

Simulating the impact of intellectual property rights on the innovation process

Teramoto, Shinto
Faculty of Law, Kyushu University : Professor

<https://hdl.handle.net/2324/1472567>

出版情報 : 2014-11-19. 11th International Conference on Innovation and Management, Vaasa, Finland
バージョン :
権利関係 :



Simulating the Impact of Intellectual Property Rights on the Innovation Process

November 19, 2014

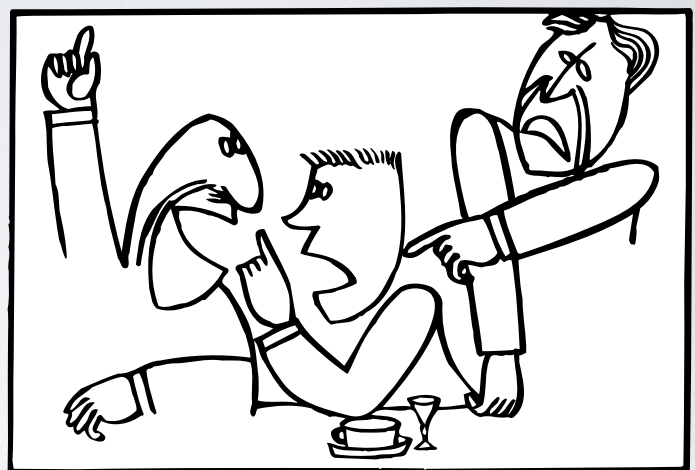
ICIM 2014, Vaasa, Finland

Shinto Teramoto*

* Professor of Law, Kyushu University, Japan
e-mail: jshin768@gmail.com

I

Debates on the function of IPRs



- For stronger protection of intellectual property?
- Or, for weaker protection of intellectual property?

The first prong of the questions in the debates —
can IPRs promote diffusion of products and services?



3

The second prong of the questions in the debate —
can IPRs promote the continuous generation of innovations?
— The question the research tries to answer through simulations on a simple model —



4

The Background of Designing a Model for Simulation

5

Lockean justification for IPRs is no more persuasive

- It argues that the inventors and authors acquire IPRs to their inventions and works of authorship because they are the products of their labor.
- Now, few lawyers believe this.
- Obviously, inventors and authors are dwarfs standing on the shoulders of giants.
- Only a tiny part of an invention or work of authorship is the contribution of the inventor or author, and the remaining greater part is inherited from the predecessors.
- The greater part of the inventions and works of authorship are not the products of the labor of the inventors or the authors.
- A tiny contribution to public knowledge hardly justifies the exclusive use of an entire invention or work of authorship by the inventor or the author.

John Lock (1632-1704)

6

The Contribution of the Studies from Law & Economics perspective in Understanding the Pros and Cons of IPR

- They suggest that:
 - IPRs can alleviate the uncertainty of the rights holder with regard to competition in the market for the distribution of the products or services embodying the invention or the work of authorship protected by IPRs; and
 - in this way, IPRs can promote the rights holder's investment in the said market; and
 - IPRs may promote the diffusion of products or services embodying invention or the work of authorship protected by IPRs.
- They also suggest IPRs that are too strong are useless because the performance of IPRs in promoting such investment is likely to hit a ceiling at a certain level.

The Perspective of a Social Network

- More and more authors are discussing the effect of a social network on the generation and diffusion of innovation.
- However, the studies from Law and Economics have not emphasized the impact of IPRs on the development of a social network.
- The Model for simulation proposed here tries to implement a social network perspective in order to assess the impact of IPRs on innovation.

