Competition over popularity in social networks

Eitan Altman
Dec 20th, 2012

Recent work

- Create videos and uploading them to youtube

- As creators we have access to much data

- This allows us to model the propagation of content in the network

- Study competition over popularity in social network

What do we learn from youtube data

* What brought the views: another social How many views according to the profile (age, sex, location)

* network? Another WEB site? The recommendation of Youtube? A search in Youtube etc.? Is it a mobile source?
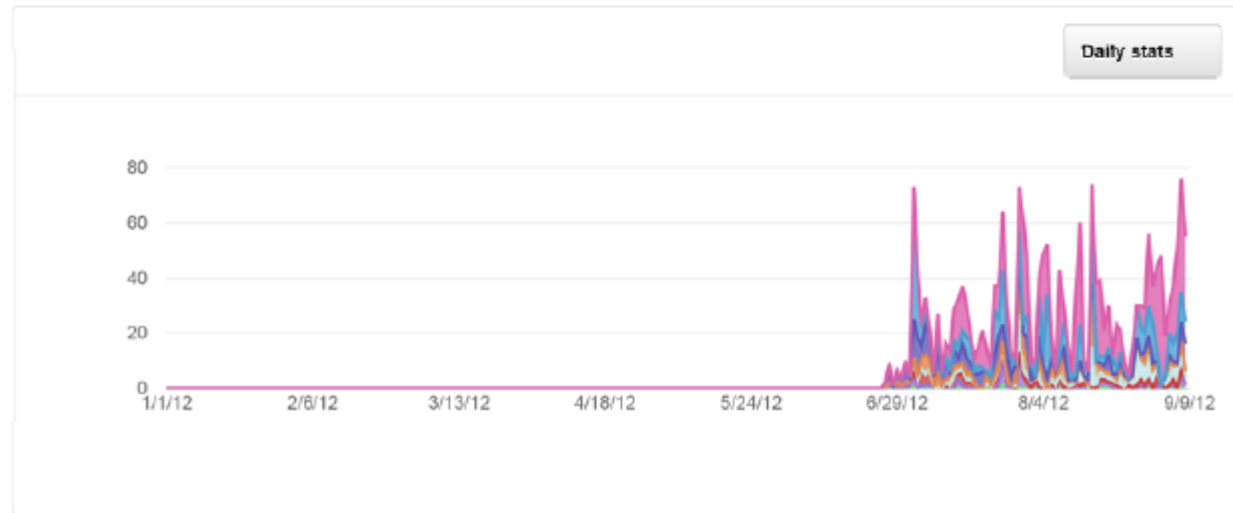
* Audience Retention

Traffic Source

I've got Peace in my Fingers (Susan Salidor)

VIDEO   Uploaded: Jun 27, 2012 - Duration: 01:57 - Lifetime views: 2,103

This year (Jan 1, 2012 – Sep 9, 2012)

View referrals from all traffic sources	View referrals from YouTube	View referrals from outside YouTube	Mobile apps and direct traffic
2,103	1,286	180	637

Daily stats

Traffic source	Views	% of total views
YouTube suggested video	850	40.4%
Mobile apps and direct traffic (unknown sources)	438	20.8%
YouTube channel page	282	13.4%
Embedded player (unknown sources)	199	9.5%
External website	172	8.2%
YouTube search	89	4.2%
YouTube – other features	63	3.0%
Google search	8	0.4%
Homepage feeds and subscriptions	2	0.1%

- 2103 views during 70 days

- 850 from recommendations of youtube

Traffic Source

- Social Networks:

