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If a Protest Falls in the Forest: Facebook Protests and the Public Sphere in the Context of Attention Scarcity

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Abstract

The adoption of Facebook as a platform for grassroots protests seemed to be the panacea for their long dependence on media coverage. Facebook allows protests to bypass the traditional media gatekeepers in their way to the public, and its advantages are many: free, open, worldwide spread, and outside direct governmental control. But, ironically, successful Facebook protests break into the public agenda only when picked by traditional media, while the big majority of the protests remain outside of the public attention. Moreover, even the most successful Facebook protests fall into oblivion after the traditional media coverage is over. The explanation advanced in this thesis is a mixture of attention economics, media reputation and the way they interact with the special characteristics of the Facebook platform. It is hypothesized that, due to those factors, protests launched in Facebook are still dependent on interaction with traditional media to reach the public agenda and to produce sustained attention, which are critical preconditions for collective action. Moreover, because of Facebook's platform limitations, even successful protests are expected to decay upon their expulsion from the mass media agenda. A model for the prediction of Facebook protests' activity level is proposed and empirically tested on three recent Israeli protests, two of which were covered by traditional media and one that was not. The results confirm the hypothesis that media coverage, when present, is highly correlated with Facebook protests' activity level, and that in the absence of media coverage the general tendency of the protest's activity level is decay. The implications of the results are that grassroots Facebook protests may still be dependent on media coverage in order to bring to policy change.

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Finally, on a personal level, if there is any achievement in this thesis, it is thanks to the infinite and unjustified support and help I received from a group of very special people: Elad Meshulam, Dori Ben-Zeev, Michael Ziv-Or, Irit Cohen, Itay Akirav, and of course my wife Einat and my family. I hope to have the opportunity to return to them at least a bit of what they have done for me. This thesis is dedicated to them, and to my daughter Alma, who will find her way to fulfill her dreams, with or without social media…

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Introduction

Over the last several years, Facebook[1] has been adopted as a legitimate protest platform; the Arab Spring, 'Occupy Wall Street, '*Indignados*' in Spain and 'Cottage Protest' in Israel are obvious examples. But those high-profile protests are only the visible tip of thousands of protest pages created every day.[2] It seems that creating a Facebook page has become an inherent part of the protest repertoire. The advantages of Facebook are many: it is global, open, free, fast, sharing-oriented, and outside of state control.[3] As a platform to diffuse the protest claims, Facebook offers an unprecedented potential to reach an audience. In theory, Facebook's sharing features can bring the protest demands to millions of users' screens in seconds.

Given the advantages of a Facebook protest, it is intriguing to hear activists reporting that they first heard of the protest in traditional media. This may mean that although Facebook has an immense reaching power, it still needs the traditional media as a pivot, or backbone, to hold and transfer the attention to its claims. Other activists have reported that, although they had seen the protest in Facebook, they decided to engage with it only after it was 'in the news'. An explanation may be that the activists needed a signal of 'seriousness' and 'worthiness' before they joined the protest, a signal delivered by traditional mass media coverage.

Even more problematic from the social point of view is that successful Facebook protests seem to vanish from the public agenda in a matter of days, regardless of the activists' efforts. Protest pages with hundreds of thousands of followers – yesterday's viral word-of-mouth – wither suddenly. For grassroots protests, which have no leverage on decision-makers other than the support of the general public, this loss of public attention is a death sentence. A possible explanation may be that some characteristics of the Facebook platform prevent it from generating the focusing power of traditional media, despite the high levels of reach potential.

On the theoretical level, these two phenomena may be explained by a mixture of attention economics, media reputation and the way they interact with the special characteristics of the Facebook platform. First, Facebook's diffusion power is not endless, but rather bound by some characteristics of the platform. Its sharing power is limited by network *homophilia*, novelty decay and the intervention of Facebook's notification algorithm. Second, even when the item reaches the user's News Feed, it may be overlooked due to competition with other items for his attention. Third, since sustained participation in protests has personal costs,[4] the Facebook protest must exhibit a potential power of success in order to gain activists'

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[1] Among other Web 2.0 sites like Twitter, Google+, etc.

[2] In a preliminary research conducted for this thesis, it was found that in Israel there are currently more than 700 Facebook protests created in 2014.

[3] Although each of these features is contested by some scholars, they are generally widely accepted features of Facebook. The different views are presented in the literature review.

[4] Even online activism, which puts lower personal costs on adherents, needs sustained participation to be effective.

confidence. Facebook, although immensely popular, may still lack the validation power that mass media have.

Big social crises, such as the Arab Spring and the anti-globalization protests, are likely to explode with or without the help of the media. When the rage, pain and oppression are unbearable, people leave their fears behind and take to the streets. But what about smaller-scale protests, such as neighbors demanding a traffic light in a dangerous juncture, a group of customers protesting a big company's fraud or an ethnic minority insisting on special governmental care? This thesis focuses on grassroots protests, which by definition[5] have no other means to influence policy makers, and therefore enjoy the most the new possibilities opened by Facebook.

Another important distinction must be made between protests under dictatorial regimes and protests under democracies. The main obstacle for protests under dictatorships is organization, as mass media is under the regime's control and protests are illegal. Since democratic regimes do not have such limitations, gaining public attention and recruiting adherents are the protests' main challenges. This paper focuses on the second type of protests and their specific set of challenges.

There are several resulting implications. First, despite the great possibilities Facebook has created, grassroots protests will fail to sustain action if they base their visibility and validation on Facebook alone. This would leave them once again depending on mass media coverage and its bias. Second, on a communications level there are questions regarding the role and limitations of Facebook as a mass medium, especially as an alternative public sphere. Third, on the political level Facebook's democratization of mass media is inefficient to allow the powerless have their demands reach the public agenda.

The aim of this thesis is to empirically test Facebook protests' ability to reach the public agenda and sustain action without the help of mass media coverage. The tests were conducted on three recent Israeli Facebook protests.

1.1 Public Agenda, Mass Media and Public Policy

In an ideal representative democracy, public policy should be the best approximation possible to the aggregate views of the citizens. But in the real world, policy setting is a complex process, involving the interaction of politicians and different interest groups. Nevertheless, the politicians and public administration are responsive to public opinion, at least in the long run (Manza & Cook, 2001; Soroka, 2002; Soroka & Wlezien, 2005; Wlezien, 2004). This is explained by the politician's need of public support, in order to be re-elected. The result is that public opinion has a strong agenda setting power.

Public opinion is formed in the public sphere. Traditionally the public sphere was the actual place where citizens discussed current affairs. This was possible while the state of affairs was under the control of a few. But with the advent of modern democracies and mass society, face-to-face communication wasn't enough to allow the democratic process of openly discussing current affairs (Habermas, 1991). The mass media was the natural candidate to

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[5] 'Grassroots protest' is defined as a natural and spontaneous popular manifestation of collective action, with the goal to affect policy change.

inherit the traditional public sphere. Although the relationship between mass media and public agenda is not free of complexities, it is widely accepted that the mass media has very strong influence on public agenda (McCombs, 2013)[6].

Since policymakers are required to address a multitude of problems and make decisions on a variety of issues, media agenda helps them determine to which issue they must pay attention (Jones & Baumgartner, 2005). For policymakers, mass media agenda serves as a proxy for public agenda. Although the natural tendency of policy makers is to retain the status quo, if the mass media agenda differs from the public policy agenda, on-time policy is expected to close the gap towards the media agenda (Walgrave & Van Aelst, 2006).

1.1.2 Grassroots protest and mass media

The mass media's inheritance of the traditional public sphere was possible due to its capacity to concentrate the focus of public attention, thus enabling the creation of common knowledge. In Gamson's terms, the modern public sphere is like a Roman Forum: the public is in the galleries, and the mass media is the arena. Everybody sees the arena, and everyone knows that everybody else sees the arena (Gamson, 2004).

Common knowledge is an essential precondition for the creation of collective action, and therefore any enterprise based on the support of the general public must find its way into the arena. Because the arena is limited in space – its limits mirror the limit of public attention – there is a constant struggle over the right to enter it. The mass media gatekeepers (reporters, editors, etc.), working under a complex array of professional, political and economic interests, decide which issues enters the media agenda and which do not (Koopmans, 2004). The agenda may change under different circumstances, but the number of agents struggling to enter is always bigger than the arena can fit. The mass media preference for the dominant narratives makes the entrance to the arena a real challenge for anyone willing to contest the status quo (Andrews & Caren, 2010). This is especially relevant for popular protests, which by definition contain a powerless minority seeking public support (Lipsky, 1968).

When a powerless minority[7] wants a policy change, its main political resource is protest (as opposed to economic influence, lobbying, coup, etc.). While the protest is aimed at the decision-maker, the final repository of a protest's political power is public opinion (Della Porta & Diani, 2009). For the protest to be effective in reaching public agenda, it must show a sustained demonstration of determination and 'numbers' (Tilly, 2005). While the level of determination is ultimately a prerogative of the protest's members, numbers are a function of the protest visibility, which is not completely under the protest members' control. The grassroots protest needs access to mass media in order to be recognized and turn its claims into an element of the political debate (Bakardjieva, Svensson, & Skoric, 2012; Casero Ripollés & Feenstra, 2012). Moreover, since the dialogue between protesters and

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[6] This holds "wherever there is a reasonably open political system and a reasonably open media system" (McCombs, 2013, p. 36). Under dictatorial regimes the mass media plays a different role. This thesis' focus is on protests in western democracies.
[7] Not as an ethnical group, but in the sense that their claims are opposed to political status quo.

policymakers takes place mainly in the media (Koopmans, 2004), a grassroots protest which is not in the media has no means to respond to the policymakers' claims.

Grassroots protests need media attention not only to influence public agenda, but also to reinforce their own dynamics as an organization. First, the protest must expand its base of power by recruiting new adherents. The protest initiative is generally based on a small strong nucleus of activists, whom then recruit the first adherents through social circles (workplace, friends, clubs, etc.). But those circles are exhausted soon after, and in order to reach new adherents, protests need the publicity of the mass media (Tufekci, 2013).

Second, protests not only need to gain new adherents, but to also maintain the cohesion between existing ones. Two important factors to secure this cohesion are the validity and worthiness of the protest in the eyes of the activists themselves.[8] Media coverage is interpreted by the activists as a prof of validity (Gamson & Wolfsfeld, 1993). It also increases the perceived effectiveness of the protest, which influences the protest's motivation power (Passy & Giugni, 2001). Third, the media is a crucial source of information that influences the decision-making process of the protest, and by extension its internal dynamics (Koopmans, 2004).

1.1.3 Protests and attention economy

The reason that visibility is crucial for protests is closely related to the concept of 'attention economy'.[9] As stated above, at any given moment there are dozens of issues struggling for public attention, but public attention cannot focus on more than a few issues at a time. The number of issues public attention can hold simultaneously varies among scholars, but is widely accepted as not more than seven (McCombs, 2013). The result is that most protests, even if their arguments have wide acceptance among the public, are ignored by public attention. In Koopmans' words, 'The history of political contention is a hecatomb of failed attempts with few survivors' (Koopmans, 2004, p. 372).

Whether the mass media will cover a protest's activities, and for how long, depends on many factors, including the level of conflict, sponsors, ideology, number of participants, and even geographical proximity of the protest (Gamson & Wolfsfeld, 1993; Koopmans, 2004, p. 373; Tilly, 2005). As a rule, research founded that protests have limited ability to get media attention (Della Porta & Diani, 2009; Gamson & Wolfsfeld, 1993; Gitlin, 1980), and that even such attention decays over time (Wu & Huberman, 2007).

The consequence is that most of protests are ignored or quickly expelled from public attention (Koopmans, 2004; McCombs, 2013). Although gaining attention may not guarantee protest success, the lack of attention is likely to 'smother' the protest (Tufekci, 2013). This raises a concern about the ability of protests, which are by definition outside the dominant narrative, to intervene in the public sphere – which is imbedded in the mass media – and exert influence on public agenda (Downey & Fenton, 2003). Tilly defines

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[8] The protest dependence on mass media coverage generates a positive "vicious circle" effect in which members are willing to pay more personal costs the more the protest's perceived worthiness rises. This effect will be developed in the next section of the literature review.
[9] The concept of "Attention economy" and how it affects social movements is developed in the next section.

demobilization as the 'transfer of control over resources to other groups' (Tilly, 1978). If the grassroots protest's main political resource is public attention, then the loss of public attention to other issues is, in terms of its life cycle, a demobilization phase.

1.2 Facebook Opportunities and Limitations

With the advent of the Web, and later social media, new forms for reaching the general public were open for protests, hence allowing them to 'bypass' their dependence on mass media coverage. A protest can create a website, blog, Facebook event, Twitter account, or even its own radio station. Alongside the traditional, mass media-dominated public sphere, a new democratic and deregulated 'networked public sphere' emerged.

There is, however, an ongoing debate among scholars about the extent of the web's positive effect on the public sphere and the democratization of the media. Issues were raised about the polarization of the public (Sunstein, 2002), corporate control over popular content (Hindman, 2008), tailor-made content which increases users fragmentation (Howard, 2006), and the 'digital divide' between citizens (Norris, 2001). On the other hand, the Arab Spring, Occupy Wall Street and '*Indignados'* protests in Spain, show that protests do enjoy from new possibilities of communication and organization thanks to social media.

Still, even if social media does have a positive influence in protests, can it replace, and therefore break, the dependence on mass media to influence the public agenda? Does social media meet protest's organizational and communicational needs? Facebook in particular has structural limitations that raise issues about social media's ability to fully meet this task.

1.2.2 Visibility under attention economy constraints

As shown above, visibility is a decisive need of protests. Visibility is the power to gain the attention of public agenda and reach potential adherents. Facebook has more than 757 million active users,[10] creating an unprecedented potential audience for the protest's claims. Furthermore, some Facebook features were designed especially to foster items diffusion (sharing, liking, commenting, etc.). A Facebook item[11] can theoretically reach millions of users in seconds.

Research about diffusion patterns on social networks is not yet conclusive. Some of the factors that can predict information diffusion are number of ties (ex: number of Facebook friends), the novelty of the item, social environment, the 'success' of the item (the number of Likes it received), recommendation, and strong social ties (Bakshy, Rosenn, Marlow, & Adamic; Ghosh & Huberman, 2013; Micó & Casero-Ripollés, 2013). It has also been found that the network density (level of interconnections between users) has strong influence on the level of political views adoption (Bakshy, Karrer, & Adamic). On the other side, factors that can explain the constraints of diffusion include novelty decay, weak social ties, *homophilia* (links bounded inside a group) and attention scarcity (Asur, Huberman, Szabo, & Wang; Harp, Bachmann, & Guo, 2012; Wu & Huberman, 2007). In general it is found that viral chains of more than two generations are rare – less than 1% (Goel, Anderson, Hofman,

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[10] Source: "Facebook key facts". https://newsroom.fb.com/key-Facts. (14.8.2014).
[11] 'Item' is defined here as any shareable element (page, event, post, picture, group, etc.) through an action in Facebook (like, share, post, comment, join, 'going', recommend, etc.) which shows up in other user's News Feed.

& Watts, 2013) and that interest in the shared content diminishes rapidly both in time and across generational steps (Dow, Adamic, & Friggeri).

Besides the specific factors that may influence item diffusion over social networks, two universal patterns stand out: 'winner takes all' and attention decay. The amount of attention received by items in social networks has a skewed distribution with a long tail (Ghosh & Huberman, 2013; Huberman, 2013; Wu & Huberman, 2009). For example, on YouTube, which promotes and rates popular video content, the top 1% of videos is viewed 50 times more than the bottom 80% combined (Hancock, 2009). In this aspect Web 2.0 has exacerbated the problem of getting public attention, in the sense that anything less than 'huge' visibility is likely to be close to zero visibility (Hindman, 2008). The result is that social networks may have democratized the opportunity to communicate, but not the ability to gain an audience (Gonzalez-Bailon, 2009).

