEE Press, 2006).

17 These microspheres are used in several industrial applications outside of physics: they're used as filler in airplane wings, and they're just now being used in some exterior paints to act as insulating material.

recognize. The tachyon or the neutrino or whatever couldn't care less that I'm trying to build a barrier, passing right through the glass as if it weren't even there.

I stumbled across some research that employed glass to route particles. These folks have figured out a solution to the problem that, again, was much more straightforward than I would have expected.

"...to resolve this, the glass has a diamondoid coating. At the molecular level glass is like Swiss cheese: full of holes. And of course it's a liquid so atoms just pass right through it. So you coat the glass: this diamondoid coating can be tuned to filter out all but the desired particles..."¹⁸

After a good hunt, I was able to procure information about the process for applying this diamondoid coating. I also was lucky enough to get in contact with a group of physicists at Lawrence Berkeley Laboratories who took an interest in my research. [Actually, they said it was "cute" that I thought I could undertake this type of experiment as a graduate student in art school.] They were interested enough, in fact, to give me a bit of the stuff.

Apparently the scale of the device I'm building is quite modest relative to the devices in use as LBL, so the

18 Crichton, 2002.

amount of the coating material I'd need amounted to what they'd scrap at the end of a coating session. A week after our conversation, a small box containing a polyethylene jar of diamondoid solution arrived at my doorstep.¹⁹

To slow the movement of the tachyon is only the first step toward obtaining a reliable measurement. Next I'd need to figure out where, precisely, to look for these things; what is the most likely source of a surge of tachyons? What might be the origin of the tachyons that I hoped to measure, and how could I train my device to a location in the sky precisely enough that I'd be able to say, with some degree of certainty, where these things came from?²⁰

Finally we arrive at the business of collecting data from these particles. The most effective way to collect any measurable data would be to observe and analyze not the particle but rather the Cherenkov radiation emitted in the moment of annihilation

Using a photomultiplier tube (PMT), I'm able to measure the flash of light emitted from the tachyons as

19 Many thanks to Adam Castaldo, physicist at LBL, for his generosity. And for taking me seriously.

20 see appendix A

they collide with the impenetrable fritted disc located at the base of the filtering cone. The PMT is a neat thing. It does the exact opposite of a light bulb, with a few added benefits. Traditional light bulbs convert electrical energy in the form of electrons into light energy in the form of photons. PMTs receive light [photons], amplify the electrical charge of this light by forcing the photons through an array of electron-charged diodes, and finally convert the amplified photon charge into electrical energy [electrons]. These PMTs can be hooked into any number of electrical arrays. For my purposes the most effective and simplest device to use is an oscilloscope.

The universe is a great big place. Take Betelgeuse, for example. Estimated at between 497 and 789 light years away from earth. Most everyone agrees that Betelgeuse should be turning supernovae "any time now," which should provide a neutrino surge. In fact, it may have already turned supernovae, possibly centuries ago, but the light from Betelgeuse still shines bright in our sky.

Being 497 light years away from us means that it will take 497 years for any visual evidence of a state-change to reach us. If in the act of turning supernovae, it expelled a tachyon surge coinciding with the neutrino surge expected (tachyons are hypothetical, neutrinos are not. And it's expected that along with a neutrino surge,²¹ tachyons should be coming along for the ride as well) it may be possible to detect this state change by retrieving data from the altered properties of these tachyons.

Because of their faster-than-light velocity, the tachyons will reach us before visible evidence [in the form of light] will.²² The limitations of using information from

²¹ they call these 'neutrino events,' which sounds quite dramatic

²² It is worth noting that physicists are already using neutrino detectors to "sense distant supernovae."

neutrinos are obvious - the data provided by neutrinos is simply derived from the actual "amount" that arrive on earth from a distant location: the neutrino itself is not embedded with any information. We can't see into the future, and at distances so great as that from here to Betelgeuse, we can't even see the present. These particles carry information, and because they travel faster than light, the information that they provide would allow us to catch a glimpse of events that have already occurred far, far away, but that we don't yet have access to. Being able to take measurements from tachyons would give us a more complete sense of what is going on, out there, right now.