- Linkedin (71)
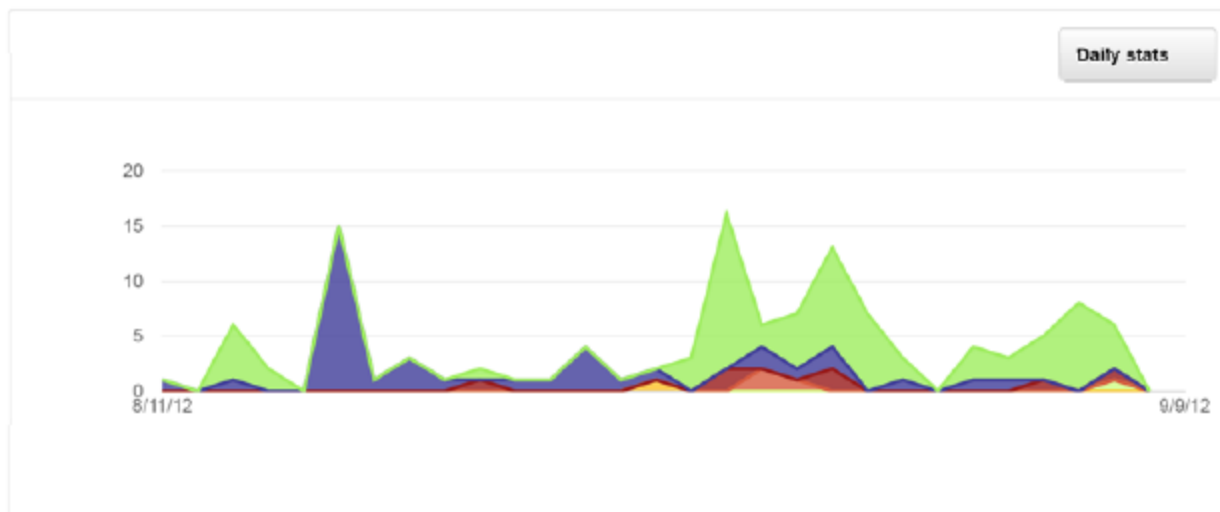
- Facebook(38)

(From INRIA:

I've got Peace in my Fingers (Susan Salidor)

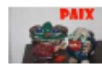VIDEO   Uploaded: Jun 27, 2012 - Duration: 01:57 - Lifetime views: 2,103

Last 30 days (Aug 11, 2012 – Sep 9, 2012)

View referrals from all traffic sources	View referrals from YouTube	View referrals from outside YouTube	Mobile apps and direct traffic
944	572	122	250

Daily stats

Traffic source	Views	% of total views
linkedin.com	71	7.5%
facebook.com	38	4.0%
mail.yahoo.com	7	0.7%
Google	3	0.3%
twitter.com	1	0.1%
bluecoat.com	1	0.1%

Show top level

Profile: location

* France: 820

* USA: 540

* Unknown: 200

* Next come locations where I gave

I've got Peace in my Fingers (Susan Salidor)
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This year (Jan 1, 2012 – Sep 9, 2012)

Views	Monetizable views
2,103	1,322

Geography	Views	Monetizable views
1. France	820	549
2. United States	540	450
3. Unknown region	200	191
4. India	149	13
5. Germany	67	0
6. Israel	27	17
7. Italy	24	12
8. Canada	21	10
9. Greece	17	8
10. Netherlands	15	7
11. Tunisia	14	0
12. Japan	13	8
13. Spain	12	10

Profile: gender and age

- 9,8% Fem views

- 4,4% Fem views in France

- 7,2% Fem views in US

I've got Peace in my Fingers (Susan Salidor)
VIDEO   Uploaded: Jun 27, 2012 - Duration: 01:57 - Lifetime views: 2,103

This year (Jan 1, 2012 – Sep 9, 2012)

