Noesis

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EDITORIAL
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In the letter which follows, Chris Langan rips me up. I agree with most of his criticisms; I'm happy that it's taken so long for anyone to enumerate my deficiencies as editor.

Point one in my defense: You get what you pay for. Because I'm a loser, my opportunity costs for time spent on Noesis are low. I qualified to join Mega based on test scores which perversely reflect my lack of achievement in the real world.

Concerning the "execrable typography"--it went to the printer as you sent it. Some pages are faint, making subscripts hard but not impossible to read. I used to type everything onto disk, but that's ridiculous--there were 15 pages of Langan material in issue 76. If you want guaranteed clarity, you must send your disk.

About the rest of the letter, which, as you'll see, accuses me of ignorance and stupidity--

Every time I put an issue together, I ask myself, "Do I have to understand this stuff to edit it? Do I even have to read it?" Usually I say "Nah," and send everything to Chris Cole to be printed. I make an effort to read submissions, but if I don't get it, I don't sweat it. Y'all can develop your own understanding of the material, or you can search for a less cavalier editor.

I don't know logic. I never remember what ipso facto and prompter hoc mean. I have only a vague image of the CTMU landscape. I skim Langan's and other difficult material and add some snide, offhand editor's comments to try to fool y'all into thinking I actually read and understand the stuff. Do you guys read and understand all the demanding material in Noesis? Nah.

I've tried to understand CTMU. It seems that Langan is saying that the universe as a vast information-manipulator and that there's no way to tell whether one's own consciousness is reality-based or simulated. Other than that, CTMU is beyond my competence.

Everything that appears in Noesis is subject to my gentle ridicule, in the form of Editor's comments. These comments are apropos of nothing except immature attempts at humor. Generally, Editor's comments do not imply:

A. endorsement.
B. lack of endorsement.
C. my understanding of the commented-upon material.

Some of you reading Langan's letter might wonder, "Is Langan a mean guy?" I don't think so. Phone conversations Chris Cole and I have had with Langan indicate that he's a pretty nice guy. His writing has an intensity that is contrary to limp politically-correct stuff, which leads to the following totally-off-the-subject question:

Why have conservatives replaced liberals in being interesting and funny? In the hippie and disco periods, liberals were vicious and subversive and lively. Now they're soft and whiny and boring, while

conservatives such as P. J. O'Rourke are nasty and funny. Rush Limbaugh is a by-the-book conservative toady, but he's the only interesting thing on my car's AM radio. Why have liberals become such squisby wusses?

Two recommendations: **The Kids in the Hall** are the only funny people on TV. Less than 50% of their skits really work, but some just kick butt (like the one about the bald guy who strangles a squirrel for seeing him without his toupee and who ends up having to wear the dead squirrel as a toupee). Florence King writes about the joy of being hostile. Her latest book, **With Charity Toward None: A Fond Look at Misanthropy**, is a short celebration of mean-spiritedness in recent history.

A LETTER FROM CHRIS LANGAN

To whom it may concern:

I just picked up my illegible copy of *Noesis* 76, along with a somewhat more legible copy of *Noesis* 75. I couldn't believe it: after waiting for *four* and *three months*, respectively, to get my latest contributions published, what did I see? Little blanks and gaps and blurs where letters and symbols were supposed to be! In some spots, the results looked sort of like a cross between Morse code and Sanskrit, but not quite as linear.

Then I got to Rick's comments on my proof of CTMU universality and unique validity. The printing seemed to have come out better, but the end result was *again* about as comprehensible as (you knew it!) a random mixture of Hebrew, Thai and Hindi. The problem this time: Rick has opined that the universe, like that part of it personally occupied by Rick himself, can at times do without a certain inessential bourgeois luxury: *logic*. (In fairness to Rick, he has made no bones about his distaste for all things logical, and in fact reiterates it in *Noesis* 75.)

Even after complaining to Chris Cole about both problems, I still felt crummy. So I decided to track down my old pal *Jojo Einstein*. I'm afraid I must admit to getting rather exercised with the poor clown, whom I interrupted in the middle of what had promised to be an extremely lucrative street scam. Although I'd put him in a foul mood - foul moods are sort of like colds, being easily spread by respiratory vectors like screaming - Jojo listened patiently to everything I had to say (he views me as a kind of "demigod" for having created him, though he expressly wishes I'd created him with a Porsche, a Rolex, and several hot girlfriends).

Finally, he raised an immaculate glove to shut me up.

"Gimme that rag", he said, swiping *Noesis* 76 out of my hand with his magician's finesse. "I tried to help Bush out with that Bozo-and-ozone angle; it didn't work out. But for you, *bwana*, maybe I can do a little better."

I waited patiently as he read. As I'd created him with a towering intellect - second only to mine - he blazed through the letter to Rick as quickly as he could flip the pages (with brief interruptions to clarify the execrable typography). It was no time at all before he had come to the end of Rick's reply.

"Okay", he finally said, nodding his great greasepainted gourd. "I think see the problem. Lemme see if I can piece it out. This guy Rosner, he's editing the journal. Since this journal allegedly contains the profound genius of the world's *primo* eggheads, you assumed that holding the position of editor would entail certain intellectual *qualifications*. Am I right?"

I nodded in agreement.

This prompted the clown to burst into a round of hysterical laughter. "What do you think this is," he said, indicating the world with an expansive sweep of his paw. "A meritocracy? *Cloud 9?*"

What could I say? I saw where he was going.

"You probably thought that this guy Rosner had to know *logic* in order to function as editor, am I right?"

I nodded sheepishly in confirmation.

