Some Examples of OSCAR Reasoning Defeasibly

These problems are contained in the problem set *Combined-problems.lisp,* and can be run from OSCAR by typing *test(problem-number).*

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Problem #1
This is a case of collective rebutting defeat
Given premises:
   P   justification = 1.0
   A   justification = 1.0
Ultimate epistemic interests:
   R   interest = 1.0

  FORWARDS PRIMA FACIE REASONS
   pf-reason_1.1: {P} ||=> Q strength = 1.0
   pf-reason_2.1: {Q} ||=> R strength = 1.0
   pf-reason_3.1: {C} ||=> ~R strength = 1.0
   pf-reason_4.1: {B} ||=> C strength = 1.0
   pf-reason_5.1: {A} ||=> B strength = 1.0

================= ULTIMATE EPISTEMIC INTERESTS ===================
 Interest in R
 is unsatisfied.

Elapsed time = 0.02 sec
Cumulative size of arguments = 7
Size of inference-graph = 7 of which 0 were unused suppositions.
100% of the inference-graph was used in the argument.
10 interests were adopted.

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THE FOLLOWING IS THE REASONING INVOLVED IN THE SOLUTION
Nodes marked DEFEATED have that status at the end of the reasoning.

 # 1
 P
 given
 # 2
 A
 given
              # 1
              interest: R
              This is of ultimate interest
              Of interest as a defeater for support-link 5 for node 5
 # 3
 B
 Inferred by:
      support-link #3 from { 2 } by pf-reason_5.1
 # 4

C
Inferred by:
          support-link #4 from { 3 } by pf-reason_4.1
5
~R   DEFEATED
Inferred by:
          support-link #5 from { 4 } by pf-reason_3.1 defeaters: { 7 }   DEFEATED
defeatees: { link 7 for node 7 }
6
Q
Inferred by:
          support-link #6 from { 1 } by pf-reason_1.1
7
R   DEFEATED
Inferred by:
           support-link #7 from { 6 } by pf-reason_2.1 defeaters: { 5 }   DEFEATED
defeatees: { link 5 for node 5 }
This discharges interest 1
          vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
          #<Node 7> has become defeated.
          vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
          #<Node 5> has become defeated.
          vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
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Problem #8
Figure 8 -- the lottery paradox paradox
Given premises:
    P   justification = 1.0
Ultimate epistemic interests:
    ~T1   interest = 1.0
    ~T2   interest = 1.0
    ~T3   interest = 1.0
    R   interest = 1.0

  FORWARDS PRIMA FACIE REASONS
    pf-reason_1.8:   {R} ||=> ~T1   strength = 1.0
    pf-reason_2.8:   {R} ||=> ~T2   strength = 1.0
    pf-reason_3.8:   {R} ||=> ~T3   strength = 1.0
    pf-reason_4.8:   {P} ||=> R   strength = 1.0

  FORWARDS CONCLUSIVE REASONS
    con-reason_1.8: {R , ~T1 , ~T2} ||=> T3   strength = 1.0
    con-reason_2.8: {R , ~T2 , ~T3} ||=> T1   strength = 1.0
    con-reason_3.8: {R , ~T1 , ~T3} ||=> T2   strength = 1.0
    con-reason_4.8: {~T1 , ~T2 , ~T3} ||=> ~R   strength = 1.0

================== ULTIMATE EPISTEMIC INTERESTS ====================
 Interest in R
 is answered affirmatively by node 2

 Interest in ~T3
 is unsatisfied.

 Interest in ~T2
 is unsatisfied.

Interest in ~T1
  is unsatisfied.

Elapsed time = 0.05 sec
Cumulative size of arguments = 9
Size of inference-graph = 9 of which 0 were unused suppositions.
100% of the inference-graph was used in the argument.
12 interests were adopted.

==
THE FOLLOWING IS THE REASONING INVOLVED IN THE SOLUTION
Nodes marked DEFEATED have that status at the end of the reasoning.