All	Male	Female
100.0%	90.2%	9.8%
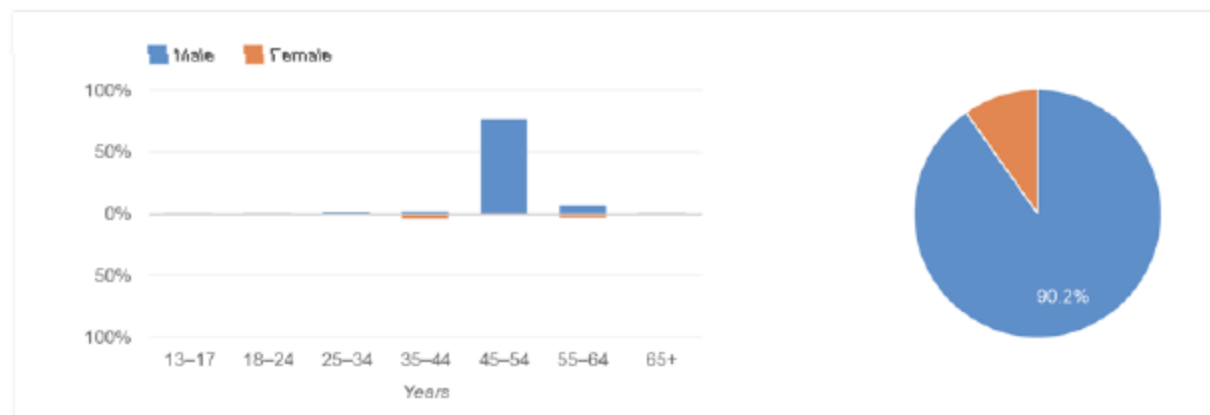
	Top locations by views	Views	13–17 years	18–24 years	25–34 years	35–44 years	45–54 years	55–64 years	65+ years	Gender
1.	France	820	0.8%	1.5%	2.0%	2.0%	90.4%	1.8%	1.5%	