Even if a Facebook item manages to catch a user's attention, the attention timespan is limited. All new items show a dynamic of attention decay over time (Asur et al.; Wu & Huberman, 2007). The main predictor of attention is novelty, which is by definition limited. The combination of novelty decay on one side, and competition with newer items on the other, diminishes older items' visibility and expels them from public attention. In some platforms, Facebook among them, those attention dynamics are imbedded in the interface. The News Feed, Facebook's home page, shows incoming items chronologically, sorted from new to old.[12] An item's probability of being seen decreases with the number of items 'above it' (Moussaid, Helbing, & Theraulaz, 2009). The constraint Facebook platform imposes on protests' visibility reduces its ability to gain public attention.

1.2.3 Validation, common knowledge and critical mass

Protests are a form of collective action, where the common good pursued is policy change. Therefore, protests suffer from the collective action's traditional problem of individual costs and free riding. Usually, the protest founders are motivated enough to sustain their participation, even without returns. But they are not enough in number to exert political influence, so they need to recruit more adherents (Tarrow & Tollefson, 1994). For a protest to engage new activists, it must show that the cost of participation are worth spending (Vliegenthart, Oegema & Klandermans, 2005). The protest must compete with alternative protests, and with the option of no participation (Collins, 2001; Gamson & Wolfsfeld, 1993; Passy & Giugni, 2001).

From the point of view of the potential recruit, only in a protest resourceful enough to influence policymakers is it worth investing participation (Opp, 1991). The 'catch' is that the protest needs a minimum number of participants to be politically meaningful. Thus, a protest's validity, an external signal of perceived worthiness, is essential to break the vicious cycle (Gamson & Wolfsfeld, 1993; McCombs, 2013). The protest must reach a critical mass of participants to ignite collective action. In grassroots protests, the 'political weight' of every

[12] The News Feed can be set to show popular posts on the top of the feed, therefore slightly altering the chronological order. Yet, the great majority of the posts are still shown in chronological order. Even the popular posts do not stay at the top longer than a few hours, as a result of the Facebook algorithm, which weights novelty as the leading factor for sorting posts.

activist is negligible, and only the joint action is politically meaningful. Therefore the activist will join the protest only if he perceives that 'others are going'. This common knowledge ("I know that you know") is a pre-requisite for collective action (Opp, 1991; Tarrow & Tollefson, 1994).

Mass media coverage is a main source of validation and common knowledge. Activists and potential recruits read about a protest's success or failure in the media. Visibility is a sign of legitimacy and of power to influence public agenda (Gamson & Wolfsfeld, 1993; Tufekci, 2013). Mass media coverage has a twofold effect on a protest's worthiness. First, it has the effect of a recommendation. Mass media has a trusted reputation in the eyes of the public, rendering the decision to cover a protest's activities a signal of seriousness (Gonzalez-Bailon, 2009; Van Stekelenburg & Klandermans, 2013). Second, mass media creates common knowledge by focusing the attention of the audience in one place. The massive scope of mass media allows the audience to be certain that the knowledge is shared by others (Lomicky & Hogg, 2010; Zhou & Moy, 2007).

Sometimes mass media coverage is so intensive that it creates a 'media storm'. A media storm is foremost a sensation that 'everybody is talking about'. But it can be conceptualized in terms of media coverage's reach and density, which together create the sense of a wave, rather than isolated items (Boydstun, Hardy, & Walgrave). The underlying idea is that media coverage, if dense and wide enough, overlap in the attention of the individual to a point at which it overwhelms the capacity of attention, creating the sensation that the issue is 'everywhere'. If, as stated above, the common knowledge and intuition of the chances of success of a protest are important conditions for bringing an individual to act, the media storm can greatly increase these chances. This is because media storm provides both factors: the sense of common knowledge ('everybody knows about it') and the sense of success ('it's in the news all the time, therefore it's important').

Although there is no literature about the validation power of Facebook in the context of protests dynamics, it's possible to infer it from the characteristics of the platform. Facebook features recommendation as an integral part of the platform. Users can recommend items by sharing, liking, commenting, etc. But the fact that anyone can recommend anything paradoxically demerits the value of the recommendation. In this case more openness means less focus.

The creation of common knowledge is also problematic in Facebook. Although the aggregate knowledge Facebook delivers to users is incredibly vast, it is not possible to know for certain who is exposed to a specific item and who is not. The News Feed is a tailor-made list of items, based on friendships and other criteria[13]. The user cannot infer from the fact that he sees a protest's item on his feed how many users share the knowledge about the item.

Facebook features one element that combines massiveness and focus: the like aggregator. When an item reaches a certain number of likes in a limited amount of time, that number is

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[13] The algorithm is used by Facebook to determine what items appear in the user's News Feed. An older version of the algorithm, called 'Edgerank', used three parameters: user affinity, content weight (how popular the item is), and a time-based decay parameter. Today Facebook uses a more complex algorithm, which has not been disclosed.

an absolute indicator of attention. The question is whether that attention was gained inside Facebook (Ex: by sharing diffusion), or with the help of external players like offline social networks and traditional media.

From the literature review so far we can learn that the Facebook platform has limitations to both produce visibility, which is a prerequisite to gain public attention, and validation, which is necessary to create collective action. These conclusions seem to contradict the fact that Facebook has been used as a platform to launch successful protests. This contradiction may be explained by the interaction between Facebook and traditional mass media. Although the influence of old and new media on protests has been subject to extensive research, the interaction between the two has not. The explanation advanced here is that the protests may be overcoming the Facebook limitations with the help of mass media coverage, which provides them visibility and validation. **If true, this means that protests launched in Facebook are still dependent of traditional media coverage in order to reach critical mass and produce sustained attention, which is critical to their success. Moreover, even in cases when the interaction with mass media brought the Facebook protests to a high level of activity – in terms of visibility and engagement – this level is expected to decay upon the expulsion of the protest from mass media agenda.**

Chapter 2: Conceptualization of Visibility and Engagement

What follows is a description of the mechanics of Facebook visibility and engagement creation, and is the result of a preliminary analysis of Facebook's platform performed at the early stages of this research. The purpose of this description is to create a linkage between protest concepts and their equivalents in terms of Facebook elements. Therefore, all the elements are analyzed in function of their power to enable 'sustained action', which as stated before, is a prerequisite to bring policy change (see Fig. 1). A Facebook protest which does not sustain the level of activity will be considered as a protest with few chances of success.

The activity level of a Facebook protest page (FPP) is influenced by the concatenation of four factors. The first factor is the page's **visibility**, defined as the total number of Facebook users who were exposed to any page content. Because the exposure to the FPP is a precondition for participation, the page's visibility determines the pool of potential supporters. Since this thesis tests the visibility power of the Facebook, a distinction is made between **endogenous** visibility (FPP's reach through Facebook platform) and **exogenous** visibility (FPP's visibility through news coverage[14]). Both types are described in detail in the following sections.
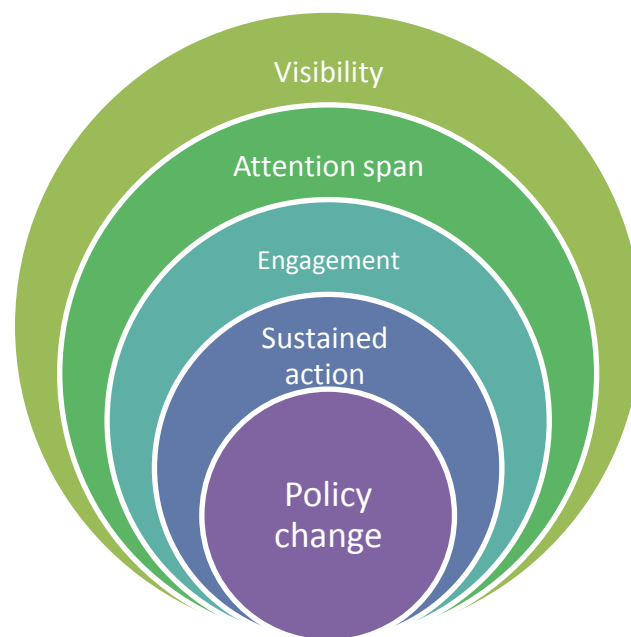
Figure 1

The second factor is the **attention** paid to the FPP. A user may be reached by the page, but for various reasons[15] not to pay attention to the content, or forget about it. The third factor of FPP activity is the **page engagement**, or users' willingness to interact with the FPP. The last factor is **time**: sustained action is the presence of the former three factors over time.

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[14] Other types of diffusion, like word of mouth, are included de facto as exogenous visibility. The reason is that, like media coverage, they occur outside the Facebook platform.
[15] For a more detailed description of the causes for missing the user's attention see the 1.2.2 section in the literature review.

Because each factor is a precondition for the next one (ex: visibility is a precondition for attention), it is assumed that upon visibility decay, engagement will decay over time. This assumption is further developed in the following sections.

2.2 Endogenous Visibility

The first factor to be analyzed is endogenous visibility. Endogenous visibility is FPP's exposure to users through Facebook's platform only (ex: does not include visibility through media coverage). In Facebook the visibility is produced in two ways: viral and organic. Viral visibility[16] is the exposure of any Facebook page's contents to a user, as a result of another user's action[17]. Actions like sharing, liking or commenting on a Facebook item, create 'stories' in the user's friends' News Feed[18]. The exposure of the user's friends to these stories is defined as 'viral reach'. Organic visibility is, on the contrary, the exposure of any of the page's content to a user, specifically not as the result of another user's action[19]. This includes notifications sent automatically to Facebook users by the platform itself. For example, when a post is published on a page, notifications are automatically sent to the page members.

Figure 2

2.2.1 Organic reach: the machine factor

When a user likes a Facebook page, he becomes a 'member'.[20] Every time the page's owner performs and action in the page (ex: a new post published), its members receive a notification about the action.[21] Every member can publish posts on the FPP but only owner's posts generate notifications.[22] The notifications are sent automatically to the members, establishing a direct relationship between the number of page members and the level of organic reach. By definition, organic reach only targets users who were already exposed to the page. Thus, organic reach does not help recruit new members[23]. On the other hand, notifications are triggered by actions performed on the page, serving as reminders of the

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[16] 'Reach' is defined as the number of unique users exposed to an item (a page, post, etc.). Therefore, multiple exposures of the same content to a unique user are counted as one unit of reach.
[17] Facebook offers very restricted and rather obscure definitions of the data it provides through Page Insights (see Appendix 3). The definitions used in for the purpose of this thesis are a combination of an attempt to decipher the Facebook original definitions, a scrutiny through different websites and various test and calculations to reassure the definitions adopted are correct.
[18] In some cases stories are also in shown in the 'Ticker'. For readability, only the News Feed is mentioned in the remaining text.
[19] Besides for the page owner, who is at the same time a user. This idea is further developed in the next sections.
[20] In Facebook jargon, users who like a page are 'followers"' In this thesis the word 'members' is used instead of 'followers' to remain closer to the protest terminology.
[21] Unless, by clicking 'Unfollow'" the user explicitly removes himself from the notification list.
[22] Actions that produce notifications are: publishing a new post, uploading a photo, changing the cover photo, etc. The notification is shown in the members News Feed, in the form of a 'story'.
[23] It may help, in the sense that organically reached members may generate viral reach, but not directly.

page's existence. Assuming that the members' attention to the page tends to decay, notifications help maintain the FPP in their attention spans.

In theory, the organic reach should always be equal to the number of the page's members. However, the actual organic reach is constricted by a Facebook algorithm. This algorithm determines which member receives a notification, and which does not, upon the occurrence of a page event. The algorithm has not been disclosed, but the rate of notification, according to different sources,[24] stands between 8% and 12% of the total number of members. Others claim that the rate of notification is reactive to the number of members, thus decreasing in function of the number of members. Either way, the outcome of the algorithm's intervention on the rate of notification is a great decrease in the FPP's potential organic reach.

Because organic reach does not depend on a member's engagement[25], but grows in function of the number of FPP members, it is expected to be relatively stable, even if the members' engagement level drops[26]. On one hand, this assures the FPP some visibility, even if the level of engagement is zero. (As long as there are members, every post published will generate some organic visibility). On the other hand, and for the same reason, organic reach alone cannot be considered a strong sign of FPP activity.

2.2.2 Viral reach: the human factor

Viral visibility is defined as the exposure of a user to any page content, as a result of another users' action. When a user shares an item with his friends, the page's viral reach increases. In Facebook, however, when a user engages with any page's content (ex: likes a photo or comments on a post) a notification is sent to his friends. Thus, any user who interacts with the page increases its visibility according to the number of his friends. **Since any engagement with the page produces viral reach, the viral reach is expected to be highly correlated to the level of engagement [H1].**

This, however, is constrained by the Facebook algorithm, which sends notifications to only some of the user's friends. As a result, when a new post is published, the Facebook algorithm intervenes twice in its visibility: once by filtering the number of FPP members who receive a notification about the post (organic reach), and again by filtering the number of a

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[24] Sources: 'EdgeRank Is Dead: Facebook's News Feed Algorithm Now Has Close To 100K Weight Factors'. In: http://marketingland.com/edgerank-is-dead-facebooks-news-feed-algorithm-now-has-close-to-100k-weight-factors-55908. (20.7.2014). "Facebook Pages' Updated Organic-Reach-Crushing Algorithm, And What it Means for You". In: https://fstoppers.com/other/facebook-pages-updated-organic-reach-crushing-algorithm-and-what-it-means-you-8346. (20.7.2014). " Controlled Test Results: Facebook Organic Reach is Under Reported". In: http://www.jonloomer.com/2014/01/14/facebook-organic-reach-under-reported/. (19.7.2014)

[25] As stated above, only an owner's posts generate notifications; therefore, other member's activities do not produce organic reach. Notifications sent to other members' friends as a result of their activities are regarded as viral reach.

[26] An important note: the 'organic reach' variable, as provided in Facebook Insights, is different from the definition of organic reach used in this thesis. The difference lies in the fact that the 'organic reach' variable provided by Facebook includes users who were exposed to the page outside Facebook. For example, users who reached the Facebook page through a search engine will be counted in Facebook Insights as 'organic reach', while in this thesis they are regarded as exogenous visibility, because the visibility was produced outside the Facebook platform. This distinction is critical in order to assess Facebook's visibility power alone, detached from exogenous visibility sources. This issue is further analyzed in section 4.2.

member's friends who are notified of his engagement (viral reach). The number of users reached virally by a new post can be stated as:

$$PVR = pm' * el * mf'$$

PVR: post's viral reach
pm': the page members who received notifications
el: percentage of PM' that engaged with the notification
mf': member's friends who received notifications

One preliminary conclusion that can be drawn from the PVR formula is that **the viral reach of a post depends on the organic reach, rather than relying only on the number of FPP members [H2]**. This is not inconsequential, as organic reach is exposed to the Facebook algorithm intervention, in contrast to the members' number, which is a result of the direct contact between the FPP and the general public.

2.3 Exogenous Visibility

Most Facebook protests never get covered by the mass media, and therefore have zero exogenous visibility. But in some cases, for a variety of reasons[27], the mass media gets interested in an FPP. Mass media coverage influences an FPP's activity level in two ways: it broadens its visibility and raises its validation in the eyes of the FPP members, and the public in general. The visibility the FPP gains through mass media expands the pool of potential supporters, who weren't reached by the FPP endogenously. The mass media's validation effect can reinforce a member's willingness to stay active, and also bring new adherents.

Media coverage generates both visibility and validation for the FPP. But the generation process is different. Visibility level is simply a function of media reach; if, for example, there were three news items about an FPP, the total exogenous visibility generated is an aggregation of the three items' reach. The validation level produced by the mass media aggregates too, but not as a simple sum of reach units. The FPP validation in the eyes of the viewer is generated by the media coverage's positive feedback on his attention. If, for example, a viewer is exposed to a news item about the FPP in the morning and to another in the afternoon, the items' superposition in his memory – provided that he still remembers the morning broadcast – reinforces the perceived importance of the FPP[28].