Assumptions for Designing a Model

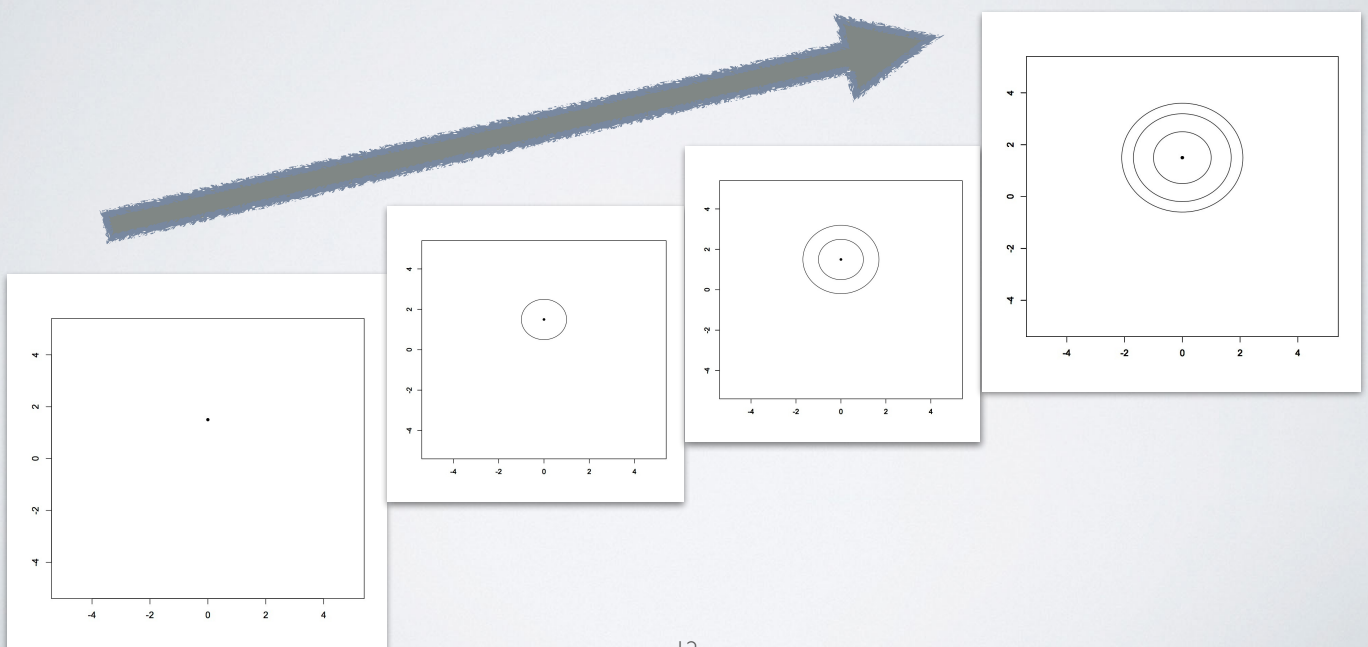
9

1. All innovation has its roots in earlier innovation; and
2. The impact of one innovation increases according to the passage of time, and gradually hits a ceiling.

Designing a Model

||

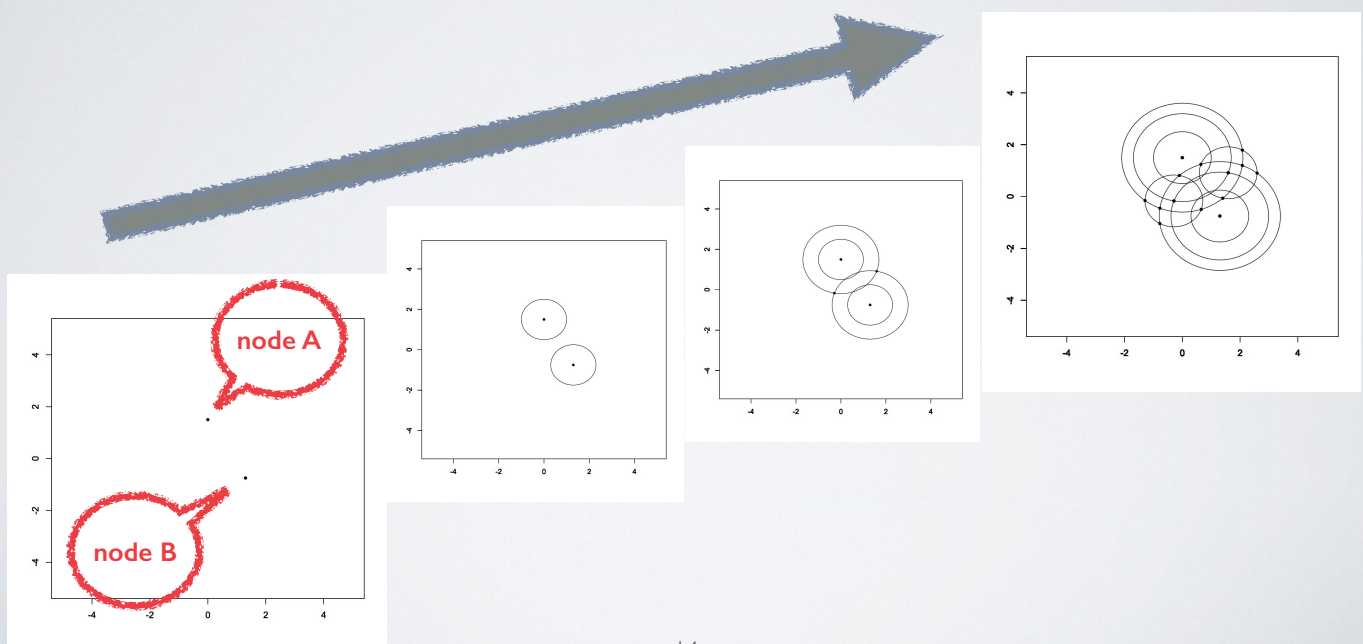
- One node denotes one innovation.
- The expanding radius (“ r ”) of a circle having one node as its center denotes the effect of the innovation denoted by the said node.



