Journal of Economic Behavior & Organization 143 (2017) 1–8

Contents lists available at ScienceDirect

Journal of Economic Behavior & Organization

journal homepage: www.elsevier.com/locate/jebo

The Streisand effect: Signaling and partial sophistication

Jeanne Hagenbach[a], Frédéric Koessler[b,*]

[a] *École Polytechnique — CNRS, France*
[b] *Paris School of Economics – CNRS, France*

ARTICLE INFO

Article history:
Received 23 March 2017
Received in revised form 28 August 2017
Accepted 1 September 2017
Available online 14 September 2017

JEL classification:
C72
D82

Keywords:
Analogy-based expectations
Signaling
Streisand effect

ABSTRACT

This paper models the Streisand effect in a signaling game. A picture featuring a Star has been exogenously released. The Star privately knows whether the picture is embarrassing or neutral and can decide to censor it, with the aim of having it unseen. Receivers observe the Star's action and make efforts to see the picture, that depend on how embarrassing they expect it to be. Censorship reduces the Receivers' chances to see the picture but also serves as a motivating signal to search for it. When players are fully rational, we show that censorship cannot occur if the picture has little chances to be found when believed neutral. Next, we consider that players may not fully understand the signaling effect of censorship and study how it affects the equilibrium outcome. We model such partial sophistication of players using analogical reasoning à la Jehiel (2005). We explain that partially sophisticated Receivers are less responsive to the Star's action, which makes censorship more likely. We also show that a partially sophisticated Star can censor in equilibrium while it gives the picture higher chances to be found than without censorship. The Streisand effect is at play, in the sense that censorship creates interest which is unexpected by the Star.

1. Introduction

The Streisand effect is the phenomenon whereby an attempt to remove or censor a piece of information has the paradoxical consequence of publicizing it more widely. This phenomenon is usually linked to information released on the Internet where suppressing photos, files and websites is nearly impossible.[1] Cases where, instead of being suppressed, a piece of information receives extensive attention are numerous.

A first example involves Barbara Streisand, an American singer and actress, who gave her name to the effect. In 2003, she sued the California Coastal Records Project accusing it of violating her privacy: one of the many publicly available aerial pictures of the coastline – aimed at showing evidence of coastal erosion – pictured her mansion in Malibu. While less than ten persons had downloaded the problematic picture before B. Streisand asked for its removal, more than 400,000 people visited the project website in the month following her reaction. The picture was also widely spread on the Internet before it was eventually removed as ordered by the court.

Another representative example involves Wikipedia France and the French Intelligence Agency (Direction Centrale du Renseignement Interieur). In 2013, the Agency wanted the removal of an article about a military radio base run by the French Air Force, under the reason that the article contained classified information. Facing the refusal of Wikipedia, the

* Corresponding author.
E-mail addresses: jeanne.hagenbach@polytechnique.edu (J. Hagenbach), frederic.koessler@psemail.eu (F. Koessler).

[1] This problem gave rise to a current and lively debate about the Right to Be Forgotten on the Internet, practically hard to implement but that the European Union, for instance, has been trying to put in practice for a few years.

http://dx.doi.org/10.1016/j.jebo.2017.09.001
0167-2681/

Agency pressured, in its offices, a French Wikipedia editor who removed the article under the threat of immediate arrest. The editor made these pressures public and the problematic article was quickly restored by another Wikipedia contributor. It ended up being, for two days of April 2013, the most viewed article on French Wikipedia.

Newspapers have been describing the Streisand effect for long and regularly report instances of it.[2] Advices to practically avoid being victim of the effect can be found in Liarte (2013) and Jansen and Martin (2015), as well as on several websites for the purpose of lawyers and communication experts.[3] However, to the best of our knowledge, there has been no attempt to model the Streisand effect in a game between a player who has a piece of information to hide and an audience whose interest may be triggered by censorship. We propose such a model with the objective to shed light on the strategic forces behind this common effect. In particular, we wish to study the extent to which censorship can emerge when individuals are fully rational, or whether the lack of sophistication of some agents makes censorship more likely. We also aim at understanding when the Streisand effect occurs, in the precise sense that the interest created by censorship is not properly anticipated by the party who uses it.