2.4 Other Sources of Visibility, Engagement and Attention Decay
2.4.1 The 'total likes' and 'new likes'

Facebook shows the lifetime number of likes the page has received. In the case of FPPs, this number is not only an aggregation of individual members who showed support to the page's claims, but a signal of vitality and strength. Although from the point of view of the FPP the final addressee of this number is the policy maker, it's a source of validation for page members and potential supporters too. As discussed above, a grassroots protest must show

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[27] The literature about media agenda setting is vast and not yet conclusive. In this thesis the coverage is considered an external event, which may be present or not, regardless of the reasons.
[28] For a more detailed description of the visibility and validation generation see sections 1.2.2 and 1.2.3.

signs of strength to convince new adherents that it's a good investment for their attention and engagement. This is also true for a protest's activists, who may decide to continue paying the attention and engagement cost or not, depending on the perceived probabilities of success.

Therefore if the FPP's total number of likes reaches the tipping point where the mere number is a signal of strength, it is expected to have positive influence on the number of new members. After joining the FPP as members, the users may follow the number of new likes from time to time, to assess the FPP's power to recruit new adherents, as well as a proxy for the public attention to the FPP. A continuous flow of new likes would be a signal of vitality, while seeing the same number of likes day after day a sign of stagnation. Therefore, the number of daily new likes is expected to have a positive influence on the member's level of engagement.

The act of liking the page also generates viral visibility, because the user's friends will receive a notification of such activity. This notification is also an invitation for the friends to like the page themselves, so it may produce more visibility, etc.

2.4.2 The posts[29]

The FPP's body, like any other Facebook page, consists of a series of posts shown in reverse chronological order. The posts are the forum where a page's members announce events (posting a status), engage in dialogue (writing comments), give feedback (liking an item), and spread the FPP's contents (sharing). If 'liking the page' is akin to signing a petition, then engaging with the posts is like joining the meetings, debating and disagreeing. It's a higher level of participation. Therefore, the level of post engagement over time is a sign of the FPP's vitality or stagnation.

As mentioned earlier, when the page owner publishes a new post on the page[30] a notification is sent automatically to the page's members, without 'human intervention'. For an FPP member who may not visit the page on a daily basis, this notification is a reminder, a call to action. **Therefore, a higher level of engagement on the FPP is expected to be seen upon the publishing of new posts [H3]**. This invites a distinction between an 'active' and 'reactive' engagement. If the level of the FPP's engagement tends to be stable over time, it will be an 'active engagement'. However, if it's low most of the time and rises upon the publishing of a new post, it will be a 'reactive engagement'. Both types of engagement are signs of the FPP's vitality, but active engagement relies more upon the FPP validation, which helps members sustain action, while 'reactive engagement' relies upon the FPP's visibility. Because the level of commitment differs between members, some may resist the 'corrosion' of attention decay longer than others. **Thus, the pool of members engaged with posts is not**

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[29] During the data collection, as part of the attempt to better understand the influence of the different elements of the FPP on its engagement level, it became clear that posts become an important source of engagement when no media items are present. This fact was not foreseen, but discovered during the preliminary tests.
[30] Only posts published by the page's owner send notifications to page's members. A preliminary test found that the posts published in the FPP by others receive close-to-zero engagement, and are therefore not included in the post count.

only expected to decrease on time [H4], but instead to concentrate around a recurring group of committed members [H5].

2.4.3 Attention decay

All the factors that influence the FPP's level of activity evolve over time: posts are published and then pushed to oblivion by new posts; new members join and leave FPPs; users' willingness to participate rise and fall; and media coverage come and goes. In a word, all the FPP's processes that involve 'human factors' are subject, to some extent, to the corrosive force of attention decay.

Since FPPs must show sustained action in order to stay in the public agenda and influence policy makers, time is an inherent element of FPPs dynamics. This is not to say that time will always play against FPP's activity level. Virality and member's recruiting are processes that develop over time.

The FPP's visibility does not develop in vacuum, but rather in an information-saturated environment. Other issues are constantly pushing to enter public agenda, displacing current issues. An FPP trying to make its way to the public agenda not only has to cope with its own limitations in technical and organizational terms, but must also compete with other issues for attention. Because the attention is limited and the competition permanent, the natural course of action is to fade from public attention. Therefore, time is expected to have a negative influence on an FPP's level of activity**.**

The level of an FPP's activity is expected to be positively influenced by media coverage and show short recoveries when new posts are published. It will otherwise decrease as days of protest pass, as a result of the effect of attention decay on the members' engagement and the competition with other issues for public attention.

Chapter 3: Data Collection and Method

This section explains the procedures used in the case study selection and data gathering and codification. Additionally, the preliminary tests, models and known methodological limitations are presented.

An empirical research was conducted to assess the thesis hypotheses. The adopted methodology is a descriptive analysis of three Facebook Protest Pages (FPPs) cases and hypotheses testing. The descriptive part of the research is intended to provide an overview of the main parameters of FPP activity, and to identify the different phases of FPP activity. The hypotheses testing assesses the predicted relationships between the parameters of activity (organic visibility, engagement, new likes, etc.). The hypotheses are intended to provide the basis for the formulation of a model for the estimation of FPPs' dynamics over time.

Two main reasons led to the selection of the 'case study' methodology. The first was the scarcity of high profile FPPs, which rendered the collection of a statistically significant number of cases unviable. The second was the scarcity of literature on Facebook, and mass media in general, in the context of protests, which made the attempt to describe their interaction in detail valuable.

Three Israeli Facebook protest pages[31] where chosen to conform the empirical base of the thesis. The first two cases, 'Rahav' and 'Nachlawi', are FPPs that reached a very high visibility in Israel, and were subject to intensive mass media coverage. The third case, 'Monsanto', is an FPP which was not covered by mass media, and lower visibility level compared with the former two, but high in comparison with the average FPP[32].

Table 1: Cases Summary			
Case	**Rahav Case**	**Nachlawi Case**	**Monsanto Case**
Page Name	'Rani Rahav? Not Buying It'	'We support David Hanachlawi too'	'Monsanto get out of Israel'
Protest's Claim	Boycott companies working with the PR expert Rani Rahav.	Change the IDF firing code in the occupied territories.	Stop the collaboration agreement with biotech company Monsanto.
Date Created	January 7, 2014	April 29, 2014	May 23, 2014
Trigger	Rahav's threats on a young journalist who wrote a Facebook post about him.	An IDF solider was prosecuted for aiming his gun on an unarmed Palestinian.	The Economy Minister's negotiations with Monsanto representatives.
Protest Target	Company CEO	IDF Chief of Staff	Economy Minister
'About' Statement	'We promise to boycott companies that pay for Rahav's services'.	'Our soldiers' blood is not to be spilled, and that must be said loudly! Let's stop abandoning IDF soldiers'.	'This page was created to fight the intentions of the government to let the corrupt agricultural corporation Monsanto and its herbicides enter Israel'.

[31] Table 1 includes the cases summaries and basic facts. For a detailed description, refer to Appendix 2.
[32] See the results of the preliminary test in Appendix 4.

Lifetime Likes	33,191	132,989	4,720
Page Posts	80	151	17
Media Items	30	126	2
Media Items – Daily Maximum	13	65	1
Competing Issues	Peace Talks, Ariel Sharon Death, Kusra Incident	Intel Investment, Shelly Dadon, Remembrance Day, Assi Dayan Death	

Unlike the Rahav and Nachlawi FPPs, which were almost unavoidable during media coverage, finding a successful FPP without media coverage posed an intrinsic challenge. The same characteristic that made such FPPs suitable for the research made them hard to find in the first place. To cope with the challenge a script[33] was written to scan Facebook[34] on a daily basis for pages matching keywords associated with protests. Upon finding matches, the script extracted their basic data, including the number of likes. This preliminary test confirmed the intuition regarding the skewed variation of FPPs' success in terms of total likes. Out of a total of 731 Israeli FPPs found on July 7, 2014, 60.1% received less than 100 likes, 90.4% received less than 1,000 likes, and only 0.04% of FPPs received more than 10,000 likes (see Fig. 3).
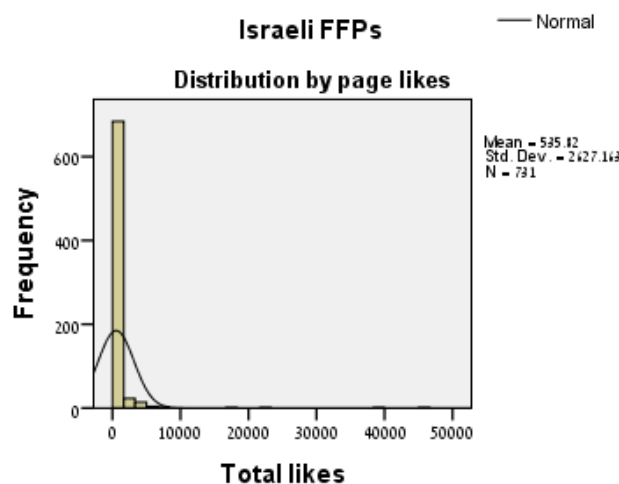
Figure 3

One of the pages found by the script was the 'Monsanto' FPP, a protest against the collaboration agreement between the Monsanto Company and the Israeli Ministry of Economy. Monsanto was chosen as the third case study for three reasons. First, it had enough likes to perform significant statistical tests. Second, the protest's theme was 'well sized', not too esoteric nor sensational. Third, the Monsanto controversy was covered once by the mass media, on the twenty-second day of the protest; this enabled an additional test, although it was still not a case of massive media coverage like Rahav and Nachlawi.

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[33] This and other related scripts were written for Python, and will be sent to scholars upon request.
[34] This was done using the Facebook API interface. All the retrieved data is open to the public.

3.2 Data Collection

The FPPs' data was collected from four sources. The main source was the FPP's insights. Facebook's platform allows the page owner to see a collection of data sets regarding different aspects of his page's activity. This data, visible to the page owner only, can be exported to an external file. The owners of the three FPPs were contacted, and they agreed to share the page insights for the purpose of this research. All the data included in the Facebook Insights are aggregates of multiple users' actions, with no personal information. In the Nachlawi case, the page owner acceded to send the data of only the first three weeks of the protest. Therefore, some tests based on Facebook Insights data were performed on Rahav and Monsanto only. The smallest unit of Insights data is a daily report of the pages' parameters of activity (ex: number of page likes, posts shares count, etc.).

The second source of data was collected with the help of the Facebook application Netvizz, which allows downloading detailed data about the page,, including the complete list of posts, number of likes, shares and comments. In addition, Netvizz retrieves the list of users engaged with every post. Netvizz masks the user's identities by assigning them randomly-generated IDs. One limitation of the data retrieved by Netvizz is that Facebook allows users to opt out of being counted in different aggregators (posts, likes, shares). This poses two data validation problems. First, the real numbers may be slightly higher than reported. Second, it may generate a selection bias problem, since aggregations exclude users sensitive to privacy issues. Nevertheless, since the function is disabled by default – and not very known – it does not seem to raise a severe validation problem. The third source of data is the FPPs themselves as seen by a regular user. This data includes the pages' 'about' statement, photos, profile pics, date of creation, and general aesthetics. This data is used as a qualitative support and information source for questions raised by the quantitative tests.

On the side of the media coverage, data about radio and TV items was taken from Yifat.[35] The company was asked to prepare the most extensive set about each case, based on a set of keywords, and data was then manually cleaned up to remove irrelevant items that had no connection to the case studies. The Yifat data includes the broadcast day, medium, show name and a short description of the item's content. Web items were collected manually from the major news websites, with the help of the Google News engine in Hebrew. Regarding news websites, a distinction had to be made between mass media and new media. A conservative line was followed by picking only the biggest news sites, all of them belonging to multimedia conglomerates. Newspaper items were collected manually from the cover pages of the five biggest Israeli national papers.[36]

3.3 Data Codification

The data in Facebook Insights comes with a short and rather obscure description for each variable. Therefore, the process of data codification was preceded by a process of understanding Facebook jargon, such as understanding the 'page engagement' parameter counts, defining its basic unit, and determining whether or not it includes 'non Facebook

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[35] Yifat is Israel's largest media information provider.
[36] For the complete list, see Appendix 1.

users'.[37] After defining the Facebook parameters, they were matched to their equivalents in the protest vocabulary. It's important to note that this was not an arbitrary process of translation. The world of protests and the world of Facebook are not two separated phenomena which are compared: The Facebook is actually being used for protest. However, since the terminologies are different, a unification of terms was indispensable for a coherent discourse.[38]

3.3.1 'Engagement' as level of activity

Among the data provided in Facebook Insights, the closest proxy to the FPP's level of activity is the 'page engagement' parameter. The 'page engagement' counts the number of unique users who clicked any of the page contents, or created a story (ex: by publishing a post or mentioning the FPP in a status).[39] 'Page engagement' was preferred over 'page consumptions', which counts the total number of daily clicks on the page, because the ultimate goal of the FPPs is to engage the largest number of members possible, while the importance of the individual level of engagement (i.e. the number of a user's clicks) is secondary.

Another considered parameter is 'page impressions', which counts the daily number of appearances of any content related to the page anywhere in Facebook. But, since impressions are considered 'items' and not 'users', they are a less accurate assessment of the FPP real 'numbers'. For example, an FPP may publish many posts the same day, thus increasing the 'impressions', while the number of members reached stays the same. Moreover, 'impressions' does not measure the level of engagement, merely the visibility.[40]Therefore, following those considerations, the daily FPP level of activity is represented only by the 'page engagement' variable.

3.3.2 'Media coverage'

For the representation of the 'media coverage' a variable was created which includes the daily number of media items in all mass media: radio, TV, newspapers and news websites. Although data was collected on media item's rating as well, the option of weighting the items by rating was discarded for simplification, and to avoid miscalculations of the overlapping between different media. Because item rating is assumed to be distributed normally, the non-weighted items are expected to be accurate enough as a proxy for the level of exogenous visibility.

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[37] Facebook has no documentation for the Insights, other than some FAQs, with oversimplified and ambiguous answers (https://www.facebook.com/help/336893449723054). Therefore, a combination of unofficial documentation gathered from various websites, crosschecking and different calculations were needed to discover the exact meaning of the values.

[38] The complete glossary, including name conventions, and operational definitions for the Insight variables, is included in Appendix 5.

39 The actions that are counted as 'page engagement' are: liking a page, posting to a page's timeline, liking, commenting on or sharing one of the page posts, answering a posted question, responding to a page event, mentioning the page, tagging the page in a photo, and checking in at the page location.

[40] The 'impressions' parameter is related, to some extent, to the idea of 'media storm' by exposing the members to the same content several times a day. But, since all those items are coming from the same source (the page owner), the validation power of the repetition is weaker.

3.3.3 'Posts'

As indicated above, during the preliminary tests it became evident that page posts have more explanatory power as generators of engagement, rather than merely as an act of engagement with the page. Publishing a post as an act of engagement has a value of 1 'unique user' engagement. On the other hand, the event of publishing a post generates a wave of organic visibility that is assumed to raise the FPP level of engagement. Therefore, publishing posts is treated as an external event (generated by the page owner), and is included among the explanatory factors of the FPP level of activity. The posts were codified in a dummy variable, instead of counting the daily number of posts, because multiple posts published on the same day are not expected to multiply the number of unique engaged users.

3.3.4 Other parameters

Although 'engaged users' is the main parameter of activity, other parameters were included in the descriptive section of the results chapter. The first parameter is 'viral visibility', which represents the FPP power to gather attention thanks to the action of other members. The second, 'organic visibility', represents the FPP capacity to gather attention[41] independent of the member's level of engagement. This includes notifications that Facebook sends automatically, and users who reach the FPP by their own initiative (i.e. after hearing about it in the mass media, by clicking an external hyperlink, etc.). When possible, these two types of organic visibility are shown separately. The third parameter is 'lifetime total likes', which represents the total number of FPP members, whether active on the page or not. Finally, 'daily new likes' represent the FPP's power to recruit new members[42].

