

Parameter-Robustness of our 4 illustrative simulation runs

This notebook checks parameter robustness of our simulation results, using the ensemble “2020_06_25-0001” with randomly chosen weights of the achievement function.

```
In[1]:= SetDirectory[$HomeDirectory];
If[! MemberQ[$Path, #], AppendTo[$Path, #]] &[
  FileNameJoin[{"git", "DialecticalStructures"}]];
If[! MemberQ[$Path, #], AppendTo[$Path, #]] &[
  FileNameJoin[{"git", "ReflectiveEquilibrium"}]];
<< DialecticalStructures`BasicTDS`;
<< DialecticalStructures`InductiveReasoning`;
<< DialecticalStructures`CoherenceMeasures`;
<< DialecticalStructures`PositionsAnalytics`;
<< ReflectiveEquilibrium`ReflectiveEquilibrium`;
```

In[2]:=

Setting up the scene

```
In[3]:= ensembleDir = "2020_06_26-0001";
fourCasesDir = "2016_09_08-0001";
```

Get data from first case.

```
In[4]:= data = Get[FileNameJoin[{
  NotebookDirectory[],
  "results",
  ensembleDir,
  ensembleDir <> "#" <> IntegerString[1, 10, 6] <> ".m"
}]];
senIDs = Cases[data, {"senIDs", _}][[1, 2]];
tau = Cases[data, {"tau", _}][[1, 2]];
param = Cases[data, {"parameters", _}][[1, 2]];

```

Gather the ensemble data according to initial commitments.

```

In[ ]:= ensembleDataSplit = GatherBy[
  Module[{
    n
  },
    n = Length[FileNames[ensembleDir <> "*.m", FileNameJoin[{
      NotebookDirectory[],
      "results",
      ensembleDir}]]];
    Table[
      Get[FileNameJoin[{
        NotebookDirectory[],
        "results",
        ensembleDir,
        ensembleDir <> "#" <> IntegerString[i, 10, 6] <> ".m"
      }]],
      {i, n}
    ]
  ],
  Lookup[Part[Cases[#, {"posEvolution", _}], 1, 2, 1], "COM"] &
];

```

Get the position-evolutions for four cases

```

In[ ]:= posEvolFourCases = Module[{
  n, pe
},
  n = Length[FileNames[fourCasesDir <> "*.m", FileNameJoin[{
    NotebookDirectory[],
    "results",
    fourCasesDir}]]];
  Echo@n;
  Association@Table[
    pe = Cases[
      Get[FileNameJoin[{
        NotebookDirectory[],
        "results",
        fourCasesDir,
        fourCasesDir <> "#" <> IntegerString[i, 10, 6] <> ".m"
      }]],
      {"posEvolution", _}];
    Echo@pe;
    Lookup[Part[pe, 1, 2, 1], "COM"] → pe,
    {i, n}
  ]
]

```

» 4

» $\{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 118 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle\}\}\}$

» $\{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 121 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle\}\}\}$

» $\{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 1090 | \rangle, \langle | \text{THE} \rightarrow 1122, \text{COM} \rightarrow 1122 | \rangle, \langle | \text{THE} \rightarrow 1113, \text{COM} \rightarrow 1113 | \rangle, \langle | \text{THE} \rightarrow 1113, \text{COM} \rightarrow 1113 | \rangle\}\}\}$

» $\{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 1333 | \rangle, \langle | \text{THE} \rightarrow 1340, \text{COM} \rightarrow 1340 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle\}\}\}$

Out[8]= $\langle | 118 \rightarrow \{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 118 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle\}\}\}, 121 \rightarrow \{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 121 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle\}\}\}, 1090 \rightarrow \{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 1090 | \rangle, \langle | \text{THE} \rightarrow 1122, \text{COM} \rightarrow 1122 | \rangle, \langle | \text{THE} \rightarrow 1113, \text{COM} \rightarrow 1113 | \rangle, \langle | \text{THE} \rightarrow 1113, \text{COM} \rightarrow 1113 | \rangle\}\}\}, 1333 \rightarrow \{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 1333 | \rangle, \langle | \text{THE} \rightarrow 1340, \text{COM} \rightarrow 1340 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle\}\}\}\rangle$

In[9]:= **Lookup[posEvolFourCases, 118]**

Out[9]= $\{\{\text{posEvolution}, \{\langle | \text{THE} \rightarrow 1, \text{COM} \rightarrow 118 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle, \langle | \text{THE} \rightarrow 611, \text{COM} \rightarrow 611 | \rangle\}\}\}$

Functions to calculate weights given parameters alpha and beta of simulation

In[10]:= **WeightAccount[alpha_, beta_] := $\frac{\alpha * \beta}{\alpha + \beta - \alpha * \beta}$;**

WeightSystematicity[alpha_, beta_] := $\frac{\beta - \alpha * \beta}{\alpha + \beta - \alpha * \beta}$;

