

Alfred Tarski, Friend and Daemon

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Engaging Tarski

Alfred Tarski's name stayed with me after I read about the Banach-Tarski paradox in [3] during high school. I then discovered logic (and Tarski's definition of truth) in the last year of college but still considered myself to be a topologist, not from love but from intimate contact in four courses as an undergraduate. So before arriving at UC Berkeley in fall 1962 for graduate work, I thought only vaguely about taking a course with him. But my inclinations were shifting: dutifully registering for fall classes in topological groups and algebraic geometry, I added metamathematics and Tarski's general algebraic systems. The next fall, Tarski offered set theory. These two courses were my only Tarski lectures, but there were numerous seminars. Visitors to Berkeley constantly identified Tarski with whatever topic occupied him so fruitfully and persuasively that year. They might never know that it changed year to year. I witnessed iterations of the two areas mentioned plus cylindric algebras, equational logic, metamathematics of algebras including decision problems, and pervasive model theory, missing only his return to foundations of geometry.

I quickly saw that the way to get Tarski's attention was to correct his boardwork. Precise, accurate, stepwise development without notes was the focus in his classroom, and students' requests for history, motivation, or remedial background were met civilly, in order of declining interest. He later revealed that the clarity of a lecture was the result of two hours' preparation and writing, even rehearsing.

I was Alfred Tarski's last student as determined by date of thesis signature. I did not seek this role.

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When I had passed doctoral exams in 1963 and sounded Bob Vaught and John Addison on their availability for supervising my research, both said that the department recognized me as Tarski's student. News to me, despite the second opinion. So I called him to learn more about my fate. He acknowledged the claim, "Good," and invited me for the first serious nighttime talk.

Source of the Title

Throughout cooperation and separation, Alfred and I were friends, cordial and personable, but not really personal. He also established another role, that of daemon in the sense of [4]: a leonine externalized conscience, at least. The scope of this conscience was foremost mathematical, with a hope for political, a goal of cultural, a reservation on philosophical and moral, and a hint of spiritual.

Mathematical Conscience

Those who absorbed an attitude toward mathematics from Tarski gained a more workable system of notation, a less ambiguous vocabulary, and a deeper appreciation for rigor combined with clarity. He demonstrated the value of careful memory; once he wrote a logical formula of maybe a hundred symbols on a scrap of paper for me, then said he had not looked at the formula in thirty years. We also learned lessons on deliberate productivity, attribution, and accuracy. The professional conduct of logic was well defined, and he could be outraged by our departures from it. We learned to bend and to stretch. For some this was not welcome exercise. Tarski and I both persevered, and his contributions to the problems I brought him created a debt still being repaid and a wish list still being satisfied.

Political Conscience

According to [1, p. 326], Tarski gave me a subscription to a political magazine "that was in line with his more conservative views." In fact, it

was *The Progressive*, a liberal magazine although more conservative than some. This exemplifies Tarski's political complexity. He vaguely supported Berkeley's Free Speech Movement but was clearly suspicious of methods, goals, and direction, taking no comfort in my tentative articulation of them. He found Poland to be a good place for increasing the political awareness of his American students. He was amused by my later free speech activity in Warsaw (see [7]) and the sit-in we exchange students made on a Soviet train platform to liberate an improperly detained tape recorder.

Cultural Conscience

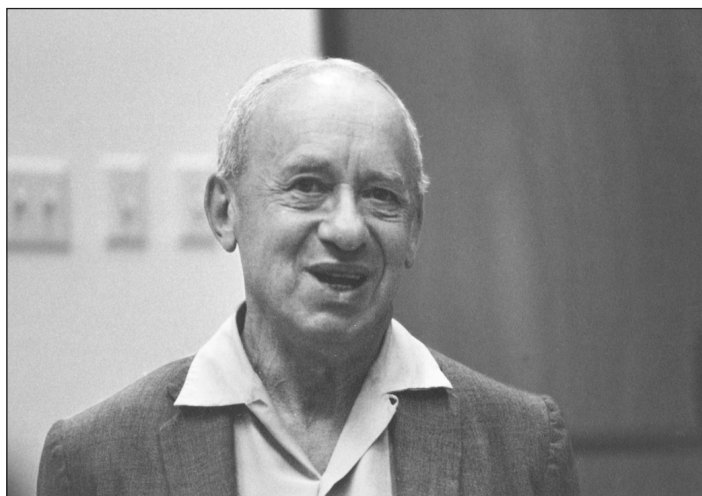
Poland was even better for introducing his students to his culture, and to culture in general. Things Polish were high on the discussion list in Alfred's kitchen after the math ended at 3 or 4 a.m.: he taught me to make *wódka kolorowa* with kumquats, told me he could not pronounce *dżdż* ("rain" in Polish) and thought no one could, appreciated jokes from Poland (not Polish jokes), avidly discussed art, women, mountains, and caves. There were salon evenings at the Tarskis' home where we met their friends far removed from logic: international, sophisticated, intellectual, artistic, always stimulating.