"Now who's the clown!" To my consternation, he grabbed himself

around the belly and laughed so hard that his red rubber nose popped off and bounced from the pavement into my pocket. Dutifully, I wiped the soggy chunk of latex off and returned it to him.
"To your infinite amazement" - his mincing pronunciation mocked my naivete - "this guy Rick turns out to know nothing about logic at all. In fact, he's *laughin in your face!* Every time he says something dumb - which, on the basis of this reply, can't be all that infrequently - you do exactly what he expects you to do: you kick yourself in the *tush* for not having made yourself clearer." He stared at me accusingly. "And then, like a predictable dope, you try - you *knock yourself out* - to make whatever you tried to tell him even simpler and clearer than you already did."
Again, I had to admit his inarguable veracity.
"And then what happens? *Surprise, surprise!* He tells you (a) that he didn't bother to read your letter; (b) that he nonetheless disagrees with your letter; and (c) that he prefers a viewpoint which, if not nearly identical to *your* viewpoint, is so antithetical to fact, logic, and common sense that it makes the Sunday funnies read like the Lost Proof of Fermat's Last Theorem!"
Though I wouldn't have believed it possible, Jojo's erstwhile hysterics were put to shame by the long, shuddering, and attention-grabbing fit he now threw. By the time it subsided, Old Man Fishman had emerged from the Kosher Deli for the first time in years, and Times Square was packed with onlookers from the pavement to the *FUJI* sign. Some had popcorn, apparently bought from Jojo's skulking shills.
"Okay, alright," I said, a little irritated. "Get a grip."
"I'm *tryin,*" he said, still sputtering. "But it ain't easy."
I waited a little longer.
"Okay, then," he finally continued. "Now, correct me if I'm wrong. But your first impulse is, you feel like *slappin this Rick character around a little.*" He regarded me narrowly, attuned to the slightest hint of dissemblance.
Heaven forfend! Could my quaking breast really have nurtured such forbidden yearnings?
"I thought so," said Jojo. "But hey, don't feel so *bad* about it. This guy Rick is a bouncer, so he probably won't mind. Hell, he obviously deserves it! And why not admit it: it could only improve his mental efficiency."
I hung my head. It seemed impossible to argue.
"Yeah," Jojo went on, "he's probably *dyin* for it. What else could explain the way he's been using his position as editor to cheap-shot you, to sop up the last word on you, to put a bum spin on your stuff and act like he knows what you're talking about when he couldn't find his rump without a road map! After all, it's not like you've been asking him to learn tensor calculus. You only expected him to know what any goof is supposed to know... *logic.* He speaks English, doesn't he? English is a language, isn't it? And languages have logical syntaxes, don't they?"
Naturally, I wanted desperately to defend Rick. But what could I say? I gazed on mutely, helpless to disagree.
"See, you're just a genius. Ricky's a *showman.* He knows what kind of audience he's got: a bunch of dweebs and poindexters who've been through the whole IQ society gambit of cranks, quacks, crack-

pots, sophists, know-it-alls, and tinhorn WGA's. To get over on *them*, all he's got to do is indulge in a little self-parody, adopt some humble affectations, put on a few self-effacing airs, and sit back while the sycophantic fan letters pour in. *You're* the guy who 'puts 'em to sleep' with world-class insight. But *he's* the guy who they praise as a bracingly cool breeze of honesty, originality and fresh air!"

There was no denying it. When Jojo was on, he was *on*.

"Now, the way I see it, you've been playing this all wrong. You're making it *way too easy* on this guy. You've published about *a hundred fifty pages of topnotch material* in this rag, including *definite and unprecedented logical and mathematical assertions about every conceivable aspect of reality*, not a single one of which Ricky or anyone else can even dream of contravening."

I gaped stupidly, steamrollered by the clown's inexorable logic. Jojo, resonating with a trans-physical level of the distributed empyreonic identity, was *spacetime-parallelized*, and already knew that the CTMU would ultimately be recognized as the everlasting crown jewel of human intellectual progress.

"Rick, on the other hand, has been skating away on eccentric observations and vague but portentious references to some fantastic theory that supposedly, unbelievably *beats* the CTMU despite the fact that you've defined it in a *supertautological, absolutely inarguable way!* Talk about doing the impossible...this guy's got *that* rap down to an art form."

Wasn't that a fact! I too had been impressed, if not hornswoggled, by Rick's balletic ability to pirouette through tons of titanium-tough logic without ever seeming to actually contact it, looking shiny and smelling lemony-fresh and ready to harvest the next obsequious flurry of praise. Not to mention the deftness with which Rick, whenever some snide little weasel would write in from left field to comment on the purported lack of genius-quality material in *Noesis*, was invariably able to avoid saying anything whatsoever about the vast bulk of original material put there by me! In fact, Rick had been one of my very greatest intellectual heroes ever since that first fateful day that I (and Kevin Schwartz) had read about him in *OMNI*.

"Everybody digs a good bullshooter", said Jojo, pursuing our common line of thought. "And *who's better than Rick?*" he enounced in flawless Brooklynese. "Sadly for you, no mere genius can do a *thing* once a smoothie like Rick goes into his routine. The logic just sort of gets *buried* under a pile of nebulous portent and inchoate mystery and immanent nonemergent numinosity. Especially with an audience as jaded and lazy as the Mega Society."

That did it. The heartless clown had destroyed my last vestige of hope. I was abjectly beaten, utterly dispirited.

"So I guess that's it", I said. "I guess that's the end of it."