3.4 Periodization

FPPs, like other temporal phenomena, have a beginning and an end. The FPP's beginning can be determined by the page's creation time. But the end of a protest is a more complex issue. Facebook pages do not expire automatically; if not intentionally deleted, a page may continue to exist as long as Facebook exists. But for the matter of this thesis, an FPP with zero engagement, zero new likes and no new posts is a dead protest. Protests must show sustained action over time as a prerequisite to stay in the public agenda and influence policy makers. After analyzing the most successful FPPs, it was found that they stop recruiting new adherents after three weeks, and reach close to zero activity after five. Therefore, to give a safety margin, the three FPP cases were followed for the first seven weeks (49 days) after their creation, a time span wide enough to encompass their full development while still not over-flattening the regression lines' slope.

3.5 The Case Studies: Descriptive Analysis and Hypotheses Testing

The first part of the study consists in a descriptive analysis of the three cases. The five parameters of FPP activity are described and analyzed. A comparison between the dynamics of each case is then conducted to discern between types of FPP activity patterns. Next, the

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[41] Is noteworthy that a 'visibility' does not mean getting attention, but visibility is a precondition for attention (see fig 1).
[42] For definitions of the terminology used in this section see the glossary in Appendix 5.

exogenous visibility of the cases is described, and its sources are analyzed to assess the extent of media coverage influence on FPP engagement level.

The second part consists of testing the hypotheses and proposed model of FPP activity. As indicated above, the hypotheses test the relationship between the FPP parameters of activity and are the basis for the proposed model. All correlations between parameters are calculated with the Pearson Coefficient test. All the data, unless explicitly indicated, is taken from Facebook Insights. Finally, the proposed model is tested and the results analyzed.

Chapter 4: Results

In this chapter the hypotheses and proposed model are tested. First, the cases are briefly presented in a descriptive analysis. Next, the results for the hypotheses tests are presented, followed by an interpretation. Finally, the model for the estimation of FPP level of activity is tested, and the results discussed.

4.1 Overall Dynamics: the Five Parameters of FPP Activity

Looking at the overall dynamics of the different parameters of FPP activity over the 49 days covered by this study allows for a general picture of the FPPs' stories. Looking at the total and new members in Fig. 4, it becomes clear that there are two types of dynamics. The number of members of Rahav and Nachlawi rose fast the first few days, and then completely stagnated for the remainder of the duration. Monsanto had a short acceleration during the first days, and escalated moderatly until day 40, when it began to stagnate as well too (although it never completely stagnated). It's also noteworthy that although Nachalwi's members outnumber Rahav's four times to one, both protests entered the stagnation phase almost simulataneounsly.
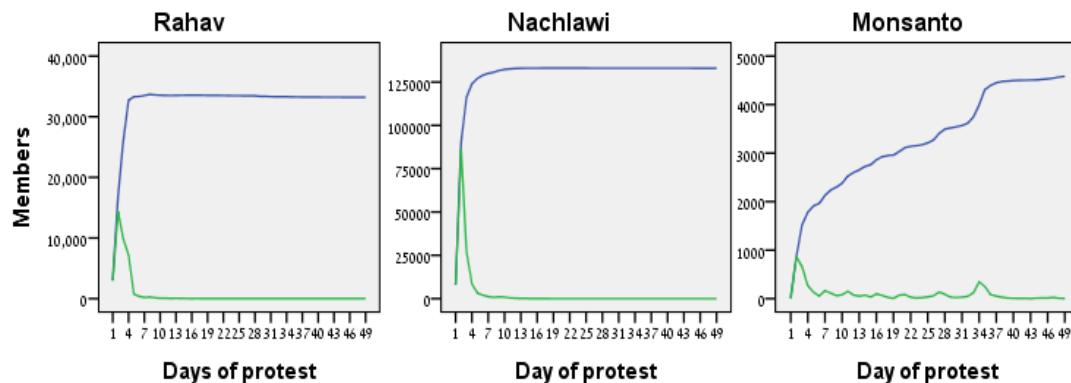
Figure 4

When looking at the dynamics of viral and organic visibility (Fig. 5), two major trends are visible. First, Rahav and Nachlawi's[43] viral visibility was much higher than their organic visibility during the first days only, after which the organic visibility was higher.[44] Second, Monsanto's viral visibility was higher than its organic visibility for all 49 days. Since viral visibility is produced by members' engagement, while organic visibility depends on the total number of members, an FPP with a high level of engagement can compensate for a lower number of members. Indeed, although Rahav had ten times more members than Monsanto, they had almost the same total visibility thanks to Monsanto's relatively high-level member engagement. In addition, Monsanto's viral and organic peaks were more correlated than in the other cases. This will be analyzed in the next sections.

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[43] As described in the data collection section, some of the 'Nachlawi' data is available only for the first two weeks. When the partial data is of interest, it's shown despite of the missing dates.
[44] Note that the Y axes are in power scale of 0.5 for better readability.
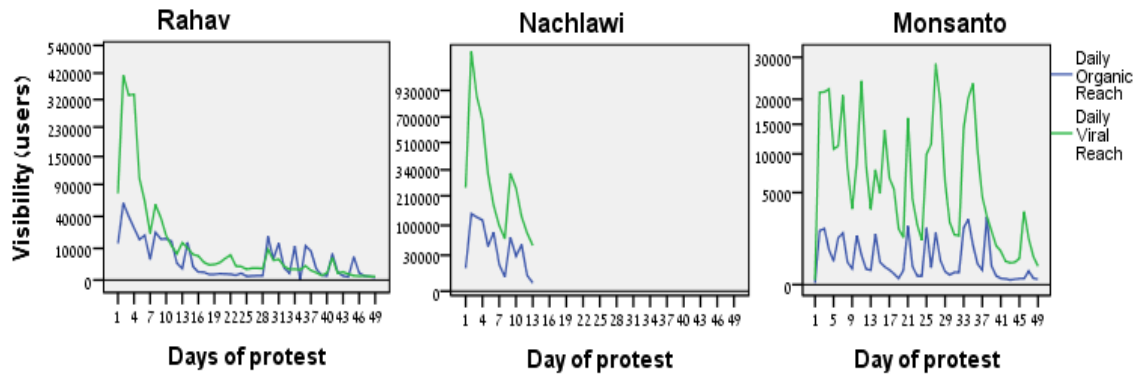
Figure 5

Finally, the level of engagement, like all other parameters, shows a different pattern in Rahav and Nachlawi than in Monsanto (Fig. 6). In Rahav the first very acute peak was followed by a series of much smaller peaks surrounded by areas of very low engagement. In Monsanto the pattern is much more fluctuant, with the highest peak on the day 28 of the protest. Once again, despite the fact that Rahav had more members than Monsanto, Monsanto's absolute level of engagement was higher for most of the time.[45]
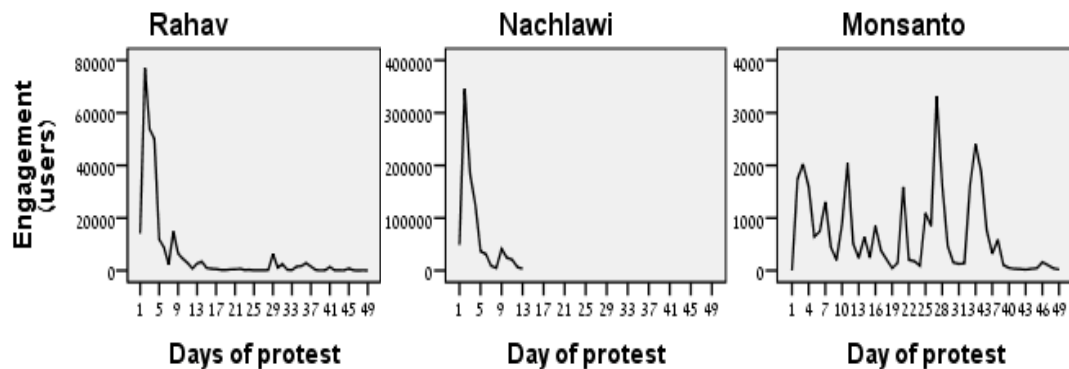
Figure 6

To conclude, the overall dynamics of the five parameters show a general decay tendency over time. In the cases of Rahav and Nachlawi there was an acute peak the first days, followed by a fast decay into low levels of activity. In the Monsanto protest, although the average tendency was one of decay too, the parameters were much more volatile for the entire period, showing recovery peaks even deep into the fourth week of protest.

4.2 Exogenous Visibility

Exogenous visibility is the FPP's visibility gained through any media other than Facebook. The main source of exogenous visibility is mass media coverage. Other types include alternative news websites, blogs, email, and word of mouth. Each of the three cases received a different amount of media coverage. 'Nachlawi' received a total of 126 media items during the first eleven days of protest, with a maximum of 61 items in the third day of protest. Rahav was covered by 30 media items during the first four days of protest, with 13 items on the second

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[45] Data about Nachlawi engagement is missing after week 2.

day. Monsanto, in contrast was covered by the mass media only once, on the day 20 of the protest. In both the Rahav and Nachlawi cases, the FPP's coverage produced a 'media storm'[46] by reaching over 80% of the mass media share share for at least two subsequent days.

To assess the power of mass media coverage to generate visibility, it is useful to put the FPP's endogenous reach in perspective. Endogenous visibility – the sum of viral and organic reach – in the Nachlawi case reached a peak of 1,338,317 users on the second day of protest. That same day, the aggregated TV coverage had an approximate reach of 1,652,000 viewers.[47] Although Facebook does not provide an account of the FPPs' total exogenous traffic, it is possible to look at some indicators of exogenous visibility influence on the FPP activity level.
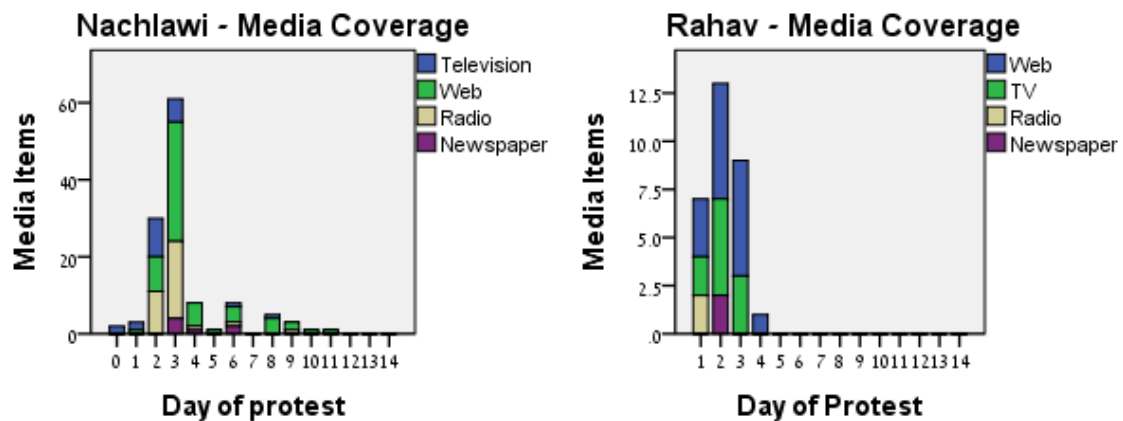
Viral reach is the main source of endogenous visibility, but viral visibility is created only when users engage with the page. These users in turn had to have been reached by the page visibility in the first place. So where does the chain of viral visibility begin?

When a page is created it has zero visibility. One of the owner's options to increase visibility is to invite his personal Facebook friends to like his page (only friends can be invited). Those among the owner's friends who accepted the invitation will be the first generation of page members. When they like the page, notifications are sent to their friends,[48] creating the first generation of virally reached users. The owner's second option is to spread notice about the new page though alternative media, such as email, word of mouth and mass media. Some of the Facebook users who are reached exogenously will look for the page and engage with it. Their engagement also creates viral visibility, because their friends will in turn receive notifications about their engagement with the FPP. Therefore, when looking at the viral reach data provided by Facebook, it's impossible to discern which 'seeds' are of endogenous

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[46] For a definition of media storm, see Section 1.2.3.

[47] This approximation is calculated by matching the TV items covering the Nachlawi incident on April 30, 2014 (as provided by Yifat company), with the rating of the TV shows in which those items were broadcast (provided by the Israeli Audience Research Board). For detailed information about rating sources, see Appendix 2.

[48] Not to every friend. The notifications are mediated by the Facebook algorithm.

origin and which are exogenous. Moreover, because the viral reach counts unique users and not instances of reach, viral reach from both origins may overlap.

Although the exact figure is not provided by Insights, Facebook does provide a clue to the extent of an FPP's reach from exogenous origin by documenting the users who reached the page by clicking on an external website link. In the Rahav case, 10,834 users reached the FPP from an external link during the first seven days of protest. In the same period the Nachlawi page received 23,336 users from external websites. It's noteworthy that although not every user who reached the FPP exogenously necessarily became a member, the fact that he actively pursued the page –as opposed to the passiveness of viral reach – is a higher signal of commitment. Moreover, this is the place where the validation power of mass media operates. A user who was reached by the FPP through the mass media, which bears the reputation of being able to discern what's important, is expected to be more prone to consider the FPP an enterprise worth his attention and support.
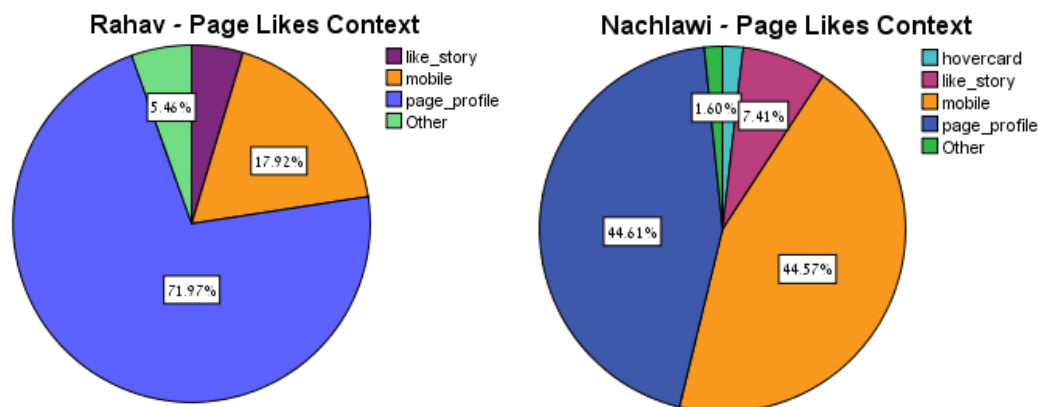
Figure 8

An additional indication of exogenous visibility can be found in the context where the page was liked. On the Nachlawi page, 44.61% of likes were clicked on the page itself, while 7.41% were clicked on a story on the user's News Feed. On the the Rahav page, 71.9% clicked like of the page itself, while 4.65% clicked on a News Feed story. Unfortunately, Facebook's Insights includes all likes generated from mobile into one category, regardless of the context. But, given that the distribution among mobile likes is similar to the general distribution of likes, it can be ascertained that a large majority of the users became members by liking the page itself. This is not to state with certainty that they reached the page exogenously (as opposed to virally), but it does mean that the option is plausible for a high percentage of the total likes.

