Collapse Theorems

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In this paper I compare two collapse theorems found in Path Semantical Logic.

In the paper “Non-Composition of XOR Trick”[1],
I studied the following proof in Path Semantical Logic[2]:

(a, b, c) (A, B, C): Level 0 Collapse Theorem
a ⩛ b, a(A), b(B), c(C) => C

Where the tuple `(a, b, c)` has level 1 and the tuple `(A, B, C)` has level 0.
The notation `a(A)` means `a=>A` where `A` is at a lower level.

This theorem collapses all propositions at level 0 that are not `A` or `B`.

It turns out that there is a similar proof that collapses propositions in level 1:

(a, b, c) (A, B, C): Level 1 Collapse Theorem
A ⩛ B, a(A), b(B) => c

This theorem collapses propositions in level 1 that are not `a` or `b`.
Notice that `C` is not used, but is added for easier comparison and further discussion.

The Level 0 Collapse theorem can not prove `c`.
The Level 1 Collapse theorem can not prove `C`.

If you add `c(C)` to the Level 1 Collapse Theorem, then `C` is `true` because `c` is `true`.

References:

[1] “Non-Composition of XOR Trick”
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https://github.com/advancedresearch/path_semantics/blob/master/papers-wip/non-composition-of-xor-trick.pdf

[2] “Path Semantical Logic”
AdvancedResearch, reading sequence on Path Semantics
https://github.com/advancedresearch/path_semantics/blob/master/sequences.md#path-semantical-logic