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# A more general general proof theory

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**Abstract**

In this paper it is suggested to generalize our understanding of general (structural) proof theory and to consider it as a general theory of two kinds of derivations, namely proofs and dual proofs. The proposal is substantiated by (i) considerations on assertion, denial, and bi-lateralism, (ii) remarks on compositionality in proof-theoretic semantics, and (iii) comments on falsification and co-implication. The main formal result of the paper is a normal form theorem for the natural deduction proof system N2Int of the bi-intuitionistic logic 2Int. The proof makes use of the faithful embedding of 2Int into intuitionistic logic with respect to validity and shows that conversions of dual proofs can be sidestepped.

*Keywords:* proofs, dual proofs, negation, co-implication, 2Int, bi-intuitionistic logic, dual intuitionistic logic, normal form, assertion, denial, compositionality, bilateralism

## 1. Introduction

In the early 1970s Dag Prawitz introduced general proof theory as "a study of proofs in their own right where one is interested in general questions about the nature and structure of proofs" [16, p. 66], and in his seminal paper on "Ideas and results in proof theory" [15], Prawitz listed what he considered to be obvious topics in general proof theory:

> 2.1. The basic question of defining the notion of proof, including the question of the distinction between different kinds of proofs such as constructive proofs and classical proofs.
>
> 2.2. Investigation of the structure of (different kinds of) proofs, including e.g. questions concerning the existence of certain normal forms.

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