 # 1
 P
 given
                        # 1
                        interest: R
                        This is of ultimate interest
                        # 2
                        interest: ~T3
                        This is of ultimate interest
                        # 3
                        interest: ~T2
                        This is of ultimate interest
                        # 4
                        interest: ~T1
                        This is of ultimate interest
 # 2
 R
 Inferred by:
          support-link #2 from { 1 } by pf-reason_4.8 defeaters: { 9 }
 This discharges interest 1
          ==
          Justified belief in R
          with undefeated-degree-of-support 1.0
          answers #<Query 4: R>
          ==
 # 3
 ~T3   DEFEATED
 Inferred by:
          support-link #3 from { 2 } by pf-reason_3.8 defeaters: { 7 }   DEFEATED
 This discharges interest 2
 # 4
 ~T2   DEFEATED
 Inferred by:
          support-link #4 from { 2 } by pf-reason_2.8 defeaters: { 8 }   DEFEATED
 This discharges interest 3
 # 5
 ~T1   DEFEATED
 Inferred by:
          support-link #5 from { 2 } by pf-reason_1.8 defeaters: { 6 }   DEFEATED
 This discharges interest 4
          ==
          Justified belief in ~T3
          with undefeated-degree-of-support 1.0
          answers #<Query 3: ~T3>
          ==
          ==
          Justified belief in ~T2

with undefeated-degree-of-support 1.0
answers #<Query 2: ~T2>
==
==
Justified belief in ~T1
with undefeated-degree-of-support 1.0
answers #<Query 1: ~T1>
==
6
T1   DEFEATED
Inferred by:
        support-link #6 from { 2 , 4 , 3 } by con-reason_2.8   DEFEATED
defeatees: { link 5 for node 5 }
7
T3   DEFEATED
Inferred by:
        support-link #7 from { 2 , 4 , 5 } by inversion_from_contradictory_nodes_6_and_5   DEFEATED
defeatees: { link 3 for node 3 }
8
T2   DEFEATED
Inferred by:
        support-link #8 from { 2 , 5 , 3 } by inversion_from_contradictory_nodes_7_and_3   DEFEATED
defeatees: { link 4 for node 4 }
9
~R   DEFEATED
Inferred by:
        support-link #9 from { 5 , 3 , 4 } by inversion_from_contradictory_nodes_8_and_4   DEFEATED
defeatees: { link 2 for node 2 }
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 6> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 7> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 8> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 9> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 5> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 3> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 4> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        ==
        Lowering the undefeated-degree-of-support of ~T1
        retracts the previous answer to #<Query 1: ~T1>
        ==
        ==
        Lowering the undefeated-degree-of-support of ~T3
        retracts the previous answer to #<Query 3: ~T3>
        ==
        ==
        Lowering the undefeated-degree-of-support of ~T2
        retracts the previous answer to #<Query 2: ~T2>
        ==
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Problem #10

Figure 9 -- No nearest defeasible ancestor is defeated.
Given premises:
     P   justification = 1.0
Ultimate epistemic interests:
   R   interest = 1.0

   FORWARDS PRIMA FACIE REASONS
     pf-reason_1.10:   {P} ||=> Q   strength = 1.0
     pf-reason_2.10:   {Q} ||=> R   strength = 1.0

   FORWARDS CONCLUSIVE REASONS
     con-reason_1.10:   {R} ||=> (P @ Q)   strength = 1.0

================== ULTIMATE EPISTEMIC INTERESTS ===================
   Interest in R
   is unsatisfied.

Elapsed time = 0.01 sec
Cumulative size of arguments = 4
Size of inference-graph = 4 of which 0 were unused suppositions.
100% of the inference-graph was used in the argument.
5 interests were adopted.

==
THE FOLLOWING IS THE REASONING INVOLVED IN THE SOLUTION
Nodes marked DEFEATED have that status at the end of the reasoning.