The most likely source of a tachyon surge, as near as we can tell, would be a solar maximum event. On March 11th, 2013, the decelerator will be engaged and will begin to collect data.

from: Jake Vincent <jakevincent@gmail.com>
 to: gabe landes <glandesk@gmail.com>
 date: Tue, Feb 8, 2011 at 10:46 PM
 subject: found!!

hey buddy.
 just an update.

I started this project thinking that the quest to measure Cherenkov radiation emitted by the tachyon was a silly and futile endeavor, but one that might raise some interesting questions about what people will accept as valid when they're presented with information supposedly coming from the scientific community. It would also serve as a good vehicle for building an interesting object letting me explore lots of fun new fabrication techniques. (Been casting plastic parts, rubber insulators, figuring out how to hook up photomultiplier tubes to an oscilloscope... fun stuff)

Today physicists are all pretty much on the same page with regards to the tachyon: this particle probably doesn't exist, as it's assumed properties really wouldn't fly within our current model of the natural world.

In my research I stumbled across the abstract for an article that I initially thought was a joke. When I realized it wasn't, I set out to find it. Initially I could only locate snippets of the paper written in Ukrainian. After a pretty good hunt I found that there was a translation printed in the journal 'Theoretical and Mathematical Physics,' which is published simultaneously with the peer-reviewed Russian edition, Teoreticheskaya i Matematicheskaya Fizika, a publication of the Division of Mathematics of the Russian Academy of Sciences.

Through the substantial powers of the VCU libraries, I submitted an interlibrary loan request on Friday. This showed up in my inbox today. In 1981, M. I. Faingold, of the Institute of Physics, Academy of Sciences of the Ukrainian SSR, thought that the experiment I'm doing warranted true academic investigation. Check it out. Negative results, but the simple fact that they took this on is pretty powerful.

Not really sure yet what the implications are for my work, but I'm really intrigued by the idea that 30 years ago the existence of the Tachyon was being taken seriously, and that now its relegated to cheesy sci-fi dramas. We re-appropriated contrived science from fictions like Star Trek to design the space shuttle (really, we did. do you know about this?), and we also use the throwaways from 'real' science to supplement our fictions. I love that it goes both ways.

-jake
 --
 JakeVincent@gmail.com

from: gabe landes <glandesk@gmail.com>
 to: Jake Vincent <jakevincent@gmail.com>
 date: Thu, Feb 10, 2011 at 11:20 PM
 subject: Re: found!!

that is very cool thanks for keeping me updated. i think i understood the abstract of the article, but i quickly got lost. there are some fancy looking equations in that paper.

i'm glad to hear that you are really getting into the subject matter, chasing down obscure papers that tie in with your explorations. quite a story about how you came to be in possession of this paper. also glad to hear that you are doing some cool making.

i'm bummed to hear that the tachyon probably doesn't exist. Like pluto the planet, i'll miss the tachyon. but i defer to your expertise on the matter. i love this line from the paper (pg 9, no. 3) -

"an important feature of the tachyon Cherenkov radiation is the azimuthal asymmetry associated with the vectoriality of a tachyon"

i think the implications for your work are huge. you cultivated an idea from your limited knowledge base (compared to quantum physicists), then decided you want to explore some feature of the physical universe as you see it through art then you discovered that physicists were exploring the same thing 30 years ago. you and the Ukrainians were curious about the same thing. if you keep this process up - learn a little, let your curiosity drive you, propose an intervention, develop a test apparatus - then eventually you will be engaging with the most cutting edge information and making experiments that replicate what is actually happening in the scientific world. It could come to pass that you begin to operate in front of them, creating experiments that pave the future path for science. Because you are less tied down by expensive pieces of functioning equipment, needing to generate actual replicable results, publishing, needing NSF grants. you are free to do the thinking, just the thinking, that they wish they could do. einstein was not an experimentalist. he worked it all out by just thinking about it and playing with equations. What if one day you make a piece, based on your understanding. then a physicist shows up and says, hey, that's a great idea. i'm gonna actually do that one. you will have invented the future. The art-science-art science-art-science cycle. it's real.

i'm totally into it. i also like how you are engaging and challenging your viewers. you ask them if they buy the story you are feeding them. but that forces them to reflect on how they buy the story fed to them by scientists. goes to our faith. goes to message creation by 'experts'. goes to how and when we question what we are fed. Big stuff.

