The Age of (Mis)Information?

A grounded theory study of vaccination discussions on Facebook

Master's thesis - cand.merc.(kom)

Pia Andersen

Supervisor: Sine Nørholm Just
Characters: 181.756
Handed in: 9/10-2015

Copenhagen Business School

Abstract

Der er ingen tvivl om, at Internettet har haft enorm indflydelse på vores hverdag og, ikke mindst, på den måde hvorpå vi tilgår og spreder information.
Før Internettet var en lang række emner, som fx videnskab, medieret af privilegerede, elitære grupper af eksperter. Disse emner er nu tilgængelige for enhver med en bredbåndsforbindelse og enhver, der har lyst, kan indgå i diskussionen af dem på diverse digitale medier.

Som udgangspunkt burde denne øgede adgang til, og diskussion af, videnskabelig information, være en god ting. Men den stigende demokratisering af emner, som før var forbeholdt eksperter, skaber også visse problemer. For selvom vi har lige adgang til information, er det ikke ensbetydende med, at vi forstår og fortolker denne information på samme måde. Og der er en lang række faktorer på spil i den digitale verden, som kan være medvirkende til, at den samme information indgår i forskellige kontekster på forskellige måder - og kan have utilsigtede konsekvenser.

Anti-vaccinationsbevægelsen er et godt eksempel på, hvordan den øgede adgang til videnskabelig information kan have utilsigtede konsekvenser for offentlig meningsdannelse - i et hidtil uset omfang. Denne bevægelse har været særdeles aktiv på sociale medier, hvilket har gjort diskussioner om vacciner til allemandseje og har fået synlige konsekvenser for folkesundheden verden over.

Denne bevægelse og dens aktiviteter på Facebook danner udgangspunktet for denne undersøgelse. Formålet er, at afdække hvad der sker med videnskabelige diskussioner, når de pludselig bliver tilgængelige for hvem som helst på sociale medier.

Filosofisk antager denne undersøgelse et socio-materialistisk udgangspunkt, som anerkender den gensidige påvirkning som materielle objekter og social praksis har på hinanden.
Undersøgelsen er udført efter principperne i grounded theory hvis grundtanke er, at genere teori FRA data - og ikke den anden vej rundt. Eftersom det datasæt, der skal undersøges er meget stort i forhold til, hvad man normalt anvender grounded theory på, er der også blevet anvendt på metoder fra Big Data og datalingvistik.
Data består af 3 års aktiviteter fra en anti-vaccinationsbevægelses Facebook-væg, samt deres modpart, en gruppe af forældre der antager en pro-vaccinationsposition.

De alternative databehandlingsmetoder bliver primært brugt i den første del af analysen, hvor de giver indblik i mere overfladiske karakteristika af den undersøgte praksis, såsom brugen af links, aktiviteter og engagement, tematikker og sproglig stil.
Disse karakteristika bliver kombineret med dyb, fortolkende tekstkodning og sammenlignende analyse med udgangspunkt i eksisterende teoretiske begreber. Der trækkes bl.a. på teoretiske begreber som framing, ekspertretorik og affordance-teori.

Resultaterne af denne undersøgelse viser, at diskussioner om videnskabelige emner, såsom vacciner forandrer sig markant i både form, indhold og kontekst når de bliver tilgængelig for alle på sociale medier.
Undersøgelsen viser et påfaldende sammenfald mellem den måde både pro- og anti-vaccinationsbevægelser diskuterer på; et sammenfald, som kan konceptualiseres som cirkulære gruppe-monologer, der er hinandens negative spejlinger og gensidigt afhængige af hinanden.

Begge grupper anvender retoriske strategier, som ligner dem, der anvendes af traditionelle eksperter. Men de misforstår fuldstændigt de videnskabelige grundprincipper, der giver disse strategier legitimitet. Grupperne opfatter sig selv som en slags partisan-eksperter, som frigør videnskaben fra elitens kløer og gør den til noget, alle kan bedrive. På samme tid tager de dog de traditionelle eksperter som gidsler, ved at kopiere og genbruge deres resultater i nye sammenhænge - og til nye formål.

Facebook er mediet, som gør det hele muligt. Mediets iboende materialitet skaber mulighed for en sammensmeltning imellem det private og det offentlige rum, gør det muligt at bygge gruppeidentitet op omkring kontroversielle meninger, skaber et rum, hvor det kan lade sig gøre at tage videnskabeligt indhold ud af sin kontekst og bruge det til egne formål, samt gør det muligt at skærme sig af for information som strider imod ens synspunkter.

Spørgsmålet er nu, hvorvidt disse pointer kan overføres til andre typer videnskabelige diskussioner på sociale medier, eller om de blot er anvendelige i denne meget specifikke kontekst.

Contents:

1. Introduction & Research question

The introduction of the Internet has radically changed the way we access and disseminate information in a range of different domains. Furthermore, it has changed WHO can access what kinds of information.

