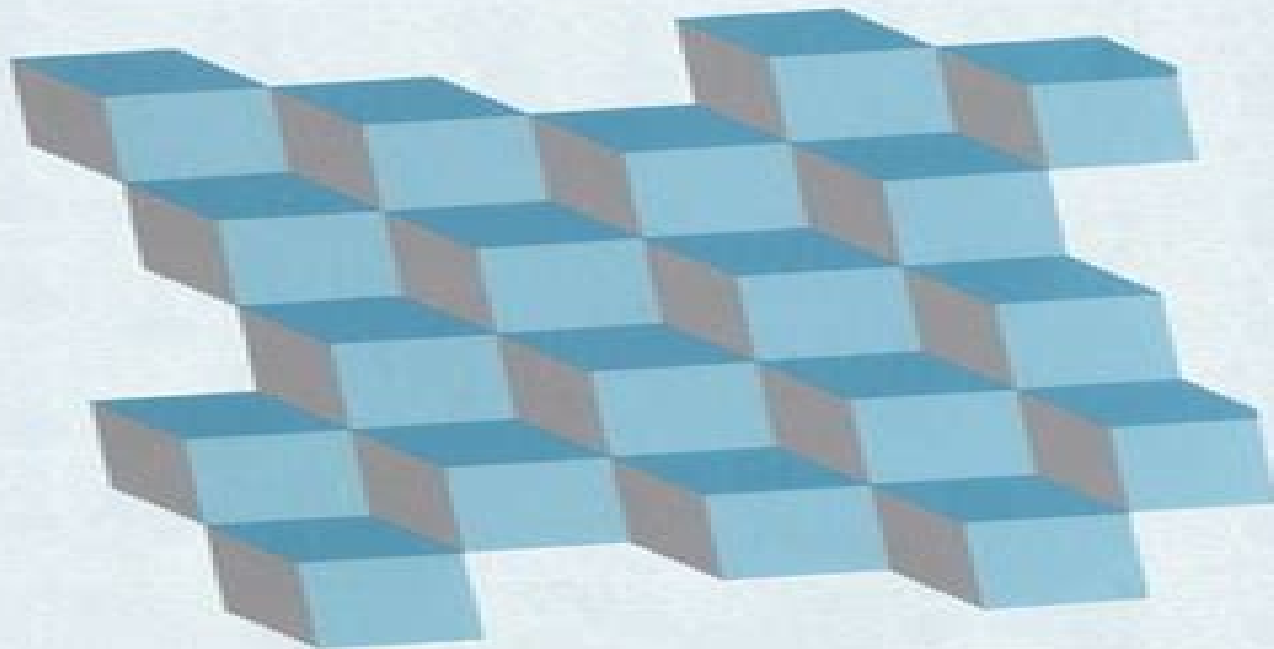




AN INTRODUCTION TO  
SUBSTRUCTURAL  
LOGICS

GREG RESTALL



# Substructural Logics

**Davide Fazio, Antonio Ledda, Francesco  
Paoli**

## **Substructural Logics:**

**An Introduction to Substructural Logics** Greg Restall, 2002-09-11 This book introduces an important group of logics that have come to be known under the umbrella term substructural. Substructural logics have independently led to significant developments in philosophy, computing, and linguistics. An Introduction to Substructural Logics is the first book to systematically survey the new results and the significant impact that this class of logics has had on a wide range of fields. The following topics are covered: Proof Theory, Propositional Structures, Frames, Decidability, Coda. Both students and professors of philosophy, computing, linguistics, and mathematics will find this to be an important addition to their reading.

**Substructural Logics: A Primer** F. Paoli, 2002-05-31 The aim of the present book is to give a comprehensive account of the state of the art of substructural logics, focusing both on their proof theory, especially on sequent calculi, and their generalizations, and on their semantics, both algebraic and relational. It is for graduate students in either philosophy, mathematics, theoretical computer science, or theoretical linguistics, as well as specialists and researchers.

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**Hiroakira Ono on Substructural Logics** Nikolaos Galatos, Kazushige Terui, 2021-12-13 This volume is dedicated to Hiroakira Ono's work on substructural logics. Chapters written by well-established academics cover topics related to universal algebra, algebraic logic, and the Full Lambek calculus. The book includes a short biography about Hiroakira Ono. The book starts with detailed surveys on universal algebra, abstract algebraic logic, topological dualities, and connections to computer science. It further contains specialised contributions on connections to formal languages, recognizability in residuated lattices, and connections to the finite embedding property, covering systems for modal substructural logics, results on the existence and disjunction properties, and finally a study of conservativity of expansions. This book will be primarily of interest to researchers working in algebraic and non-classical logic.