- The radius (“ r ”) denotes the impact of an innovation that is assumed to gradually increases as time passes.
- In the model, for the purpose of convenience and simplicity, the growth of the radius (“ r ”) is regulated by the following formula:
 - $r = \max(\log((t-g)/\tau) + 1, 0)$
 - t : the number of the relevant trial
 - g : the number of the trial when the relevant vertex was generated
 - $\tau, \tau > 0$: a constant that regulates the growth of r

13

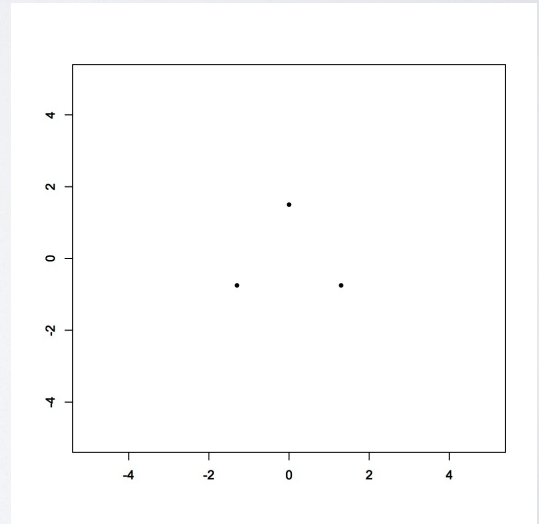
- New innovations may be generated under the effects of past innovation A (denoted by node A) and innovation B (node B).
- The intersections of the circle, having node A as its center, and the circle, having node B as its center, denote such new innovations.



14

- The simulation starts from the conditions in which three previous innovations exist.
- The simulation conducted here does not give specific meaning to the geodesic position of each node.
- The geodesic positions of the said respective nodes are arbitrarily determined as follows:

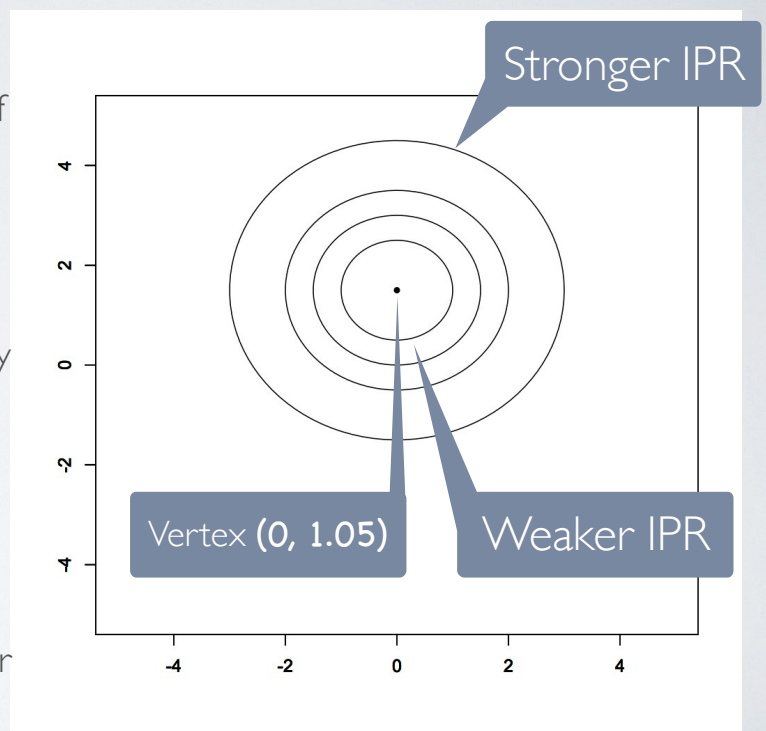
- $(0, 1.5)$
- $(1.5 \times \cos(\pi/6), -1.5 \times \sin(\pi/6))$
- $(-1.5 \times \cos(\pi/6), -1.5 \times \sin(\pi/6))$



