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## **Using Economics Experiments to Understand Patent Licensing Behavior**

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# Using Economics Experiments to Understand Patent Licensing Behavior

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## Background

Patenting is one of the strongest forms of intellectual property protection but it does not always result in the highest possible payoffs for innovators. Patents can be challenged after grant either via a direct validity challenge and/or via infringement, which can be very costly (average litigation costs exceed \$3 million per side (Hsieh 2006)), and the outcome may be unfavorable for the patentee.<sup>1</sup>

So when should firms patent their innovations and when should they choose trade secrecy? If the decision to patent is made, how broad should the protection claimed be? When should firms litigate under infringement and when should they license their patents?

Data on patent granting, litigation and licensing has limited use in empirically studying patenting behavior and understanding the patenting decision making process as one can only observe the ex-post decisions (whether the innovation has been patented or not, licensed or not or whether a trial has taken place or not) and not the decision making process itself. Economic experiments allow for empirical analysis without such problems.

## Objective

Evaluate various aspects of the innovator’s patent licensing behavior and gain insight into the patenting decision making process under different market conditions using an economic experiment.

Specifically we examine:

1. whether patentees are more likely to license broad versus narrow patents (theoretical findings suggest that broad patents are more likely to be licensed).
2. the likelihood of patent licensing, patent infringement and patent litigation given the type of the potential entrant (weak versus strong).

1. In fact, more than 45% of patents are revoked during infringement trials (Allison and Lemley 1998) while 75% of the patents which are directly challenged end up being revoked or amended (Barton 2000). During 2002-2004 the lawsuit loss rate for patent owners at the appellate level was 75.6% (Janicke and Ren 2006).

## Methods

A computerized interactive choice experiment where subjects participated in a series of games (strategic interactions) was developed.

- Each game simulated specific market conditions.
- The subjects were randomly and anonymously paired up and assumed the role of an innovator/patentee or a potential entrant.
- Innovators decided whether to license their patents and whether to invoke a trial if infringement occurred.
- Entrants decided whether to buy a license and in the absence of licensing whether and how to enter in the market (via infringement or non-infringement).
- Under licensing, the licensing fee was determined through bargaining.

## Market conditions

- The questions of interest were examined under 6 different scenarios that determined whether the licensing outcome is affected by:
- a. The nature of the bargaining process during which the licensing fee is determined (one shot game versus multiple interactions).
  - b. Who initiates the bargaining process, the patentee or the potential entrant.
  - c. Whether the players had complete versus incomplete information with respect to their rivals’ payoffs.

