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# A “Fuzzy” Like Button Can Decrease Echo Chamber Effect

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## Abstract

One of the big problems of the US political life is the echo chamber effect – in spite of the abundance of materials on the web, many people only read materials confirming their own opinions. The resulting polarization often deadlocks the political situation and prevents politicians from reaching compromises needed to make needed changes. In this paper, we show, on a simplified model, that the echo chamber effect can be decreased if we simply replace the currently prevalent binary (yes-no) Like button on webpages with a more gradual (“fuzzy”) one – a button that will capture the relative degree of likeness.

## 1 Formulation of the Problem

**What is echo chamber effect.** The Internet is full of different political opinions from all sides of the spectrum. One would expect that this would promote people’s understanding of different ideas and make them better understand each other. In reality, the effect is exactly the opposite: many people completely ignore different opinions and only communicate with those whose opinions are identical – and thus, persevere in their opinions. This phenomenon is known as *echo chamber effect* – as in the echo chamber, when it sounds like several people are yelling but in reality, it is the same voice repeated several times.

**Why?** One of the reasons that people do not read opposite opinions is that the Internet is so vast that some filtering is needed. Usually, filtering is done by the binary Like button: a person marks materials that he/she likes with Like and the materials that he/she dislikes with Dislike. The system learns fast and only delivers to this person materials similar to what this person liked in the past. Naturally, most people dislike opposite political opinions and like their own. As a result, opposite political opinions are completely filtered out and never reach this person. This is exactly what leads to the echo chamber.

**What we do in this paper.** It is desirable to decrease echo chamber effect. In this paper, we show that to achieve this goal, there is no need to make drastic changes, that a natural need to make the Like button more adequately describing people’s opinions – i.e., turning it into a “fuzzy” button – will actually lead to the desired decrease.

*Comment.* The idea of making the Like button fuzzy – and the suggestion that this may lead to a decrease in the echo chamber effect – was first proposed by our colleague Ramon Ravelo [4]. In this paper, we provide a model detailing and justifying this suggestion.

## 2 Proposed Solution

**Need to make information about likes more adequate.** The current systems treat our likes as a binary quality: either we like something or we don’t. In reality, there are different degrees of liking and different degrees to disliking. To give the system more accurate information about our preferences, it is thus desirable to replace the binary Like button with a “fuzzy” button that will enable us to evaluate degrees of likeness, e.g., on a scale from  $-5$  to  $5$  where:

- $5$  would mean “like very much”,
- $-5$  would mean “dislike very much”,
- positive values smaller than  $5$  would mean like somewhat,
- negative values larger than  $-5$  would mean dislike somewhat, and
- $0$  would mean indifference.

The system would then supply, to the user:

- all the materials with predicted degree of likeness  $5$ ,
- some materials with predicted degree of likeness  $4$ ,
- a little fewer materials with degree of likeness  $3$ , etc., and
- a little bit of materials with degree of likeness  $1$ .

*Comment.* We are *not* requiring that a person gets anything that he/shes dislikes – or to what he/she is indifferent.

**How this can help decrease the echo chamber effect.** Let us suppose that, similar to how it is now, most people occupy two opposite levels of the political spectrum. For simplicity, let us mark these levels by  $-1$  and  $1$ .

There are also some people in between, but they are the absolute minority. People do hear about the opinions of such in-between people – as long as these folks are on average on the same side of the debate:

- If a Republican Senator criticizes a Republican President, Democrat-oriented press usually covers thus, although on many issue, this particular senator still has many opinions which are opposite to theirs.
- Similarly, when a Democratic Senator criticizes the Democratic leadership, the Republican-oriented media likes to mention it.

But – and this is a big but – they briefly mention these opinions, but they do not provide any detailed and coherent explanation of their opinions. In most cases, the mention consists of something not very informative like this: “Even some Republicans, such as Senator X, disagrees with the President’s policy on Y.” Such mentions, by themselves, do not decrease the echo chamber effect, we describe it just to emphasize that such opinions are bound to get mild likes.