i did not know about the shuttle / star trek connection. do you have an article on that? i'd like to read more on the relationship between art and science -

<http://bmdesign.tumblr.com/post/394869959/art-drives-science-science-drives-art>

the two paragraphs after the dashed line are good. i can see them in vinyl letters on the gallery wall at your exhibition. in addition to being about 'the authority of scientific language' i think there is something in your work about artistic language, the other side of the coin. maybe that it returns power to the viewer. the individual's perspective matters again. scientific language is top down. is artistic language more egalitarian? more open? you don't have to be in the know, you just have to be there to receive it. with regards to the second paragraph, if science takes faith, what does art take? might art be more concrete? the thing is in the room, it was made, and it can be seen. science is now literally smoke and mirrors, vapors and picoseconds. you are shaking up the paradigm.

remember, you can't say something with your work about science, without also saying something about art.

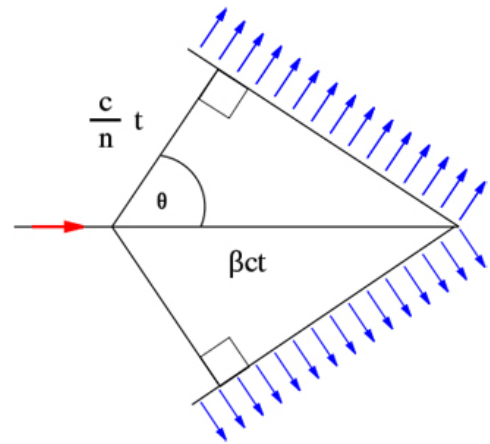
keep it up

-g

TACHYON DECELERATOR, 2011

equatorial scope mount, oscilloscope, blown glass with Diamonoid coating, borosilicate Microsphere metafiltering substrate, plastic, rubber, stainless steel, Hamamatsu Photomultiplier Tube CRM 114 R2066-02, Gooch Type fritted borosilicate wafer filter
20" x 26" x 38"





energy conversion of Cherenkov radiation emitted by tachyon particle upon annihilation

Disclaimer (reality), 2010

Carey Young

“There is no reality independent of subjective bias, but there is a reality influenced by it. In other words, there is a sequence of events which actually happens, and this sequence incorporates the effect of the participants' biases. It is likely, that is, that the actual course of events differs from the expectations of the participants, and the divergence can be assumed as an indication of the distortion that comes into play. Unfortunately, it only serves as an indication - not as a measure of the full bias - because the actual course of events already incorporates the effects of the participants' bias.”

THAT NONE THAT IS, 2011

steel, glass, plumbing, vacuum gauge, rubber,
vacuum pump, high vacuum grease
14" x 14" x 18"

I'm still doing objects, even though the autonomous, precious, and assertive art object has become quite meaningless to me. My objects are tools or devices with a specified use, which is to create a moment of slight confusion or to induce hallucinations in the widest sense, I've been doing works that act upon you. Paradoxically, to embrace doubt adds to the clarity of one's thoughts, possibly as a result of being more honest in admitting the level of confusion.²³

²³ Carsten Holler, *Interviews, Volume I*, Hans Ulrich Obrist, p. 409



Vitrine, 2011

9" x 12 1/2" x 21"
Glass, Steel, Velvet, Wood

There's this thing I saw. Within the collection of Andrew Ong, there is some work that is quite interesting and some work that falls quite flat. But one thing stands out more than anything has in a long time.

A sheet of plywood built by hand is a brilliant and beautiful comment on the means of production, on the notion of what we consider beautiful, and on how we come to conclusions surrounding value. On modern technology replacing the hand in contemporary production, and on the resultant aesthetic. And loads more. This piece by Robert Gober, *Plywood*, has a lot to say,

As I was looking at this piece, this piece of plywood, "bearing down on it" as Jenny Van Horn would say, I couldn't keep my eyes off of the vitrine that stood at the edge of the glass railing above the stairway. There's a paperback book inside. I've been working on something that will live in a vitrine, and as a result I'm more aware of these transparent boxes that dictate importance than I've ever been. I like the idea of the vitrine. The objects that live inside these case more often than not are the things we're expected to pay attention to. Somehow,

these 'bonnets' feel at times more powerful than the things they contain. The idea that this little case housing a velvet pad can make a thing automatically precious is fascinating. We assign value to lots of things for lots of reasons.