Before the advent of the Internet, access to information on a vast array of topics was, in some sense, *mediated.* Authorities with privileged access and schooling in the interpretation of certain types of information acted as mediating links towards the public. Especially the institutionalised expert, with a specialised knowledge within a certain field, access to the media and the means of conveying his knowledge to the public has been a prevalent entity (Hartelius 2011, 5-6).

One could say that the Internet has removed this need for mediating authorities. If you need information on a certain topic, you can just google it and get access to a vast array of scientific studies, infographics, blogs and media commentaries. An Internet connection essentially enables you to be your own expert!
This could mean that we are witnessing the rise of an informational democracy where everybody has both the means and the right to access, distribute and disseminate any kind of information regardless of background or education.
Science is one of the areas that have been increasingly democratised in this way. From 2006 to 2014, the Internet has surpassed television as the primary source of information on Science and technology in the both the US and Europe (NSF 2006, NSF 2014).

In theory, this increased democratisation of (scientific) information should be a good thing. As established by Foucault, power and knowledge are intrinsically linked, and giving people access to more knowledge should in turn empower them (Foucault 1980, 52).
This sort of informational democracy, where everyone has equal access to information, equal access to dissemination and equal access to participation should produce equal levels of enlightenment, letting everyone become experts in their chosen fields of interest - and eliminating the need for traditional experts mediating the information in the public sphere.

This is the premise that this study aims to explore. However, I will assume a sceptical view on this of informational democracy, problematising the presumed benefits of equal access to scientific information.
I will start out with a quite controversial claim: Democracy of information is NOT necessarily a good thing. Why is this? Because equal access does not necessarily and causally signify equal understanding. From the current literature on the subject, I have extracted three critical factors that makes the *causality* between equal access = equal understanding problematic.

Firstly, leaving out the mediators with necessary schooling in both scientific method and critical thinking, makes it increasingly difficult for the public to distinguish between good, solid scientific argumentation and what can be described as "pseudo-science" (Hartelius 2011, 5-6).
Secondly, displacing scientific discussions into today's social media, a technology created and generally used for personal and more informal purposes, will undoubtedly have an impact on the way scientific topics are treated. Social media, compared to traditional arenas for discussing and disseminating scientific information, lack the institutional "checks and balances" that usually regulate the debate. (Cattaneo & Corbellini 2014, 335).
Thirdly, the "snowball-effect" of misinformation is significant to the spread of "pseudo-science" as it entails misinterpreted, flawed or incomplete evidence or results becoming popularly accepted and then forms a basis for new studies and public opinion, which will build upon the initial flaws (Medvedev 2014). In addition, the spread of faulty or unscientific evidence, and the continued building upon this, might lay the basis for home-brewed theories and faulty causalities that might prove "hard to kill" as they provide easy answers to complex problems (Wombles 2012).

The question that begs to be answered now is; what happens to scientific discussions when they are accessible to everyone and are moved from traditional arenas onto social media platforms?
This, I will aim to answer in this study by breaking it down into three parts:

How can these discussions be conceptualised - what form and function do they have and which dynamics drive them?
How do they relate to the realm of expertise - do they cancel out the need for experts?
What role does the media play in enabling these types of discussions?

To answer these questions, this study takes its starting point in the anti-vaxxer movement, which has gained ground in a way that its effects are now visible on public health statistics worldwide. I will use the case of the vaccination debate to dig deep into the hearts and minds of communities discussing scientific topics on Facebook. This case has been chosen because it is one of the most significant examples of a scientific discussion amongst laypersons, which has had so strong an impact on public opinion that it has had implications on public health in countries all around the world (Park 2011). Facebook has been chosen due to both its pervasiveness in society, as well as its inherent dialogical nature, which enables discussion and dialogue.

1.2 The anti-vaxxer movement

Debates about vaccines have gained momentum since 1998, where a controversial study linking the MMR-vaccine to autism in infants was published in the UK based medical journal, The Lancet (McKee 2004). The proposed link that the MMR vaccine caused autism was later proven unfounded and 10 of the original authors retracted their support (McKee 2004). Furthermore, the main author, Andrew Wakefield, has later been revealed to have manipulated the evidence used to found his claims and has had his medical license revoked in the UK (Park 2011).

However, the damage was done. The ghost of Andrew Wakefield still haunts the movement where celebrity activists, such as actress Jenny McCarthy, still cling on to the link between autism and vaccination proposed in his 1998 study (Haberman 2015).

In the US, measles was declared eradicated by health authorities in 2000 due to years of successful public vaccination programmes (Gambino 2015). However, the last couple of years have seen a dramatic rise in measles outbreaks in the US, which, by both researchers and the media alike, are attributed to the growing strength of the anti-vaccination movement (Caroll 2015, Gambino 2015).

A large outbreak stemming from an unvaccinated patient zero at Disneyland California in December 2014 has brought attention to the rising impact that the anti-vaccination movement is gaining in the minds of parents (Gambino 2015).

