

## WHAT HE THINKS AND HOW HE THINKS

[C K Zachos, Miami2019, 12/15/19 MGM memorial session]

40 years ago: 4th floor, Lauritsen, Caltech, April 1979.

I'm defending my PhD thesis on extended supergravity and technicalities.

I am one of "our student" types, a high-strung cocky creature, real pleased with his antigravity (cancelation of static forces) stuff; evidently, one frown by Murray would constitute an inarguable existential thunderstroke.

My pro-bono court-appointed attorney (Pierre), Murray, Barry Barish and Jon Mathews are arrayed in judgement of my stuff.

I start perorating on extended supermultiplets, and Murray readily falls asleep.

Sigh... I was supposed to be mostly talking to Him...

Fortunately, Helen Tuck had warned me that Murray had insomnia the night before, and took sleeping pills, which didn't work then, but are working now.

Hmmm. This might work.

I am yapping on counterintuitive doublings of  $N=2$  scalar multiplets and BONGGGG!

Murray's eyes open and stare at me, and he launches a really good question

[pleonasm, if you've heard one Murray question in your life: a Murray question].

... he is back to sleep by the time I've finished my elaborate answer.

Now, this happens 4-5 times: BONGGGG! BONGGGG! BONGGGG! BONGGGG!

I answer every time.

After I passed, Barry (whose TA I had been) apologized to me for not asking any questions, since "Murray asked them all".

Go figure.

Every 10 years, at Halloween?, the scene reappeared in my dreams, in various realistic mutations: Stalin lying in state morphing into Murray popping his eyes open and launching an elegant question, Veltman in a coma morphing into Murray and launching a fish-eye question, Susskind in a park...

Is it appropriate to exclude the supernatural discussing Murray? After all ..., he would like us to. The only non-supernatural explanation I've come up with is: Murray read my thesis in his twilight of insomnia the night before, formed the question linked to some tasteful Murray keyword, and when the keyword hit him in his sleep during the defense [Murray's sleep being more sentient than our wakefulness here...]; the Murray brain engaged and launched.

OK, so much for stories. Stories aside, my point today is that, amusing or trying as his peculiarities and idiosyncracies were, few of us would try emulating them [do you collect precolombian pottery? instruct birds on how to pronounce their names? ...save for the odd articulate tartness on occasion, or a momentary linguistic flight of know-it-all].

But Most of us would stumble on "how would Murray do this?", or "how would Murray frame this?", or "how would Murray hedge this?" moments throughout their careers -- [and you admit few would try this for Feynman].  
So Murray dominates our thoughts he shaped. He framed the world we think in.

At the end of the day, it may well be not about the complex personality, but about the thoughts.

Einstein wrote this sort of thing about himself: "The essential in the being of a man of my kind lies in what he thinks and how he thinks, and not in what he experiences or does."  
[Das wesentliche im Dasein eines Menschen von meiner Art liegt in dem, was er denkt und wie er denkt, and nicht in dem, was er tut oder erleidet.]

So, a century from now, historians might think of Murray as the conduit of the cascade of ideas of the quarter century of physics he shaped, if not owned:

Renormalization group; Strangeness; V-A; Sigma model;  
Flavor Lie groups and hyperfocus on symmetry; Quarks;  
Current algebra; Real nice color...  
What late 20th century physics really was.

So, as we celebrate Murray's magic years of Camelot,  
stay mindful all the while of the granite blocks sure to survive...