114.   Surprises in logic. *Bulletin of Symbolic Logic.* 19 (2013) 253. (Coauthor: William Frank)

► JOHN CORCORAN AND WILIAM FRANK, *Surprises in logic.*

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There are many surprises in logic. Peirce gave us a few. Russell gave Frege one. Löwenheim gave Zermelo one. Gödel gave some to Hilbert. Tarski gave us several.

When we get a surprise, we are often delighted, puzzled, or skeptical. Sometimes we feel or say "Nice!", "Wow, I didn't know that!", "Is that so?", or the like.

Every surprise belongs to someone. There are no disembodied surprises. Saying there are surprises in logic means that logicians experience surprises doing logic—not that among logical propositions some are intrinsically or objectively "surprising".

The expression "That isn't surprising" often denigrates logical results.

Logicians often aim for surprises. In fact, [1] argues that logic's potential for surprises helps motivate its study and, indeed, helps justify logic's existence as a discipline.

Besides big surprises that change logicians' perspectives, the logician's daily life brings little surprises, e.g. that Gödel's induction axiom alone implies Robinson's axiom. Sometimes wild guesses succeed. Sometimes promising ideas fail. Perhaps one of the least surprising things about logic is that it is full of surprises.

Against the above is Wittgenstein's surprising conclusion ([2], 6.1251): "Hence there can never be surprises in logic".

This paper unearths basic mistakes in [2] that might help to explain how Wittgenstein arrived at his false conclusion and why he never caught it. The mistakes include: unawareness that surprise is personal, confusing logicians having certainty with propositions having logical necessity, confusing definitions with criteria, and thinking that facts demonstrate truths. People demonstrate truths using their deductive know-how and their *knowledge* of facts: facts *per se* are epistemically inert.

[1] JOHN CORCORAN, Hidden consequence and hidden independence. *This Bulletin*, vol.16 (2010), p. 443.

[2] LUDWIG WITTGENSTEIN, *Tractatus Logico-Philosophicus*, Kegan Paul, London, 1921.