Philosophical and Moral Conscience

Apart from the philosophical embodiment in his logic and mathematics, Alfred did not dwell on philosophy in my hearing. Nor was morality discussed. Some will be aghast at his independence described in [1], while others term these descriptions sanitized. I make no witness in this area, having no direct information. In my experience, Tarski was refined, courteous, and I guess above all discreet. Except for alcohol, tobacco, and kola nut, the only talk of drugs was Witkacy's use while painting the portraits on the walls of the Tarski home. Tarski exuded honesty and a sense of righteousness. From there, he argued, cajoled, almost cudged over mathematical faults and against social ills, e.g., vagueness, overreaching, improper attribution, antinepotism, antisemitism, communism, and other public stupidities.

Spiritual Conscience

He lamented C. C. Chang's move from mathematics to mysticism after Chang found his Hindu guru during the 1971 Tarski Symposium. On returning from Poland three years earlier (followed then by a week in India), I had become devoted to the Indian spiritual master Meher Baba, but Alfred later said he felt I would continue to do science, unlike Chang who declared himself to be finished with research. We rarely discussed religion; he did, however, enumerate the diverse religious/ethnic backgrounds in his extended family: one member was of the karaim like Besicovitch, another had become a Buddhist, and more. I asked him what he was; he looked astonished at my ignorance: "Roman Catholic!" He told me that if reincarnation



Photographs in this article by Steven Givant.

Alfred Tarski at the Tarski Symposium, 1971.

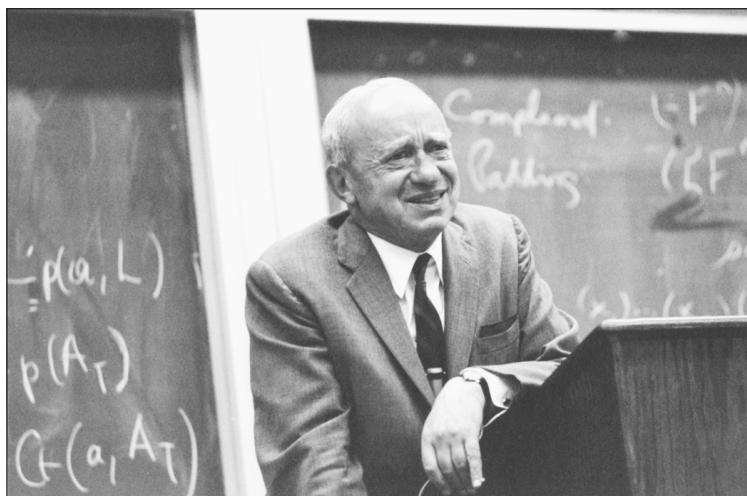
works,¹ then he would like to return as a paleontologist (this contrasts with others' recollections that he would like to be a biologist/botanist if he could do it over). I had put somewhat obscured references to spiritual stories as similes in my dissertation, and he asked that they be removed (most were). I said, "So you want me to take out the religion?" "Exactly," he responded but said his main target was my self-aggrandisement—a spiritual lesson.

Curiosa

Some Tarski images are indelible. He smoked endless cigarillos in a cold, unventilated basement workroom that reeked of aftershave. He smoked during his lectures, and I saw him inhale the chalk, leaving a white mark on his lips for the rest of the hour. He clutched his briefcase across his chest with both arms, and he drove smartly while looking under the top rim of the steering wheel. Alfred had the nickname "Fredzio" among intimates. He told me that he was called "Dan" in his family; whether it had the Hebrew force of "judge" or the Middle English of "master", it was apt.

His 40-odd-page scrapbook of the political activists Patty Hearst, Angela Davis, and Bernadine Dohrn is accurately described in [1, pp. 327–328].

¹In 1965, Tarski said [10], "I represent this very rude, naive kind of antiplatonism, which I could describe as materialism, or nominalism with materialistic taint. It is hard for a man to live his whole life as a mathematician or as one who has a hobby called set theory. Maybe in some future reincarnation (and possible future reincarnation is appropriate to think of at my age) I shall not be such an extreme antiplatonist as now. I imagine I shall not abandon all my tendencies, let's say some rejection of knowledge of priority, some empiricalist tendencies, some physicalist tendencies. Maybe I shall arrive at the conclusion that the existence of classes is not a proper problem, makes no sense, or maybe I shall accept some minor form of platonism."