"Not quite," answered Jojo sharply. "You can't let 'em wear you down, kid. You got to *stand up and fight for logic*, no matter how dull, unfunny, and non-entertaining it is! Sure, it runs a lousy second to cheap comedy and false modesty. But unto thine own self be true. You got to pick yourself up off the ground and show this guy *he can't push you around any more!* Good grief, kid, show some pride!" The clown had shapeshifted in order to look and sound more

like the ghost of Burgess Meredith in *Rocky V(I?)*, the patron saint of every good New Yorker.
"What can I do?" Seeing and hearing myself from what seemed to be a great distance, unable to believe my own actions, I grabbed Jojo by his accordion collar and shook him maniacally. "Pleeeeeeease... *you've got to tell me what to do!*"
"It's simple, kid. You got to face the guy. You got to eat your fear. You got to do what you never dreamed you could do. You got to put it to him like I'm gonna put it to him right here, right now: *Okay, Ricky boy, one clown to another: what's this big theory you keep alluding to like it was a Dead Sea Scroll or something? Never mind about the 'interesting results' - interesting is in the eye of the beholder! Now kin you PUT up, or are you finally gonna SHUT up?*"
Incredibly, the clown seemed to shrink and vanish in an angry, compact tornado of strobed lightening and buzzing wind. I stood there for a goodly time in thought, his parting words echoing loud between the aching walls of my feverish, ultrapressurized skull. *What theory, indeed?* Rick's theory was a "flex theory" able to mold itself to any nomology encoding any amount of information. *The CTMU already was.* Rick's theory would allow the generalized identification of that which resists specification. *The CTMU already did.* Rick's theory was polymorphic, appearing in as many guises as there were cognitive syntaxes, and with as many degrees of logical structure. *The CTMU was designed to do exactly that.* Rick's theory would somehow confirm the Ronald K. Hoeflin notion that metaphysics can never be unified at any level of generality. *The CTMU already...* whoops, better put a hold on *that* one. *No* valid theory can confirm the inconfirmable, the antilogical or the absurd. But anyhow, Rick's theory was going to do all of this, *and yet be nonisomorphic to the CTMU!* And to really cap it off, this was *all going to be accomplished without benefit of boring distractions like logic or algebra!*
I was in terrible, terrible trouble. I'd already repeatedly shot off my stupid mouth and said in effect that what Rick had proposed was impossible. But clearly, Rick - pampered pet poodle of the Mega Society - had now flung his gauntlet directly into the ugly, drooling face of its bottom dog and most despised cur (me). How could such an *impasse* be broken in any but one way...*Ricky's way?* It seemed only a matter of time before Rick's sledgehammer of a theory would fall on my poor vacant head.
I'd already waited what had felt like years for the other shoe to drop, for Damocles' thread to unravel, and every second had seemed like sheer Chinese water torture. When would it end? When would Rick's great fiery dragon of a theory congeal from the pungent mists of portent to put a quick and merciful end to me and my foremost soporific "delusion", the CTMU? *When?*

Well, how about it, Rick? I don't know about the peanut gallery, but as you can see, Jojo, I, and thousands of good New Yorkers are on the edges of our gummy seats.

Regards, Chris L.

[Editor's comments: Without a clear understanding of CTMU, I can't really comment on its legitimacy. (Even with a clear understanding, I wouldn't be qualified to critique it without knowledge of related issues.)
However, I can use fake ID-catching technique to see if Langan has a fake idea--
When patrons appear at the door of my bar, I try to sort them into Bayesian categories. That is, I try to classify them into groups which I know to be fake-ID enriched or deficient. Only then do I evaluate them as individuals. Lately, I've been saying to hell with individual evaluation and have been snagging some ID's solely on the basis of the context in which an ID is presented. You could call this intuition, but paranoia would be more accurate.
Not understanding CTMU, I must evaluate it solely on the context in which it appears, rather than on its content.
Points against CTMU:
A. It appears in a high-IQ society journal.
B. The ratio of the number of revolutionary theories which are true to the number of revolutionary theories which are postulated is low.
Points for CTMU:
A. Langan seems determined and frustrated, but not crazy.
B. CTMU has a promising angle of opposition to currently-accepted thinking. (It belongs to a class of theories which are extreme enough to be true, but not so far-fetched to be senseless.)

The idea of evaluating a theory from context rather than on content is itself far-fetched enough to be senseless. I'm trying to be funny, dammit.]

PUBLISHER'S NOTES

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1. Since the printer is now charging more, and the set of back issues has grown larger, I can no longer afford to send out complete sets of back issues for $20.00, postpaid. The new price is $40.00, postpaid.

2. In this issue, Chris Langan complains about the illegibility of his copy of *Noesis*. I have worked out a deal with the printer which I now pass on to the readership, to wit: anyone with an illegible copy can return it to me, and I will without charge replace it with a legible copy.

3. When submitting material for publication, please include two inch margins on the top and bottom of each page, to make room for section headers and footers. I have had to leave off the footers in this issue, which can cause the printer to foul up and does not look as nice. Also, some of the section headers are crowding the text. So remember, two inch margins, top and bottom.

To the Editor:

A LETTER FROM LEROY KOTTKE
PLUS A CORRECTION TO HIS ARTICLE IN THE PREVIOUS ISSUE

After absorbing (or is that adsorbing) to the best of my ability the various letters in issue #76 of Noesis, I feel like commenting on the general subject of information and theories of informational organization and processing; my viewpoint is confined to the U1--the universe of my own logic; by that I mean that I have/am not sworn to uphold any particular discipline, however I have gleaned information from any and every source that I considered relevant. Since I contend to be but am not necessarily content to be a child of the universe, I have come to feel unconditionally qualified as a classless citizen of this universe, that my perceptions and observations belong to this universe.

