

El dilema del prisionero territorial

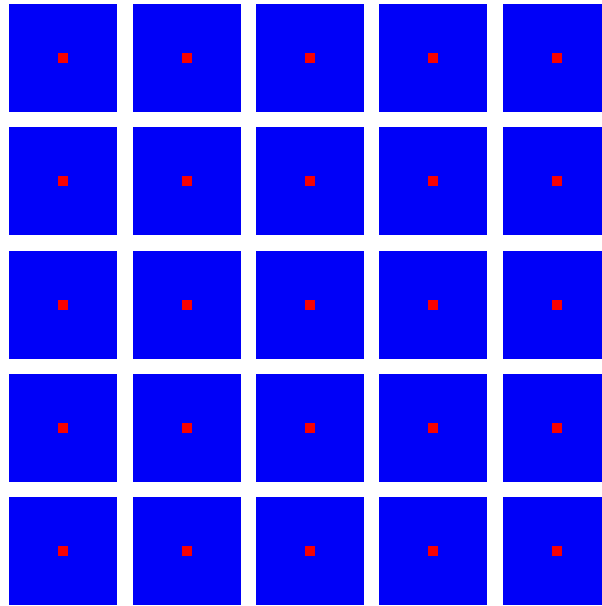
Gaylord, Nishidate, Mathematica in Education and Research 4 (1995)

Los puntos del retículo cuadrado tienen valores C o D, que representan estrategias de cooperar o defraudar. Después de jugar con los 8 puntos que le rodean y con él mismo, el punto adopta la conducta con mayor pago en cada torneo. La distribución inicial es un defraudador en el centro, rodeado de cooperadores.

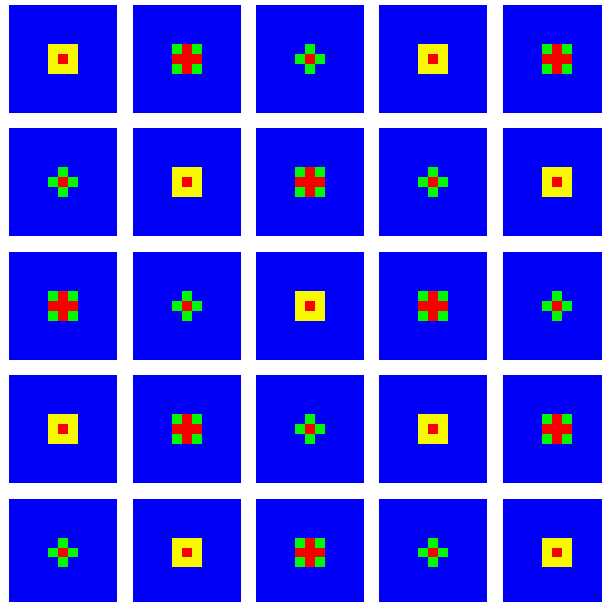
```
In[1]:= SpatialPrisonersDilemma[n_,p_,t_]:=Module[
  {initConf,MooreValues,totalPayoffPlayer,outcome,
  StrategyDecision,totalPayoffLat,sitePayoffPairsLat,
  BestNbrhdPayoffStrategy,newStrategyLat,evolution},
  initConf=
  ReplacePart[Table[C,{2 n+1},{2 n+1}],D,{n+1,n+1}];
  MooreValues[function_,lat_]:=
  MapThread[function,{#,RotateRight[#{0,1}],
  RotateRight[#{1,0}],RotateRight[#{0,-1}],
  RotateRight[#{-1,0}],RotateRight[#{1,1}],
  RotateRight[#{1,-1}],RotateRight[#{-1,-1}],
  RotateRight[#{-1,1}]], 2]&[lat];
  totalPayoffPlayer[x_,a_,b_,c_,d_,e_,f_,g_,h_]:=
  outcome[x,x]+outcome[x,a]+outcome[x,b]+outcome[x,c]+
  outcome[x,d]+outcome[x,e]+outcome[x,f]+outcome[x,g]+
  outcome[x,h];
  outcome[C,C]=1;outcome[C,D]=0;
  outcome[D,D]=0;outcome[D,C]=p;
  StrategyDecision:=
  (totalPayoffLat=MooreValues[totalPayoffPlayer,#];
  sitePayoffPairsLat=MapThread[List,{totalPayoffLat,#},2];
  BestNbrhdPayoffStrategy[x_]:=Last[Sort[{x}]][[2]];
  newStrategyLat=
  MooreValues[BestNbrhdPayoffStrategy,sitePayoffPairsLat])&;
  evolution=NestList[StrategyDecision,initConf,t]]

In[2]:= SocialEvolution[lis_]:=Module[{picture},
  picture=Rest[MapThread[color,{#,RotateRight[#{#}]&[lis],3}];
  Map[Show[Graphics[RasterArray[Reverse[#]/.
  {color[C,C] -> RGBColor[0,0,1],
  color[D,D] -> RGBColor[1,0,0],
  color[C,D] -> RGBColor[0,1,0],
  color[D,C] -> RGBColor[1,1,0]}]],
  AspectRatio ->Automatic, DisplayFunction->Identity]&,
  picture]]
```