Moreover, it is increasingly becoming a global phenomenon. Since October 2014, 724 people have been struck ill with measles in the German capital of Berlin - an outbreak that has also been attributed to an increasing number of people choosing to forego the MMR vaccine (Deutsche Welle 2015). The outbreak has even spurred talks about the German government making the MMR vaccine compulsory by law (Deutsche Welle 2015).

Even here in Denmark, resistance to the public vaccination programmes is starting to take hold. The debate about vaccines has been given increasing amounts of attention from the media, uncovering a phenomenon that is more widespread in the Danish society than one would have imagined. The Danish newspaper Jyllandsposten recently published an article on closed Facebook-groups where Danish parents “trade” infectious diseases such as measles and mumps in order to achieve “natural immunity”, eliciting outraged responses from both the medical community and the public.

This goes to show, that what was once ignored as being just another group of American crackpots seeing conspiracies everywhere, is actually alive and thriving amidst all of us. In addition, it shows that digital media and social networks are increasingly becoming the “weapon of choice” for the anti-vaccination movement.

2. Theoretical framework and philosophical positioning

The motivation behind this study is to develop theory, explaining a phenomenon developing in a highly dynamic and rapidly changing arena, where data is generated faster than any researcher could do with a more structured traditional approach to data collection. This will be done from a grounded theory perspective in order to explain the phenomenon from raw, unforced data generated by participant's practice. Below, I will outline the philosophy behind, and principles of, grounded theory.

2.1 What is grounded theory?

One of the "founding fathers" of grounded theory, Barney Glaser, claims that doing grounded theory research is akin to the exercise that we, unconsciously, go through every day - coding and categorising events, and constantly comparing them, in order to make sense of the world (Glaser 2014, 47). We know the patterns of the world around us, and use prior knowledge of these patterns to generate new knowledge through comparison when faced with a new domain (Glaser 2014, 47).
Doing this in a formalised way, using a constantly comparative and iterative methodology and working from an inductive perspective, is the basis for grounded theory (Birks & Mills 2015 10-2).

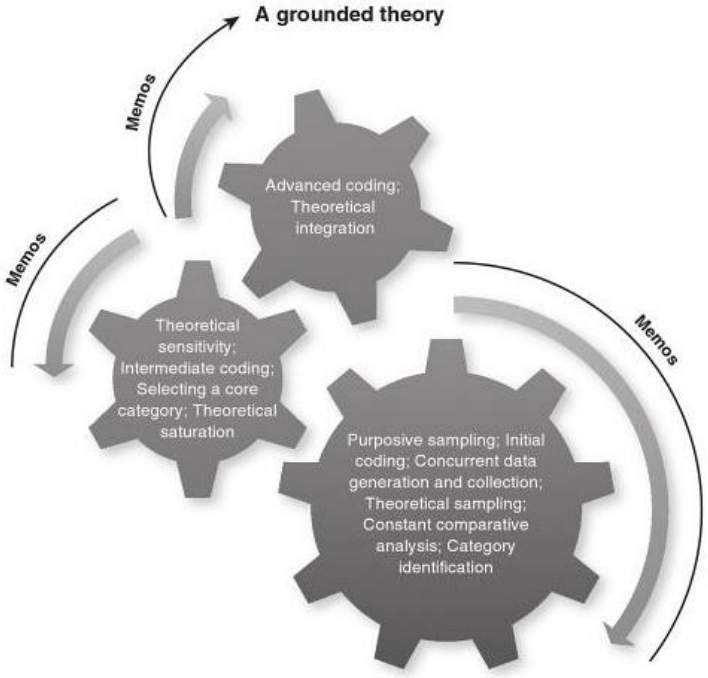
Grounded theory is not as much a theoretical framework as it is a research philosophy and a work process. Where you would, traditionally, use a theoretical framework to generate a hypothesis and apply this to empirical data grounded theory flips this process upside down (Birks & Mills 2015, 10-3). When working with grounded theory you let the data do the talking - generating theory FROM the data, through deep submergence into the data and meticulous adherence to the work process of grounded theory - which will be described below (Birks & Mills 2015, 10-3).
Theory, in this respect, can be defined as an explanatory scheme, comprised of concepts related to each other in a logical way, which goes beyond mere description of the phenomenon under scrutiny (Birks & Mills 2015, 108-9).
In order to "stay grounded" within the data, and not force any theoretical perspectives or assumptions on them, a grounded theorist is encouraged to refrain from reading literature on the subject at hand at the first stages of research (Birks & Mills 2015, 58-9).

The earliest incarnations of grounded theory, as developed by Glaser and Strauss, had a distinct focus on objectivity (Charmaz 2008, 396-9). In this almost positivistic view of grounded theory, the data was envisioned as being able to speak for itself, and the researcher as being able to extract objective and universal truths from it, through adherence to the grounded theory principles (Charmaz 2008, 396-9).