It seems to me that there is no reason that hierarchical universal sets should have a limit. This may have the same meaning as the condition that--"the boundary of a boundary is zero"--when applied to G.R. Anyway, it seems reasonable that, as sentient beings, we have the unique ability to pose this question: "What are the fundamental limits to my existence?" I guess another way of saying this is that if I am defined by boundaries, they are invisible. We perceive lower animals to be doomed to non-awareness, having to live out an existence that we can clearly see as limited and since we can see these limits, then we exalt ourselves to a higher plane. (Descartes before the horse). Being cognizant of transparent boundaries and operating under their restrictions without being aware of it are, of course, two different things. The difference is the possibility of becoming further aware of said boundaries once I acknowledge the possibility of their existence. But back to the implications of unlimited hierarchical sets; to me this implies neither the conclusion that I **will not** ever be able to rise to such a perspective that I can say "now I know everything" nor does it imply that I **will** be able to rise to such a perspective. The prevailing metaphor here is the image of a invisible balloon. The moral is: The transcendence of undecidability as the ultimate law of the universe. Not just undecidability but the absence of decidability.

This is not to say that the observation and undeniability of this truth can't be suspended--in fact--I believe that everything tangible enough to point to and make rules about has an **apparent** reality, along with any every verifiable theory of science. But, it is a delusion that we (almost) all agree to accept. It is undoubtedly the fact of our macro-existence and occasionally running into hard physical objects in our path that gives us the idea that the whole universe is like this. By introducing the necessarily arbitrary boundaries (suited to our size) it becomes possible to create a conditionally acceptable reality. The metaphors for this state of affairs abound, and are as numerous as everything we perceive as solid object and every cultural artifact.

[Editor's comment: Evaluating this letter from context (rather than reading it), I theorize that it has something to do with CTMU.]

To the Editor;

Re Noesis, Issue 77, page 14. It has been pointed out to me by Patrick Thomas in In-Genius, issue 74, page 14, that I made an error in unit conversions. And since I used one of these conversions to arrive at a fundamental constant, that too is incorrect. The corrected numbers then are: Tmin should be: 8.9*10^-40 sec. and 1/Tmin =1.1*10^39 Hz with Kf, the fundamental observational constant being 7.9*10^-58 Hz-secs.

But worse than that, I think that I have made an error in interpretation, confusing the AGE of the universe with the UNCERTAINTY or ERROR in the AGE. This sheds new light on the variance with the Planck time quantum and corresponding Planck length, these being 5.39*10^-44 sec and 1.62*10^-35 meters.(these two quantities are related through the speed of light, c, and are derived from the Gravitational constant). Using the Planck time as Tmin, the corresponding ERROR in age of the universe (1/Fmin) = 6.6*10^13 secs. or only about 2 million years! Whereas, my Tmin of 10^-39 serves only to define the max. error in the age of the universe; i.e., +/- 20 billion years.

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I may, however, postulate a theory based on the **absence** of a boundary (i.e., an all encompassing theory of reality however large), this is not different in principle, being still founded on assumptions, but the meaning and importance of that theory may be profound and may lead to unanticipated discoveries.

It therefore seems that the ultimate meaning of a theory that purports to be universal but remains unable to demonstrate any predictive power in and of itself, is that it is automatically driven to the conclusion of undecidability. If this "theory" merely acts as an executive computer program that collects all known theories like subroutines, then it is **really not** a theory after all, but might more properly be called a Meta-Theory. The MCTMU ?

LeRoy C. Kottke
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[Editor's comment: Putting stuff from Noesis on InterNet seems like a good idea, especially considering the Stone Age speeds with which I process material. What do readers who are less computer-stupid than I think?]

A LETTER FROM JEFFREY WRIGHT

Dear Rick,

I liked Dean Inada's question on being lost in a dense forest within one mile of a linear road. However, it's the kind I hate to see on a test--an optimizing problem. I quickly had three insights for a solution, each a lower upper bound, but without a conclusive "aha", I must either stop in uncertainty or get "dogged" (and then stop in uncertainty). A suggestion, as far as a test is concerned, might be to use some sort of confirming hint. For example, give the fifth and sixth significant digits, or perhaps the sum of the first seven. This I think could save time on the test without giving it away.

Keep up the good work.

Jeff

[Editor's comment: I'd like to see variable credit given on some of the more miserable test problems, depending on how far a test taker wanted to take the solution process. For instance, one point might be given for an order of magnitude estimate on a tough math problem, one more point for an estimate within fifty percent, and a third point for a exact solution. Of course, most problems wouldn't present the computational, rather than conceptual, challenges that would make such a scoring system appropriate. I agree with you that a well-constructed test would pander to the less-persistent.]

A LETTER FROM P. A. POMFRIT

Dear Rick,

Only one person tried my verbal analogy test (Noesis 74) and scored an excellent 45 out of 50. He missed numbers 3, 6, 8, 14 and 31. It might be worth reprinting numbers 8 and 14 as "possibles" for the short-form test. [done, see March issue]

If you are ever short of material for Noesis I have other test available--please let me know.

How about this AHA! series as a possible short-form test question? (although I think that it's much too easy) [moved to March issue]

Happy New Year to one and all.

All the best,

Pete

P.S. Only just spotted this analogy in Noesis 59
PROBABILITY : BAYESIAN :: MIMICRY : BATESIAN

[Editor's comments: Please send other tests for inclusion in Noesis. Your answer to the analogy is of course correct, as is your answer to short-form problem 16.]

