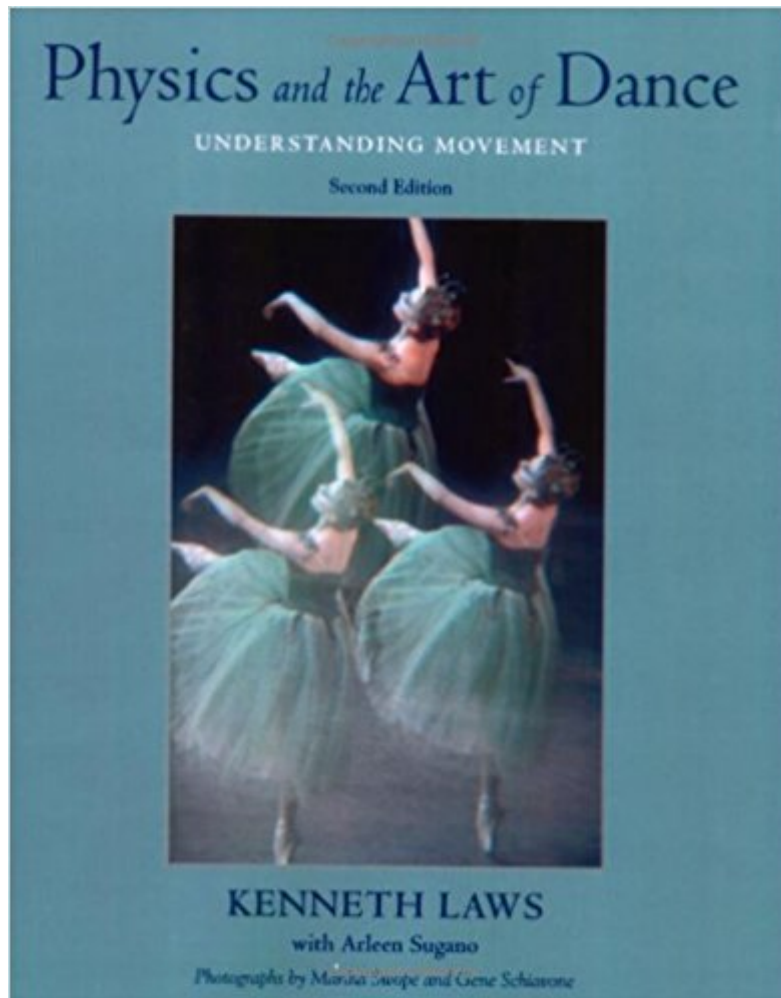




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# Physics And The Art Of Dance: Understanding Movement



## Synopsis

Physics and the Art of Dance gives all who enjoy dance - whether as dancers, students, teachers, or fans - an opportunity to understand what happens when human bodies move in the remarkable ways we call dance. How, for instance, do dancers create the illusion of defying gravity? Or of starting to spin when in the air with no source of force to act on their bodies? You may observe some dancers using their arms in a way that allows some to jump higher than others. What is that technique, and why does it work? In this second edition, author Ken Laws - a physicist with years of professional dance training - teams with veteran dance instructor Arleen Sugano to provide new step-by-step experiments for dancers. "What you see" sections describe the way physical principles form the framework within which some movements exist. The complementary "What you do" sections allow dancers to experience how those physical analyses can provide them a more efficient means of learning how to carry out those movements. Throughout, the book shows how movements are first artistic expressions, and secondly movements of the body within the framework of easy-to-understand physical principles. Dancers and dance instructors will find in this book an efficient means of improving technical proficiency and growing professional and aesthetic development. For physics and science teachers, the book provides a new and compelling way to draw people into the world of science. And observers and fans of dance will marvel over the beautiful time-stop photography by renowned dance photographers Martha Swope and Gene Schiavone.