15

- A past innovation may be protected by an IPR (patent, copyright, etc.).

- In the simulation, for the purpose of simplicity, only the vertex $(0, 1.5)$, which denotes one of the past innovations, is given IPR.
- The impact of the IPR is denoted by the area in the circle that has the vertex $(0, 1.5)$ as its center.
- The radius (R) of the said area is longer to denote a stronger IPR, and it is shorter to denote a weaker IPR.

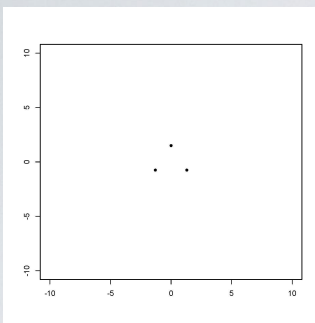


16

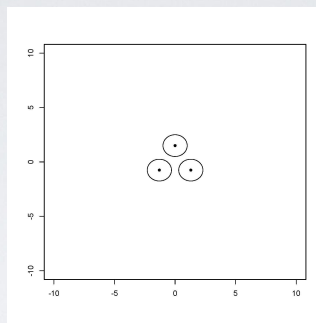
- An IPR can suspend the dissemination of the products and services embodying a new innovation that fall within the scope of the IPR.
- Thereby, the increase of the effect of such new innovation is obstructed by the exercise of such IPR.
- This phenomenon can be denoted by the restricted or delayed increase in the radius (“ r ”) of the circle which represents the effect of the said new innovation.

17

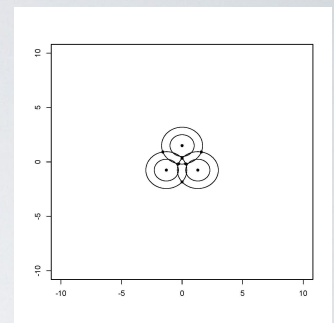
The generation of intersection when $R = 0$ (no IPR)