TWO ARTICLES FROM ROBERT HANNON

VELOCITY IN SPECIAL RELATIVITY

One of the almost-universally accepted results of the theory of Special Relativity (SR) is an equation which, it is said, proves that no two velocities can add up to more than C, the velocity of light. It is also said that this equation proves that C is always the same, regardless of how fast its source may be moving relative to an observer.

The SR Velocity Equation is:

$$v' = (v+S)/(1+vS/C^2)$$

v = the velocity of an object relative to a frame of reference K.
S = the constant linear velocity, in the same direction as v, of an observer relative to the frame of reference K.
C = the velocity of light in a vacuum (3x10^8 meters/sec).
v'= the velocity of the object as measured by the observer.

If we set v = 0.9C and S = 0.9C
then: $v' = (0.9+0.9)C/(1+0.81)$
$= 1.8C/1.81 = 0.994475C = <C$

If we set v = 1.5C and S = 12C
then: $v' = (1.5+12.0)C/(1+18.0)$
$= 13.5C/19.0 = 0.710C = <C$

* Therefore it appears that v+S can not exceed C.

If we set v = C:
then: $v' = (C+S)/(1+CS/C^2) = C^2(C+S)/(C^2+SC)$
$= C(C^2+SC)/(C^2+SC)$
$= C$

* Therefore, v'= v = C, regardless of S, the relative velocity of source and observer.

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Where did the SR Velocity Equation come from?

According to the Lorentz Transformation (LT), which is the

entire mathematical foundation of SR:

(1-2) $x' = (x+St)/\sqrt{(1-S^2/C^2)}$

(1-3) $t' = (t+Sx/C^2)/\sqrt{(1-S^2/C^2)}$

and, according to basic physics:

$$v' = x'/t' = \frac{(x+St)}{(t+xS/C^2)}\frac{[(1/t)]}{[(1/t)]} = \frac{(x/t+S)}{[1+(Sx/tC^2)}$$

And, since $v = x/t$:

(1-4) $v' = (v+S)/(1+vS/C^2)$

This all seems straightforward, but it neglects the most basic postulate involved in the derivation of the LT itself:

(1-5) $x = Ct$, and $x' = Ct'$

or: $x/t = C$, or: $x'/t' = C$

This fundamental postulate requires that we treat x and t (or x' and t') only in their fixed relationship. Substituting (1-5) in (1-2) and (1-3):

(1-2a) $x' = (Ct+St)/\sqrt{(1-S^2/C^2)}$

$= t(C+S)/\sqrt{(1-S^2/C^2)}$

(1-3a) $t' = (t+SCt/C^2)/\sqrt{(1-S^2/C^2)}$

$= (t/C)(C+S)/\sqrt{(1-S^2/C^2)}$

Therefore:

$v' = x'/t' = C$

And, by symmetry as well as by definition:

$v = x/t = C$

Thus by scrupulously observing the premises of the LT, we find that we can not obtain a Velocity Transformation Equation by taking the ratio x'/t' or x/t. This is to be expected because of the definition of x and x' given in (1-5).

We can derive an SR Velocity Equation by postulating that something is moving relative to frame of reference K at

velocity Z, where Z = Xa/Ta. Then, remembering that C in (1-2) and (1-3) is the velocity of something moving relative to frame of reference K, we must substitute Z for C:

(1-8) $$Z' = Xa'/Ta' = [Xa+STa]/[Ta+SXa/Z^2] = Z^2[ZTa+STa]/[Z^2Ta+SZTa]$$

$$= Z^2Ta[Z+S]/ZTa[Z+S] = Z$$

Which tells us that the velocity of an object moving at Z relative to frame of reference K will be measured to be Z' = Z by an observer in another frame of reference, regardless of how fast the two frames of reference are moving relative to each other.

It must be understood that **neither (1-4) nor (1-8) makes v' or Z' relative to the observer.** These equations transform **only** the magnitude of v or Z to the metric of the observer; **v' and Z' remain relative to frame of reference K.**

How can we determine U', the velocity relative to the observer, of the object that is moving at Z relative to frame of reference K? It is the vector sum of S, the relative velocity of K and the observer, and Z', the velocity of the object relative to K as measured by the observer:

(1-9) $$U' = S + Z' = S + Z$$

It is (1-9) which must be compared with the conventional (but invalid) interpretation of (1-4), which presumes that v' is v as measured by **and relative to** the observer.

When Z is less than C:

(1-4) says $U' = (Z+S)/(1+ZS/C^2)$
(1-9) says $U' = S + Z$

When Z = C:

(1-4) says U' = C for all values of S
(1-9) says U' = S + Z = S + C

When Z > C:

(1-4) says U' < C for all values of S and Z
(1-9) says U' = S + Z

In short:

(1-4) says U' is dependent on S except only when Z = C, and C is a limit which can not be exceeded.
(1-9) says U' always = S + Z, thus C is not invariant, and C is not a limit.

The foregoing analysis indicates that the conventional "Special Relativistic Transformation of a Velocity" [equation (1-4)] violates the most basic premises of the Lorentz Transformation, and that (1-9) does not.

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TIME IN SPECIAL RELATIVITY Robert J. Hannon 9/5/92

The Lorentz Transformation (LT), which is the entire mathematical premise of Special Relativity (SR), tells us that time will appear to pass more slowly (a second will appear longer) in an inertial frame of reference (IFR) that is moving relative to us at some constant linear velocity, S. The mathematical equation representing this effect is usually given as:

(1-1) $$t' = (t+Sx/C^2)/\sqrt{(1-S^2/C^2)}$$

Where: t = a unit of time duration measured by a perfect clock in the IFR under observation.
x = a distance in the same direction as S, as measured in the IFR under observation,
S = velocity of the IFR under observation relative to the observer,
C = velocity of propagation of light in a vacuum.
t' = the duration of t as measured by a perfect clock stationary relative to the observer.