A last sign of exogenous visibility can be traced by observing the organic reach provided in Facebook's Insights. Facebook defines organic reach as the number of people who visited a page or saw the page or one of its posts in the News Feed. The number can include both visitors who liked the page and those who did not. This description aggregates two types of visibility of a different nature. On the one hand, users who "saw your Page or one of its posts in news feed" (passive type) which can only be page members (only members receive page

notifications in their news feed[49]). On the other hand, users "who visited your page" (active type), which may be non-members who reached the page upon exposure somewhere else (ex: a user heard about the page in the workplace, and searched for it in Google). Since the 'passive type' of organic reach can only reach members, if the total organic reach of both active and passive members is greater than the number of page members, there is a presence of active type organic reach. In both the Rahav and Nachlawi cases, organic reach outnumbered the number of members during the first days of protest (see Fig. 9). This means that under the organic reach variable, regarded as endogenous by Facebook, there are cases of exogenous reach as well. Since not every member is reached organically, due to the intervention of the Facebook algorithm, the number of exogenous cases may be nontrivial.
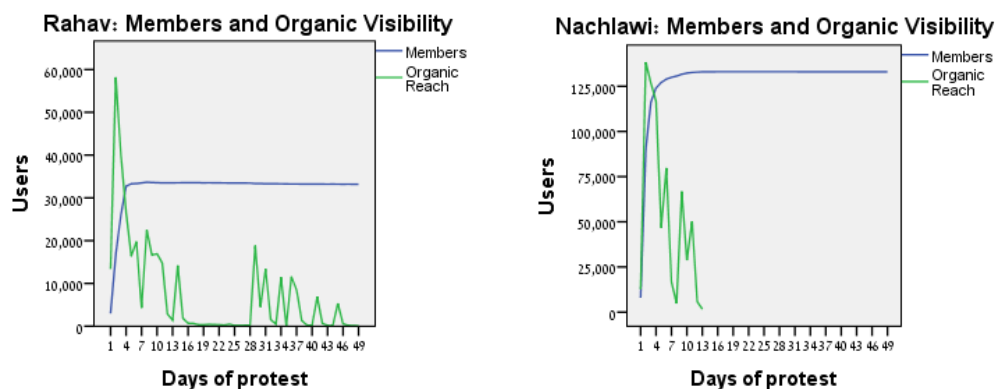
Figure 9

It could be claimed that the protests' early success was due to novelty rather than due media coverage. However, such a claim contradicts the finding that most FPPs never receive significant attention,[50] even during the first days post-creation.

Directly testing the validation power of media coverage and its influence on an FPP's activity level is beyond the scope of this thesis. Yet, is interesting pointing out the fact that mass media coverage is consistently reported in FPPs' posts. In the Rahav case, for example, seven posts were devoted to report mass media coverage. Those seven posts, about 10% of the total, received an average of 539 likes, above the general average of the posts. However, those media items do not provide new information to the page members. The links to media items are attached under comments such as 'See what they wrote about us', or 'here's another item talking about us'. Although an in-depth content analysis is needed to statistically confirm the findings, it seems that FPP's exhibit the media items as a proof of worthiness.

To conclude, it is beyond the scope of this thesis to empirically measure the exact amount of page engagement gained through exogenous visibility. Still, three conclusions can be drawn. First, the absolute amount of exogenous visibility through mass media outnumbers the

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[49] Users who are not members may receive a notification about a friend's engagement with the page in their News Feed, but Facebook counts those cases as viral reach.
[50] Of 730 FPPs in Israel, less than 5% got more than 1,000 likes. (See Appendix 4 for details about the preliminary test.)

endogenous visibility. Second, some of the viral visibility may be originated in exogenous 'seeds'. Third, there are strong indicators that part of the likes were originated in users reached exogenously. Finally, in the three cases FPP's are aware of media coverage, and exhibit on their posts.

4.3 Viral Reach, Organic Reach and Engagement

Hypothesis 1 claims that the viral reach is expected to be highly correlated to the level of engagement. The reason both values are expected to be highly correlated is the 'social' character of Facebook virality. If 'classic' virality is based on the will to share valuable items with peers, Facebook virality is generated by every action performed inside its environment. The user does not need to actively share an item to create viral reach; everything he posts, likes, comments on, responds to, or tags is reported to his friends. Therefore, the level of FPP engagement, which includes all those actions, is expected to correlate with the level of viral reach. In the Rahav case a correlation of 0.990 is found, while in the Monsanto case the correlation is 0.957 (both correlations significant at the 0.01 level). [51] Therefore, Hypothesis 1 is confirmed in both cases.

Hypothesis 2 claims that viral reach is more closely correlated to organic reach than to the total number of members. The underlying idea is that although classic virality is generated by human agency, in the case of Facebook the platform itself has more influence on the level of viral reach than the amount of FPP members. The correlation test shows that in Rahav and Monsanto, viral and organic reach are highly correlated, while the total number of members is poorly correlated to both. Looking at the coefficients of correlation, the intervention of Facebook's algorithm can be seen clearly. The more steps away from the viral reach (see Model 1), the less correlation; viral reach is most correlated to 'engagement', then to 'organic reach' and lastly to 'total members'. Therefore, Hypothesis 2 is confirmed in the Monsanto and Rahav cases. This is not to say that the total number of members has no influence on the viral reach, as it is certainly generated by members' engagement with the FPP. But, the members' effort is filtered twice, so the output (viral reach) is more dependent on the filters (Facebook algorithm) than on the original signal (number of members).

4.4 Posts and Engagement

Hypothesis 3 claims that 'engagement' is positively correlated with the publication of new posts. A correlation of 0.845 is found between the two (see Table 2) in the Rahav case, while in the Monsanto case a correlation of 0.305 is found. The underlying idea behind the hypothesis is that the notifications sent to the FPP members upon the publication of the post work as a reminder or 'call to action'. The correlation between posts and engagement confirms the intuition that even members who are not active on a daily basis in the FPP will engage with the page when they have the opportunity to do so (e.g. in their own News Feed). The difference between the levels of correlation in the Monsanto case indicates that members do react to the publishing of new posts, but are also engaged in between posts. This shows a higher level of 'active engagement' as opposed to the 'reactive engagement' seen in the Rahav case.

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[51] For a detailed report see Appendix 6
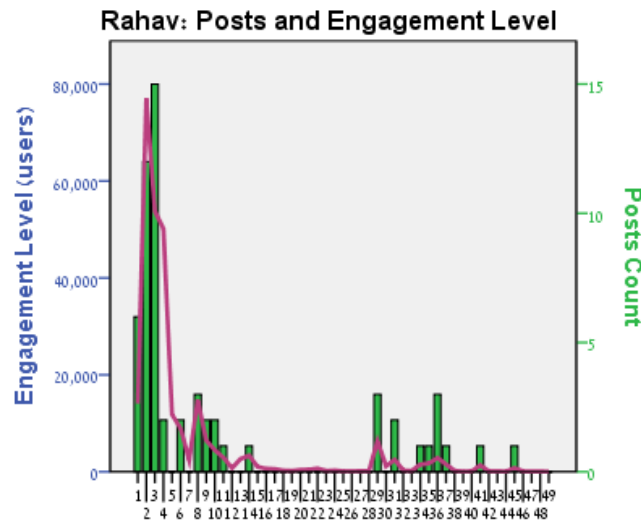
Figure 10

Table 2: Engagement and posts correlation		Daily Page Engaged Users	Daily Posts Count
Daily Page Engaged Users	Pearson Correlation	1	.845
	Sig. (2-tailed)		.000
	N	49	49
Daily Posts Count	Pearson Correlation	.845	1
	Sig. (2-tailed)	.000	
	N	49	49

4.5 Attention Decay and Declining Engagement

Hypothesis 4 states that although the publishing of a new post generates engagement, the overall level of engagement is expected to decrease over time due to the 'corrosion' of attention decay. The hypothesis is confirmed (see Fig 11). Monsanto's level of engagement is very fluctuant (R^2=0.091), and as stated before, showed a good recovery on day 28 of protest, while Rahav's engagement remained in a state of stagnation most of the time (R^2=.260). The overall tendency in both cases is one of engagement decrease over time.
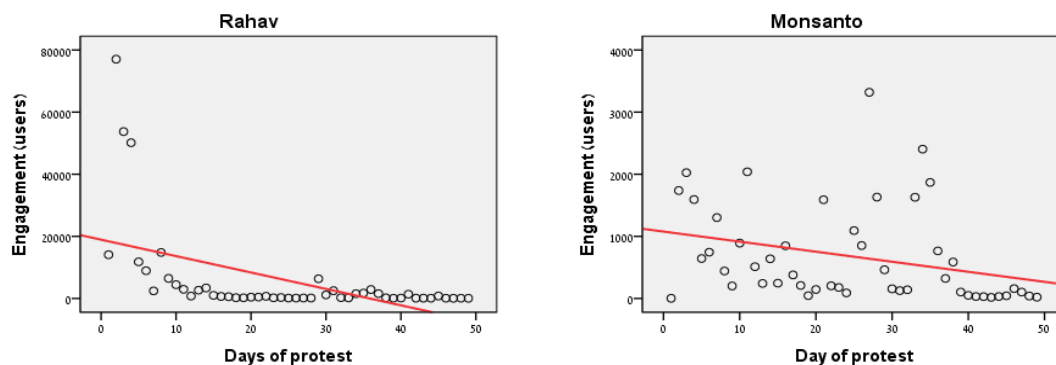
Figure 11

Hypothesis 5 claims that the corrosive power of attention decay will first 'peel off' the less committed members, and therefore the pool of members who engage with the posts is expected to be concentrated to a recurring kernel of committed members. One sign of FPPs'

vitality is their power to engage new adherents. For a better illustration it is useful to think about protest meetings. Even if the number of attendees does not grow, it is of interest to see how many of them are new. In the Rahav case the proportion of new members was as high as 80.33% on the first day[52] of protest, but dropped to 33.98% on the second day, and continued to decrease all the way down to 4% in the last posts. This confirms the hypothesis that the population of engaged members not only decreases in absolute numbers (less members are engaged), but also among the members themselves (less engaged members are new). In the case of Monsanto, as in other aspects the tendency is less clear. Although the proportion of new engaged members did decrease, even in the last posts half of the engaged members were new. Moreover, the absolute number of engaged members converged towards the end of the period, despite Rahav's advantage over Monsanto in total number of members.
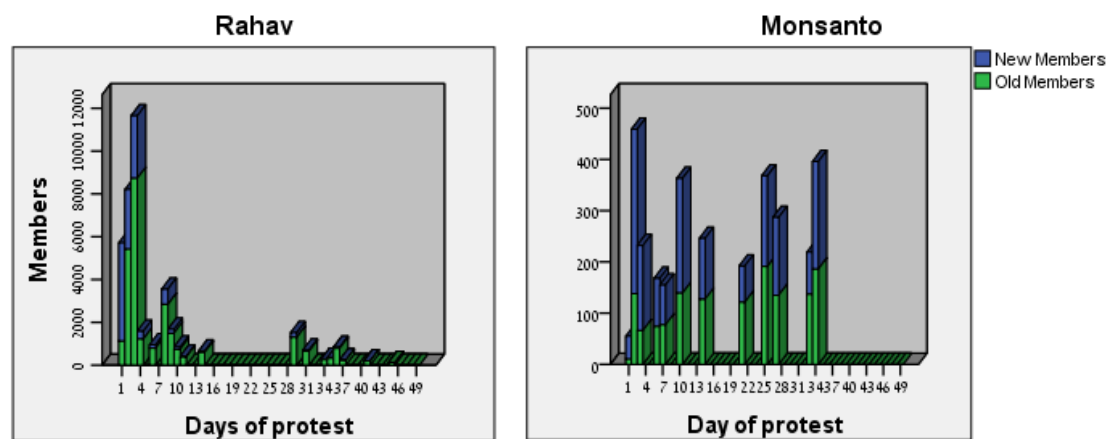
Figure 12

4.6 The Dynamics of FPP Activity

In this section the proposed model is tested and the results analyzed on the basis of the hypotheses. According to the research hypotheses, the dynamics of FPP activity are influenced by mass media coverage and the publishing of new posts, and attention decay is represented by the days of protests since the creation of the FPP.

Because the data provided by Facebook Insights is on a daily basis, it poses a dilemma regarding the temporal coding of the independent variables. On one hand, it is preferable to lag the independent variables by one day (t-1), to avoid directionality problems. On the other hand, in the Facebook environment, where reaction times are short, some of the results of the independent variables' effects occur within the first hours, before the end of the day. To cope with the problem, two versions of the model are tested.

The more conservative Model 1 introduces lagged independent variables only. Therefore, the directionality problem is diminished, at the price of failing to encompass the full effect of media items and posts on engagement. Model 1 of FPP's level of activity is stated as:

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[52] Because on the first day of protest more than one post was published, the recurring members after the first post are already "old members"

$$ENG_t = \beta_0 + \beta_1 MEDIA\_ITEMS_{t-1} + \beta_2 POST_{t-1} + \beta_3 t + u_t$$

Where ENG is the FPP's level of activity (represented by the 'page engagement' variable), MEDIA ITEMS is the level of media coverage, POST is the presence of a new post, and t is the day of protest since FPP creation.

The second version, Model 2, includes the media items and posts in both original and lagged time (t and t-1):

$$ENG_t = \beta_0 + \beta_1 MEDIA\_ITEMS_{t-1} + \beta_2 MEDIA\_ITEMS_t + \beta_3 POST_{t-1} + \beta_4 POST_t + \beta_5 t + u_t$$

It is assumed that the chances of mass media to react to changes in the level of engagement are much lower than the opposite. Mass media, especially TV and newspapers, have slow reaction times, especially regarding non-urgent news. Therefore, in the presence of correlation between media items and engagement, the highest likelihood is that mass media is influencing the level of engagement and not the opposite.

Regarding posts, although the reaction time in Facebook is faster than mass media, the chances that thousands of FPP members will suddenly engage with the page, triggering a reaction from the page owner in the form of a post, seems improbable. Moreover, in most of the cases posts were published after days of nearly zero engagement. Therefore, in the case of correlation between posts publishing and engagement, it will be assumed that the notification sent after the publishing of posts is what influences page engagement.

Model 1: Results

Model 1: Page engagement (conservative model)			
	Rahav	**Nachlawi**	**Monsanto**
Media Items (t-1)	4935.713 (.000)	511.724 (.667)	762.630 (.118)
Posts (t-1)	656.138 (.752)	33141.029 (.305)	736.217 (.004)
Days of Protest	-193.121 (.010)	-7449.908 (.013)	-9.965 (.186)
Constant	7286.141 (.003)	103883.181(.016)	724.426 (.004)
F	67.751 (.000)	4.569 (.016)	7.043 (.001)
Adjusted R^2	.862	.349	.278
Observations	49	21	49

In Model 1, as expected, *Media Items (t-1)* and *Posts (t-1)* have positive influence on engagement, while the influence of *Days of Protest* is negative. By Rahav,, which got the highest *Adjusted R^2* score of .862, the independent variables are all significant, but *Posts (t-1)* has a low significance level (.752). This was expected to happen in Model 1, where the effect of posts is measured the following day. As noted above, in Facebook environment were users are notified immediately about page events, much of the effect is expected to happen

on the day of publishing. When comparing the influence of both media items and posts, is evident that the media items' influence is several times higher than posts' influence.

Regarding Monsanto, while the directions of influence are the same as Rahav, a different pattern is seen. First, *Media Items* (t-1) and *Posts (t-1)* coefficients are similar. Although Monsanto was covered by only two media items, the significance is relatively high (.118). Because of the low media coverage, Monsanto's posts get a greater role in explaining the engagement, despite their lower visibility in comparison with media items. The main finding is that the days of protest have little and insignificant negative influence on the engagement. This may be related to the relatively low visibility of the Monsanto FPP, which may contribute to a slower process of viral diffusion. In contrast, due to Rahav and Nachlawi's high level of visibility, a great proportion of the potential adherents were exposed to the FPP during the first days, thus more quickly exhausting the 'non-exposed' population.

In the Nachlawi case the directions of influence are also as expected, but the scarcity of cases (n=21) result in insignificant *Media Items (t-1)* and *Posts (t-1)* coefficients. In these three cases, the absence of media coverage led to the new posts becoming the main factor of influence on engagement.

