Foreword

When I began work in automated theorem proving almost 30 years ago, things were quite different. Only a very few papers had been published, most of the problems being cited and studied were trivial, and the number of interested researchers was very limited. Since then, the field has progressed to the point where the solution of open problems using automated deduction programs has become routine. In one particularly pleasing event, our colleague William McCune (the author of the OTTER system described in this book) solved an open question that challenged some of the best minds in logic for over 60 years and made the *New York Times*. To me, this progress has been truly awesome.

Larry Wos understands the events that led to this progress more thoroughly than anyone else I have met. He was there in 1963, working with J. A. Robinson and George Robinson at Argonne, when resolution was discovered. He has been part of many steps forward since then, and continues focusing on the issue of how to get programs to pluck proofs of theorems from huge spaces of logical formulas.

Larry has played a unique role in the development of automated deduction systems. His ideas have repeatedly led to significant, and often fundamental, advances. A few of us have been fortunate enough to discuss these ideas with him frequently over the years, but most of the community is largely unfamiliar with Larry and his rather unorthodox approach to research. Certainly, his papers say a great deal and have reached a wide audience, but there is far more to what occurred than appears in those published papers. His earlier books were serious attempts to capture the essential positions and techniques (and to do so in a way that would entertain as well as educate). Yet there is much more to be said about the views, insights, and experiences that make up Larry's perspective on the field. Certainly this book is not comprehensive either; however, it does, as those before it have, uniquely capture aspects of Larry's views and the experiments that shaped them.

Different classes of researchers will approach the material in this book from widely differing backgrounds, and what they wish to extract will also vary considerably. A few will approach it with the same motives I had in forming a relationship

with Larry—a desire to understand how to build more powerful systems. Far more will wish to learn about how to use a program such as OTTER to attack problems in logic and mathematics. Others will simply be trying to formulate a reasonable overview of the field. In each case, I believe that there are critical lessons to be learned from both this book and the separate two-volume book of his collected papers.

For me, one of those lessons is foremost: You must play with problems if you hope to get insight. People often believe that they can predict accurately what will be the outcome of an experiment in automated deduction, but my experience indicates that it is seldom the case. By providing a copy of OTTER—a wonderful tool developed by William McCune—Larry has given you the opportunity to easily encode and run problems that vary from extremely simple exercises to open questions in mathematics.

I am tempted to try to summarize what I think is really important in Larry's work, but that would be foolish—you, the reader, should try to understand Larry's perspective, not my understanding of it. Instead, let me describe my first encounter with Larry's work: the paper in which he introduced paramodulation (Robinson and Wos 1969). I was a young graduate student attempting to define a thesis project. When I read the paper, I basically ignored Wos's opinions and focused on the problem he posed (a modestly difficult theorem in group theory that no system had yet been able to prove). By doing so, I got a thesis topic, a solution to the problem, and a doctorate. Later, when I worked with Larry, I took the position that paramodulation was inferior to hyperresolution (after all, I had solved the challenge problem with hyperresolution, rather than with paramodulation). Larry demurred, arguing that the success was due to other factors. Much later, it became abundantly clear that he was right, that his basic understanding expressed in the original paper was accurate, and that the final (or at least current) picture of what was happening could emerge only through extensive experimentation and careful analysis. And, this is my point: there is a great deal to learn from Larry, even when you disagree with him (or, perhaps, most often when you do disagree with him). The debt that I owe him based on this single paper on paramodulation is extensive, but in the grand scheme of things it is dwarfed by insights gained through many other similar interchanges.

If you are a young student—or, at least young at heart—interested in understanding automated deduction, I can think of no better approach than reading and studying Larry's work. There are other sources that I would also recommend, but your chances of being stimulated to develop your own skills, comprehension, and successes are probably best served by this volume.

Ross Overbeek
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