This all seems straightforward, **except for x**. What distance does x represent, and how is it measured? Usually, the entire term Sx/C^2 is ignored, because it is **assumed** that S can not equal or exceed C and that x is "small", thus Sx/C^2 must be about 1/C or less; since C = 3x10^8 m/sec, 1/C is therefore assumed to be a very small number.

However, if we go back to the derivation of the LT (any of its many derivations) we find that, contrary to the foregoing, x can not take on any arbitrary value; indeed x has a very specific meaning:

(1-2) $$x = Ct \quad \text{and} \quad x' = Ct'$$

This means that x is "small" **only** if t is much smaller, so maybe it is not valid to ignore Sx/C^2. Let's substitute the value of x given by (1-2) into (1-1), and see what results:

$$\begin{aligned} t' &= (t+Sx/C^2)/\sqrt{(1-S^2/C^2)} \\ &= (t+SCt/C^2)/\sqrt{(1-S^2/C^2)} \\ &= (t/C)(C+S)/\sqrt{(1-S^2/C^2)} \end{aligned}$$

(1-3) $$t' = t\sqrt{[(C+S)/(C-S)]}$$

In this form, there is no questionable (possibly undeterminable) value of x to deal with: t' is determined entirely by t, S and C, but we get different values of t'/t using (1-3) than using (1-1). If we set C = 1:

TABLE A: S	t'/t [(1-1)]	t'/t [(1-3)]
0.01C	1.00005	1.010
0.1C	1.005	1.106
0.5C	1.155	1.732
0.9C	2.294	4.359
0.99C	7.089	14.107
0.999C	22.366	44.710
0.9999C	70.712	141.418

0.99999C	223.607	447.212
1.00C	infinity	infinity

Obviously Sx/C^2 is more signficant than is usually recognized, even when S is relatively small.

Let's consider what (1-2) means. These relationships are fundamental to all rigorous derivations of the LT; indeed they are the sole avenue by which C enters the mathematics. (1-2) can also be stated as:

(1-2a) $$x/t = C = x'/t'$$

which tells us that **the velocity x/t equals the velocity x'/t' equals the velocity C.** In short, C is the same in one IFR as it is in any other. **This is a basic postulate of the LT and of SR. It must be true if the LT and SR are valid. It can not be ignored.** It tells us that x and t (and x' and t') as they are used in the LT, or in any relationships derived from the LT, have a definite and fixed relationship. x is the distance travelled in t seconds by anything moving at velocity C in the metric of one IFR; and x' is the distance travelled in t' seconds by anything moving at velocity C in the metric of another IFR. x and t (or x' and t') can not have simultaneous values that disgree with (1-2) or (1-2a). This means that the Sx/C^2 term of (1-1) can not be ignored if (1-1) is to yield the true value of t'. It also means that (1-3), not (1-1), will yield the correct values of t' or of t'/t.

This result is in direct conflict with various experiments in which the half-life of unstable sub-nuclear particles such as muons has been observed to increase with their velocity in nearly exact accord with (1-1) when the Sx/C^2 term is ignored. In such experiments, the half-life of large numbers of particles is measured when they are "at rest" relative to the observer, and the half life of large numbers of the same kind of particles is measured when they are moving at a specific average velocity which is a significant fraction of C, relative to the observer. The velocity of the particles is measured in terms of time and distance in the observer's frame of reference and is assumed to be S. But is it?

In Einstein's derivation of the LT it is plain that S is invariant, that is, it does not change if the observer moves from one frame of reference to the other. Does a particle in such a measurement correspond to "another inertial frame of reference" in terms of the LT? **If it does**, then it is at rest relative to its own frame of reference (x/t = 0), and **the LT does not apply to it.** [Einstein's derivation of the LT makes it plain that x/t and x'/t' (both of which must equal C) are velocities respectively measured **relative to the two separate IFRs employed in his analysis]. If it does not**, then S = 0 and x/t does not equal C; again, **the LT does not apply to it.**

How then is it possible for said experiments to yield results that appear to be in close accord with (1-1), ignoring Sx/C^2? There is no apparent answer within the LT or SR, except to observe that the LT applies only to objects moving at C relative to the IFR under

observation, and that when applied to objects moving at some other velocity, the LT will yield spurious results. It is also important to note that the experimental results seem to conform to (1-1) only under the improper assumption that Sx/C^2 may be ignored. If the half-life of particles such as muons actually changes due to their velocity relative to any observer, that change must arise from some as-yet unknown phenomenon.

It is interesting to note that the sign of S can not be the same when the IFRs are approaching each other as it is when they are receding from each other. If it is positive when they are approaching, it must be negative when they are receding. This vitiates the reciprocity or symmetry ordinarily assumed to exist in SR when we recognize that Sx/C^2 can not be ignored. Then, when S is negative, (1-1) becomes:

(1-1a) $\qquad t' = (t-Sx/C^2)/\sqrt{(1-S^2/C^2)}$

and (1-3) becomes:

(1-3a) $\qquad t' = t\sqrt{[(C-S)/(C+S)]}$

which is profoundly different from (1-3). Inserting the values of t'/t obtained from (1-3a) into Table A, above:

TABLE B:

S	t'/t [(1-1)]	t'/t [(1-3)]	t'/t [(1-3a)]
0.01C	1.00005	1.010	0.990
0.1C	1.005	1.106	0.905
0.5C	1.155	1.732	0.577
0.9C	2.294	4.359	0.229
0.99C	7.089	14.107	0.071
0.999C	22.366	44.710	0.022
0.9999C	70.712	141.418	0.007
0.99999C	223.607	447.212	0.002
1.00C	infinity	infinity	zero

Note: t'/t [(1-3)] and t'/t [(1-3a)] are exactly reciprocal.