Model 2: Results

Model 2: Page engagement (Comprehensive model)			
	Rahav	Nachlawi	Monsanto
Media Items	2409.587 (.000)	2593.715 (.022)	1061.193 (.004)
Media Items (t-1)	3218.745 (.000)	-377.873 (.707)	529.149 (.132)
Posts	3155.177 (.043)	39145.552 (.213)	956.167 (.000)
Posts (t-1)	894.316 (.554)	41220.865 (.188)	818.762 (.000)
Days of Protest	-107.271 (.052)	-4112.877 (.104)	1.662 (.768)
Constant	3469.287 (.063)	32376.319 (.445)	153.650 (.426)
F	86.745 (.000)	6.548 (.002)	17.323 (.000)
Adjusted R^2	.899	.581	.635
Observations	49	21	49

Model 2, which takes into account the *Media Items* and *Posts* influence on engagement on the same day (*t*) and following day (*t-1*), shows higher *Adjusted R^2* scores in the three cases. Rahav's general tendencies remain the same as in Model 1.*Media Items* remains significant (.001) in both *t* and *t-1*, confirming its high influence on engagement level. *Posts (t-1)*, which were insignificant in Model 1 (0.752), remain insignificant in Model 2 (0.554), but *Posts* influence on the same day (*Posts t*) are statistically significant (0.43). This confirms the assumption that a big portion of page members react to posts on the same day, and their inclusion improves the model's prediction power.

Monsanto enjoys a major predictive improvement by including *Media Items (t)* and *Posts (t'* in the model. All coefficients are significant, except for *Media Items t-1* (.132) and especially Days *of Protest* (.768). In Monsanto, unlike in the hypotheses claims, time had a positive (although insignificant) influence on engagement. This result confirms the assumption that in cases of FPPs with low visibility, the negative effect of time on page engagement is less pronounced. This could be because the visibility potential is not exhausted by mass media, therefore leaving room for the viral visibility to act.

In the Nachlawi case, just like in Model 1 the coefficients are insignificant, with the exception of *Media Items*. Because Nachlawi's data includes only the first 21 days of protest (which began with five days of intensive media coverage), the relative weight of *Media Items* is higher than in other cases. This may explain the significance of *Media Items (t)* and the increase in the model's overall power of prediction (.581).

In conclusion, Model 2 has more predictive power in all three cases. The best explanation can be found in the inclusion of the effect of *Media Items* and *Posts* on engagement the same day they occurred. In all cases, the coefficients with high statistical significance behaved as expected: *Media Items* and *Posts* influence positively on page engagement, while *Days of Protest*'s influence is negative. In the cases with high level of media coverage (Rahav and Nachlawi) the influence of media items was stronger, while in regards to Monsanto, posts played a more important role in explaining page engagement.

Despite the fact that in Monsanto time did not negatively influence engagement, the general tendency was one of activity decay. Since the total number of Monsanto members was below 5,000, the protest did not show good chances of success in terms of political power. In the Rahav and Nachlawi cases, the publishing of new posts were far from reaching the level of activity achieved during the first days, under mass media coverage. Therefore, despite the relatively high numbers during the first days, Rahav and Nachlawi likewise did not show good chances of success after losing the momentum of the media coverage.

Discussion

5.1 Main Findings and Interpretation

The main goal of this thesis was to assess Facebook as a platform for grassroots protests, specifically examining the factors which determine the dynamics of FPP activity on time. Based on the literature it was hypothesized that some Facebook platform's characteristics may hinder an FPP's ability to generate and sustain collective action, especially in the context of an increasingly information-saturated environment. The thesis focused on two factors – visibility and validation – that are preconditions for the generation of sustained engagement. The results of the various tests and the proposed model provide support for the hypothesis that, given the factors enumerated above, an FPP may fail to reach high visibility without the help of mass media coverage. Furthermore, even in its presence, the FPP may fail to sustain the level of activity once the media coverage ends.

On the descriptive level, the analyses of the FPP's dynamics in the three cases show a consistent tendency of decay in all parameters: visibility, recruitment and engagement. Where there is media coverage the tendency is more pronounced: the high level of activity during the first days of protest ends almost immediately once the coverage is gone. But the fact that an FPP without media coverage has a less pronounced decay curve is not a sign of vitality. Monsanto's relative stability in the parameters is due to its lack of success in reaching enough visibility. A page which at its peak was seen by 23,000 users, yet had less than 3,000 engaged, is invisible in terms of public agenda. A page could, in theory, grow slowly for a long period until reaching great popularity, but this was not the case for Monsanto. Despite the recoveries, its general tendency was negative. This supports the basic assumption that, in the absence of external events – such as media coverage – the general tendency of the FPP's activity level is one of decay, because of the constraints of attention scarcity.

In the analysis of the FPP's exogenous visibility, many indications were found which support the hypothesis that media coverage is a major source of FPP visibility. Furthermore, as expected from theory, evidence of the mass media validation power was found as well. Whether FPPs seek media coverage, or mass media finds the protest issue, the result is the same: while the FPP is under the warm lights of the mass media their parameters of activity grow exponentially, but the minute the coverage is gone, they drop to a state of deep stagnation. This finding calls for a short observation about the relationship between events and their representation in the media, specifically in the context of the public sphere. It could be argued that mass media does not influence FPPs' activity level, but rather both media coverage and FPP activity are influenced by a third, external factor: the event itself. For example, one could argue that Nachlawi got more media coverage and FPP activity than Rahav because the Nachlawi incident was 'bigger' than Rahav. This argument's pitfall is that the perception of the incident's 'size' is already mediated by mass media. Ultimately, neither Nachlawi or Rahav would reach the public opinion without the help of the mass media and new media diffusion power. If the media had ignored them it is likely that the public would never have heard of them (like millions of other events which are never reported and never gain publicity). Another argument could be that Nachlawi was more significant politically, and therefore received more media attention and FPP activity than Rahav. However, once

again the allocation of media attention is barely correlated to the 'seriousness' of the issues.). To speak of the 'size' of an event, detached from the way it is portrayed in the media, implies a misunderstanding of the adoption of mass media in the public sphere. This has nothing to do with the social significance of events, but rather with the way the public allocates its attention to different issues. Both in relative and absolute values the mass media is a main source of visibility for FPPs, to the extent that it raises questions about FPPs' ability to reach the public agenda without the presence of mass media coverage.

The correlations between the different parameters of visibility and engagement exposed a complex system of information diffusion. To the extent of the knowledge at hand, this is the first attempt to systematically describe and analyze the Facebook diffusion mechanism in terms of visibility creation. The findings allow for a better understanding of visibility influence on page engagement. First, the organic visibility, which becomes an increasingly dominant source of visibility as days of protest pass, was found to be independent from members' engagement. This guarantees a minimum level of visibility for the FPP, even in the absence of member activity. However, for this is not an indication of FPP strength, but simply a result of the platform's automatic feature. Second, once media coverage ends (in the cases where media coverage was present), the FPP's engagement level becomes highly correlated to the publishing of new posts. These two findings lead to the conclusion that the FPP's activity level, in the absence of media coverage, is explained by the interaction of new posts and automatic notifications sent by the platform. Thus, the nature of most of the page engagement is reactive to the notifications, and does not demonstrate a high level of determination. If so, many of the FPPs which keep showing relatively high level of engagement may be just an echo of protests whose members have already lost interest in it.

Another finding was the confirmation of the Facebook algorithm's intervention in the diffusion power of FPPs. Although Facebook encourages user engagement by notifying them of their friends' interaction with pages, those interactions are reported only to a small portion of the users' friends. When the FPP owner publishes a post, he cannot be certain who will receive a notification about it. On the contrary, there is the certainty that only a few members will be notified. The algorithm intervention may make for a more user-friendly experience, but from the FPP's point of view it's a serious obstacle for intra-member communication, a basic need of any protest. As long as the FPP gets visibility from exogenous sources (e.g. media coverage), the effect of this limitation is diminished. However, once the FPP is left to produce visibility on its own, the algorithm poses a great obstacle to Facebook as a tool of protest organization.

The Facebook algorithm not only interferes in the FPP communication with its members, but also constricts the FPP's overall visibility. Facebook's diffusion power lies on the connective nature of its structure. Therefore, while FPP viral visibility is potentially enormous, in reality it is far below potential, because of the algorithm intervention For example, Rahav has about 33,000 members. The average number of a user's Facebook friends is 359.[53] Upon publishing a new post, even if only 10% of the members had engaged with it, the viral reach should

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[53] Pew Institute 2014.

have been 1,184,700 unique users.[54] In reality, at its peak Rahav's viral visibility reached only 440,000 unique users. As described in the results chapter, a reach of 400,000 is equivalent to an average news broadcast on a medium-size Israeli TV channel. Media coverage outnumbers by many times the total level of endogenous visibility Facebook produces. This raises questions about Facebook's recruiting power of a politically significant number of adherents without the support of exogenous visibility.

The model's test results support the hypothesis that the general tendency of FPP activity is negative, unless positively influenced by media coverage new posts. Although both factors have positive influence, the nature of the influence is different. Posts published by the page owner act as reminders of the page's existence. Therefore, they restrain the general tendency of decay by generating punctuated peaks of attention. But because most of the visibility they produce is among members, the new posts do not help to recruit new ones. New posts could theoretically produce viral visibility, and so expand the FPP reach to potential adherents, but as seen in the previous findings, the member engagement with posts decrease over time, and the members involved with them does not renovate.

Media coverage, like new posts, was found to have positive influence on the FPP's level of activity. But, as opposed to new posts, media coverage is also highly correlated to the recruitment of new members. This, according to the thesis hypothesis, is thanks to the visibility and validation power of mass media coverage. The exogenous nature of mass media enables it to bridge above Facebook visibility barriers like network *homophilia*, algorithm intervention and chronological format of the News Feed.

In the cases of Rahav and Nachlawi, the media coverage was present during the first days of protest. Therefore, an alternative explanation for the correlation between the high levels of FPP activity during those days and the presence of media coverage could be the FPP novelty. Two findings, however, contradict this explanation. First, indications of FPP external visibility were found, including users who reached the page from external websites (a sign of interest and support to the FPP claims). Second, if novelty alone was enough to generate the level of recruitment that both cases reached, there should be additional cases of FPPs which reached high levels of recruitment in the absence of media coverage. But, as described in the methodology chapter, a special effort was required to find an Israeli FPP without media coverage that recruited more than 10,000 members. In the preliminary test conducted to find such a case, among the 730 FPPs found, only 0.04% received more than 10,000 likes. This two arguments support the assumption that novelty alone cannot explain Nachlawi and Rahav's high levels of recruitment. Therefore, if media coverage is the main factor which explains high level of recruitment, the FPP's power to expand its support basis depends on a factor external to Facebook platform.

Finally, although the general tendency of activity parameters is negative in the three cases, in the Monsanto protest the engagement level produced by the publication of new posts did not decay over time. This poses a challenge to the proposed model, which assumes that attention decay causes decay on the activity level. It must be that due to Monsanto's

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[54] This calculation is for illustrative proposes only. It does not include mutual friends, adverse selection of Facebook users or other factors which may affect the total viral visibility.

relatively low level of visibility, the page did not consume its total engagement potential during the first days. This explanation presupposes that there is a limited number of potential adherents who are activated by exposure to the FPP. If the assumption is correct, the level of engagement should be negatively correlated to the level of visibility once the repository of potential adherents is exhausted. This assumption is supported by the finding that once the engagement produced by the recruiting of new members ends the FPP's level of activity begins to decay. In the case of Monsanto the recruiting took longer because of its low level of visibility, and therefore the FPP activity level takes longer to stagnate. In Rahav and Nachlawi protests the mass media coverage boosted the FPP's visibility, thus quickly consuming the potential adherents' repository. As stated above, the fact that Monsanto sustained the level of activity longer than the other two protests is not necessarily a sign of FPP robustness. Monsanto never reached a significant level of activity, and since its general tendency is negative, the chances are that it will not recover from stagnation.

The direct implications of an FPP's general decay tendency predicted by the proposed model are that, in the absence of media coverage, FPPs will fail to reach public agenda. On the other side, because media coverage always ends eventually, FPPs that receive media coverage will decay once they are expelled from the public agenda.

5.2 The Role of Facebook as Mass Media

Besides the direct implications for grassroots protests, the findings in this thesis, together with previous research, may have theoretical implications regarding Facebook's role as mass media.

With the advent of the Internet, a new form of mass communication came to existence. From the perspective of the public sphere – where political debate takes place, opinions are formed and public agenda is set – it meant new possibilities of civic interaction. Therefore, any change in the conformation of the public sphere meant a change in the way these democratic processes are conducted. The question is, therefore, what role Facebook plays in the public sphere.

In this thesis, grassroots' protests ability to influence public policy was conceptualized in terms of their power to produce visibility and common knowledge. Visibility is essential for the creation of collective action, because visibility captures public attention, a prerequisite for action. Common knowledge is the social glue that holds individuals together and allows them to act collectively. These are the two pillars in which protests stand to show numbers and determination. A policy change is by definition a challenge to the status quo, and is therefore always comes at the expense of the other's interests. Therefore, even if the protest's power to generate collective action is never materialized, it must exist potentially. It is due to this power that the policy maker will consider a policy change or not. Visibility without common knowledge is just information; if individuals are not aware that others share their knowledge, such information has no political effect.

Mass media is able to generate high levels of visibility and common knowledge. This, as stated above, enabled mass media to inherit the traditional public sphere. But what is Facebook's role in that context? Does it expand public sphere? Replace it? Is Facebook even part of the public sphere at all?

At first sight the answer is straightforward: a media visible by billions of users cannot be but part of the public sphere. But this answer raises more questions about how Facebook generates visibility. First, although Facebook as a whole has a high level of visibility, such visibility is distributed among millions of pages. Second, that visibility is distributed unevenly, in a highly skewed fashion. For the majority of the pages the level of visibility is close to zero. In other words, the access to public attention is still out of reach for the great majority of pages. But even for the few pages that gain high visibility, the ability to reach the public agenda is still in question.

McCombs' definition of public sphere was adopted by this thesis due to its clarity and relevance to the world of public affairs. According to McCombs, the arena is at the center of the forum; its main characteristic is that everyone can see it and everyone knows that everyone else see it. Facebook has 1.32 billion monthly active users,[55]more than 10% of the world population, which makes it a central player in the world of mass communication. But to what extent does that visibility comply with the rules of the arena? Some of the platform characteristics raise questions about Facebook's aptitude to become an alternative arena. First, as opposed to a television channel or newspaper, a very popular page may be ignored by great portions of the population due to patterns of *homophilia*. Second, because some of the page's contents are 'tailor made' for the user, Facebook creates uncertainty about the unity of the message among members. Third, because of Facebook's algorithm intervention on notifications, a user who received a notification cannot know which other users were exposed to the same content. Fourth, users may be exposed to the same content at different times, breaking the unity of time. Finally, because the page content is diffused virally, each branch of the network depends on users' will to engage with it.

The common denominator of all five characteristics is a breakage of the unity of both time and space. The Facebook platform, from the user's point of view, is like a kaleidoscope, where forms and colors change with every click. The content each user is exposed to is unique (different from all other users) and temporal (it may change the next time he logs in). Each user sees a small and fragmentary view of the data kept by Facebook. For the regular user it's impossible to see Facebook from above, for Facebook has no geography, only a continuous apex of the 'now' and 'me'. The user can only see the shadows of this 'view from above', in the form of aggregators like the total likes and shares attached to items. These aggregators do permit the user to sense the presence of fellow users who have been exposed to the same content; he may look for comments, but users who comment are only a small minority. But, those are only numbers collected over time, and cannot create the sense of unity of time.[56]

This fragmentary characteristic discloses an essential truth about Facebook and other Web 2.0 sites: they are databases. There is no such a thing as a "page" or "profile" in the sense of a final, closed text, like a TV news broadcast or a newspaper story is a final text. This feature

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[55] Source: The Facebook Company Website (http://newsroom.fb.com/company-info/29.08.2014).
[56] Of course not all media must be simultaneously consumed in order to create common knowledge; newspapers can be read at different times and still create common knowledge. What makes newspapers different is that they are intended to be consumed within a determinate timespan (a day, a week). When a new edition is published, it renders the old one obsolete.

has many advantages: it allows creating a dynamic text which is reactive to user input, can adapt faster to changes and fosters interaction and collaboration between users. But on the other hand, all those characteristics undermine Facebook's ability to create common knowledge or, not less important, to be *perceived* as a medium capable of producing it. This makes the Facebook less suitable for the creation on collective action. This conclusion seems to be in contradiction to actual protests, some of them famous around the world for their incorporation of Facebook in the protest repertoire.