2.	United States	540	0.0%	2.8%	3.2%	3.6%	64.5%	24.6%	1.3%	
3.	Unknown region	200	0.0%	0.0%	0.0%	17.7%	82.3%	0.0%	0.0%	
4.	India	149	0.0%	5.4%	12.0%	5.7%	76.9%	0.0%	0.0%	

audience retension (allows dimensionning)
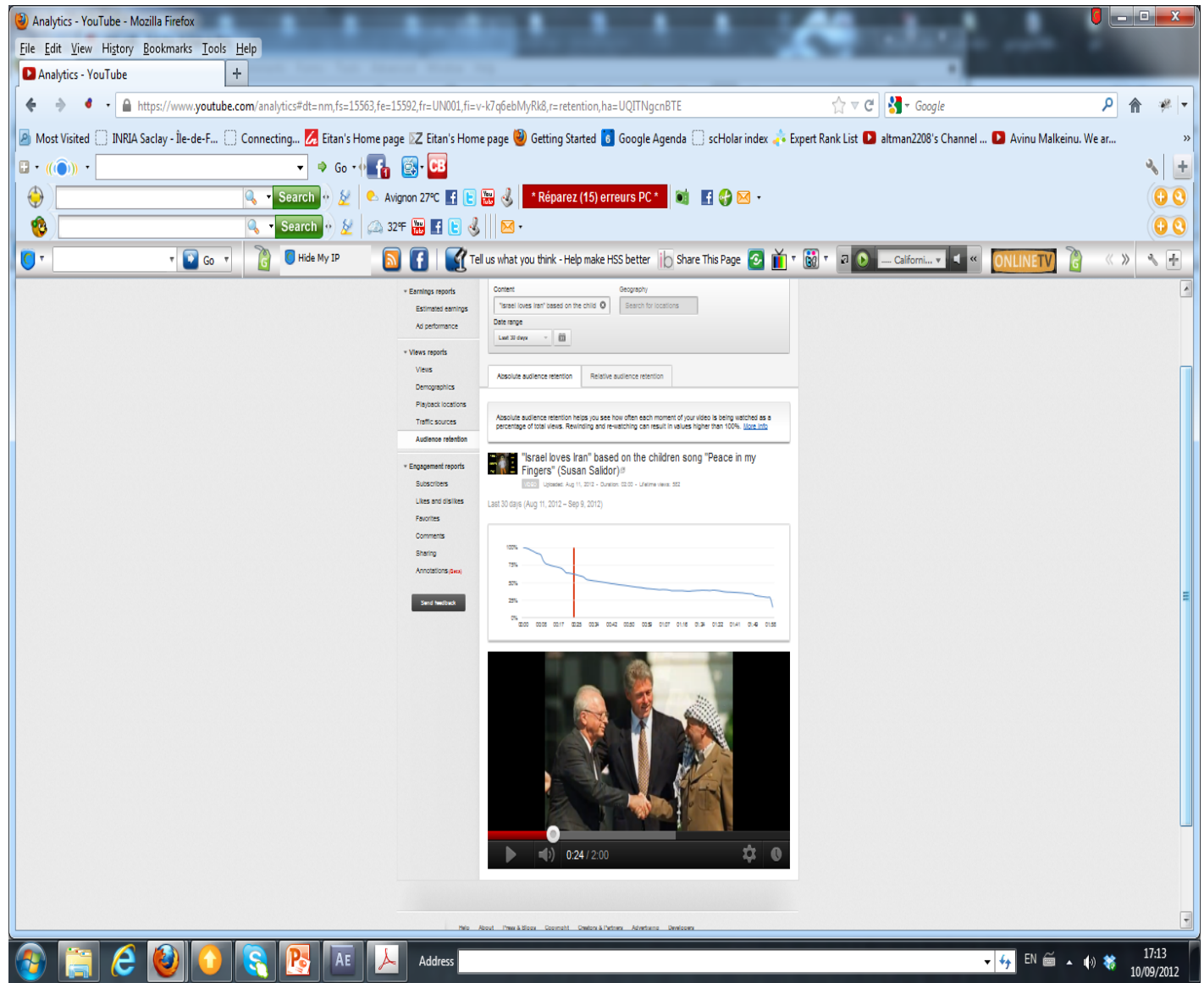
Data we get from Facebook:
✖ Data on each