I will endeavour to use a more modern approach to grounded theory, inspired by Charmaz, who advocates a more methodically flexible way of applying grounded theory, and recognises the researcher's own impact on the data collected and analysed (Charmaz 2008, 398-9).
Working from this more constructionist view of grounded theory, means that I will not claim to produce an objective theory of the phenomena under scrutiny (Charmaz 2008, 401-3). Rather, I know that I as a researcher, my personality and schooling, will have an impact on what I select as being salient aspects of the data and what I will eventually discard (Charmaz 2008, 401-3). I will recognise the product of my research as being a construction and a perspective, which does not make my research completely subjective and unscientific but rather relativistic.
I will spend an entire section on specifying the philosophical position I am going to anchor myself within, as being aware of your position as a scientist and the perspective this makes you see the data from, is extremely important in order to understand your own role in the generation of theory from data (Charmaz 2008, 402).

2.1.1 Grounded theory research process

In this section, I will describe the key principles of the grounded theory work process and how I have applied these principles to my data.
As the grounded theory method chosen entails a focus on process and constant comparative analysis, the steps of the work process will be handled in more detail as we go along analysing the data.



The figure to the right from Birks & Mills 2015 is a good example on how grounded theory is essentially an iterative work process where you go back and forth between activities and levels until a point of saturation - the point where no new concepts emerge from the data (Birks & Mills 2015, 96). The activities you go through at each level will enable you to reach higher levels of theoretical sensitivity, enabling you to relate themes and categories to each more efficiently than at the earlier stages of research (Birks & Mills 2015, 181).

You explore the data through coding, sampling and memoing.

Coding is the cornerstone of grounded data analysis and entails going extremely deeply into the data, doing line-by-line reading and identifying central words and themes within the text (Birks and Mills 2015, 10, 92-3). When coding you often assign a keyword or short explanation to the themes identified, *codes,* which will, through constant comparison and sampling, turn into concepts and categories (Birks and Mills 2015, 10, 92-3).
Coding takes place on three levels of analysis with each level becoming increasingly abstract; initial or open coding, intermediate coding and advanced coding (Birks & Mills 2015, 10-2).
Initial coding entails assigning labels to any words or groups of words, which might be of interest or serve to further explain the dynamics behind the phenomenon studied (Birks & Mills 2015, 10). As you have no basis for comparison at this point, many codes will probably be generated in order to make sense of the data; codes, which are then grouped into categories of codes with similar meanings (Birks & Mills 2015, 10).
Due to the sheer amount of unstructured, textual material accumulated on a Facebook wall, I have chosen to use methods from computational linguistics and big data analytics in order to extract preliminary and superficial characteristics of the data (Ohlhorst 2012). Data collections of this size by far exceeds what is realistic to process manually and just the thought of reading through millions of different Facebook updates and comments is, at best, a daunting task. Applying Big Data methodology, and treating thousands of posts as unstructured data, will allow me to process and make sense of these enormous amounts of text, and extract meaningful insights (Ohlhorst 2012).

In order to keep track of the categories and codes developed it is essential to engage in *memoing* - keeping a logbook of the activities performed, codes developed and their relationship to each other (Birks & Mills 2015, 12). Memos become a sort of secondary data, which can enable the researcher to fully develop categories and concepts in an iterative manner (Birks & Mills 2015, 12).

Intermediate coding is the next step in the analysis, which aims to connect codes and categories in meaningful ways in order to develop higher-level concepts (Birks & Mills 2015, 12). There is no point at which it is required to move from initial to intermediate coding. You should continue *sampling* and coding until a point of saturation is reached - where the initial coding activities only yield results, which are similar to the codes and categories already established (Birks & Mills 2015, 10).
Sampling is crucial to the iterative and comparative processes of grounded theory, and is done at several points of the analysis. Purposeful sampling is used to describe the initial data collection on which you start the coding process, whereas theoretical sampling describes a concurrent addition of new data in order to reach a point of saturation (Birks & Mills 2015, 10-12).

One can move on from the process of intermediate coding once it is possible to identify a core category (Birks & Mills 2015, 97-8). A core category is the most salient and pervasive category, whose importance for not only describing, but also explaining the data trumps other categories (Birks & Mills 2015, 97-8). The core category, or categories, will then be subjected to even more theoretical sampling and analysis, in order to achieve saturation and move on to advanced coding (Birks & Mills 2015, 12). When moving from intermediate to *advanced* coding it is crucial to take the insights generated directly from the data to a higher level of abstraction by drawing on existing theories and concepts. The point of this is not only to discuss the meaning of the data, but also to conceptualise it further in order to achieve theoretical integration (Birks & Mills 2015, 108-9).
Theoretical integration forms the product of grounded theory research and is in essence a generalisable framework, which can move the insights gained from the data from mere description to interpretation and explanation (Birks & Mills 2015, 108-9).