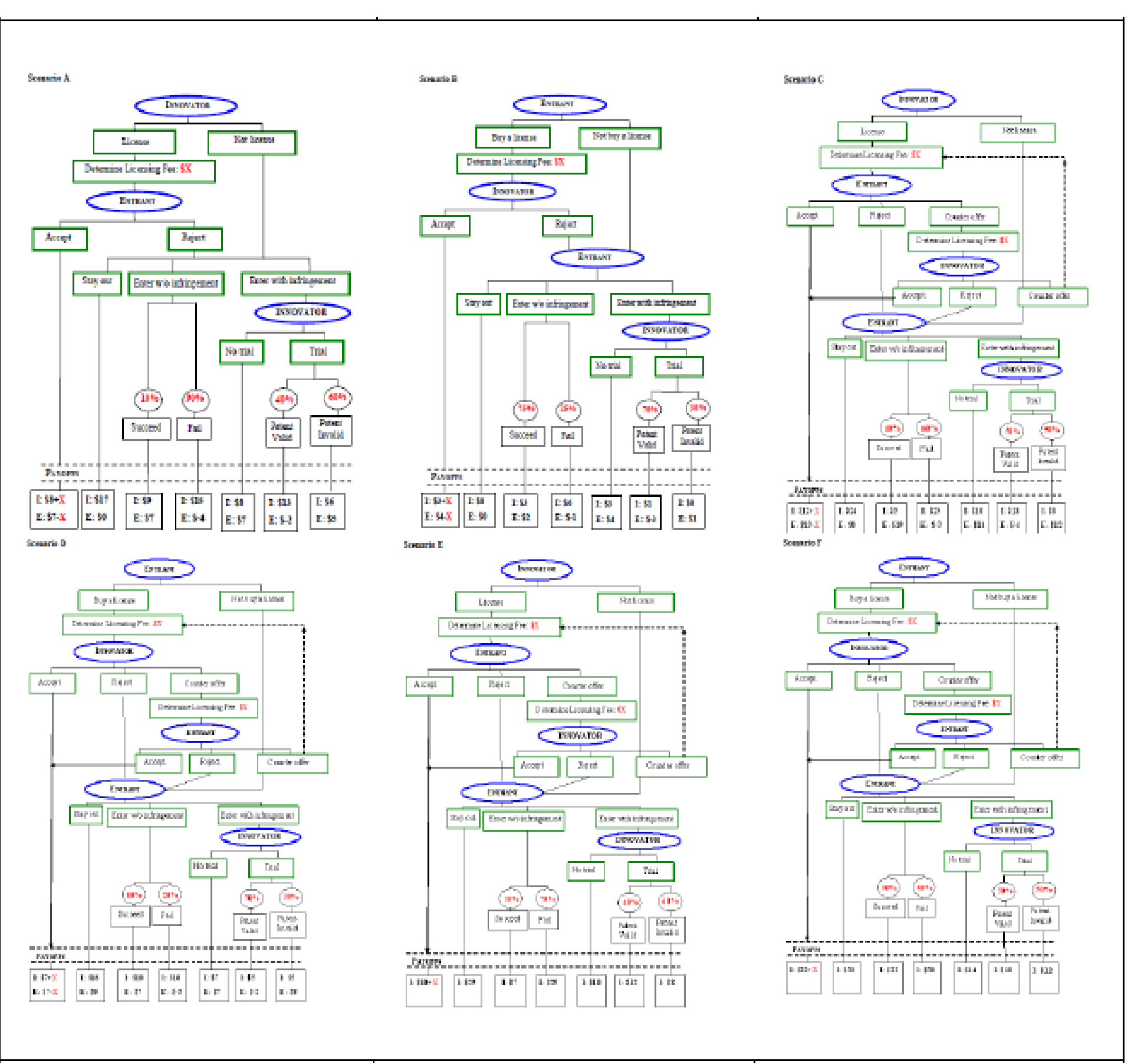
## Participants

96 undergraduate students from UNL. Subjects were each paid \$10 for participating and each could earn up to an additional \$20 depending on their performance in the interactive game.

## Analysis and Results

Each decision of interest was analyzed separately. The analysis was performed using the GLIMMIX procedure in SAS 9.2 © The binary distribution and the logit link options in GLIMMIX were used because of the binary nature of each dependent variable.

Figure 1: An Example of the Six Different Scenarios



## 1. Licensing decision

- The likelihood of licensing was affected by the breadth of the patent in a manner consistent with theoretical predictions; broad patents were more likely to be licensed than narrow ones.
- The likelihood of licensing was greater under incomplete information where innovators were more likely to license to weak rivals.
- Contrary to theoretical findings, under complete information innovators were more likely to license to strong rivals.

## 2. Patent challenge decision

- The likelihood of patent challenge was greater for broad rather than narrow patents.
- Weak rivals were more likely to challenge patents than strong rivals.
- A patent was more likely to be challenged when no licensing offer was made.

## 3. Patent litigation decision

- The likelihood of patent litigation under infringement was smaller for broad rather than narrow patents.
- Innovators were more likely to litigate infringed patents when they faced a strong rather than a weak competitor and when they, rather than the potential entrants, initiated the licensing process.

## Conclusions

While some of the results conform with theoretical predictions, a few contest theoretical findings and give new insights on the factors affecting patent licensing behavior (e.g., the effect of the type of entrant on the likelihood of patent challenge and patent litigation). These first results will be used to fine tune the experiments and run them using real life innovators as subjects.

## References

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