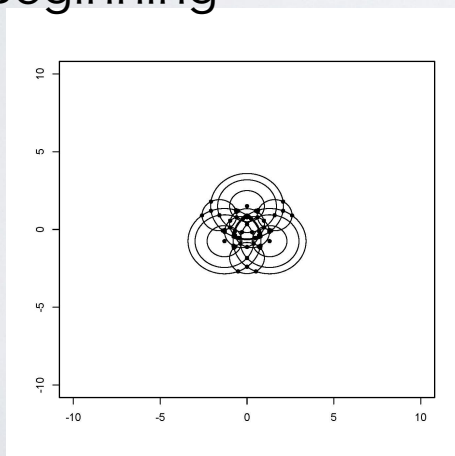
Beginning



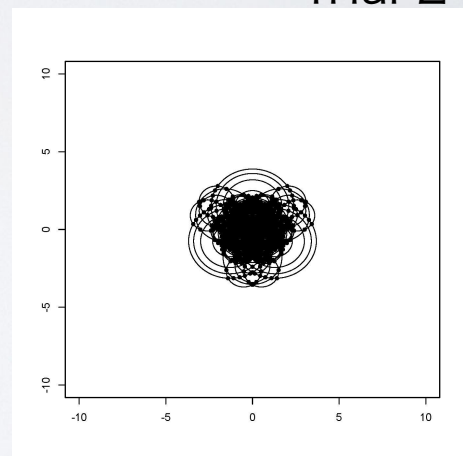
Trial 1



Trial 2



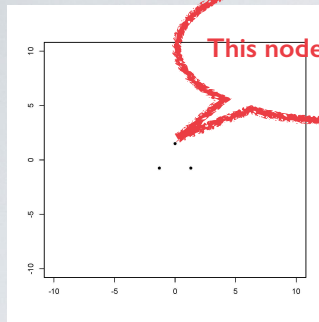
Trial 3



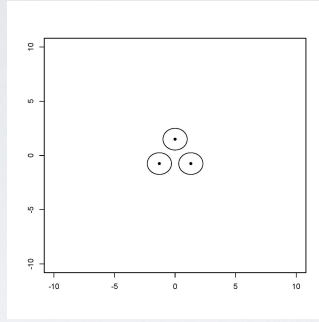
Trial 4

18

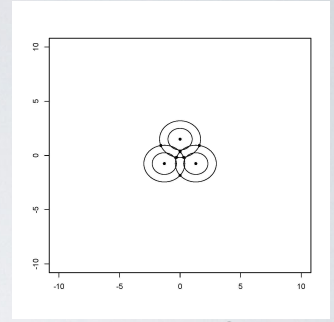
The generation of intersection when $R = 1$ (weak IPR)



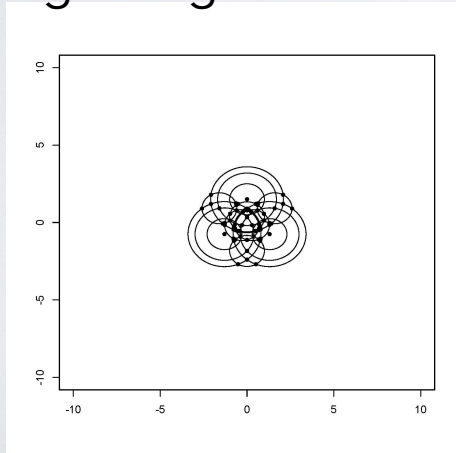
Beginning



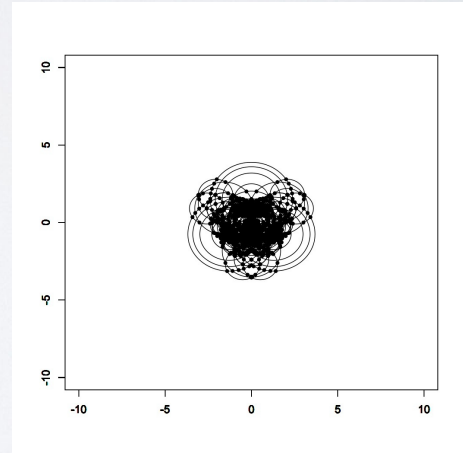
Trial 1



Trial 2



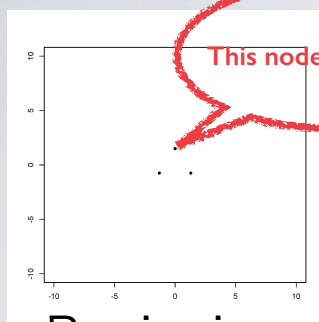
Trial 3



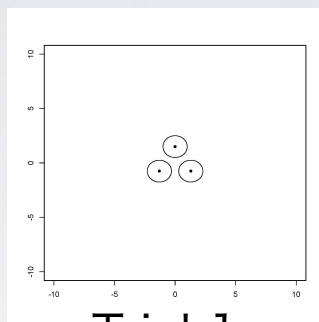
Trial 4

19

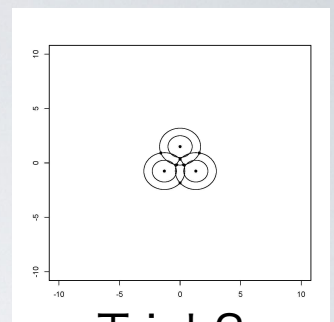
The generation of intersection when $R = 1.5$



