

# **Science of judo (ed. by Dr Mike Callan)**

## **Introduction**

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## Introduction

This is a book about judo, a sport and a way of life. A sport developed from the Japanese martial arts and ways as a physical, intellectual and moral education. A sport founded by the father of Japanese Physical Education, Professor Jigoro Kano. Jigoro Kano was a visionary, who applied rigorous research and analysis to the development of judo, and often referred to it in scientific terms. This book continues that approach, it offers a mirror onto judo from a scientific perspective.

Judo is practiced across the world in over 200 countries, and five continents. The practitioners, *jūdōka*, form part of the global judo family. Judo changes lives. It is the only Japanese *budō* to also be included in the Olympic programme, and the founder Jigoro Kano was the first member of the International Olympic Committee from Asia. Given the global reach, it is not surprising that many world leaders have a background in judo. A modern sport that can trace its roots back to hand-to-hand combat in pre-history.

There are two fundamental principles of judo, the maximum efficient use of physical and mental strength, and mutual prosperity for self and others. The first is about applying your power in the most efficient way, a principle which can be applied just to throwing an opponent, but also to all actions in daily life. Kano realised that for individuals, worry, anger and conflict, are not efficient, they are a waste of power. If many people are inefficient, then a society will fail. The most efficient use of power for a group, relies on members supporting each other, and then the society can benefit from that application of maximum efficient use of power. Thus, creating mutual prosperity for self and others. As Jigoro Kano said, 'The purpose of judo is to perfect yourself so that you can contribute to society'.

I was honoured to be approached by Routledge to write this book and wanted to bring to the project some of the leading thinkers of this generation. This is a remarkable group of knowledgeable individuals and practitioners I am proud to call colleagues. Drawn from six countries and ten universities, between them they have provided specialist services to competitors at the last four Olympic Games. They have coached Olympic and World Championship medallists. They hold seven doctoral qualifications, eight hold the judo grade of 4th Dan or above. We offer this book as a tribute to the judo scientists over the last century who have built the body of research that makes a book such as this possible.

I should like to thank the team of authors for their efforts in the preparation of this manuscript, and for sharing their expertise.

The 16 chapters are divided into three sections or themes; firstly, History and Education, then Development and finally, Competition. In this way the reader can follow the path from

the origins and purpose, through the development of the individual to international competition.

## Part 1, History and Education

The '*Historical development of judo*' chapter draws academic sources to present a depth of analysis on the development of judo, and particularly the development of judo scientific and research activities. It is structured in three sections; early history; Jigoro Kano; modern judo and internationalisation. The chapter demonstrates that science and research has been an integral part of judo since its inception.

The second chapter, draws on the writings of Jigoro Kano to consider '*judo as a physical, intellectual and moral education*'. The Principle of the Three Educations as originally proposed by Herbert Spencer. The chapter is in three sections; physical; intellectual; and moral. It draws on academic research, such as studies into brain grey matter, and the psycho-social impact of martial arts training, to consider the three educations in the context of judo.

'*Kata Training for Judo*' is the third chapter, recognising that the practicing of judo is based on kata and randori, it presents a short history of judo kata, an outline of the Kōdōkan kata, and a discussion on the value of kata training. In particular how the techniques and principles of kata can be applied in randori and shiai.

The last chapter in this section, '*Judo Injuries Epidemiology and Prevention*' discusses the frequency of occurrence of judo injuries in training and in competition, and the different training situations and the associated injury risk. It highlights the main risks involved in judo and gives an overview of promising measures and implementation strategies to prevent judo injuries.

## Part 2 - Development

In chapter five, '*Judo for children*', the benefits for children who practice judo are identified, including; behavioural, multilateral development, development of social skills and cognitive abilities. The role of judo in human psychological development is emphasised, and the link between expertise in judo and negative levels of aggression is acknowledged.