These are the basic principles of grounded theory, which will be applied in this study. However, as this study has taken a more methodologically flexible approach to grounded theory it might be labelled as "grounded theory-inspired". These methods will be elaborated below.
I will adapt the principles and work processes from grounded theory to accommodate the use of computational methods, which will be elaborated below, but the most important aspect that will guide this study is letting the data do the talking.

2.2 Philosophical positioning

Doing a grounded theory analysis of real life phenomena without recognising the impact of your own schooling as a scientist, your biases and preconceptions of the field, as well what you expect to discover, will never produce a usable scientific product. It is crucial to have a basic concept of the ontology and epistemology you are working from as a scientist.
In order to make this a scientific inquiry we need to take a stance on how we, as scientists, see the world and generate knowledge about it. This is what separates the scientist from the layman - an awareness of how you conceptualise reality and an awareness of how this affects your point of view (Charmaz 2008, 402).

2.2.1 Socio-materiality and practice

My stance is grounded in the material and in practice. Materiality, or interaction with material objects, is inherent to all social action and entails that the world and the objects in it exists and are not just social constructions(Orlikowski & Scott 2008, 455, 463-7). Material objects and technologies affect our possible actions and how we interact with them inscribes them with meaning and make them significant (Orlikowski & Scott 2008, 455-6). As a result, the MEANING is constructed through the way they are

used in practice. Practice are patterns of action - repeated and continuous, they reveal how people think and make sense of the world. Observing and analysing practice is essentially an inductive exercise the "truth" is accumulated evidence of regularities in practice.

2.2.2 Socio-materiality and technology

In the socio-material approach, technology, social organisation and practice are not seen as analytically separate concepts, but rather as inseparable entities that mutually influence each other (Orlikowski & Scott 2008, 434). The view of technology is that it has its own inherent materiality, with distinct and individual features and properties, but it does not gain meaning until used by humans embedded within a social context (Orlikowski & Scott 2008, 455-6). The work being done with the technology, the practice, is where individuals embedded within a social context shapes and gives meaning to a technology (Orlikowski & Scott 2008, 456, 463, 467). Technology may exist as a material artefact, but it only becomes something more than just soft- or hardware through practice, the interplay between human work processes, technology and organisations (Orlikowski & Scott 2008, 455-6). Organisation, technology and human practice are thus intrinsically linked: practical use, technology and social organisation mutually influence and shape each other by both constraining and enabling different forms of social action (Orlikowski & Scott 2008, 455-6, 463-4).

The structurational model of technology takes its starting point in the work of Anthony Giddens, and his structuration theory, which entails that social structures shape how reflexive individuals act by both constraining and enabling different forms of social actions (Orlikowski 1992, 404). In turn, reflexive individual actions serves to either affirm and solidify existing social structures or changes them through action (Orlikowski 1992, 404-5).
Technology, when understood from a structurational point of view, becomes a concrete manifestation of rules and resources constituting the structural fabric of a social domain (Orlikowski 1992, 405). Viewing technology as structural property of a social domain entails that it has to be understood as dualistic in nature and interpretively flexible (Orlikowski 1992, 405).
The duality of technology means that technology is not a static representation of social structure (Orlikowski 1992, 406). Rather, it is constructed both physically and socially by reflexive actors that operate within a certain social context and thus imbues the technology with aspects of their social reality (Orlikowski 1992, 406). Nevertheless, a technology is not written in stone. As it is created and used by actors, it has the potential for becoming reinterpreted and changed by being embedded within daily practice (Orlikowski 1992, 406). However, as it becomes embedded in practice, it has a tendency to become institutionalised and objectified, "fixed", in order to serve the needs for stability and habituality of its users (Orlikowski 1992, 406).

As technology, in this view, is ultimately a construction by human actors, it always carries within it the potential for reconstruction by the same an inherent interpretive flexibility (Orlikowski 1992, 408-9). You might not be able to change the material aspects of a technology through practice, but you can use it in a way that it might not be intended to, use or reject some features or functionalities, or reinterpret its purpose to adapt to changing institutional contexts (Orlikowski 1992, 408-9).

2.2.3 Consequences of a socio-materialistic approach

Having a socio-materialistic approach to discussions about scientific topics on Facebook will have consequences on the results produced. The most important one is the fact that the media will have a significant influence on the conversations examined, as it will create boundaries for action - restricting how we are able to talk about certain topics in a specific time and place. From this perspective, you will expect some degree of uniqueness: these conversations would not look the same in another technological setting.

However, conceptualising technology as dualistic in nature means that technology in itself does not become the only determining factor. Social structures are both challenged and reified through practical use of technology. Certain boundaries can be pushed and remodelled through the interaction with technology, but some structures embedded within the technology will be upheld through continuous use in practice.

3. Data and methodology

In this section, the data sample and the collection of it is introduced. In addition, it will provide an overview of the methods used for the initial coding activities.