Alfred Tarski at the Tarski Symposium, 1971.

However, my reading of Alfred was that, while he was not joking, his attitude was definitely ironic bordering on sarcastic, all the while in dead earnest. That still does not explain his motivation but makes it more likely derisive than celebratory.

Tarski once told me he had talked with Kurt Gödel the night before; Gödel was convinced that Stanford's Paul Cohen had given correct proofs of independence in a manuscript he had sent Gödel. Amazingly, I spotted Cohen on the Berkeley campus a few hours later and could tell him to his great pleasure that Gödel was satisfied.

Tarski did not like computers.² He asked me to remove "Recapitulating Turing Machines" from a draft title of my thesis. I told him it gave a flavor of computer science to the work. "Exactly," he replied. Later, he urged, "Since you like computers, maybe you could write a program to check Gödel's incompleteness proof. You know, it is widely accepted, but no one has checked it in every detail." This was eventually carried out by Shankar [5] for Gödel's first theorem (the second remains an open task). The request reflects on Tarski's contention that he almost beat Gödel to the incompleteness results, having to settle for the undefinability of truth as a consolation prize. Logic students can be perennially amused by Gödel's completeness and incompleteness results paired with Tarski's definability and undefinability of truth.

Late and Later Developments

A prelude to my 1967 journey to Warsaw [7] was an exchange of letters with Tarski. Part of Tarski's answer was reconstructed in [1, p. 325] because I thought the letter lost. It is found. The paraphrase was not accurate but close in spirit. He actually wrote: "You will certainly have inspiring scientific

²Despite his aversion to computers and computing, Tarski and his results have inspired many computer scientists. See [1, pp. 229-230] and [2].

contacts in Warsaw. Let me say however that you really could have had more such contacts in the Bay Area than you actually had if you tried hard enough." He continued: "I can assure you that Warsaw is not a monastery and at any rate not a nunnery. ... People in that part of the world are claimed to have various secret weapons. Maybe they will make some of them available to you and you will learn how to beat down the intrusion of the outside world. ... If the decision were entirely up to me I would probably suppress all my misgivings and have you go to Warsaw, treating the whole adventure as a calculated risk." That risk paid off, in time.

At the end of our time together, he released several students to complete their Ph.D. work with Ralph McKenzie, but he kept me because he liked my results (according to McKenzie). For a puzzling aspect of that liking, see [8] and related papers cited there. The reminiscence [6] covers our last thesis interaction.

When [1] was published, I knew that four hours of taped interview, numerous emails, and joyous conversations with the Fefermans over years would be revived there. I am grateful for the close rendering but much more so for their wonderfully vast, synchronized introduction to the life and work of the Polish king of logic—and to him I am most grateful, this ultimately friendly daemon.

References

- [1] ANITA BURDMAN FEFERMAN and SOLOMON FEFERMAN, *Tarski: Life and Logic*, Cambridge University Press, 2004.
- [2] SOLOMON FEFERMAN, Tarski's influence on computer science, *Logical Methods in Computer Sciences* 2, no. 3 (2006), 1-1-13, www.lmcs-online.org.
- [3] EDWARD KASNER and JAMES R. NEWMAN, *Mathematics and the Imagination*, Penguin, 1940, reprinted by Dover, 2001.
- [4] PHILIP PULLMAN, *His Dark Materials*, Knopf, 2007.
- [5] NATARAJAN SHANKAR, *Metamathematics, Machines, and Gödel's Proof*, Cambridge University Press, 1997.
- [6] BENJAMIN WELLS, The triumph of the one, in proceedings of Bridges 2004, Reza Sarhangi and Carlo Sequin (eds.), *Bridges: Mathematical Connections in Art, Music, and Science* (2004), pp. 103-108.
- [7] _____, The prince of logic, in Andrzej Ehrenfeucht, V. Wiktor Marek, Marian Srebrny (eds.), *Seventy Years of Foundational Studies: A Tribute to Andrzej Mostowski*, IOS Press, Amsterdam, 2007 (in press).
- [8] _____, Higher hierarchies of equational theories lacking recursive uniformity, accepted for the *International Journal of Unconventional Computing* (2007).
- [9] Transcribed from audiotape of a symposium panel on Gödel's incompleteness theorem at the Association for Symbolic Logic meeting in Cheley Bancroft Library 84/69 Tarski Archive, Carton 5.