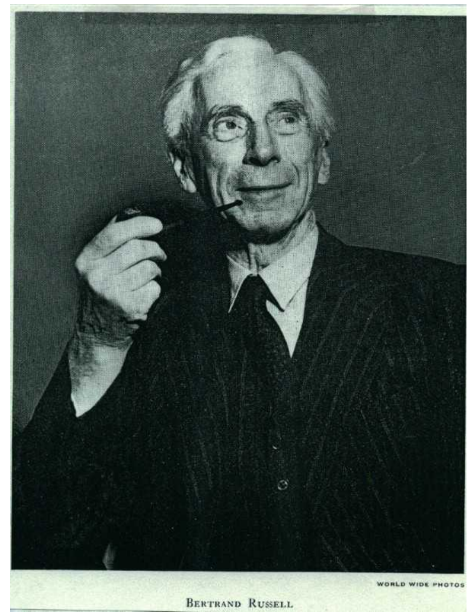
Bertrand Russell



Bertrand Arthur William Russell (May 18, 1872 – February 2, 1970), one of the greatest philosophers and most complex and controversial figures of the 20th century, exerted a profound influence on modern thought. A genuine polymath, he was a mathematician, philosopher, logician, essayist, social critic, Nobel laureate, and renowned peace and nuclear disarmament advocate. He was a prolific writer on a wide range of topics, including education, social science, politics, ethics, sexual freedom, and religion but best known for his work in mathematical logic and analytic philosophy. He used logic in an attempt to clarify issues in the foundations of mathematics as well as to settle philosophical questions. Along with Kurt Gödel he is considered one of the two most important logicians of the 20th century.

Russell was born in Ravensworth, Treeleck, Wales and died in Penrhyndeudraeth, Merioneth, Wales, some 98 years later. His parents were Lord John and Lady Kate Stanley Amberley, advocates of women's rights and independent thinkers in matters of morality and religion. Russell's father wrote *An Analysis of Religious Belief*, in which he detailed his belief in a non-personal God. Bertrand's grandfather was Lord John Russell, an ardent reformer and promoter of civil and religious liberty, who twice served as Prime Minister during the reign of Queen Victoria. Soon after Bertrand's mother died of diphtheria in 1874, followed by the death of his father twenty months later, he and his older brother Frank went to live with their grandparents. Their grandfather died two years later and the boys came under the influence of the remarkable Lady Frances Russell. Her political ideas were more radical than her husband's. She opposed Britain's imperialism, supported Irish home rule and advocated the elimination of the House of Lords and the teaching of religion in tax-supported schools. As she aged she came to believe that neither the Bible nor any church was infallible in its teachings. She considered theology "the greatest enemy of true religion." She often commented to Bertrand, "What is mind? No matter. What is matter? Never mind." When she presented a bible to him, she inscribed in it, "Thou shalt not follow a multitude to do evil."

Russell was educated at home where, inspired by Euclid's *Elements*, he showed a brilliant aptitude for pure mathematics and a fascination with philosophy. During his teens, he investigated his religious convictions, abandoning belief in free will, immortality, and the existence of God. At Cambridge his intellectual gifts were soon recognized and he became a member of the "Apostles," a forerunner of the Bloomsbury Group, and a coterie of writers, philosophers, and artists who met to discuss aesthetic and philosophical questions. In 1894 Russell received first class degrees both in mathematics and the moral sciences. He became a Fellow of Trinity College the following year. Russell said in his autobiography that he met the Italian mathematician Giuseppe Peano at the Second International Congress in 1900 and was greatly influenced by the latter's work. Russell believed that if the fundamental laws of mathematics could be derived from logic, then the problems of consistency in the foundations of mathematics would be solved. Concerned with the defense of the objectivity of mathematics, Russell sought to arrive "at a perfected mathematics which should leave no room for doubt." For many years Russell held that the principles of logic and the objects of mathematical knowledge existed independently of any mind and are merely perceived by the mind.

In preparing his *Principles of Mathematics* (1903), in which he amplified his position about the physical truth of mathematics, Russell discovered the paradox that bears his name. It arises within naïve set theory by considering the set of all sets that do not contain themselves as members. If M represents this set, then A is an element of M if and only if A is not an element of A. There are some versions of this paradox that may be easier for non-logicians to understand. Russell put his antinomy into the following popular form. A village barber only shaves the people of his village who don't shave themselves. So who shaves the barber? If the barber shaves himself he contradicts his claim and if he doesn't shave himself, he is a member of the village who doesn't shave himself so according to his claim he should shave himself. As another example, by Russell's paradox, an encyclopedia entry titled "List of all lists that do not contain themselves" must be either incomplete if it does not list itself or incorrect if it does. The drawback with these popularizations of the paradox is that they don't quite illustrate Russell's point. To explain away these examples by insisting such sets do not exist means that the definition of the notion of "set" within a given theory is unsatisfactory. Russell alerted Gottlob Frege of a contradiction in his work based on this paradox just as Frege's *Fundamental Laws* was going to press. Needless to say, it was quite a shock for poor Frege. It now became the work of many mathematical logicians, including Russell, to try to find ways to "fix" mathematics.