But the idea of assigning value to a thing simply because it's presented in the manner that most often presents a thing that we assign value to is confounding. It points to this truth that we don't always assign value appropriately: sometimes far too much, sometimes far too little. Rarely, it seems, just the right amount. More often than I'm comfortable with, we come to conclusions surrounding value based not on true content or ideological import but on modes of presentation. And here we're not talking about the presentation of 'art objects' or artifacts, we're talking about the presentation of ideals, of ways of thinking, of methods for dictating meaning.

Anyway, I took a look at this vitrine. To see if it might be a good presentation model for the work I'm doing. It wasn't. The vitrine was poorly constructed, pretty terrible in fact. But the thing inside was totally

fascinating. And I think to some degree there's a piece of this piece that fits very well within a crummy vitrine. Because to have, inside a shoddy display case that looks like it's been abused, like it hasn't been cared for, an object that represents a total and complete instability of the system, the thing that deserves the *most* perfect vitrine, is really interesting.

Inside this case lives a paperback book. "While My Pretty One Sleeps," by Mary Higgins Clark. It's opened to a ripped page, page 197. When we see an object that has been cared for in this way, that has literally been put on a pedestal, we recognize that it must be important, it must be precious. So we set out to determine what, precisely, we're expected to admire.

In this case our precious thing appears to be just another trashy romance novel from the supermarket check out line. Torn paper reveals text printed on the page beneath. Somehow, by some act of chance or fate or sleight of hand, the tear reveals one torn sentence whose characters match up perfectly with the sentence over which they're superimposed. They line up as if there was no rip. The words mesh, the text cogent and concise.

These words make a statement that the original text did not intend to address, to be sure. The actual statement that is exposed, or brought to light, or brought to life, is about chance in the universe.

The work is so incredibly smart and powerful and subtle and convincing and elegant. The artist is German, his name is Simon Dybbroe-Moller. Andrew Ong has some of Dybbroe-Moller's other work within his collection as well, but the rest is entirely flat; visually unstimulating and intellectually quite dry.

As it turns out, this artist makes work that is pretty flat across the board. It's almost as if Simon has created an entire body of work, the results of a lifetime of making, that is crummy. Just to make this one demonstration of instability stand out.

THE ONLY THINGS ARE THE THINGS THAT I KNOW

If you only knew how many people have misunderstood me. My work has suffered terribly because of it. My projects, my investigations, my experiments. But in spite of all the setbacks, I have never really been daunted. At present, for example, I am engaged in one of the most important things I have ever done. If all goes well, I believe I will hold the key to a series of major discoveries. The key: the thing that opens locked doors. Of course, for the time being I'm merely collecting data, gathering evidence so to speak. Then I will have to coordinate my findings. It's highly demanding work. You wouldn't believe how hard - especially for a man of my age. There's so much to do, and so little time to do it. Every morning I get up, constantly on the move, forever on my feet. It wears me out, you can be sure of that. But it's worth it. Anything for the truth. No sacrifice is too great.

You see, no one has understood what I have understood. I'm the first. I'm the only one. It puts a great burden of responsibility on me. The world on my shoulders, so to speak. Or what is left of it. You see, the world is in fragments, and it's my job to put it back together again. I realize that I've taken on quite a bit. But I'm merely looking for the principle. That's well within the scope of one man. If I can lay the foundation, other hands can do the work of restoration itself. The important thing is the premise, the theoretical first step. Unfortunately, there is no one else who can do this. I've made much progress. Enormous strides. In fact, I feel I am now on the verge of a significant breakthrough.

It's a comforting thought. And it's all because of my cleverness, the dazzling clarity of my mind. You see, I've understood the need to limit myself. To work within a terrain small enough to make all results conclusive. The premise of the premise, so to speak. The principle of the principle, the

method of operation. The world is in fragments. Not only have we lost our sense of purpose, we have lost the language whereby we can speak of it. These are no doubt spiritual matters, but they have their analogue in the material world. My brilliant stroke has been to confine myself to physical things, to the immediate and tangible. My motives are lofty, but my work now takes place in the realm of the everyday. That's why I'm so often misunderstood. But no matter. I've learned to shrug these things off. It's the only admirable response. The only response worthy of a man of my stature.