WeightCloseness[alpha_, beta_] :=
1 - (WeightAccount[alpha, beta] + WeightSystematicity[alpha, beta]);

```

In[ ]:= PlotData[ensembleData_] := Module[{alpha, beta, posevol, matchesStandardCaseQ},
  Map[
    Function[
      data,
      alpha = Lookup[
        Cases[data, {"parameters", _}][[1, 2]],
        "alpha"];
      PrintTemporary["  alpha: " <> ToString[alpha]];

      beta = Lookup[
        Cases[data, {"parameters", _}][[1, 2]],
        "beta"];
      PrintTemporary["  beta: " <> ToString[beta]];

      matchesStandardCaseQ = Equal[
        Cases[data, {"posEvolution", _}],
        Lookup[
          posEvolFourCases,
          Lookup[Part[Cases[data, {"posEvolution", _}], 1, 2, 1], "COM"]
        ]
      ];

      Style[
        {WeightSystematicity[alpha, beta], WeightAccount[alpha, beta]},
        If[matchesStandardCaseQ, Red, Blue]
      ]
    ],
    ensembleData
  ];

```

```

In[ ]:= PlotData@((ensembleDataSplit[[4]])[[1 ;; 10]])

```

```

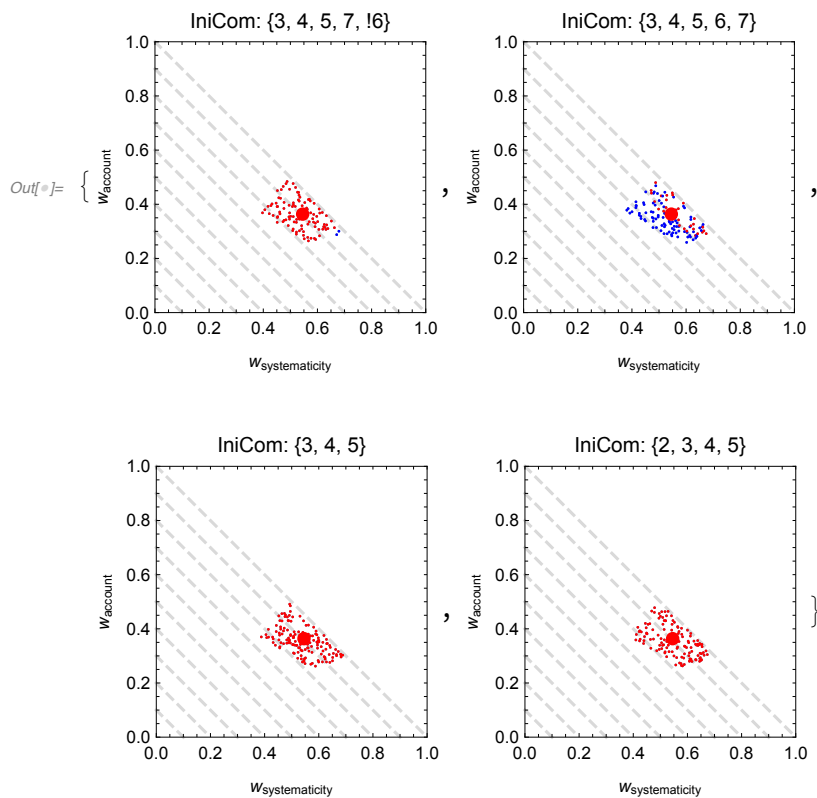
Out[ ]:= { {0.513967, 0.397618}, {0.609296, 0.288997},
  {0.504997, 0.463265}, {0.449624, 0.381943},
  {0.532111, 0.315632}, {0.6529, 0.342015}, {0.409548, 0.358884},
  {0.51422, 0.430526}, {0.505138, 0.326844}, {0.517482, 0.314966} }