## Book Information

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## Customer Reviews

"[L]ucid, friendly, and to the point. Laws obviously knows his ballet as well as his physics...This book will surely have immense value to dancers...[F]ascinating to see physical principles applied in such practical detail to positioning the human body in the beautiful and abstract movement of the ballet."--Physics Today"[T]his volume provides clear explanations of the physical laws that describe the way nature controls balance, leaps, pirouettes, lifts, and turns; the effect of body size on ballet technique; and the relationship between the science and dance...Excellent photographs and diagrams illustrate the text. Providing a new understanding of the application of physics to ballet that results in better and safer performances, this valuable resource is accessible to students and general readers as well as dance scholars, faculty, and professional dancers."--Choice"Physics and the Art of Dance should be read by all dancers, choreographers and dance teachers. Dance artists and dance scientists will delight in the new information. The puzzlers at the beginning of each chapter motivate the reader to find logical answers. Photographs by Martha Swope are elegant; the tables and glossary are excellent. This book will be required reading for all my students."--Janice Plastino, University of California at Irvine"Ken Laws seems to me to be an important ambassador coming to dance from the world of science. He is our interpreter and all his explanations of the physical laws are informed by, and infused with, his great love of dance and dancers." --Francia Russell, Pacific Northwest Ballet"Which came first, gravity, human rhythmic movement, Newton's laws of motion, classical ballet, an understanding of the physics of dance, or an appreciation of the aesthetics of ballet? Which one? And does it matter? Ken Laws in this most remarkable book juxtaposes all the concepts above resulting in a clarification, enhancement and appreciation of the beauty of both ballet and physics. Laws make use of first-rates photographs and illustrations to illuminate and inform the reader resulting in a superior enjoyment of both ballet and physics."--Brian Schwartz, Professor of Physics and Vice President for Research and Sponsored Programs, The Graduate Center, City University of New York"Laws' book is fascinating to read and one of the finest examples of the marriage of science and art in the literature today."--Gigi Berardi, author of Finding Balance"Explains your steps in scientific terms...The practical lessons will surely help you out in ballet, and science class, too."--Dance Spirit Magazine --This text refers to an out of print or unavailable edition of this title.

Kenneth Laws is Professor Emeritus of Physics, Dickinson College, and author of *The Physics of Dance* (Schirmer, 1984), *Physics, Dance, and the Pas de Deux* (Schirmer, 1994), and *Physics and the Art of Dance: Understanding Movement* (OUP, 2002) Arleen Sugano is Independent Dance

Instructor, former instructor of Dance, New York University, University of North Texas, Joffrey Ballet School, Rod Rodgers Dance Company, and Lula Washington Dance Company, amongst many others.

A must for physicians, physical therapists, and dance medicine scientists!

Excellent resource. Very informative and helpful for both the budding physicist and aspiring ballerina.

As a physics professor and one who discusses sports, I find Laws book beautifully written, very well thought out, and beautifully illustrated. It is a fun read and informative.

Super

The question of how a knowledge of the science behind the movement of the human body helps students of dance learn to dance better is always discussed. Like the author, I too am both a physicist and a ballet dancer. I have found that the most important thing to learn in ballet is the imagery that works for you, and sometimes science can actually get in the way. Take walking for example: if we had to analyze every movement in walking we would never be able to move. I should also point out that science still does not thoroughly understand walking, let alone dancing! Still, it is helpful in some places to understand, at least a little, what is happening in a movement or static pose. This book does a surprisingly fine job of covering most of the pertinent topics and some topics you would not have thought of asking about. I liked the fact that the author does not over simplify some topics, which is often done in elementary explanations. Science usually tries to abstract and simplify in order to explain phenomena, but this can lead to problems. Take, for example, the case of static balance on a point. If you approximate the human body as a rigid body, it is impossible to explain stable equilibrium on a point. Rigid bodies can only achieve unstable equilibrium over a point. But human beings are not rigid! In ballet, we can achieve stable balance over a point for an indefinite period of time (it is very difficult and rarely seen in performance but often in ballet class). This book actually mentions this and explains how it is done. It even includes a discussion of how much a cushioned floor will reduce shock to the dancer's joints. Many illustrations and photos are also included. This is the best book available on this subject, and for those who want to explore this topic further, this is the best place to start.