Algebraic Perspectives on Substructural Logics Davide Fazio, Antonio Ledda, Francesco Paoli, 2020-11-07 This volume presents the state of the art in the algebraic investigation into substructural logics. It features papers from the workshop ASubL: Algebra, Substructural Logics, Take 6, held at the University of Cagliari, Italy. This event is part of the framework of the Horizon 2020 Project SYSMICS: SYntax meets Semantics, Methods, Interactions, and Connections in Substructural Logics. Substructural logics are usually formulated as Gentzen systems that lack one or more structural rules. They have been intensively studied over the past two decades by logicians of various persuasions. These researchers include

mathematicians philosophers linguists and computer scientists Substructural logics are applicable to the mathematical investigation of such processes as resource conscious reasoning approximate reasoning type theoretical grammar and other focal notions in computer science They also apply to epistemology economics and linguistics The recourse to algebraic methods or better the fecund interplay of algebra and proof theory has proved useful in providing a unifying framework for these investigations The ASubL series of conferences in particular has played an important role in these developments This collection will appeal to students and researchers with an interest in substructural logics abstract algebraic logic residuated lattices proof theory universal algebra and logical semantics

*Residuated Lattices: An Algebraic Glimpse at Substructural Logics* Nikolaos Galatos, Peter Jipsen, Tomasz Kowalski, Hiroakira Ono, 2007-04-25 The book is meant to serve two purposes The first and more obvious one is to present state of the art results in algebraic research into residuated structures related to substructural logics The second less obvious but equally important is to provide a reasonably gentle introduction to algebraic logic At the beginning the second objective is predominant Thus in the first few chapters the reader will find a primer of universal algebra for logicians a crash course in nonclassical logics for algebraists an introduction to residuated structures an outline of Gentzen style calculi as well as some tidbits of proof theory the celebrated Hauptsatz or cut elimination theorem among them These lead naturally to a discussion of interconnections between logic and algebra where we try to demonstrate how they form two sides of the same coin We envisage that the initial chapters could be used as a textbook for a graduate course perhaps entitled Algebra and Substructural Logics As the book progresses the first objective gains predominance over the second Although the precise point of equilibrium would be difficult to specify it is safe to say that we enter the technical part with the discussion of various completions of residuated structures These include Dedekind McNeille completions and canonical extensions Completions are used later in investigating several finiteness properties such as the finite model property generation of varieties by their finite members and finite embeddability The algebraic analysis of cut elimination that follows also takes recourse to completions Decidability of logics equational and quasi equational theories comes next where we show how proof theoretical methods like cut elimination are preferable for small logics theories but semantic tools like Rabin's theorem work better for big ones Then we turn to Glivenko's theorem which says that a formula is an intuitionistic tautology if and only if its double negation is a classical one We generalise it to the substructural setting identifying for each substructural logic its Glivenko equivalence class with smallest and largest element This is also where we begin investigating lattices of logics and varieties rather than particular examples We continue in this vein by presenting a number of results concerning minimal varieties maximal logics A typical theorem there says that for some given well known variety its subvariety lattice has precisely such and such number of minimal members where values for such and such include but are not limited to continuum countably many and two In the last two chapters we focus on the lattice of varieties corresponding to logics without contraction In one we prove a negative result that there are no nontrivial splittings in that

variety In the other we prove a positive one that semisimple varieties coincide with discriminator ones Within the second more technical part of the book another transition process may be traced Namely we begin with logically inclined technicalities and end with algebraically inclined ones Here perhaps algebraic rendering of Glivenko theorems marks the equilibrium point at least in the sense that finiteness properties decidability and Glivenko theorems are of clear interest to logicians whereas semisimplicity and discriminator varieties are universal algebra par excellence It is for the reader to judge whether we succeeded in weaving these threads into a seamless fabric

**Substructural Logics** Peter Joseph Schroeder-Heister, Kosta Došen, 1993 The new area of logic and computation is now undergoing rapid development This has affected the social pattern of research in the area A new topic may rise very quickly with a significant body of research around it The community however cannot wait the traditional two years for a book to appear This has given greater importance to thematic collections of papers centred around a topic and addressing it from several points of view usually as a result of a workshop summer school or just a scientific initiative Such a collection may not be as coherent as a book by one or two authors yet it is more focused than a collection of key papers on a certain topic It is best thought of as a thematic collection a study in the area of logic and computation The new series Studies in Logic and Computation is intended to provide a home for such thematic collections Substructural logics are nonclassical logics which arose in response to problems in foundations of mathematics and logic theoretical computer science mathematical linguistics and category theory They include intuitionistic logic relevant logic BCK logic linear logic and Lambek's calculus of syntactic categories Substructural logics differ from classical logics and from each other in their presuppositions about Gentzen's structural rules although their presuppositions about the deductive role of logical constants are invariant Substructural logics have been a subject of study for logicians during the last sixty years Specialists have often worked in isolation however largely unaware of the contributions of others This book brings together new papers by some of the most eminent authorities in these various traditions to produce a unified view of substructural logics

Interval / Probabilistic Uncertainty and Non-classical Logics Van-Nam Huynh, Yoshiteru Nakamori, Hiroakira Ono, Jonathan Lawry, Vladik Kreinovich, Hung T. Nguyen, 2008-01-11 This book contains the proceedings of the first International Workshop on Interval Probabilistic Uncertainty and Non Classical Logics Ishikawa Japan March 25-28 2008 The workshop brought together researchers working on interval and probabilistic uncertainty and on non classical logics It is hoped this workshop will lead to a boost in the much needed collaboration between the uncertainty analysis and non classical logic communities and thus to better processing of uncertainty

**Paraconsistency** Walter Alexandr Carnielli, 2002-04-10 This book presents a study on the foundations of a large class of paraconsistent logics from the point of view of the logics of formal inconsistency It also presents several systems of non standard logics with paraconsistent features

Advances in Logic Based Intelligent Systems Kazumi Nakamatsu, Jair Minoro Abe, 2005 LAPTEC 2005 promoted the discussion and interaction between researchers and

practitioners focused on both theoretical and practical disciplines concerning logics applied to technology with diverse backgrounds including all kinds of intelligent systems having classical or non classical logics as underlying common matters

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