Experiments of this sort imply that the particles under observation are moving in spacetime that has a different metric than that of the observer, and that the metric of that spacetime changes with the velocity of the particles relative to any observer. This implies a relative-velocity-dependent "curvature" of spacetime analogous to the acceleration-dependent metric of spacetime in General Relativity. This is inconsistent with the logical premises of Special Relativity, in which space and time are entirely amorphous and uniform: Euclidian-flat, and the same everywhere and everywhen. From the viewpoint of an observer moving with a particle, it is the spacetime of the other observer that is relative-velocity-dependent. Suppose we introduce a third or fourth observer, each moving at a different velocity relative to the particle; what then is the metric of the particle's spacetime?

Recognizing that the LT does not require any IFR to contain mass,

we must consider that any and all of the vast number of light quanta that exist throughout the universe are moving at C relative to us or to a particle under observation. The implication, using the conventional interpretation of (1-1), is that our clock, the particle's clock, and indeed all clocks in the universe must be stopped, because then t' must be infinite. Does a light quantum qualify as an IFR as defined by the LT? If it does, it is stationary relative to itself, and the LT does not apply. If it doesn't, S = 0, and the LT does not apply. This appears to be the reason why all clocks in the universe are not actually stopped due to their velocity relative to light quanta.

The "Twins Paradox" (also called the "Clocks Paradox") arises largely from the assumption that Sx/C^2 may be ignored. In that paradox, two identical, perfect clocks are set in exact synchronism here on earth. One is kept by an observer on earth, and the other is taken aboard a spaceship by a second observer. The spaceship is accelerated to attain and maintain a large constant fraction of C relative to and away from the earth. It is assumed that the observer on earth can somehow see the elapsed time shown on the clock on the spaceship, and that the observer on the spaceship can by the same means see the elapsed time shown on the clock on earth. Applying (1-1) and assuming that Sx/C^2 may be ignored, it is apparent that each oberver will perceive the other's clock to be slow compared to his own clock, and by exactly the same amount. It is further assumed that after travelling at a constant large fraction of C for some significant period, the spaceship will turn around and head back toward the earth at exactly the same velocity, S, travelling inbound for exactly the same period as it travelled outward. The spaceship will then decelerate and return to earth. It is assumed that both clocks are somehow turned off during all periods of acceleration or deceleration, so that any General Relativistic effects are excluded. The "paradox" lies in the fact that it is not possible for the clocks to be simultaneously both slow and normal, and that it is impossible to determine how they will compare when they are brought back together on earth.

Setting aside for the moment the question as to whether or not two clocks that are stationary relative to their respective "inertial frame of reference" meet the requirements of the LT, it is obvious from (1-3) and (1-3a) that there is no paradox. On the outward half of the spaceship's trip, we can assume S to be negative, and each observer will perceive the other's clock to be **fast** in accord with (1-3a). On the return/inbound half of the trip, S will be positive and each observer will perceive the other's clock to be **slow** in accord with (1-3). And, as it is assumed that the duration of the two portions of the trip is the same and the magnitude of S is identical, the time gained during the "fast" interval will exactly equal the time lost during the "slow" interval and the readings of the two clocks will be identical when they are brought back together on earth.

The entire situation of the purported "paradox" is predicated on five assumptions that are not necessarily correct:

a) the time difference predicted by (1-1) is a real, factual, physical change. There is nothing in the derivation of the LT

which mandates this to be true. There is no experimental evidence that it is true, when the premises of the LT are scrupulously observed. There are many logical arguments which imply that it is not true. It may nevertheless be true, but with no actual effect on the outcome.

b) the term Sx/C^2 can be ignored. We have shown above that this is not true.

c) a clock stationary relative to the earth conforms to the basic physical situation on which the LT is predicated, and

d) a clock stationary relative to a spaceship conforms to the basic situation on which the LT is predicated, and

e) the LT is applicable to objects whose velocity (x/t) relative to the frame of reference under observation differs from C.

The Einstein derivation makes it plain that the LT does not apply to anything that is stationary relative to the IFR under observation; indeed, its velocity (x/t) relative to that IFR must equal C.

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Dear Rick,

I'd like to know what you think of the following idea. I suggest that we periodically gather intellectual material (not the ad hominem stuff) from Noesis and place it on Internet (with authors permission of course), so that we might get a bit more exposure in the outside world. Comments and replies, if any, could then be printed in Noesis.

More on psychometrics:

1. Extrapolation of test scores: Use Rasch's idea of the nth test problem having a location q(n) on the IQ scale, which interacts with the subject who also has a position q(S), the "true IQ", on the same scale. q(n) is the IQ of the subject who has a probability of 1/2 of solving problem n. S is the average raw score for a hypothetical large number of Mega-type tests taken by a single subject. s denotes the subject's actual raw score on a single test. The subject's probability of solving the nth problem is:

$$f(n,q) = \frac{1}{\sigma\sqrt{(2\pi)}} \int_{-\infty}^{q} e^{-[(q-q(n))/\sigma(n)]^2/2}\, dq \qquad (1)$$

where the standard deviation $\sigma(n)$ may be different for different problems. The q(n) values are spaced at 1.1 to 1.2 IQ points apart.