This book is INCREDIBLE! I have several years of different kinds of dance and dance-related background (social dancing - swing, tango, etc.; yoga, pilates, ballet, ...) I also have a strong background in mathematics, physics, computer science (will have a Ph.D. in a few months) and related disciplines. If you have some college-level physics background, or even a solid understanding of high-school physics, chances are that you can work out many of the things in this book on your own. But it takes time, and you may not have the enthusiasm. (In fact, after reading this book you may get the enthusiasm to actually work out a few things.) On the other hand, if you have this kind of background, then reading this book is simple, very enjoyable, and also a great learning experience. You do not have to understand everything. If you understand one idea from each chapter - that is more than enough to read this book. (For example, if the only things you understand from the chapter on pirouettes is that it makes sense to push into the floor with both legs in opposite directions. Another idea you may get from another chapter is - why your body wants to lean in the direction you are starting to fall to actually save you from falling.) This is great for learning dance on top of your scientific background. In minutes you pick up things that would take months to discover. You start applying them immediately. Very quickly (if you devote some time to thinking over this book) it creates a framework in your mind. You come to a dance class, and you understand so much more, because many of the things can be easily explained in the framework of this book. In other words, the book gives you a quick foundation to build on top, if you have intellect and years of education, rather than years of dance background (then you already do have a foundation). Besides, this book gives you a better understanding of physics. Especially if you are more of a dancer than a thinker, then, I would assume (not sure though) you can get a lot of physics out of it. That is, you can use the book the other way round. You know how something feels, and then you can relate to the physical explanation. I am not, however, sure that this book would be of equal benefit to those who don't know much physics. Generally speaking, I would highly recommend to every dancer to actually learn some physics. Especially if you are in college, take a course in basic Newtonian mechanics. (This can make even more sense for a dancer, than learning anatomy or music.) The author of the book stresses it a lot, many dancers without a science background do many things that are counterproductive. It takes just a little scientific thinking to recognize these mistakes and stop wasting time. Just like it is useful to know how your body works to e.g. stretch safely and efficiently, it is also useful to know how nature works to dance better. If you ask "What does it feel like, when you know more physics, how does it help to dance?" --- I can try to answer. You know how it feels when you notice which way you are falling (out of balance or out of

alignment) - forward, sideways, etc., right? You notice, then you fix it. After this book, especially if you have some physics background to relate to, but perhaps even without it, you will start to notice how having your feet further apart makes it easier to rotate (e.g. pirouette from 4th), how lifting your leg in Arabesque Pirouette slows you down (unless you lift it higher than 90 degrees), how sacrificing turnout before a grand jete makes your jump longer and higher; how you get more tired when doing slower jumps than when doing faster jumps, and other kinds of things. The world will become more clear for you, easier to understand; it will make more sense. If you do some other dance style, you would also definitely benefit from this book. (You would benefit much more if you supplement your dancing by taking some ballet classes, at least for a year, and then you can apply this book to your dance style.) If you do acrobatics, martial arts, etc., you can greatly benefit from this book as well, but again, you need to be able to relate to this book. You need to know some ballet (better by personal experience) and/or some physics, at least on a basic level (e.g. 2nd Newton's law,  $F=ma$ ). If you are a physicist, note that this book is not technical. It has some appendices (still pretty basic) and plenty of references, some, presumably, to more technical materials. So you can use it as a starting point. (Not sure there is much technical research on the physics of dance or related activities.) Overall, a great book. Standing ovation!

This book made a great gift for our daughter who is a member of her college dance company. We gave it to her following completion of her first college year. She loves the book and it has become part of her reference library.

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