3.1 Data collection

The data sample used for analysing discussions about vaccines on Facebook was collected using SODATO, a social media analytics tool, designed to fetch, store, prepare and analyse data derived from Facebook walls (Vatrapu et. al. 2014).

The primary community page chosen for analysis is that of the National Vaccine Information Centre, which is often being cited as one of the biggest authorities in the anti-vaccination community (Caroll 2015, Haberman 2015). The organisation runs a very active Facebook page with 123,000 people following the organisation and engaging in its community (NVIC Facebook 2015).

On Facebook, the organisation describes itself as:

"The National Vaccine Information Center (NVIC) is a national, non-profit educational organization founded in 1982. The oldest and largest consumer organization advocating the institution of vaccine safety and informed consent protections in the mass vaccination system, NVIC is responsible for

launching the vaccine safety and informed consent movement in America in the early 1980's." (NVIC FB 2015).

Data was collected for a period of three years, October 2012 to October 2014, comprising 1.9 million data points (Facebook "events", such as posts, comments and likes).
The initial sample has been divided into three - one per year extracted from the Facebook wall under examination. This has been done partly out of convenience - handling and processing 1.9 million data points requires substantial computing power not at my disposal at the moment. In part, this division is also performed in order to explore the impact of time on the conversations on the wall examined - do they change over time? Are the same topics being discussed in the same way as we progress through the years?

In addition, I will include a "control sample" in order to test and develop the generality of the categories and theoretical constructs developed. This sample is taken from a page that is often referenced by the NVIC community and plays the role of an antagonist: Informed Parents of Vaccinated Children - from now on denominated IPVC. The stated purpose of this page is:
"If the ingredients in vaccines sound scary, you don't know enough.
We are a group of mothers who have been reading, learning, and working to understand vaccines for a while. Our goal is to help inform parents about the importance of vaccinations by providing facts, answering questions, and addressing concerns seriously." (IPVC FB 2015).

It is worth noting that this control sample is *significantly smaller* than the primary sample with only 2671 page likes and 7732 posts in the time period surveyed (10/2012-10/2014). Thus, it will not be divided into yearly segments, as these would become too small to be comparable. However, this sample has been chosen because it represents an alternate view of the topics discussed by the primary sample.

Due to the inherent comparative and iterative nature of the grounded theory approach, more data samples might be extracted as the study progresses, in order to achieve theoretical saturation (Birks & Mills 2014, 96).

The initial coding activities will be largely computer-assisted, using tools from Big Data and computational linguistics to uncover content and activity, terms, topics and keywords, as well as emotions and style.
Below, the tools used for this part of the analysis, their functionality and results, will be presented in further detail.

3.2 Content and Activity - social graph analysis

Social graph analytics is a discipline within social media analytics, concerned with people and the way the act, connect and create on social media (Vatrapu 2013). Social graph analytics examines the actions taken by people and the way they act and interact and the artefacts they create whilst doing so (Vatrapu 2013). The aim of a social graph analysis is uncovering content, engagement and interactions (Vatrapu 2013).
The primary tool used for this part of the analysis is SODATO. SODATO is a social media analytics tool, designed to fetch, store, prepare and analyse data derived from Facebook walls (Vatrapu et. al. 2014). The output from fetching a wall is downloaded as a csv-file with detailed information for on post-ID, date and time, type of action (comment/like/post), type of artefact (link/photo/status), post author and text value (Vatrapu et. al 2014). This information will then be processed in Excel to generate linear statistics, determining popular types of content and activity, user activity and engagement.

3.3 Keyword and terms - topic analysis

The main tool used for this part of the analysis is khCoder, a piece of software designed for quantitative content analysis and text mining (KhCoder 2014). KhCoder incorporates the Stanford POS-tagger to perform sentence splitting, tokenization, POS tagging and lemmatization (KhCoder 2014, Stanford NLP 2014).
The results are then compiled into a MySQL database for searching and statistical analysis (KhCoder 2014).
The primary functions, which khCoder has been used for in this study are keyword extraction, keyword-in-context and term extraction.
Keyword extraction is performed by the khCoder system by compiling lists of the most commonly used keywords divided by POS-tag (KhCoder 2014). The keywords can then be explored in their "natural" context by compiling searchable lists of words connections and their placement in relationship to each other (KhCoder 2014). Using these connections, you can extract the entire list of sentences, which these particular word combinations appears.
Finally, khCoder has a built-in terminology extraction module, which can extract word combinations of two, three or more words, which appear together at such a high frequency that they can be labelled "terms" (KhCoder 2014).

3.4 Emotions and style - sentiment analysis

This part of the analysis concerns itself with the sentiments expressed, and how the use of words, writing style and rhetoric constructs a certain type of discourse (Vatrapu 2013).

In short, sentiment analysis concerns itself with the expression of subjective information in text, such as opinions, sentiments, polarity and emotions (Pang & Lee 2008, 1-4).