Formally, we study a simple signaling game involving a Star who can decide to censor, at a cost, a piece of information exogenously released. The Star, or sender, is assumed to know how embarrassing this information is. The Receivers – representing media, reporters, people on social networks, . . .– observe whether the Star has tried to censor the information and form expectations about how embarrassing the information is. The Receivers' expectation determines their motivation and search effort to access and spread the information, which in turn determine the probability that the information is actually discovered and published. On the one hand, censorship has the direct mechanical effect that it decreases the chances that the information is discovered for every given level of search effort. On the other hand, censorship has an indirect signaling effect in that it creates interest for the information, inducing more search effort. The first effect increases the Star's incentive to censor when the information is embarrassing, while the second effect discourages the Star from censoring.

We first examine the trade-off between these two effects in the benchmark case of fully rational players. We show that the signaling game has a unique (perfect Bayesian) equilibrium. Quite intuitively, when the direct effect of censorship on the chances that the information is discovered is relatively strong, the Star with embarrassing information is more likely to censor (and therefore to separate). In this benchmark situation, censorship cannot be observed in equilibrium if the probability to discover the information is low when the Receivers believe it is neutral. When censorship occurs with a positive probability in equilibrium, the Star is actually better-off doing so: on average, censorship does not have the unintended consequence of publicizing the information more widely than when the information is left circulate.

As suggested by the examples given above, we talk about Streisand effect when censorship is excessive and unprofitable for the Star. A simple reason for this may be that players do not fully understand the signaling effect of censorship. We examine this possibility by considering partially sophisticated players and using the concept of analogical reasoning developed in Jehiel (2005), Jehiel and Koessler (2008) and Ettinger and Jehiel (2010). This approach relies on limited cognitive rationality by relaxing players' ability to form correct expectations, but by maintaining their ability to act rationally given their beliefs. It assumes that players' expectations are correct on average, but that they are derived from a coarse perception of others' strategies. A similar approach is taken by other bounded rationality models in the literature such as, for example, cursed equilibrium (Eyster and Rabin, 2005), behavioral equilibrium (Esponda, 2008) and Berk–Nash equilibrium (Esponda and Pouzo, 2016). The use of an analogy-based expectation equilibrium can be justified by a learning process in which players receive partial statistical feedbacks about past interactions (see, for example, Jehiel and Koessler, 2008, Section 3; Esponda and Pouzo, 2016, Sections 3.3 and 4).

In an analogy-based expectation equilibrium, a partially sophisticated Receiver bundles the types of the Star into an analogy class and forms expectation about the Star's action in that class. Said differently, such a Receiver understands the aggregate behavior of the Star but not the link between the Star's type and her action. Similarly, a partially sophisticated Star perceives the average strategy of the Receivers across their decision nodes but does not understand that their reaction might be linked to her own decision to censor or not.

When a proportion of the Receivers are partially sophisticated, we show that the (analogy-based) equilibrium remains unique. As the proportion of partially sophisticated Receivers increases, the signaling effect of censorship is less at play and separation (and censorship) is therefore easier to obtain. As in the benchmark case however, when there is censorship, the probability that information is discovered is low enough to justify the use of censorship by the Star. In fact, the Star correctly perceives the extent to which the Receivers partial sophistication make them less responsive to the signaling aspect of her action. The results are similar if we interpret the proportion of partially sophisticated Receivers as a proportion of rational Receivers who do not observe the Star's action.

When it is the Star who is partially sophisticated, she underestimates the signaling effect of her own action, and we show that there may be multiple equilibria. The conditions to have censorship (and separation) are also weaker than in the benchmark case. In particular, when the cost of censorship is low enough, the unique equilibrium is separation: the Star with embarrassing information always tries to censor even though the probability to find out the information is lower by leaving the information circulate. The Streisand effect is at play: the Star uses censorship at her expense because she does

[2] See, for instance, the article of *The New York Times* entitled "Living with the Streisand Effect" (Dec. 26 2008), the article of *The Guardian* entitled "The Streisand effect: Secrecy in the digital age" (Mar. 20 2009), or the article of *Le Monde* entitled "The buzz we did not want" (Nov. 1 2013).

[3] See, for example, http://www.mcw.com.au/page/Publications/Technology/avoiding-the-streisand-effect/.