The issue in question here is not whether Facebook is a useful tool for protest organization political debate or publishing ideas. The question is whether Facebook, thanks to its worldwide prevalence and potential reach, is able to raise an issue to the public agenda on the scale of the mass media. Among the cases under study in this thesis, only those which received media coverage succeeded to reach public agenda. The research conducted in this thesis does not permit one to draw statistically significant conclusions from the results, but previous literature, and the finding of media coverage's positive influence on the FPP's dynamics, indicate that mass media provides at least part of the visibility and validation, which Facebook alone is not able to provide. While Facebook may help an issue enter to arena, and may be a place to discuss what's in the arena, but in the context of protests, is not an arena. For an item to reach the public agenda it must still be picked up by mass media.

5.3 Facebook, Public Sphere and Democracy

The findings in this thesis have also implications regarding the openness of political debate in modern democracies, the opportunities for collective action or popular demand for political transparency and responsiveness.

As stated many times in this thesis, the political power of the powerless resides in its ability to address the public agenda. In modern societies the mass media has replaced the traditional public sphere; therefore, access to mass media is a precondition to reach the general public. But mass media agenda is not easily reached. Due to its limited space there is constant competition for its focus. Since the media has its own interests (economic, political, personal, professional), only the appropriate ones will get its attention. The mass media in democratic regimes is not monolithic; some media channels are state owned, others private. In a healthy media market, when one medium supports one side of a conflict, it creates the opportunity for others to support the opposition, thereby restoring the equilibrium. But when the conflict is between the powerful – whether a government figure, mogul, or celebrity – and the powerless, there is a danger that economic and political interests will restrain the media from giving the powerless a stance in their agenda.

Many saw in the Internet a panacea for the bias of mass media: a powerful, open, worldwide, and cheap alternative medium. Today, however, the Internet is seen in a more critical and realistic light, both in the academic world and popular culture. Yet the 'Twitter protests' of the Arab Spring and other high-profile movements which used Web 2.0 as part of their protest arsenal, brought a new wave of enthusiasm regarding the their democratic opportunities, especially in the popular media. Recently scholars have begun to object this

utopia too. The findings of this thesis support this critical view of Facebook opportunities for civic life, especially in the context of popular protests.

First, it was found that although the Facebook potential visibility is huge, the actual visibility of most successful FPPs is barely comparable to the average TV show, while the majority of FPPs get close-to-zero visibility. Also, as written earlier, the Facebook platform constricts the FPP's potential visibility rather than expanding it, due to the intervention of its algorithm. For an FPP to reach the public agenda and recruit a significant number of adherents, it still depends on the mass media and its bias. Of course Facebook may be used as a springboard to get media coverage or as an information resource for the protest members, butthe critical task of breaking into the public agenda still falls on the mass media.

Second, it was found that the Facebook algorithm, by choosing which notification is sent to whom, creates gaps in the information sent to the different FPP members. From the member's point of view, the FPP visibility depends on different factors such as social ties, personal preferences and competing items loading at a certain time. Facebook content's 'custom-made' nature content generates fragmentation instead of common knowledge. The 'one size fits all' message of the mass media has many disadvantages, and has been criticized for being homogenous, conservative and patriarchal. But for all those disadvantages, it has the advantage of generating common knowledge, the basis for political debate. Both supporters and detractors have a common ground to share and discuss ideas. The tailored content of Web 2.0 sites fits itself automatically to the interests and needs of each user, generating both disorientation and fragmentation. It generates disorientation, because each user sees a different image of the public sphere, with different current issues, depending on his personal interests. It generates fragmentation, because since the content is created according to the individual idiosyncrasy, there is less knowledge held in common, which is a prerequisite for acting collectively.

Third, the results of the model support the hypothesis that, other things the same, time has a negative influence on the FPP level of activity. The implication of this finding is that the public attention given to FPPs always decays over time. In the context of grassroots protests, this means that FPPs are expected to fail in generating sustained action. Because attention is a precondition for engagement, once the attention decays the engagement level will decay too. Grassroots protests seek to raise the awareness about an issue in order to bring to a policy change. Because policy makers are responsive to numbers, if the issue stays in the public agenda for enough time, policy makers are expected to pay attention to the claims. But because policy change is always at the expense of other's interests, the policy maker may try to lower his profile and wait for the protest to vanish from the public agenda, especially if the protests claims are at the expense of his political allies' interests. Public agenda is the reflection of society's collective memory. If the public already forgot about a conflictive issue, there is a serious doubt as to whether it will be addressed by the policy maker, even if the claims were in the public agenda just a few days before and received public empathy. Because the mass media agenda is limited and the competition for its focus permanent, it cannot hold an issue for more than a few days, with the exception of a dramatic issue such as war or natural disaster. Even then, the media can hold the issue only if the dramatic factor continues to escalate.

As stated above, most of the issues covered by mass media have a much shorter lifespan. The traditional dependence of protests on mass media coverage imposed the timeframe on the protests, and therefore most protests failed because they were dropped from the media agenda too soon. Facebook seemed to bring a solution to that dependence by offering the protests access to a mass communication tool without the constraints of the traditional media. Once a page is created it will stay visible for every user who wishes to visit it or comment on it, so long as Facebook exists. But, in an information-saturated environment, the public attention will not stay for so long. Therefore, the chances are that the FPP will fall into oblivion, joining all other protests that briefly shined in the public agenda before vanishing forever.

5.4 Research Limitations and Future Research

This is, to the best knowledge, the first attempt to assess Facebook as a tool for grassroots protests from the point of view of the platform and its bias. Moreover, no literature was found containing a full description of Facebook's internal visibility mechanics and the interrelation between the different elements. This created the necessity to perform several preliminary tests and analysis to map the platform and to understand the data it provides. Because there was no previous research to rely on, some assumptions had to be made in order to be able to cope with the extension of the field under research. Future research will be able to fill the gaps and assess the assumptions.

There are some known limitations of this research. On the methodological side, the scarcity of successful Israeli FPPs required a case study methodology to be chosen, therefore weakening the generalizability of the results. Moreover, the three cases were selected as representative types of protests, but as no two protests are identical, a problem of selection bias may be present. It would be helpful to conduct a research on FPPs worldwide and collect a statistically significant number of FPPs. In this regard, this thesis must be understood as a first attempt to map and analyze the field of grassroots FPPs, and not a comprehensive study of the phenomenon.

Regarding the external validity, some of the special characteristics of Israeli protests (i.e. the limitation of the Hebrew language to gather support from abroad) must be taken into account. In addition, as stated before, this study focus on grassroots protests under democratic regimes. Dictatorial regimes pose a different set of challenges to protests, namely restrictions on the right of speech and the monopoly on mass media. In such an environment Facebook has other advantages and disadvantages than the ones exposed here.

Not all the results in the statistic tests are significant. In some cases this is due to the relatively small number of observations (n=49). In other cases the reason is that other factors that may influence the FPP activity level were overlooked in favor of the model's simplicity (e.g. day of the week, members' average age, competing events). This was made consciously for two reasons: first, to propose a generalizable model that is not too specific or local, and second, to better assess the universality of attention decay, which produces FPPs' activity decay regardless of other factors.

Another limitation of this research resides in the fact that members' attention, a core concept in this research, was tested by proxy, through its reflection in the FPP activity, and not directly. In future studies it will be fruitful to conduct research based on empirical data about the members' behavior through questionnaires and surveys. Participants should be asked about where they first heard about the FPP; when and why they decided to join it; and the point at which they felt that the FPP became inactive, and why.

A final limitation is that this research assumes that zero activity means that the FPP failed, unless the policy changed while the FPP was active. It may be the case that the protests succeeded to bring to policy change in an indirect way, which is beyond the scope of this research. Because the thesis deals with the power of media to change public agenda, it was assumed that if the FPP didn't reach it, it failed in its main goal.

Finally, there are some future directions for research from this point. First, as mentioned above, it would be positive to conduct a wider research with a statistically significant number of FPP cases. Second, it would be interesting to further develop the preliminary test that looked for failed FPPs, which usually remain unknown. The inherent invisibility of failed FPPs creates a bias in the perception of Facebook as a successful protest tool. Third the first steps of FPP' viral diffusion could be recreated with the help of a simulator, to better assess the exogenous visibility's influence on the diffusion of FPP contents. Fourth, a qualitative research of the posts, including mentions of mass media and other signs of internal and external validation, could be conducted. Finally, a field experiment could be performed by creating identical FPPs in various cities calling for a small municipal policy change (e.g. adding a traffic light to a juncture), and inviting local mass media to cover the protest in some of the cases. This kind of experiment could bring valuable information regarding the extent of the influence of mass media on FPP activity level.

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APPENDIX 1: CASES DESCRIPTION

Case 1: Rani Rahav Protest Page

Rani Rahav is the owner of an eponymous leading Israeli PR company. He's a controversial public figure with high level public profile. Among his clients are leading companies in Israel such as Bank Hapoalim, IDB, Strauss Group and The Israeli Company. Last year his popularity (for better or for worse) rose due to his participation on the top-ranking TV show "Rising Star". On January 7, 2014 journalist Sharon Shpurer published the recording of a telephone conversation between them, in which Rahav wass heard cursing Shpurer and threatening to badmouth her in the media if she didn't remove a negative post about him from her Facebook page. The story was picked up by most of the Israeli media, including TV, radio, newspapers and online sites.

The next day, a leading journalist posted a blog post calling on Rahav to reveal his client list, which was never published. The same day a Facebook group called 'Rani Rahav? Not Buying It' was created, calling for a boycott of all Rahav clients, and created a Facebook event to be held on March 1, 2014 Over the next five days the Facebook page received about 33,000 likes. Some of Rahav's clients denied being represented by his company, while others lowered their public profile. After five days the volume of mass media coverage decreased significantly, and eventually stopped completely. The March 1 event wasn't held.

Case 2: David Hanachlawi Protest Page

The David Hanachlawi incident occurred in April 2014 during a routine Israel Defense Forces (IDF) patrol in the city of Hebron. An IDF solider, David Admov, aimed a loaded gun at a young, unarmed Palestinian,[57] in response to a suspected ambush. The incident was filmed by a Palestinian activist, who later uploaded the video to YouTube and sent copies to several journalists. *Channel 10*, Israel's second-largest television network, reported the incident in its main news broadcast on the evening of Monday, April 28. The story was covered again the same night on the network's late-night news program 'Hayom Shehaya'.[58] That same night at 22:47, leading[59] news website *Walla* reported that Admov was dismissed from his unit because of the incident.[60]

The following day, the Facebook page 'I'm With David Hanachlawi Too' was created. The page motto was 'Our soldiers' blood is not to be spilled, and that must be said loudly! Let's stop abandoning IDF soldiers!'[61] The same day at 17:00, *Channel 10* reported Admov's dismissal. At 20:54 the first post was published: a photo of a handwritten sign with the slogan 'I'm With David Hanachlawi Too' next to an IDF beret and Golani[62] unit tag. The post received 656 likes, 16 comments and 12 shares. This first image served as a leitmotif for the thousands of photos sent by Facebook users, all of them of one or more people, many of them soldiers, holding a sign with the page slogan. During the first four weeks of protest,

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[57] The IDF soldier declared after the incident that he though the young Palestinian was holding a brass knuckles.
[58] For the complete list of media items, see Appendix 1.
[59] The Walla news website has a daily average reach of 2,300,000 unique users, and a share of 44.66% (The Israeli Committee of Internet Rating, June 2013).
[60] This later proved to be false; Admov was indeed dismissed, but because of another incident he was involved in.
[61] The original text in Hebrew is "דם חיילנו אינו הפקר וצריך לומר זאת בקול! שמים סוף להפקרת חיילי צה"ל"
[62] The Golani Brigade is one of the IDF's five infantry brigades and an important unit.

5,400 posts were published in the page, 151 by the page administrator, and the rest by other users.[63] The posts together got a grand total of 744,442 likes, 26,839 comments and 45,872 shares.[64].

The next day, April 30, the national radio station *Galei Zahal* first mentioned the David Hanachlawi FPP in a news report. At that time the FPP had reached 7,303 likes. Over the course of the day another 29 news items mentioned the FPP. By the day's end the page had reach 73,445 likes. Public opinion, as portrayed in news broadcasts, was divided between supporters and detractors of the soldier's behavior. The supporters' reactions were exacerbated by the alleged news that the soldier was sent to military prison, which later proved false. The soldier's supporters further claimed that the IDF's fire-opening code was too strict and endangered soldiers' lives, calling for reform. This was also the main claim of the FPP, as stated in the page's 'About' section and posts.

On May 1, the three biggest Israeli newspapers featured the FPP on the front page. The issue opened all news broadcasts, with complete stories including the original video, images from the FPP, a review of the page's claims, the IDF reaction to that claims, and political experts talking about 'the first digital revolt in the IDF'. That day the media coverage reached its peak with 65 news items, and the FPP reaching 112,289 likes. The next day, May 2, media coverage dropped to 8 items, mainly on online websites, and in the next seven days combined the incident was featured only 16 times. By then the total number of likes was 132,342, 3.25% of the total of Israel's Facebook users, and 5.41% of active Israeli Facebook users in Israel[65], or five mandates, in terms of electorate.

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[63] In the 'Visibility' section these figures and their meaning in terms of engagement are discussed.
[64] All of these figures are further analyzed in the next sections.
[65] Some of the users liked the page from abroad, but the number is negligible.

Case 3: Monsanto Protest Page

On May 22, 2014 the Office of the Israeli Chief Scientist published a post on its Facebook page, announcing it had reached an agreement with the multinational biotechnology corporation Monsanto. Monsanto is 'notable for its involvement in high-profile lawsuits, as both plaintiff and defendant. It has been involved in a number of class action suits, where fines and damages have run into the hundreds of millions of dollars, usually over health issues related to its products'.[66] The corporation has been the target of many protests around the world, including the 'March against Monsanto' international coalition of ecological movements.[67]

The FPP 'Monsanto get out of Israel' was created on May 23, 2014. The page defined itself as fighting 'the intentions of the government to let the corrupt agricultural corporation Monsanto and its herbicides enter Israel'.[68] The next day, a first post was published, with a picture of the meeting between the Chief Scientist and Monsanto representatives signing the agreement, and a text calling to stop the agreement, including a link to the movie 'The World According to Monsanto'. The post received 12 likes, 3 comments and 1 share. Since its creation, 145 posts have been published in Monsanto FPP, 17 of them by the page owner and the rest by other users. All of the posts together have received 4,174 likes, 494 comments and 3482 shares. The majority of the posts expose different aspects of Monsanto policies, while some of them single out the Israeli Ministry of Economy.

The Monsanto FPP was covered only once by mass media, in *Channel 10*'s tech magazine *Hatzionor*, on May 11, 2014. In addition, if has been covered by a few alternative websites like *Mekomit*, *Calcala Amitit*, and the news aggregator rotter.net.

