Substructural Type Systems

Small-group work

Discuss some or all of the following questions about David Walker's article "Substructural Type Systems."

a)   How can projections `fst` and `snd` be included in the system? Suggest appropriate typing rules.

b)   Would the typing rules need to be changed for a call-by-name operational semantics?

c)   Is it strange that we need the *algorithmic weakening* and *(linear) strengthening* lemmas (Lemma 1.2.7 and 1.2.8, resp.) – considering we are dealing with a linear type system? Can you guess where they are used?

d)   Find a counter example to the conjectured substitution lemma 1.2.13.

e)   Solve Exercise 1.3.1 about linear binary trees and an associated constant-space map function.

f)   In the ordered type system, is the addition of `let` strictly necessary? Which problems arise if one would permit the allocation of general pairs (t, t') on the stack, rather than just (x, y)? What problems can arise with function closures on the stack?

Discuss any further problems, or questions you find interesting about the chapter.