Let us also suppose that when we seriously read someone’s opinion, we tend to move somewhat in that person’s direction – it is inevitable, serious political opinions do have reason behind them, otherwise they will not be supported by big groups of people. Serious politicians understand that there are two sides to each story, it is very rarely – if ever – angels with wings against devils with horns and hoofs. At the risk of being crucified by extreme supporters of one of the viewpoints, let us give three examples:

- Raising the minimal wage can help poor people live better – but it will also force some small businesses (especially those that are currently struggling to survive) not to hire people and maybe even to fire who they hired in the past, and thus, to increase unemployment. In our opinion, the correct solution is to take both effects into account and find a compromise which works best for the society.
- If the basic medical help will be free for a larger group of US folks than now, this will help improve people’s health – but this would require either raising taxes or cutting some current federal expenses. Again, the correct solution is to take into account both effects when making the corresponding decision.
- Requiring that phone and internet companies provide backdoor access to encoded data at the government’s request will help fight crime, but will also decrease our privacy, etc.

In the usual situation, for a person at level 1 his/her likes are opinions of people at the same level. So this person listens to similar opinions all the time and thus, remains at the same level. Similarly, persons at level  $-1$  remain at this level after all the “liked” materials that they read.

What happens when we allow mild likes? Let us consider the simplest model in which:

- almost a half of the people – the proportion  $0.5 \cdot (1 - \varepsilon)$  for some small  $\varepsilon > 0$  – are at level 1,
- the same proportion of people are at level  $-1$ ,

- the proportion  $\varepsilon/2$  is at some level  $\delta > 0$ , for some small number  $\delta$ , and
- the same proportion is at level  $-\delta$ .

Let us also assume that on average, all the people post the same number of postings, and that, due to a minor degree of liking,

- the proportion of postings of  $\delta$ -folks reaching people on level 1 is  $p > 0$ , and similarly,
- the proportion of postings of  $(-\delta)$ -folks reaching people on level  $-1$  is also  $p > 0$ .

Finally, let us assume that:

- a message from the level differing from the current level by the difference  $d$  will move the reader's level by a value proportional to  $\alpha \cdot d$  in the message's direction, for some  $\alpha > 0$ , and
- the actual resulting level shift can be obtained by averaging level shifts corresponding to all the messages.

*Comment.* This is a simplified version of a model presented in [3]. Readers interested in more detailed models of how people make political decisions can look at [1, 2] and references therein.

In the initial moment of time, most people were at levels  $x_0 = 1$  or  $-x_0 = -1$ . Let us analyze what will happen at the next moment of time. Since the situation is completely symmetric, let us consider only what happens at people who were initially at level 1.

At the next moment of time, each person on level  $x_0$  will get:

- $1/2 - \varepsilon/2$  messages from the same level  $x_0$ , and
- $p \cdot (\varepsilon/2)$  messages from level  $\delta$ .

Messages from the same level  $x_0$  do not change people's opinions, but messages from level  $\delta$  will shift their opinion by the value  $\alpha \cdot (x_0 - d)$ . So:

- $1/2 - \varepsilon/2$  messages do not change the level, while
- $p \cdot \varepsilon/2$  messages shift their opinion by the value  $\alpha \cdot (x_0 - d)$ .

Thus, the average shift is equal to

$$\frac{(1/2 - \varepsilon/2) \cdot 0 + p \cdot (\varepsilon/2) \cdot (x_0 - d)}{(1/2 - \varepsilon/2) + p \cdot (\varepsilon/2)},$$

i.e., to  $k \cdot (x_0 - d)$ , where we denoted

$$k \stackrel{\text{def}}{=} \frac{p \cdot (\varepsilon/2)}{(1/2 - \varepsilon/2) + p \cdot (\varepsilon/2)}.$$

Thus, at the next moment of time, these folks will be at level  $x_1 = x_0 - k \cdot (x_0 - d)$  for which, therefore,  $x_1 - d = (1 - k) \cdot (x_0 - d)$ . Due to symmetry, the folks who were at level  $-x_0$  will now move to the level  $-x_1$ .

Similarly, at the next moment of time, we will have  $x_2 - d = (1 - k)^2 \cdot (x_0 - d)$ , and, in general, after  $t$  moments of time, at the level  $x_t - d = (1 - k)^t \cdot (x_0 - d)$ .

When  $t \rightarrow \infty$ , we will have  $x_t - d \rightarrow 0$ , i.e.,  $x_t \rightarrow d$ . So, in this simplified model, eventually, everyone will take centrist opinions – while retaining their main emphasis of being on one side or another.

Of course, in reality, things are more complicated, but this makes us hope that such a simple idea as having a “fuzzy” like button will indeed help decrease the echo chamber effect.

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