Content in a page
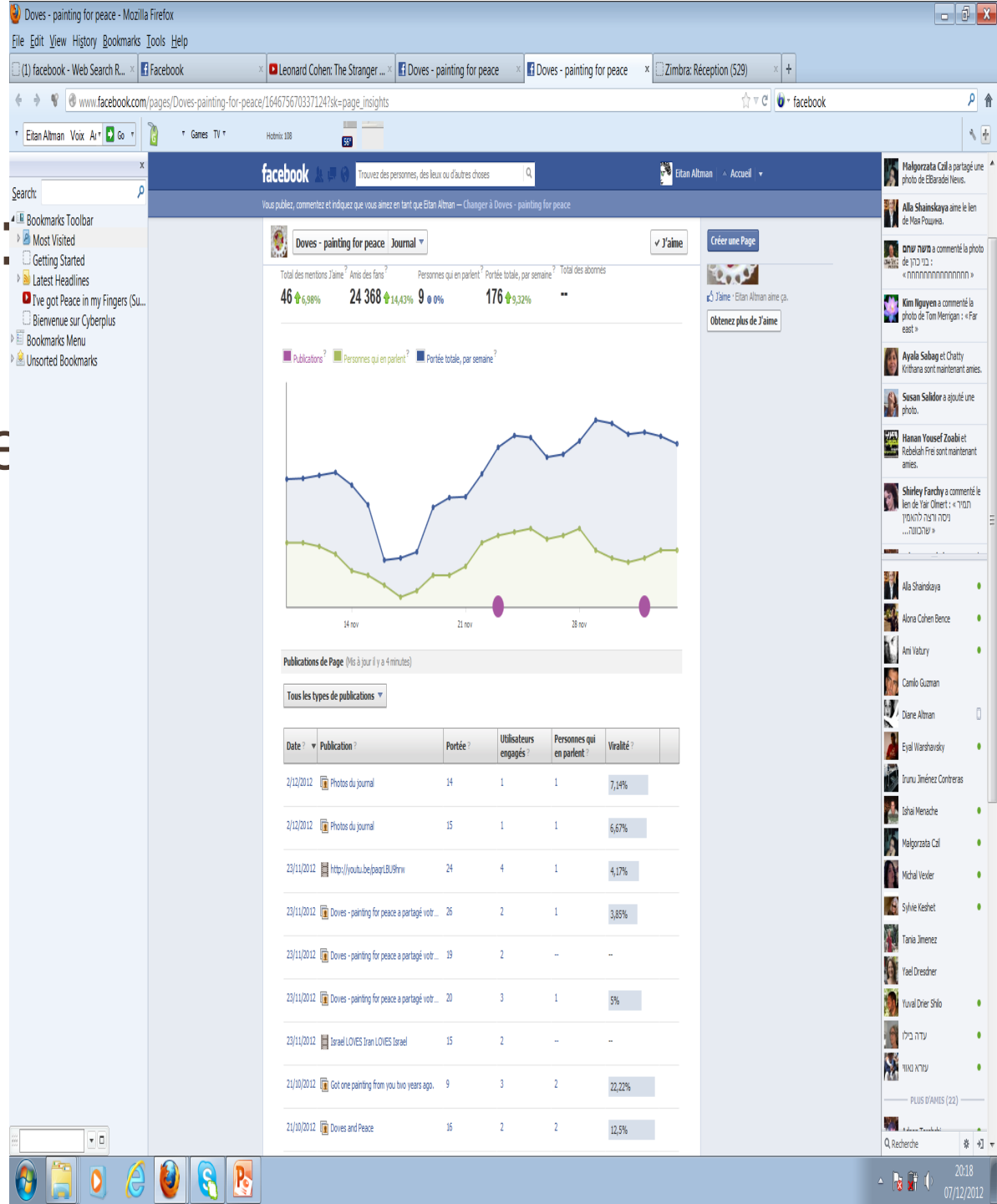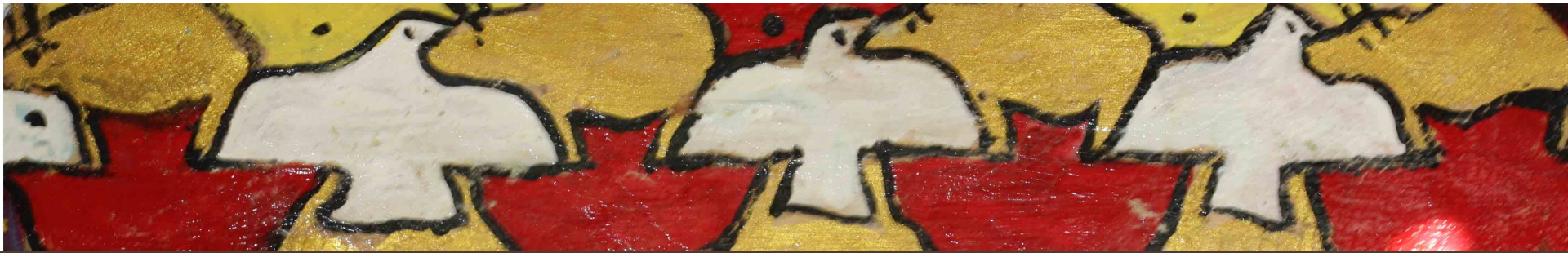
Competing over popularity of content:

- **Individuals** who wish to disseminate content through a social network. **Goal: visibility, popularity**

- **Social network provider** (SNP) interested in maximizing the amount of downloads

- Has **tools** to accelerate the dissemination of popular content. Example: **Recommendation graph**

Example: YOUTUBE

Example: YOUTUBE

AD 1

AD 2

AD 3

Example: YOUTUBE

AD 1

AD 2

AD 3

Recom graph

A list containing other ad events:
Sharing and embedding

✗ Semi Dynamic model: ads in the beginning

Significant discovery events

	Date	Event	Views
A	02/22/12	First view from a mobile device	107,108
B	02/22/12	First embedded on – facebook.com	75,452
C	02/22/12	First referral from YouTube search – obama singing	31,008
D	02/22/12	First embedded on – whitehouse.gov	23,221
E	02/22/12	First referral from – facebook.com	19,180
F	02/22/12	First embedded on – plus.google.com	11,465
G	02/22/12	First referral from YouTube search – barack obama singing	7,892
H	02/22/12	First referral from YouTube search – obama sings	6,601
I	02/22/12	First embedded on – failblog.org	5,824

Snowball epidemic effects
Dynamic ads policy

Other acceleration Factors:

· Other publishers

Embed content

· Comments and Responses increase Visibility
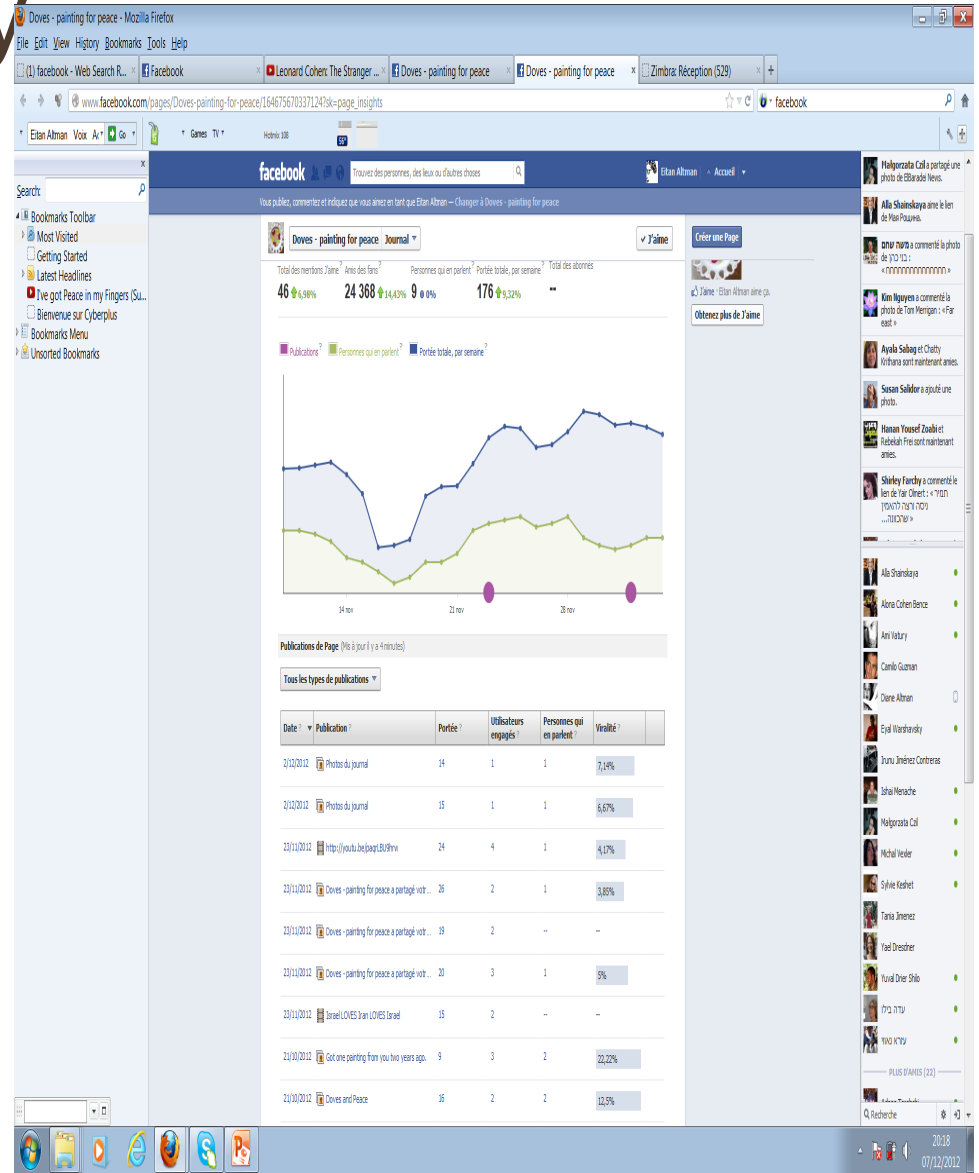
Model

* N content creators (seeds)– players

* M potential destination

* A destination m is interested in the first content that it will be aware of.

* Information on content n arrives at a destination after a time exponentially distributed with parameter λ(n).

* The goal of a seed: maximize the number of destinations $X_i(T)$ at time T (T large) that have its content (dissemination utility).

For linear dissemination utility, we can reduce the state space to the number of destinations that have some content. 1-dimensional!

Solution: formulate explicit M matrix games, the equilibrium at matrix m is the equilibrium of the original game at state m

Let $\overline{x}_i(t) := E[X_i(t)]$ and $\overline{x}(t) := \sum_{i=1}^{N} \overline{x}_i(t)$. Then

$$\dot{\overline{x}}_i(t) = \lambda_i w_t^i (M - \overline{x}(t))$$

We take as state the vector whose i-th component is the expected number of destinations with a packet from source i. .