The most widely used approach to sentiment analysis is the “bag-of-words” model where certain words are considered as the main indicator for a certain type of sentiment where their frequency determines the overall sentiment of the text (O'Connor et al 2010, 123-4).
LIWC, the tool used for this analysis, is a bag-of-words system that measures 80 different categories of both linguistic and psychometric features in a text, allowing for a good indication of the style of writing and the amount of emotionality in a given text (Pennebaker et. Al 2007). LIWC uses a proprietary dictionary that classifies words into the above-mentioned categories, and then counts the frequencies of these words in a given text (Pennebaker et al 2007). This is done by producing a percentage of each variable by dividing its frequency by the total number of words in the sample (Hancock et al 2008, 12). LIWC was created for statistical analysis of language with a special focus on psychometrics (statistical psychology) (Hancock et. al. 2008, 11-2).

The LIWC system provides baseline values for six different kinds of writing; Emotional or Control writing, scientific articles, blogs, novels and talking, derived from the analysis and comparison of 168 million words from different genres of text (Pennebaker et al 2007).
The purpose of this analysis is to detect sentiment as expressed through WRITING STYLE, comparing the results of the texts from the two Facebook walls with the baseline values described above as well as a test sample - a scientific article treating the same topics as the Facebook pages (Taylor et. al 1999).

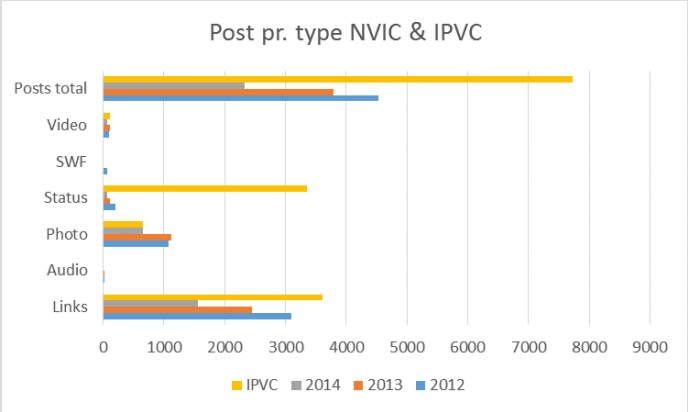
4. Initial Coding - superficial characteristics

This part of the analysis will serve to determine the superficial characteristics and commonalities displayed by the initial sample, divided into three periods, and the control sample. The purpose is to get an overview of what type of content and activities these pages display, what keywords and terms are salient and what kind of writing style is displayed.

4.1 Social graph analysis - Content and activity

All results from this part of the analysis can be found in Appendix A, where each spreadsheet has a tab named “Social graph stats”.

4.1.1 Content



This section will aim to give a preliminary overview of the types of content being posted on the sampled Facebook pages. It is worth noting that ONLY the page itself is allowed to post content; limiting the interaction with users to likes and comments.

The figure shown to the left illustrates the types of posts being made on the NVIC page and their distribution over the years, as well as the aggregate posts from IPVC.

When looking at "posts total", it appears that activity levels on part of the page itself has been in decline from 2012 to 2014.

However, there seems to be congruence in the types of content posted, with links being the most frequent and videos and flash graphics (SWG) being the least.

The figure shows an inclination towards heavy linking behaviour- there are significantly more links than other types of content, and this tendency remains noteworthy across the 3 years surveyed.

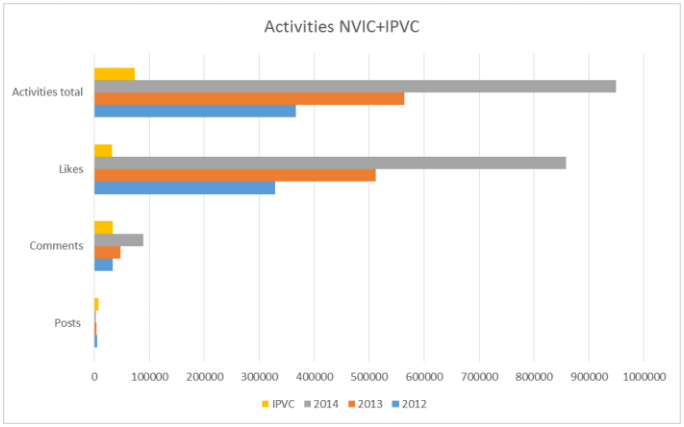
Photos are the next most popular content type. In itself, this is not as interesting as when actually looking at the most engaging photos, which are often of the "We are being hidden - please press like to stay in touch"-type. The photo displayed to the left was both the most liked and commented in 2014.

From the page's point of view, this might just be a strategy to stay fresh in the mind of users, as continued liking of a company's posts, such as photos, will make their post appear in user's news feed more frequently. This is due to the way Facebook's algorithm works: you might like a certain page, but if you do not engage with it, the algorithm will sort it out as it is assumed that you are not interested in viewing content from pages you do not engage actively with (Bakshy, Messing & Adamic 2015).