```

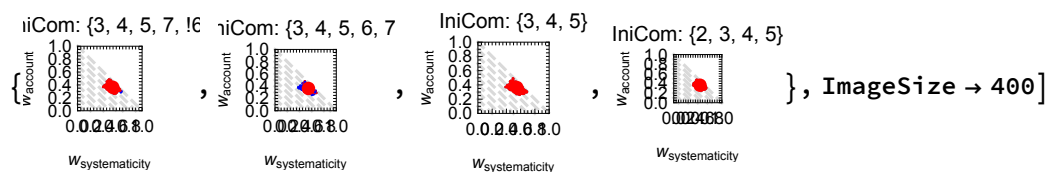
```

In[ ]:= With[{wa = 0.36363636363636365`, ws = 0.5454545454545454`},
  Map[
    Function[
      splitDataRecords,
      Show[
        Table[
          Plot[-x + c, {x, 0, 1},
            PlotStyle → {Dashed, LightGray},
            PlotLabel → "IniCom: " <>
              ToString[IntegerToList[Lookup[Part[Cases[First@splitDataRecords,
                {"posEvolution", _}], 1, 2, 1], "COM"], senIDs]],
            Frame → True,
            AspectRatio → 1,
            PlotRange → {{0, 1}, {0, 1}},
            FrameLabel → {"Wsystematicity", "Waccount"}
          ],
          {c, 0, 1, 0.1}
        ],
        ListPlot[PlotData@splitDataRecords],
        Graphics[{Red, PointSize[Large], Point[{ws, wa}]}]
      ]
    ],
    ensembleDataSplit
  ]
]

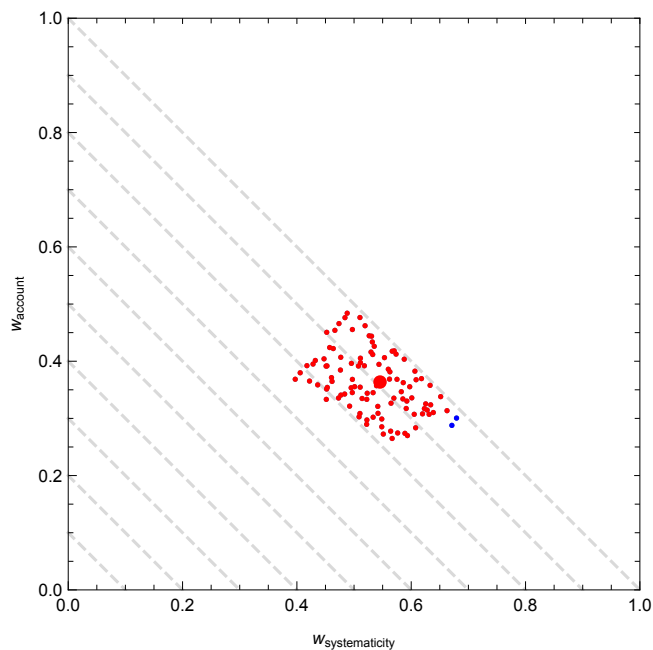
```



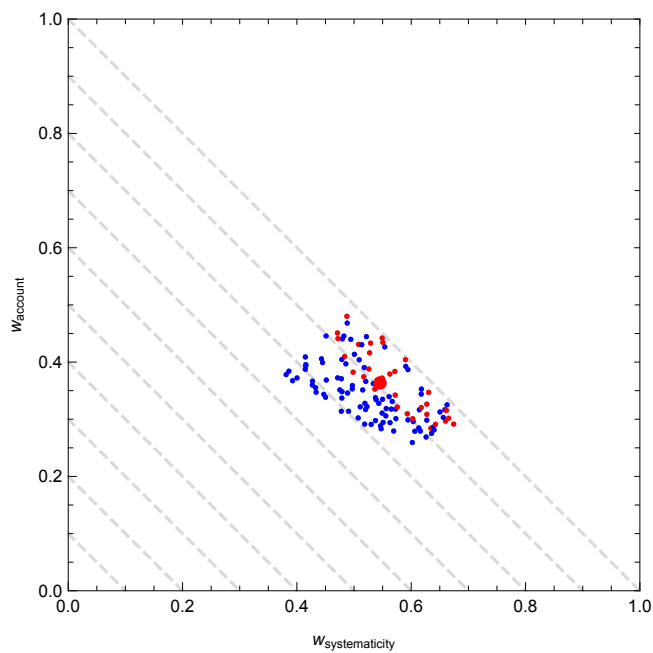
In[12]:= GraphicsColumn[



IniCom: {3, 4, 5, 7, 16}



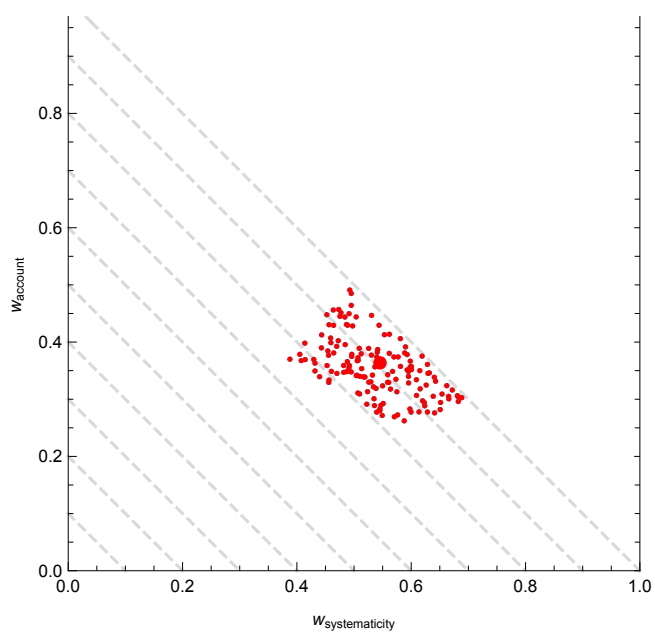
IniCom: {3, 4, 5, 6, 7}



Out[12]=

IniCom: {3, 4, 5}





IniCom: {2, 3, 4, 5}