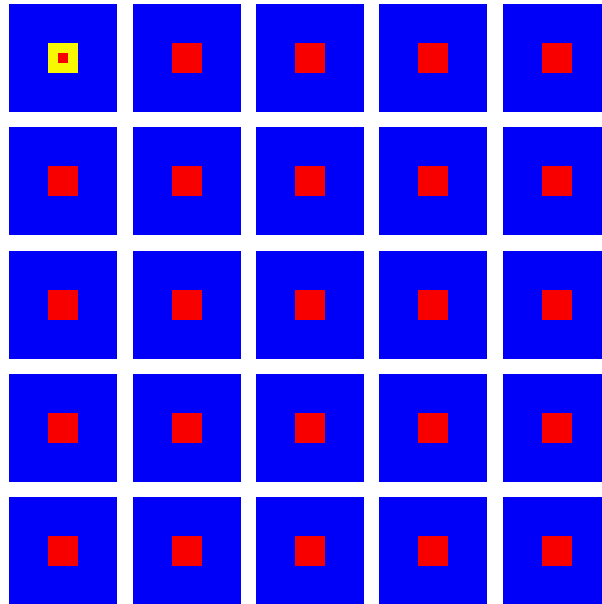
```
In[3]:= Show[GraphicsArray[Partition[SocialEvolution[  
SpatialPrisonersDilemma[5,1,25]],5]]];
```



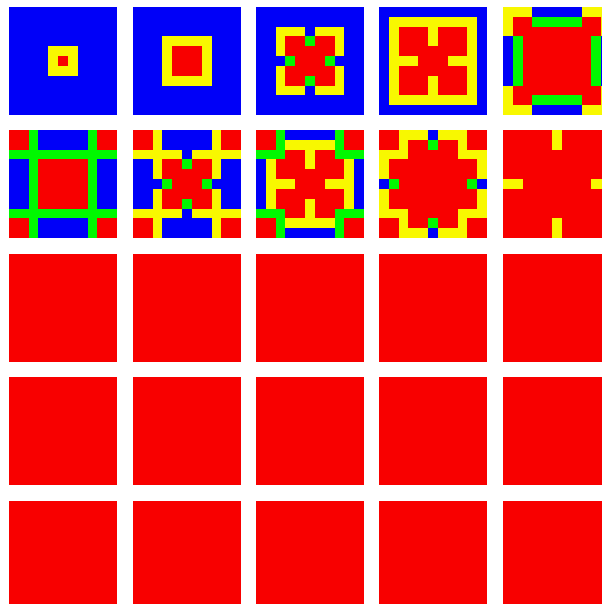
```
In[4]:= Show[GraphicsArray[Partition[SocialEvolution[  
SpatialPrisonersDilemma[5,1.5,25]],5]]];
```