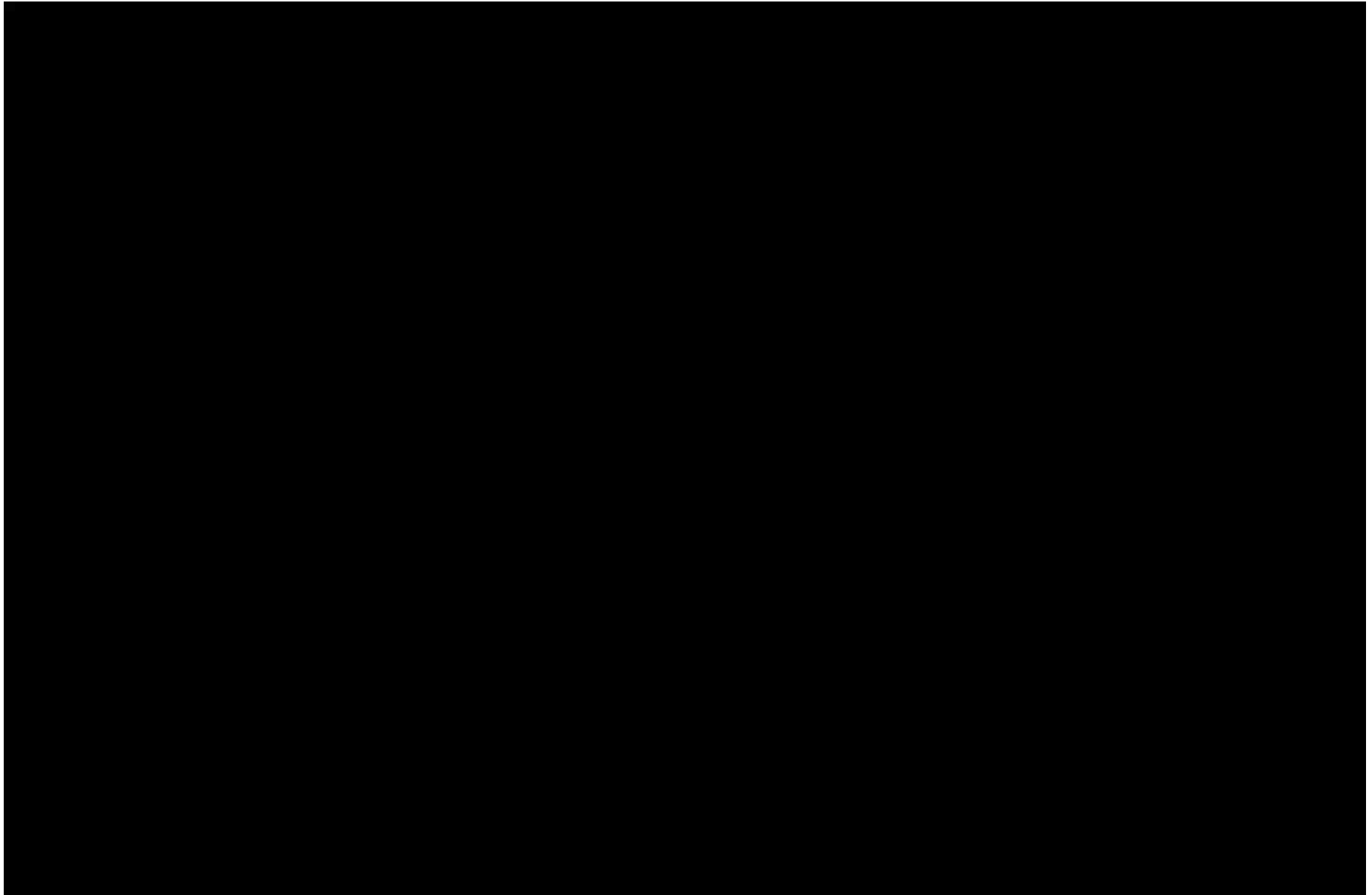# Results

Again state space collapce to dimension 1

- ✖ Equilibrium at state m obtained as equilibrium of m-th matrix game. Now m is a real number

- ✖ For linear acceleration cost – same threshold policies as in the case of full information.