To extend test scores at the high end: Starting with eq. (1), to get the IQ for an average raw score of S, find q such that:

$$\sum_{n=1}^{48} f(n,q(S)) = S$$

By numerical evaluation for S = 47 this q(S) is about 185, when parameters are set for q(S=24) = 150 and q(S=38) = 168. Highest q(n) is about 178.

A second practical extrapolation method, which eliminates the influence of varying σ's for different problems, is to start by plotting f(n,S)'s using the collected psychometric data and drawing smooth curves through them. Note that eq. 1 leads directly to:

$$\frac{dq}{dS}(n,S2) = \frac{dq}{dS}(n,S1) * [\, df(n,S2)/dS \,] / [\, df(n,S1)/dS \,] \qquad (2)$$

where S1 and S2 are values of S such that:

$$f(n,S2) = 1 - f(n,S1) \qquad (3)$$

The essential thing to see here is that the f(n,q) function, which is symmetric when referred to the q scale, is "compressed" by a factor dq/dS when it is referred to the S scale instead.

Now find df/dS for each n from the smoothed f(n,S) curves at, for example, the convenient values of f = 0.25 and 0.75. (avoiding multiple choice problems and problems with small integer answers, as f does not tend to 0 at lower IQs). The ratio of these two quantities then equals the ratio of dq/dS at values S1 and S2.

This should allow the extrapolation of IQs from the 130s into the 170s, where the data become sparse. Using Ron's data for eight of the problems and the above procedure I obtained rudimentary estimates for dq/dS for S values from 2 to 46, used these to get estimates for the IQs, and extrapolated linearly for S=47, 48. The curve has a shape very similar to that given in the 6th norming. Fitting the curve to the 6th norming up to IQ 150, we get 4:119, 8:129, 12:136, 36:164, 40:171, 45:180, 46:182, 47:185, 48:189.

The "true" score (the S corresponding to the real IQ) implied by a subject's single test score s depends on the initial subject sampling: whether the person came randomly from the population or was "self-selected". Bayes' theorem yields:

$$p(S|s) = p(s|S)\ p(S) \ / \ \sum_S p(s|S)\ p(S)$$

where p(A|B) = probability of A, given B.

Thus the mean S is

$$S\ (\text{mean}) = \sum_S S\ \ p(s|S)\ p(S) \qquad (4)$$

p(S) = p("true" score), well known if our sampling is from the general population. For this sample, true IQ scores are about 4 points lower than those given above for the "average". thus for s = 45, IQ = 181 - 4 = 177. For midrange IQs, around 150, the difference is 1 point.

If the original sample is the set of Omni subjects who actually took the test, we don't have p(S), but can make ballpark estimates using p(s) instead. For this group of subjects, the implied IQ is about 1 point lower than that for the average. Thus a 45 implies 181 - 1 = 180. For midrange IQs, the difference is very small.

Parenthetically, a simple equation for the difference between s and S at the middle of the IQ scale can be found as follows. The standard deviation for raw scores at the middle of the scale is derived from eqn. 1,

$$\sigma 1 \ = \ u/2 \ + \ \surd(\sigma u)$$

where u is the spacing between q(n)'s, and σ is the average standard deviation for the f(n,q)'s.

The Bayes mean is, using eq. 4:

$$Q\ (\text{mean}) = \ q(S) - \ \sigma 1^2 \ \ln\ [p(S)/p(S-1)]$$

assuming p(S) is of the form (const.) ^ S in the neighborhood of S.

Third method: The 6th Mega norming uses an extrapolation of the ratio of observed to predicted numbers of Mega test participants for the IQ range 170 to 193. An alternative is to divide the number of observed subjects obtaining each raw score from 1 to 38 by the frequency of the corresponding IQ in the general population, and plot the logarithm of the result against the raw score. One gets an almost straight line from about s = 12 all the way up to 38. Extrapolating gives 42:172, 44:176, 46:181,

48:188. However, since I see no theoretical basis for this procedure, perhaps it should be taken lightly.

Conclusion: Combining results from the three methods, the 6th norming is accurate up to an IQ score of about 170. Beyond this, the IQ implied by a given raw score does not rise as quickly as the 6th norming suggests. Results for the Omni group: 39:168, 40:170, 41:172, 42:174, 43:176, 44:178, 45:180, 46:182, 47:185, 48:188. At the top end of the scale, about 4% to 6% of the potential high scorers in the English speaking world (300 million) have actually participated.

2. Testing for "power" and "facility" in a relatively short time: Suppose we administered a test by computer containing somewhat easier problems than the Mega, arranged in order of difficulty. The program will keep track of the number of problems correctly solved as a function of time. Now let us hypothesize that the rate of solution, or rate at which the raw score s increases, depends on s according to the following two parameter formula.

$$\frac{ds}{dt} = a\, e^{-bs}$$

where a and b depend on the subject's ability characteristics. For this formula to be true, q(s) should depend linearly on s. Then if s=0 at t=0,

$$s = \frac{1}{b} \ln (1 + abt) \quad ; \quad t \text{ in hours}$$

After the program records the s vs. t data, it fits the data to the above equation determining the parameters a and 1/b. The power and facility IQs are then calculated by norming on the a and 1/b values.

The coefficient 1/b probably relates to "power" and coefficient a mainly to "speed" or "facility", which seems more closely related to the kind of ability that is emphasized in academe. Finally the question arises: Does it make sense to say that the "g factor" has two components?