Set theory needed to be reformulated axiomatically in such a way that avoided the problem of Russell's paradox and other related problems. Russell responded to his paradox by introducing his "theory of types." This evolved from his 1908 article "Mathematical Logic as based on the Theory of Types" and was developed in the monumental three-volume work *Principia Mathematica* (1910-1913), co-authored with Alfred North Whitehead. Russell argued that troublesome sets such as the set of all sets which are not members of themselves can be avoided by arranging all propositions into a hierarchy. Propositions about individual things are at the lowest level, propositions about sets of things are at the next lowest level, propositions about sets of sets of things is the next lowest level, and so on. In this way, Russell was able to show why naive set theory's so-called "unrestricted comprehension axiom," originally introduced by Cantor, fails. The Russell-Whitehead system avoids the known paradoxes and allows for the formulation of all of mathematics, but it has not been widely accepted. Other approaches to the problem have been proposed, such as the Zermelo-Frankel axiomatic set theory and New

Foundations.

In the , Russell also launched his defense of logicism, asserting that the vocabulary of mathematics constitutes a proper subset of logic and that all mathematical proofs can be recast as logical proofs. This implies that the theorems of mathematics constitute a proper subset of the theorems of logic. Formal logic deals with assertions of facts, called statements or propositions. The unrestricted comprehension axiom states that any propositional function in x, P(x), determines a set whose members are exactly those "objects," that make P(x) true. With most propositional functions this axiom presents no problem; but as Russell's paradox shows conditional statements such as "x is a set" should not be applied to the set of all sets because self-application involves a vicious circle. Russell allowed that it is possible to refer to a collection of objects for which a given condition holds only if the objects are all at the same level or of the same "type." In other words, if one says that a belongs to b, then b must be at a higher level or higher type than a. In this way one cannot speak of a set belonging to itself. Though the *Principia* failed to gain universal acceptance, it was a seminal work whose methods Russell and others applied to metaphysics, epistemology, and ethics. Russell and Whitehead never collaborated again, each going in different philosophical directions. While lecturing at Harvard Whitehead observed, "Bertie Russell says I am muddleheaded. Well, I say he is simple-minded."

Besides his work in logic and philosophy, Russell took delight in standing up for his radical convictions with unyielding stubbornness. He expressed his lifelong motivations as follows:

> "Three passions, simple but overwhelmingly strong, have governed my life: the longing for love, the search for knowledge, and unbearable pity for the suffering of mankind. These passions, like great winds, have blown me hither and thither … over a deep ocean of anguish, reaching to the very verge of despair."

In seeking love, Russell married four times and had many affairs. He wrote about his sexual morality and agnosticism in *Marriage and Morals* (1929), arguing that human beings are not naturally monogamous. In 1907 Russell offered himself as a Liberal candidate for Parliament but was turned down as being too much of a "free-thinker." In 1916 his pacifism cost him his fellowship at Trinity College. He was also fined 110 pounds and served six months in Brixton Gaol in 1918 for anti-war protests. He used the time profitably to write his *Introduction to Mathematical Philosophy* (1919). In 1920 Russell traveled throughout the Soviet Union and taught philosophy at Peking in China. During the 1920s he made his living by lecturing and journalism, becoming ever more controversial. With his second wife Dora Black, Russell started a progressive school near Peterfield in 1927.

When his brother died in 1931 Russell succeeded to the earldom. In 1939 the evils of Fascism caused him to temporarily renounce his pacifism. Still he was so controversial that an appointment at City College of New York was revoked due to public protests against his employment. After 1949 Russell became a champion of nuclear disarmament, noted for his many spirited anti-war and anti-nuclear protests. In 1955 he released the Russell-Einstein Manifesto condemning the use and development of nuclear weapons, and in 1958 he became the founding President of the Campaign for Nuclear Disarmament. At the age of 89 he was imprisoned for a week in connection with anti-nuclear protests. Russell remained a prominent figure until his death in 1970.

In 1967-69 Russell wrote a remarkably open, objective and fascinating three-volume *Autobiography.* Among his other books are: *An Essay on the Foundations of Geometry* (1897), *The Problems of Philosophy* (1912), *An Outline of Philosophy* (1927), *Why I Am Not a Christian* (1927), *The Scientific Outlook* (1931), *An Inquiry into Meaning and Truth* (1940),), and *My Philosophical Development* (1959). *A History of Western Philosophy*, written in 1945, ended his financial difficulties (believing that inherited wealth was immoral, Russell had given away most of his money when he succeeded his brother as Lord Russell) and in 1950 earned him a Nobel Prize for Literature.

One of Bertrand Russell most familiar quotations is his "definition" of mathematics, "Thus mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true." This is a rather curious statement and some not familiar with the axiomatic approach to mathematics might suspect it was made with tongue in cheek. But note that it begins with the word "thus," which suggests that something relevant was said prior to this statement. For those who would like to read the preface to his definition, the quotation is taken from "Recent Work on the Principles of Mathematics", *International Monthly*, vol. 4, 1901. For those wishing an immediate explanation, consider the following. When a branch of mathematics is treated as a logical system, it consists of four ingredients: undefined terms, defined terms, postulates and propositions. As it is not possible to define everything, some terms in the system are undefined. For instance, in geometry the concepts of point, line and plane are not defined. However defined terms are stated in terms of the undefined ones. Thus, we don't know what we're talking about. Next, the system is based on certain assumptions called postulates or axioms from which the theorems and propositions are derived. As we don't know whether the assumptions are true (which is not a requirement of logical systems - we've come a long way from the time when it was believed that these were self-evident truths), so we really don't know if what we are saying (the statement of the theorems and propositions) are absolute truths.

Quotation of the Day: "Mathematics, rightly viewed, possesses not only truth, but supreme beauty – a beauty cold and austere, like that of a sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest can show."– Bertrand Russell