Motivation: video competition

More info: 1 goto my homepage

2. Click on "Dodescaden project"

Home page: EITAN ALTMAN

Home | Research | Teaching | Music | CV

· *Organisation:* INRIA
· *Research Unit:* Sophia Antipolis
· *Service:* Projet Maestro
· *E-mail:* Eitan.Altman@sophia.inria.fr
· *Phone:* +33 4 92 38 77 86
· *Venue information and maps*

L'Academie des Sciences

Personal Links and News

The book "Through the Eyes of a 12-Year-old Girl" by my Mother, Yanina Hesheles Altman, has been translated to Ukranian and Russian thanks to the great work of devoted persons from Hesed Arie association in Lviv. In addition, they made an excellent movie and theater show based on the book. My deepest thanks to Adel Dianova, Ola Lidovskaja, Olchovsky Slavik, Alexandra Somish, Tatjana Sukorkina, Aharon Weiss and maney others. A short film is available, documenting the movie the theater show, and the return of Yanina to Lvov in that occasion. You may directly download from here the file in the format of AVI.... Helena Ganor, writes about my mother in her book "Four letters to the witnesses of my childhood": "After the war, she [Janina Hezseles] published a book about these times ... Papa bought it for me after the war .. This book, as I see it now, was a Polish equivalent to The Diary of Anne Frank. How sad it is, my dear Mama, that this book is unknown to the world..." The most recent book by my mother is on the Weisse Rose (German resistence movement of students and professors in Munich University). The first part of the book entitled "Naturwissenschaftler vor und nach Hitlers Aufstieg zur Macht" has now appeared in German.

NEWS

October 2012: The **CONGAS** (COmplex Networks and GAmeS theory) European STREP EU Project (of which I am the scientific coordinator) has its first meetings 1. See 2 for notes from the second meeting.

October 16th, 2012, the French Academy of Sciences attributes the **Grand Prix France Telecom** jointly to Joel CIBERT and to Eitan ALTMAN, see video (to the left) and photos.
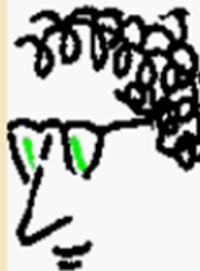
The DODESCADEN project (Data and cOntent DElivery in SoCiAl networks: an epiDEmic aNalysis) is in search for a sponsor!

Past and Present Projects that I coordinated:

POPEYE

IFANY

DAWN

GANESH

PAINTINGS:
Visit my Gallery, view and print my book of selected paintings or visit my facebook galeries: 1 2 3 4 5 6 7 8 more.

Find there related publications and videos

Dodescaden involves technology, art, and society. The word "Dodescaden" stands for the sound that the train does, as we learn in Akira Kurosawa's masterpiece which carries this name. The train, although existing only in the immagination of its unemployed driver, allows that driver to pursue a regular life and also helps him in creating interactions with those virtual passangers that he meets everyday.

The passangers in our project are even more virtual - they consist of data and content: symbols, letters, words and sentences, that move through data highways over which social networks are built.

In the Dodescaden project we create content: paintings, music, dance video and films. We then tweet them over social networks and help them compete for visibility and recognition, using game theoretic models. So far, my Dodescaden project has been as virtual as the train in Kurosawa's film, and yet as present as that train is for the driver.
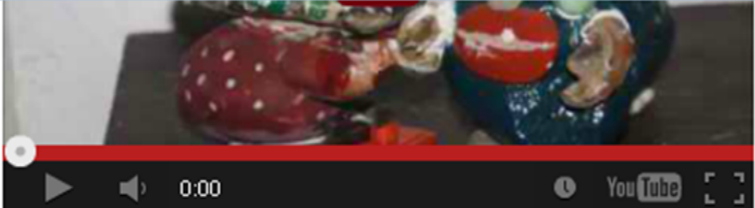
Publications:

[d1] "A stochastic game approach for competition over popularity in social networks", Eitan Altman, to appear in Dynamic Games and Applications, (Elsevier), special Issue on stochastic games, 2012.

[d2] "Game theoretic approaches for studying competition over popularity and over advertisement space in social networks", Eitan Altman, Proceedings of Valuetools conference, Cargese, Corsicaa, 2012.

[d3] "An epidemic game between contents in a wireless network", , Eitan Altman, hal-00690347, version 1 Proc of IEEE IWCSC, August, Paris, France.

[d4] "The Interplay Between Caching and Popularity", Majed Haddad and Eitan Altman, International conference on NETwork