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[66] Source: Wikipedia. http://en.wikipedia.org/wiki/Monsanto#Legal_actions_and_controversies.
[67] Source: Wikipedia. http://en.wikipedia.org/wiki/March_Against_Monsanto.
[68] Source: the 'About' section of the protest page. In Hebrew:
'העמוד הזה הוקם כדי להילחם בכוונת הממשלה להכניס לישראל את תאגיד החקלאות וחומרי ההדברה המושחת
מונסנטו.'
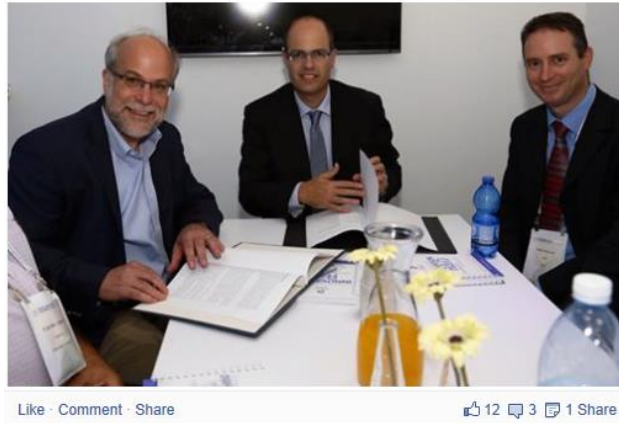
Since its creation the page received 4,720 likes, with a daily maximum of 654 and a minimum of zero. When looking at the FPP dynamics over time, a clear pattern is seen: a big peak in the second day of protest, followed by series of smaller peeks and dips fluctuating around a linear, slightly decreasing average.

APPENDIX 2: MEDIA COVERAGE SOURCES

Media coverage data was collected both manually and retrieved from the information database Yifat. Keywords were used to identify items about each case. After collection items were manually revised, and items with no connection to the case were discarded:

Case	Rahav	Nachlawi	Monsanto
Keywords	'רהב' 'שפורר' 'חרם רני'	'הנחלאווי' 'הנחלאוי' 'חייל הנחל' 'אדמוב'	'מונסנטו'
Rationale	'רהב' is Rahav in Hebrew. 'שפורר' is the last name of the journalist attacked by Rahav[69]. 'חרם רני' means 'boycott Rani'. 'Rani' is a popular name in Israel; therefore the conjunction with 'boycott' brought only items regarding the case.	'הנחלאווי' and 'הנחלאוי' are two forms to write the nickname given to the soldier in the media. 'חייל הנחל' is 'the Nachal[70] soldier', another nickname user to refer to him. 'אדמוב' is the soldier last name.	'מונסנטו' is the spelling of 'Monsanto' in Hebrew. In this case the company name was assumed to be present in any item about the case.

The mass media scanned for the media coverage collection are:

TV	Web	Radio	Newspaper
Channel 1	Ynet	Galei Zahal	Yediot Aharonot
Channel 2	Walla	Reshet Alef	Israel Hayom
Channel 10	Haaretz	Reshet Bet	Haaretz
	Nana	Reshet Gimel	Makor Rishon
	NRG		Maariv

For each media type the media included constituted more than 80% of the total share. The original data files will be sent to scholars for replication proposes upon request.

Rating data for TV shows was retrieved from the Israeli Audience Research Board website,[71] which holds daily rating data of leading TV shows from the last 12 months. Radio ratings were retrieved from the press release for the year 2013 of the TGI rating company.[72] Website ratings were retrieved from the 'Israeli Committee for Internet Rating' press release for 2013.

[69] See the Rahav case details in Appendix 2.
[70] The Nachal Brigade is another one of the IDF's five infantry brigades.
[71] (http://www.midrug-tv.org.il/)
[72] (http://www.tgi.co.il/tgi/www/mutsarim.html)

APPENDIX 3: FACEBOOK INSIGHT DEFINITIONS[73]

The Facebook platform allows page owners to see and download data about page activity parameters. 'Page Insights' include the following parameters, which were user in the current research:

Lifetime Total Likes: The total number of people (unique users) who have liked the page.

Daily New Likes: The number of new people (unique users) who have liked the page.

Daily Page Engaged Users: The number of people (unique users) who engaged with the page. Engagement includes any click or story created.

Daily Organic Reach: The number of people (unique users) who visited or saw the page or one of its posts in the News Feed. These can be anyone who have liked the page and those who have not.

Daily Viral Reach: The number of people (unique users) who saw the apge or one of its posts from a story shared by a friend. These stories include liking the page, posting to the page's timeline, liking, commenting on or sharing one of the page posts, answering a posted question, responding to a page event, mentioning the page, tagging the page in a photo, or checking in at the page's location.

[73] Please note that the definitions provided by Facebook are not identical to the operational definitions used in the thesis. For the thesis glossary, see Appendix 5.

APPENDIX 4: ALL ISRAELI FPPs

During the preliminary phase of the data collection process, research was conducted to map the nature and size of the FPP phenomenon. Finding FPPs turned to be a challenging task due to visibility limitations inherent to the Facebook platform. A Python script was developed to search for Facebook pages answering to a list of keywords associated with protests, using the Facebook API. The script was run every seven days and the resulting list of pages documented. The last list was retrieves on August 3, 2014. The list used in this thesis is the aggregation of all the pages found, after manually discarding any pages that were mistakenly recognized as protests. A list of 731 FPPs remained.

Each of the discovered FPPs was followed by a script which recorded the total number of likes every 15 minutes. The results of the data collected – which will be the base for future research – show that the great majority of the FPPs received a low number of likes (only 6% of the FPPs received more than 100 likes). Among the pages that received more than 100 likes, only 4 were still active, in terms of the new likes received daily (a page that received more than 10 new likes a day was considered active). The following are the 25 more active FPPs, and the total likes they received:

Protest	Number of Likes
מחאת הדלק	4,958
חרם על חברת אל על Al El	3,050
חרם על טורקיה!!	2,923
מצעד הגאווה עוצר לדקה	1,925
העם דורש צדק חברתי	1,701
אומרים די למוות בכבישים	1,507
מחאת הקוטג'	1,263
תמיכה בצה"ל הגיבורים והאמיצים	1,014
מחאת האוהלים	755
הפגנה - דורש צדק חברתי	647
עוצרים את הגראד - נכנסים לעזה	526
מחאת החיילים נגד רכבת ישראל	412
האשקלונים דורשים עוד יום בבית	405
תומכים בועד עובדי פילת	396
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APPENDIX 5: TERMS GLOSSARY

Activists: Users who are actively engaged with the FPPs.

Adherents: Facebook users who support the FPP claims, whether they are FPP members or not.

Daily New Likes: The number of likes a Facebook page received on a specific day.

Daily Organic Visibility/Reach: The total number of unique users who were exposed to any page content, not as a result of a viral action.

Daily Page Engagement: The total number of unique users who clicked on any on the page contents, whereas in the page itself or in stories about the page in the News Feed.

Daily Viral Visibility/Reach: The total number of unique users who were exposed to any of the pages content on that day, through Facebook only, and as a result of other user's action.

Endogenous Visibility: Visibility the FPP gained through the Facebook platform ('inside Facebook').

Exogenous Visibility: Visibility the FPP gained outside the Facebook platform (e.g. mass media, word of mouth).

FPP: Facebook Protest Page.

Members: Facebook users who liked the FPP and therefore are subscripted to its notifications.

News Feed: The page where Facebook users are notified about the activity of their friends and pages they have liked.

Notification: Any 'story' created in a user's News Feed as a result of an event in the page (e.g. a new post was published).

Subscribers: Members 'following' a Facebook page.

Total Likes: The total number of likes a Facebook page received since its creation.

APPENDIX 6: ACTIVITY PARAMETERS CORRELATION TABLES

Rahav Case: Correlations		Days of protest	Daily Page Engaged Users	Daily New Likes	Daily Organic Reach	Daily Viral Reach
Days of protest	Pearson Correlation	1	-.510**	-.443**	-.561**	-.524**
	Sig. (2-tailed)		.000	.001	.000	.000
	N	49	49	49	49	49
Daily Page Engaged Users	Pearson Correlation	-.510**	1	.980**	.894**	.990**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	49	49	49	49	49
Daily New Likes	Pearson Correlation	-.443**	.980**	1	.835**	.966**
	Sig. (2-tailed)	.001	.000		.000	.000
	N	49	49	49	49	49
Daily Organic Reach	Pearson Correlation	-.561**	.894**	.835**	1	.856**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	49	49	49	49	49
Daily Viral Reach	Pearson Correlation	-.524**	.990**	.966**	.856**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	49	49	49	49	49
**. Correlation is significant at the 0.01 level (2-tailed).						

Monsanto Case: Correlations		Day of protest	Daily Page Engaged Users	Daily New Likes	Daily Organic Reach	Daily Viral Reach
Day of protest	Pearson Correlation	1	-.300*	-.429**	-.239	-.432**
	Sig. (2-tailed)		.036	.002	.098	.002
	N	49	49	49	49	49
Daily Page Engaged Users	Pearson Correlation	-.300*	1	.617**	.710**	.955**
	Sig. (2-tailed)	.036		.000	.000	.000
	N	49	49	49	49	49

Daily New Likes	Pearson Correlation	-.429**	.617**	1	.510**	.656**
	Sig. (2-tailed)	.002	.000		.000	.000
	N	49	49	49	49	49
Daily Organic Reach	Pearson Correlation	-.239	.710**	.510**	1	.613**
	Sig. (2-tailed)	.098	.000	.000		.000
	N	49	49	49	49	49
Daily Viral Reach	Pearson Correlation	-.432**	.955**	.656**	.613**	1
	Sig. (2-tailed)	.002	.000	.000	.000	
	N	49	49	49	49	49

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Nachlawi Case: Correlations						
		Day of protest	Daily New Likes	Daily Organic Reach	Daily Viral Reach	Daily Page Engaged Users
Day of protest	Pearson Correlation	1	-.355*	-.585*	-.662*	-.623**
	Sig. (2-tailed)		.012	.036	.014	.003
	N	49	49	13	13	21
Daily New Likes	Pearson Correlation	-.355*	1	.676*	.902**	.954**
	Sig. (2-tailed)	.012		.011	.000	.000
	N	49	49	13	13	21
Daily Organic Reach	Pearson Correlation	-.585*	.676*	1	.880**	.836**
	Sig. (2-tailed)	.036	.011		.000	.000
	N	13	13	13	13	13
Daily Viral Reach	Pearson Correlation	-.662*	.902**	.880**	1	.985**
	Sig. (2-tailed)	.014	.000	.000		.000
	N	13	13	13	13	13
Daily Page Engaged Users	Pearson Correlation	-.623**	.954**	.836**	.985**	1
	Sig. (2-tailed)	.003	.000	.000	.000	
	N	21	21	13	13	21

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX 7: MODELS DETAILED RESULTS

Rahav Case - Model 1 - Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.905[a]	.819	.807	6513.877	2.234

a. Predictors: (Constant), There is Post t-1, Days of protest, Number of media items day before
b. Dependent Variable: Daily Page Engaged Users

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8624110892.356	3	2874703630.785	67.751	.000[b]
	Residual	1909376653.644	45	42430592.303		
	Total	10533487546.000	48			

a. Dependent Variable: Daily Page Engaged Users
b. Predictors: (Constant), There is Post t-1, Days of protest, Number of media items day before

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7286.141	2298.154		3.170	.003
	Days of protest	-193.121	72.057	-.186	-2.680	.010
	Number of media items day before	4935.713	439.317	.807	11.235	.000
	There is Post t-1	656.138	2061.259	.022	.318	.752

a. Dependent Variable: Daily Page Engaged Users

Rahav Case - Model 2 - Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.954[a]	.910	.899	4700.594	3.007

a. Predictors: (Constant), There is Post t-1, There Is Post, Days of protest, Number of media items, Number of media items day before
b. Dependent Variable: Daily Page Engaged Users

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9583377241.100	5	1916675448.220	86.745	.000[b]
	Residual	950110304.900	43	22095588.486		
	Total	10533487546.000	48			

a. Dependent Variable: Daily Page Engaged Users
b. Predictors: (Constant), There is Post t-1, There Is Post, Days of protest, Number of media items, Number of media items day before

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3469.288	1818.617		1.908	.063
	Days of protest	-107.271	53.716	-.103	-1.997	.052
	Number of media items	2409.588	408.620	.394	5.897	.000
	Number of media items day before	3218.745	414.321	.526	7.769	.000
	There Is Post	3155.178	1515.333	.104	2.082	.043
	There is Post t-1	894.316	1498.969	.029	.597	.554

a. Dependent Variable: Daily Page Engaged Users

Monsanto Case - Model 1 - Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.570[a]	.324	.278	657.258

a. Predictors: (Constant), There is Post t-1, LAGS(media_item,1), Day of protest

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9128544.261	3	3042848.087	7.044	.001[b]
	Residual	19007460.989	44	431987.750		
	Total	28136005.250	47			

a. Dependent Variable: Daily Page Engaged Users
b. Predictors: (Constant), There is Post t-1, LAGS(media_item,1), Day of protest

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	724.427	238.823		3.033	.004
	Day of protest	-9.966	7.426	-.180	-1.342	.186
	LAGS(media_item,1)	762.631	478.506	.199	1.594	.118
	There is Post t-1	736.218	239.291	.416	3.077	.004

a. Dependent Variable: Daily Page Engaged Users

Monsanto Case - Model 2 - Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.821[a]	.673	.635	467.711

a. Predictors: (Constant), There is Post t-1, LAGS(media_item,1), Media Items, There is Post, Day of protest

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18948342.684	5	3789668.537	17.324	.000[b]
	Residual	9187662.566	42	218753.871		
	Total	28136005.250	47			

a. Dependent Variable: Daily Page Engaged Users

b. Predictors: (Constant), There is Post t-1, LAGS(media_item,1), Media Items, There is Post, Day of protest

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	153.651	191.322		.803	.426
	Day of protest	1.663	5.605	.030	.297	.768
	Media Items	1061.193	345.021	.277	3.076	.004
	LAGS(media_item,1)	529.149	344.163	.138	1.537	.132
	There is Post	956.168	175.019	.525	5.463	.000
	There is Post t-1	818.763	171.957	.463	4.761	.000

a. Dependent Variable: Daily Page Engaged Users

Nachlawi Case - Model 1 - Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.668[a]	.446	.349	67336.043

a. Predictors: (Constant), LAGS(there_is_post,1), Day of protest, LAGS(Numberofmediaitems,1)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	62155276032.424	3	20718425344.141	4.569	.016[b]
	Residual	77080425936.529	17	4534142702.149		
	Total	139235701968.952	20			

a. Dependent Variable: Daily Page Engaged Users

b. Predictors: (Constant), LAGS(there_is_post,1), Day of protest, LAGS(Numberofmediaitems,1)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	103883.182	38761.606		2.680	.016
	Day of protest	-7449.909	2696.692	-.554	-2.763	.013
	LAGS(Numberofmediaitems, 1)	511.724	1168.226	.093	.438	.667
	LAGS(there_is_post,1)	33141.029	31326.657	.203	1.058	.305

a. Dependent Variable: Daily Page Engaged Users

Nachlawi Case - Model 2 - Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.828[a]	.686	.581	54003.619

a. Predictors: (Constant), LAGS(there_is_post,1), Day of protest, there_is_post, LAGS(Numberofmediaitems,1), Number of media items

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	95489838429.376	5	19097967685.875	6.548	.002[b]
	Residual	43745863539.576	15	2916390902.638		
	Total	139235701968.952	20			

a. Dependent Variable: Daily Page Engaged Users
b. Predictors: (Constant), LAGS(there_is_post,1), Day of protest, there_is_post, LAGS(Numberofmediaitems,1), Number of media items

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	32376.320	41285.945		.784	.445
	Day of protest	-4112.877	2378.875	-.306	-1.729	.104
	Number of media items	2593.716	1017.561	.469	2.549	.022
	LAGS(Numberofmediaitems,1)	-377.874	987.324	-.068	-.383	.707
	there_is_post	39145.553	30087.795	.240	1.301	.213
	LAGS(there_is_post,1)	41220.865	29877.719	.253	1.380	.188

a. Dependent Variable: Daily Page Engaged Users