You see, I am in the process of inventing a new language. With work such as that to do, I can't be bothered by the stupidity of others. In any case, it's all part of the disease I'm trying to cure. It's a language that will at last say what we have to say. For our words no longer correspond to the world. When things were whole, we felt confident that our words could express them. But little by little those things have broken apart, shattered, collapsed into chaos. And yet our words have remained the same. They have not adapted themselves to the new reality. Hence, every time we try to speak of what we see, we speak falsely, distorting the very thing we're trying to represent. It's made a mess of everything. But words are capable of change. The problem is how to demonstrate this. That is why I now work with the simplest means possible - so simple that even a child can grasp what I am saying.

Renormalization determines the relationship between parameters in the theory, when the parameters describing large distance scales differ from the parameters describing small distances.²⁴

Instead of adding measurable motion to measurable motion, or things of one kind to other individuals of their kind, there is a co-operation of things of unlike kinds. The emergent is unlike its components insofar as these are incommensurable, and it cannot be reduced to their sum or their difference.²⁵

Consider a word that refers to a thing - 'umbrella,' for example. When I say the word 'umbrella,' you see the object in your mind. You see a kind of stick, with collapsible metal spokes on top that form an armature for a waterproof material which, when opened, will protect you from the rain. This last detail is important. Not only is an umbrella a thing, it is a thing that performs a function - in other words, expresses the will of man. When you stop to think of it, every object is similar to the umbrella, in that it serves a function. A pencil is for writing, a shoe is for wearing, a car is for driving. Now, my question is this. What happens when a thing no longer performs its function? Is it still the thing, or has it become something else? When you rip the cloth off the umbrella, is the umbrella still an umbrella? You open the spokes, put them over your head, walk out into the rain, and you get drenched. Is it possible to go on calling this object an umbrella? In general, people do. At the very limit, they will say the umbrella is broken. To me this is a serious error. The source of all of our troubles. Because it can no longer perform its function, the umbrella has ceased to be an umbrella. It might resemble an umbrella, it might once have been an umbrella, but now it has changed into something else. The word, however, has remained the same. Therefore, it can no longer express the thing.

²⁴ P.A.M. Dirac, "The Evolution of the Physicist's Picture of Nature," *Scientific American*, May 1963, p. 53.

²⁵ Lewes, G. H. (1875), *Problems of Life and Mind (First Series)*.

It is imprecise; it is false; it hides the thing it is supposed to reveal. And if we cannot even name a common, everyday object that we hold in our hands, how can we expect to speak of the things that truly concern us? Unless we can begin to embody the notion of change in the words we use, we will continue to be lost.

For among the great many truths in the world is this one: a man named Digby once believed something false. To take an interest in that false belief is not to reject the truth, but only to wish to fill out our picture of the truth with as much detail as possible, and not because of some aesthetic inclination to the baroque, but rather because false theories are an important part of the puzzle that we as philosophers should be trying to complete: that of determining the range of ways people conceptualize the world around them.²⁶

My work is very simple. The brokenness is everywhere, the disarray is universal. You have only to open your eyes to see it. The broken people, the broken things, the broken thoughts. The whole is a junk heap. It suits my purpose admirably. I find my surroundings an endless source of material, an inexhaustible storehouse of shattered things. Each day I go out and seek things that seem worthy of investigation.

I never make a mistake. It's a function of my genius. Once I've published my book, you and the rest of the world will know. But for now I have to keep it to myself. It won't be long now before I put my findings in order. Then great things will begin to happen. It will be the most important event in the history of mankind. But from this moment on, we know nothing.²⁷

²⁶ Smith, Justin E. H., *The Flight of Curiosity*, 5.22.11
²⁷ Peter Stillman, 1983

EVERYTHING I KNOW IS TRUE, 2011

4 1/4" x 6 7/8"
 101 pages

"Perhaps it is a way to remind myself that I know nothing, that the world I live in will go on escaping me forever"

- Paul Auster