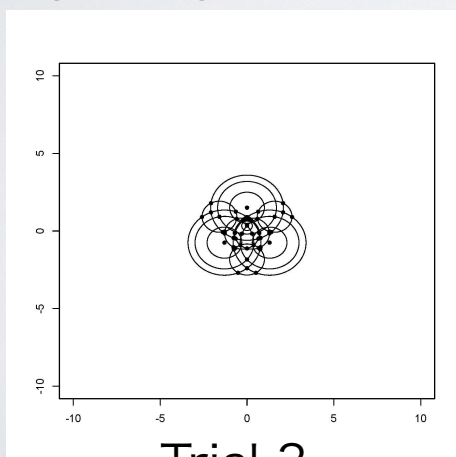
Beginning



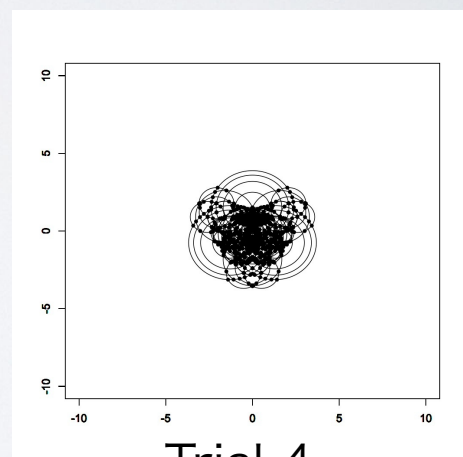
Trial 1



Trial 2



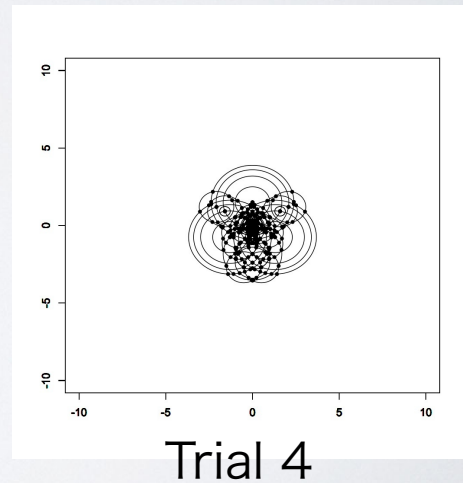
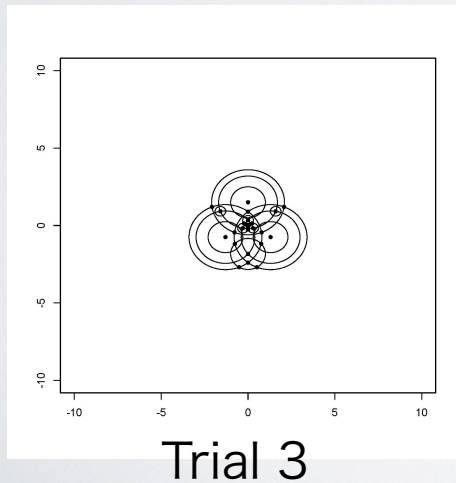
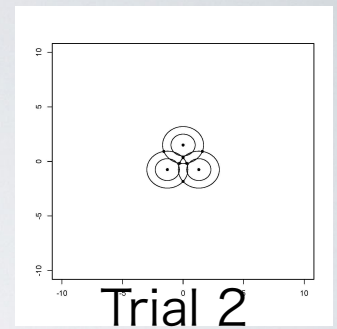
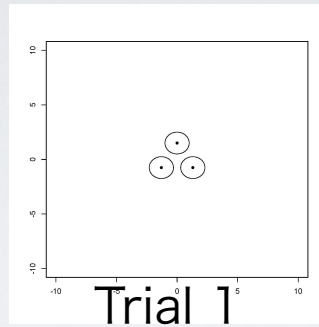
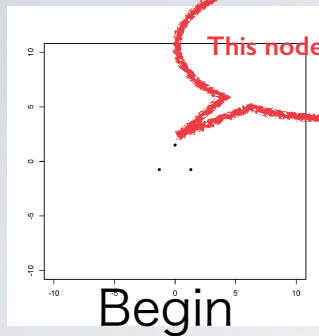
Trial 3



