

What Problem Did Ladd-Franklin (Think She) Solve(d)?

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Outline

- Who is Ladd-Franklin?
- What is her solution?
- What is the problem?
- What is her problem?

Christine Ladd-Franklin

- Born 1847, died 1930.
- Admitted to Johns Hopkins University in 1878, under the name “C. Ladd”.
- Wrote a dissertation, “On the Algebra of Logic”, under supervision of C.S. Peirce.
- Dissertation printed in 1883.
- Post-PhD work in psychology, esp. vision.
- Officially granted PhD in 1927, age 78.

The Solution

Theorem

The argument of inconsistency,

$$(a \nabla b)(\bar{b} \nabla c)(c \vee a) \nabla \quad (\text{II})$$

is the single form to which all the ninety-six valid syllogisms (both universal and particular) may be reduced [Ladd, 1883, p. 40].

Proof.

Any given syllogism is immediately reduced to this form by taking the contradictory of the conclusion, and by seeing that the universal propositions are expressed with a negative copula and particular propositions with an affirmative copula [Ladd, 1883, p. 40]. □

What's the problem?

Susan Russinoff (1999):

In 1883, while a student of C.S. Peirce at Johns Hopkins University, Christine Ladd-Franklin published a paper titled On the Algebra of Logic, in which she develops an elegant and powerful test for the validity of syllogisms that constitutes the most significant advance in syllogistic logic in two thousand years. . . In this paper, I bring to light the important work of Ladd-Franklin so that she is justly credited with having solved a problem over two millennia old [Russinoff, 1999, p. 451, emphasis added].

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- Not figure: Aristotle already could reduce all syllogisms to the first figure.
- Not mood: Syllogisms can't all be reduced to the same mood.
- If something else: not a “two-millennia old” problem.

What is her problem?

- A problem due to Jevons, not Aristotle.
- The “inverse logical problem”: “given certain combinations inconsistent with conditions, to determine those conditions” [Jevons, 1880, p. 252].
- Jevons’ solution “consists in inventing laws and trying whether their results agree with those before us” [Ladd, 1883, p. 50].
- Ladd’s solution is uniform, general, and easy to implement.

Whence Russinoff et al.?

In a newspaper clip “To Get Her Degree Earned Years Ago”, Josiah Royce is quoted as describing her thesis work as “the crowning activity in a field worked over since the days of Aristotle”. “The [Aristotelian] system was never fully demonstrated until Mrs. Ladd-Franklin worked out the whole method at Johns Hopkins” (The Hartford Courant, February 21, 1926, p. 20) [Pietarinen, 2013, fn. 6].

Josiah Royce of Harvard told his students, “It is rather remarkable that the crowning activity in a field worked over since the days of Aristotle should be the achievement of an American woman. “Professor Royce on an American Woman’s Work,” New York Evening Post, n.d., Box 14, CLF-FF Papers [Spillman, 2012, fn. 29].

Concluding remarks

- In her 1883 dissertation, Ladd-Franklin introduced to Boolean algebra a pair of symmetric copula.
- This allowed her to define the “antilogism”, an “inconsistent triad” that could be used to represent every valid syllogism.
- People recognised the utility of this representation soon after her work.
- Within 30 years, people made the leap to her formula being a **solution** to a **problem**.
- Within 40 years, people attributed the problem to Aristotle.
- At some point after that, the problem attributed to Aristotle was attributed as a problem to all intervening logicians, too.
- While she might have solved a problem, it certainly wasn't Aristotle's, nor had it vexed people for millennia.

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