This leads into a consideration of '*Talent identification, development, and the young judo player*', a collaboration between three respected coaches, George Bountakis, Andrew Burns and Yusuke Kanamaru. They recognise the complex journey from beginner to winner, and how all people involved in the process of identification and development of talented judoka need to possess a keen awareness of the key considerations at this vital time in an athlete's career. Additionally, they offer an understanding of key developmental constructs such as

deliberate practice, psychological characteristic development, and how the management of key relationships could greatly enhance the experience of talent development for the athletes.

This is followed by a chapter considering '*The skill acquisition process for judo - building to a constraints led approach*', by Darren Warner and Yusuke Kanamaru. They outline skill acquisition models that provide frameworks for coaches and educators that encourage learning through the use of games designed to improve understanding. This chapter identifies existing theory behind the skill acquisition process, evaluating its relevance to the developing judoka before considering any practical implications.

Finally, in this section the focus turns to '*Considerations for the female judoka*'. For most female judokas their competitive years coincide with their reproductive years, so they are exposed to fluctuations in hormones throughout the menstrual cycle or through oral contraceptive use, which affect many physiological functions. The influence of these hormonal fluctuations, on the health and performance of the judoka are explained.

### Part 3 - Competition

The section begins with an analysis of the '*Competition demands of judo*'. Determining the physiological requirements of the sport through time-motion analysis and competition demands. Identifying that match duration can vary from over 10 minutes to only seconds, with the average match duration of approximately 3 minutes. Each match consists of about 11 blocks of activity lasting between 20 to 30 seconds each followed by approximately 10 seconds of rest.

The demands analysis leads into a chapter on '*Athlete-centred coaching*', by one of the world's leading exponents, Darren Warner. He explains how to optimise the performance programme to ensure the delivery the best possible performance in judo competition. He discusses why the athlete should be at the centre of the decision-making process when designing a performance programme. He provides a variety of interventions, considering potential benefits to the athlete as well as methods of monitoring and assessment for each athlete.

The process of '*Periodization and planning of training for judo*' is outlined next, an area with conflicting research and opinion on what is correct. The chapter aims to give coaches the knowledge to develop their own process for planning training based upon their athletes and their environment.

The following chapter is a collaboration between Andrew Burns, Ben Rosenblatt and Allan Macdonald all experts in '*Physical preparation for judo*', who focus on developing the

physical capacity to achieve two goals; to enable the athlete to complete the necessary training needed in order to develop their sport specific skills; and to enhance the capabilities of the athlete to deliver performance in a competition scenario. This chapter details the scientific underpinning that governs the physical training required to compete in judo.

Physical preparation is followed by '*Psychological Preparation for the Judoka*', a chapter which explains why psychological preparation should be an integral part of a judoka's development and competition preparation. It introduces some general information about psychological preparation in judo and offers guidelines for implementing such a programme.

'*Notational analysis for judo*' allows us to understand three main areas of our sport, the technical components, the tactical components and the physiological demands via time-motion analysis. The chapter allows us to understand how judo is constructed, analysing the athlete's opposition and developing our athletes. It will also consider the various types of software used and how the coach or athlete might use hand notation as a low-cost solution to analyse the opposition or oneself.

As the techniques of judo are based on biomechanical principles, '*Biomechanics of judo*' takes the common approaches to Sport Biomechanics and explains the main concepts in the context of judo.

The final chapter '*Nutrition and weight management for judo*' considers the basics of good nutrition for the general population, the specific requirements for sports performers, and the specific needs of the judoka. It considers issues around weight management, include the advantages and disadvantages of common weight-loss techniques. There is also an explanation of issues around dehydration, glycogen depletion, and strategies to recover after a weigh-in.

Through this approach the authors hope to provide a broad introduction to judo from a scientific perspective. Each chapter refers to relevant scientific sources, where the reader may find greater detail. It is hoped that this work will stimulate the reader to study judo deeper and take further steps along the way.