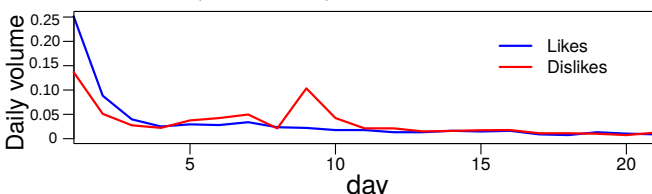


Collective Evaluation Dynamics in Online Communities

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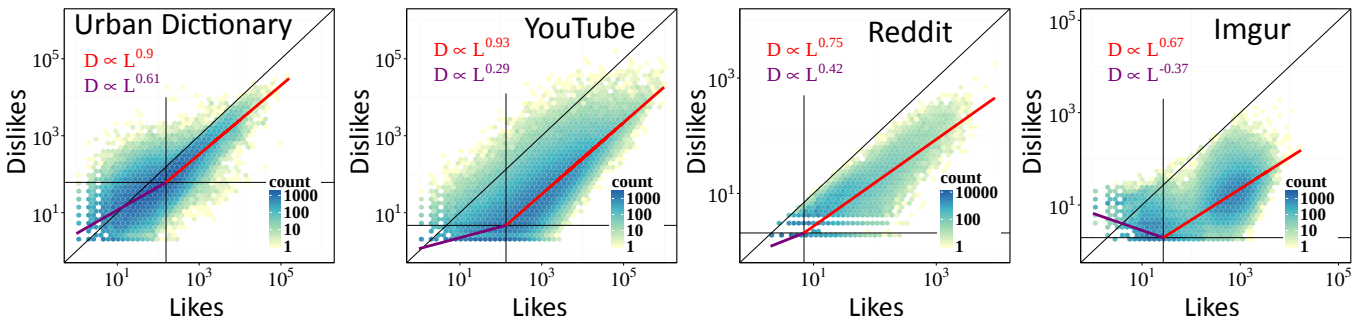
Evaluation dynamics in Youtube

The early viewers of a YouTube video are prone to like it, either due to a social connection with the uploader, or given the similarity of the video with their past liked content. This is a consequence of the purpose of **social filtering mechanisms** and **recommender systems**. In contrast, the video can also spread through other media and eventually reach a global audience with users more critical or negative towards the video. This phenomenon can be seen as another aspect of the **filter bubble** (Pariser, 2011):



Normalized daily volume of likes and dislikes for a YouTube video. Initially, there are more likes than dislikes to a video, but after 4th day dislikes rise and peak at the 9th day.

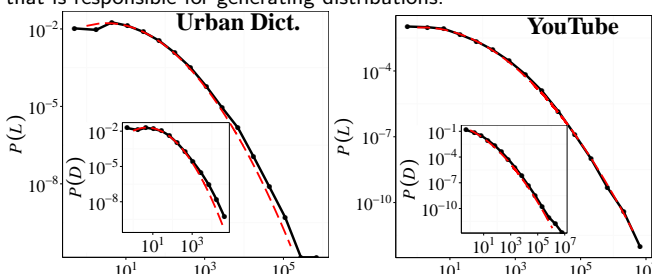
The reinforcement of opinions caused by filtering mechanisms creates an initial pocket of positivity, but when the filter bubble bursts, collective negativity can backlash.



Relationship between the number of dislikes and likes shown as two-dimensional joint distributions with 50 bins. Purple and red lines indicate the local and global regimes. Threshold estimates are located at L_c , estimated as $L_c = 155$ in Urban Dict.; $L_c = 131$ in YouTube; $L_c = 7$ in Reddit; and $L_c = 27$ in Imgur. The dual model outperforms the linear model in R^2 and GCV.

Distribution fits

Below is shown the probability density function of collective evaluations with exponential binning and fits to **log-normal distribution** (red dashed lines), which is identified as **the the best fit** for all distributions (KS and log-likelihood ratio tests). This finding allows us to trace back to the properties of the multiplicative growth processes that is responsible for generating distributions.



References 1.Pariser, E. *The filter bubble: What the Internet is hiding from you.* Penguin UK, 2011. 2.Reisenzein, R. *The schachter theory of emotion: two decades later.* Psych-l bulletin 94, 2 (1983), 239.

Datasets statistics

The data used in this research is the result of our **crawl between 2011 and 2015** of four publicly accessible online communities.

Dataset name and items	Crawled	Filtered	Likes	Dislikes
definitions	220,000	208,000	61 Mln	26 Mln
vid. descript-s	6,200,000	2,700,000	763 Mln	41 Mln
submissions	338,000	142,000	5 Mln	1 Mln
image titles	200,000	125,000	54 Mln	2 Mln

Dual pattern of collective evaluations

We test the existence of a **dual local versus global regime** by using an extension of a traditional linear modelling, **Multivariate Adaptive Regression Splines**, which fits a continuous piecewise regression function with *knots* that join locally linear pieces:

$$D(L) = I + \alpha_1 * \max(0, L - L_c) + \alpha_2 * \max(0, L_c - L)$$

The values of likes above L_c and the values of dislikes above $D(L_c)$ correspond to observations in the global regime, after the bubble bursts, and the values in which any is below map to the local regime.

Emotions in polarization

We compute polarization as a geometric mean of standardized logarithmic values of likes and dislikes: $Pol = \sqrt{Z_L * Z_D}$, where $Z_L = \frac{\ln(L) - \langle \ln(L) \rangle}{sd(\ln(L))}$ and $Z_D = \frac{\ln(D) - \langle \ln(D) \rangle}{sd(\ln(D))}$. **Polarization is high under simultaneous large amounts of positive and negative evaluations, and it is low when only one of the values is dominant.** Table below shows the influence of valence and arousal (or a feeling of activation) in the evaluated item on polarization $Pol \sim V + A$.

	Urban Dict.	YouTube	Reddit	Imgur
Int.	2.0508***	1.4543***	1.3511***	1.7623***
V	0.3132***	0.2980***	-0.1954***	-0.1908***
A	0.2662***	0.1005***	-0.0327(n)	0.2399***
χ^2	480.64***	3420.4***	97.315***	88.669***

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, (n) not significant

Our regression model findings suggest that **arousal and negative feelings** (not shown here), such as **anger and outrage**, tend to create **more polarized responses**, which is in line with theory (Reisenzein, 1983) that poses emotions as mechanisms to speed up evaluation processes at the expense of more extreme reactions.