Trial 4

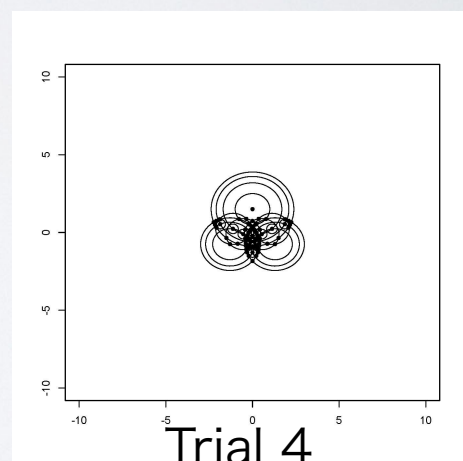
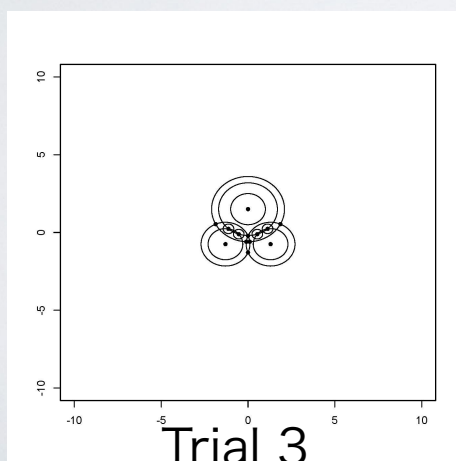
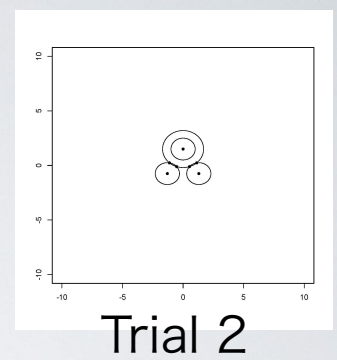
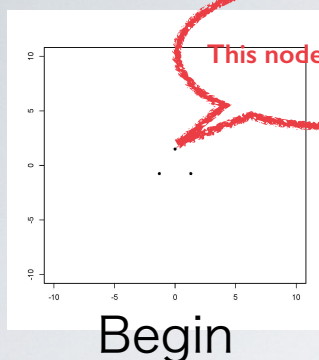
20

The generation of intersection when $R = 2$



21

The generation of intersection when $R = 3$



22

The Suggestion of the Simulation

- The Model is a very simple base model, and the knowledge that is derived or will be derived from a regression analysis of real diffusion of innovation are not yet implemented in the Model.
- Accordingly, the Model cannot predict or even suggest under which specific conditions IPR can promote innovations and in which specific conditions it cannot.
- However, even such simple model can suggest that both of advocates for stronger IP protection and advocates for weaker IP protection are “partly” justifiable.

23

- The simple simulation on a model, as shown above, shows the difficulties in our choice of whether we should advocate for stronger IPRs or for weaker IPRs (or, even a perfectly open license).
- The said simulation suggests the merit of openness to society as a whole, while it suggests the merit of strong IPRs to specific enterprises under certain circumstances.
- Moreover, if individual enterprises cannot protect their innovations against their competitors by means of their IPRs, they may hesitate to invest in R&D, and this would be an obstacle to innovation. The Simulation highlights the difficulties entrepreneurs face in choosing a strategy.

24

Conclusion and Future Developments

- Over time, the arguments in the debate over the utility and/or the adverse effects of IPRs in the innovation process have become repetitive.
- Conducting a simulation using a model representing limited aspects of the realities will help lawyers to assess the effect of a specific legal strategy, legal interpretation, and industrial policy, by looking at the similarities of the specific conditions they face through one or more models.

25

- In order to obtain more detailed and practical suggestions from simulations, the Model must be manipulated in various ways.
- For example, in order to assess the viability of open source licenses, patent pools, SSOs or other means to alleviate the problems caused by IPRs, we have to give IPRs to multiple vertexes (or, every vertex) of the Model, and we also have to implement a trigger that makes IPRs exercisable.
- In light of the simplicity of the Model proposed herein, the Model would be viable to accept various manipulations and would permit its variations.

26

Thank you.