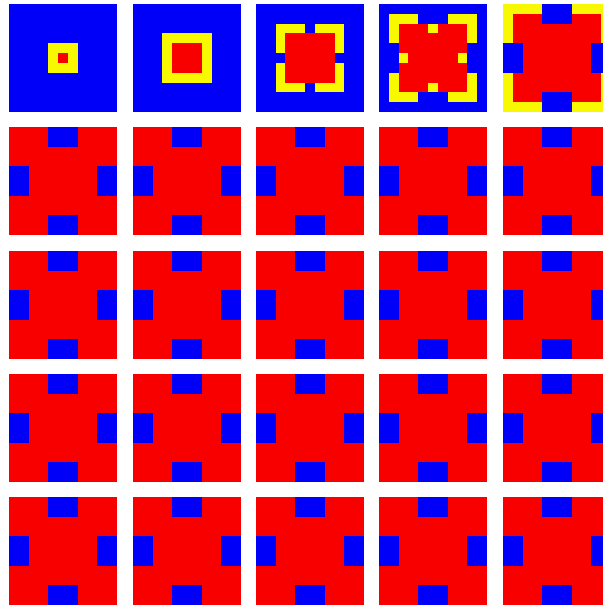
```
In[5]:= Show[GraphicsArray[Partition[SocialEvolution[  
SpatialPrisonersDilemma[5,1.6,25]],5]]];
```



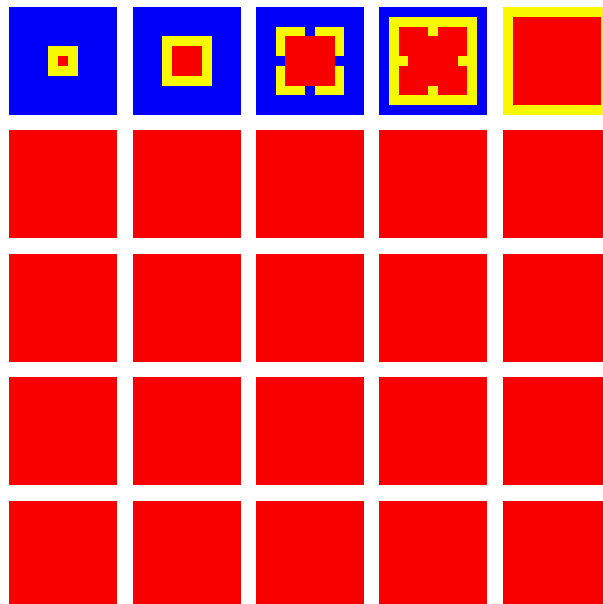
```
In[6]:= Show[GraphicsArray[Partition[SocialEvolution[  
SpatialPrisonersDilemma[5,1.8,25]],5]]];
```



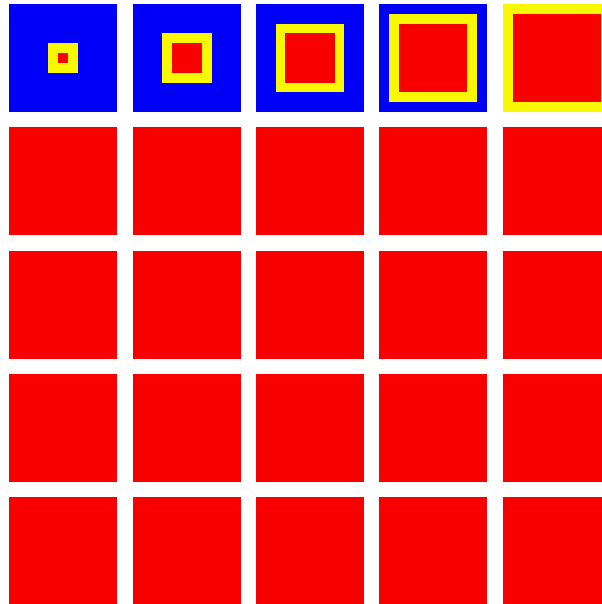
```
In[7]:= Show[GraphicsArray[Partition[SocialEvolution[  
SpatialPrisonersDilemma[5,2,25]],5]]];
```



```
In[8]:= Show[GraphicsArray[Partition[SocialEvolution[  
SpatialPrisonersDilemma[5,2.3,25]],5]]];
```



```
In[9]:= Show[GraphicsArray[Partition[SocialEvolution[  
SpatialPrisonersDilemma[5,3,25]],5]]];
```



```
In[10]:= Show[GraphicsArray[Partition[SocialEvolution[  
SpatialPrisonersDilemma[25,1.85,30]],5]]];
```

