Giuseppe Peano and his work and ideas

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The interconnectedness of all things

- In the 19th century, people began to challenge **Plato's argument**, **that mathematics contains true knowledge.**

- In particular, it was not understood how Plato's abstract forms could interact with physical objects, since both obey different laws.
  Philosophers of science wanted to find another way to justify the certainty we have in mathematics,
  and many other schools of thought emerged, including **intuitionism, formalism, and logicism.**.

- **Intuitionism** argues that mathematical statements are mental constructions.
  Formalism states that numbers do not exist, except as symbols that are not about anything, and that mathematics is built from the manipulation of these symbols by following rules.
  Logicism states that the whole of mathematics can be derived from the philosophical laws of logic.

- The most famous set of logical mathematical axioms is the theory of the **Peano axioms**,
  named after the 19th century Italian mathematician **Giuseppe Peano**.

The Peano axioms state:

1. **Zero** is a number.

2. If *N* is a number,
the successor of *N* is a number.

3. **Zero is not the successor of a number.**

4. Two numbers, of which the successors
are equal, are themselves equal.

5. If a set of numbers *S* contains **zero**,
and also the successor of every number
is in *S*, then every number is in *S*.

Peano Axioms

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GIUSEPPE PEANO (1858-1932)

- He was born **on a farm in Spinetta, Piedmont**, Italy on August 27, 1858.
His parents, **Bartolomeo Peano** and **Rosa Cavallo**, work the farm there.

- The school of Giuseppe was a three miles walk far.
His uncle noticed that young Giuseppe was a very talented child and took him to Turin to begin his secondary schooling in 1870.

- **By 1876, he enrolled at the University of Turin and graduated at the top of his class to 1880**.

- He stayed at the university after graduation and eventually got to a position where he was the faculty member assigned to teaching calculus, apparently a significant honour at that time.

Peano's first written books

- His first written book was **a textbook on calculus** (1878).

- It was then followed by **a book on mathematical logic** that has made him famous of this day.

- It was this book where he introduced the modern symbols we use in studying sets, such as **symbols for intersection ∪ and union ∩.**

- In 1887, Giuseppe maried **Carola Crosio.**

- During this time he was also teaching **at Royal Military Academy,** where he was later promoted to professor first class.

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Peano as very prolific writer

- He founded the journal ***Rivista di Mathematica in 1881.***

- The same year he started
  a *„**Formulario Project**",*
  which was a compilation of all the known theorems and formulas used in mathematics.
  In the book he introduced his own notation.

- This led to some complications in printing process,
  because he wanted **all formulas
  to be printed on one line.**

- As a result, he purchased his own printing press to ensure that his requirement was held firm.

Second International Congress of Mathematicians, Paris 1900

He met the famous British mathematician and logician

Bertrand Russell (1872 – 1970) who was so impressed with Peano's *Formulario Project* and the innovative logical symbols used therein.

Russel the used Peano's logic notation in his later writings.

The peak of Peano's career - 1901

He was presenting at conferences and was teaching calculus, differential equations and vector analysis.

He was dismissed from the Royal Military Academy.

He did retain his position at the University of Turin.

Interlingua

In 1903, Peano began to write in a form of Latin that he called ***Lattino sine Flexione,***

which was later referred to as ***Interlingua.***

It was based on synthesis of Latin, German, English, and French vocabularies with a very simplified type of grammar, removing all irregular forms.

He did give speeches in this form of Latin and it was seen as **a new language**, one that served **an international purpose**.

Formulario mathematico – 1908

- **The collection contained 4 200 theorems and formulas, along with justifications and proofs.**

- By 1910, Peano began to concentrate his efforts on writing mathematics text for secondary schools as well as a dictionary of mathematics.

- He continued to publish and to teach, eventually moving from infinitesimal calculus to complementary mathematics, which he felt better suited his style of mathematical thinking.

- He continued to teach at the University of Turin until he died of a heart attack in Turin **on April 20, 1932.**

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