 # 1
 P
 given

                         # 1
                         interest: R
                         This is of ultimate interest
   # 2
   Q   DEFEATED
   Inferred by:
           support-link #2 from { 1 } by pf-reason_1.10 defeaters: { 4 }   DEFEATED
   # 3
   R   DEFEATED
   Inferred by:
           support-link #3 from { 2 } by pf-reason_2.10   DEFEATED
   This discharges interest 1
           ==
           Justified belief in R
           with undefeated-degree-of-support 1.0
           answers #<Query 1: R>
           ==
   # 4
   (P @ Q)   DEFEATED
   Inferred by:
           support-link #4 from { 3 } by con-reason_1.10   DEFEATED
   defeatees: { link 2 for node 2 }
           vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
           #<Node 4> has become defeated.
           vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
           #<Node 2> has become defeated.
           vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
           #<Node 3> has become defeated.

vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
==
Lowering the undefeated-degree-of-support of R
retracts the previous answer to #<Query 1: R>
==
==

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Problem #15
figure 14 -- a three-membered defeat cycle.
Given premises:
    A   justification = 1.0
    P   justification = 1.0
    R   justification = 1.0
    T   justification = 1.0
Ultimate epistemic interests:
    B   interest = 1.0

  FORWARDS PRIMA FACIE REASONS
   pf-reason_1.15:   {A} ||=> B   strength = 1.0
   pf-reason_2.15:   {P} ||=> Q   strength = 1.0
   pf-reason_3.15:   {R} ||=> S   strength = 1.0
   pf-reason_4.15:   {T} ||=> U   strength = 1.0
   pf-reason_5.15:   {Q} ||=> (R @ S)   strength = 1.0
   pf-reason_6.15:   {S} ||=> (T @ U)   strength = 1.0
   pf-reason_7.15:   {U} ||=> (P @ Q)   strength = 1.0
   pf-reason_8.15:   {Q} ||=> (A @ B)   strength = 1.0

================== ULTIMATE EPISTEMIC INTERESTS ===================
  Interest in B
  is unsatisfied.

Elapsed time = 0.02 sec
Cumulative size of arguments = 12
Size of inference-graph = 12 of which 0 were unused suppositions.
100% of the inference-graph was used in the argument.
17 interests were adopted.

==
THE FOLLOWING IS THE REASONING INVOLVED IN THE SOLUTION
Nodes marked DEFEATED have that status at the end of the reasoning.

 # 1
 A
 given
 # 2
 P
 given
 # 3
 R
 given
 # 4
 T
 given
                        # 1
                        interest: B

This is of ultimate interest

5
U   DEFEATED
Inferred by:
        support-link #5 from { 4 } by pf-reason_4.15 defeaters: { 8 }   DEFEATED
6
(P @ Q)   DEFEATED
Inferred by:
        support-link #6 from { 5 } by pf-reason_7.15   DEFEATED
defeatees: { link 9 for node 9 }
7
S   DEFEATED
Inferred by:
        support-link #7 from { 3 } by pf-reason_3.15 defeaters: { 11 }   DEFEATED
8
(T @ U)   DEFEATED
Inferred by:
        support-link #8 from { 7 } by pf-reason_6.15   DEFEATED
defeatees: { link 5 for node 5 }
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 5> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 6> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
9
Q   DEFEATED
Inferred by:
        support-link #9 from { 2 } by pf-reason_2.15 defeaters: { 6 }   DEFEATED
10
(A @ B)   DEFEATED
Inferred by:
        support-link #10 from { 9 } by pf-reason_8.15   DEFEATED
defeatees: { link 12 for node 12 }
11
(R @ S)   DEFEATED
Inferred by:
        support-link #11 from { 9 } by pf-reason_5.15   DEFEATED
defeatees: { link 7 for node 7 }
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 10> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 11> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 9> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 7> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 8> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
12
B   DEFEATED
Inferred by:
        support-link #12 from { 1 } by pf-reason_1.15 defeaters: { 10 }   DEFEATED
This discharges interest 1
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
        #<Node 12> has become defeated.
        vvvvvvvvvvvvvvvvvvvvvvvvvvvvvvv
==