When looking at the IPVC sample in relation to the NVIC one, it is interesting to witness that even though IPVC are heavy linkers as well, the proportion of links compared to other types of content is significantly smaller than for NVIC. Where links comprise around 65% of the content posted on the NVIC page, it is only around 45% on the IPVC page roughly the same amount as status updates.
Tentatively, this could be a symptom of the NVIC page assuming a more quasi-official role, as their mission statement works very hard to establish legitimacy as an advocacy group, whereas IPVC in their mission acknowledges that they are a discussion group for private individuals.

4.1.2 Activity

This section will give an overview of the type of activities going on the sampled pages, comprising both the posts made by the page, as well as activities that users engage in (comments and likes).



What is noteworthy in the figure of activities to the right is the fact that even though page activity for NVIC might have gone down from 2012-2014, activity levels in total has gone up due to heavier engagement by users. They are both commenting and liking in increasing amounts, even though there seems to be an inclination towards more liking.
This might be a self-perpetuating process - when users engage more in the content posted, the page might not need to post as much to keep up activity levels. Alternatively, the reverse could be the case. When dealing with online communities, higher communication volume can result in lower response or engagement rates as users become overwhelmed by information that requires their attention (Arguello et.al. 2006, 2). Consequently, when users experience information overload, they are less likely to respond to posts, but if the volume is adjusted to a level they are able to digest engagement rates become higher (Arguello et.al. 2006, 2).

When comparing with the data from the control group, IPVC, we see that the post count is higher for this sample than any year of the NVIC sample, even though the group is significantly smaller.
These are of course aggregate data from 3 years. This does not explain it completely, as NVIC has approx.130.000 users/likers, whereas IPVC only has around 2600 (NVIC FB 2015, IPVC FB 2015). The significant difference is more likely because IPVC allows users to post as well as the page itself, and brands itself as a discussion group, which could lead one to thinking that users are more active in general.

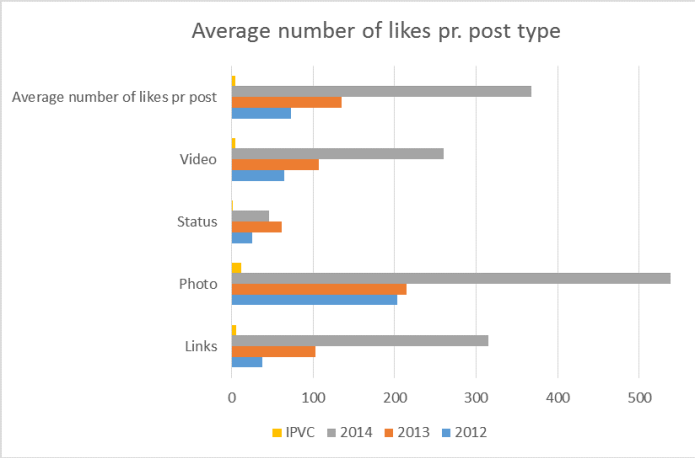
More evidence to this claim is the fact that IPVC users seem to be more engaged in active debate, in lieu of the passive liking displayed by NVIC members. The proportion of comments to likes is almost equal for IPVC, whereas NVIC users seem to be liking much more than they comment.

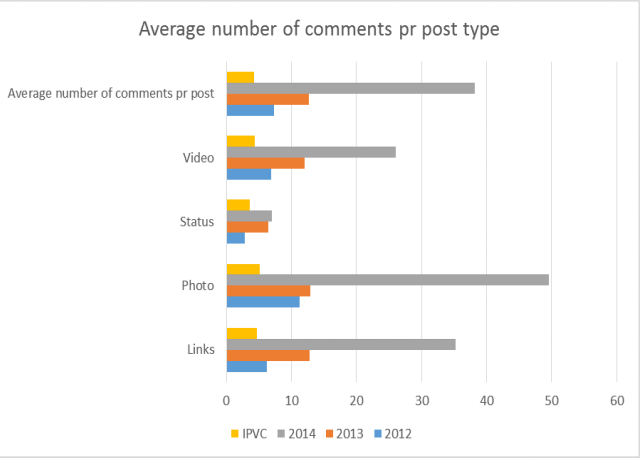
The figure above shows the general activity levels for the years and pages surveyed, where both the activity generated by the page itself and users are taken into account. But what happens when we isolate the users and distribute their activities onto the different kinds of posts made? What kind of content is most popular - generating the most likes? And what kind of content is most engaging - generating the most debate through comments?

4.1.3 User activity

In order to offset the differences in volume of likes and comments for each type of post, I calculated an average of likes/comments pr. post in each category in order to present a more accurate picture.

The figures presented below shows that photos actually seem to engage users more than links, which are the pages' preferred method of communication.

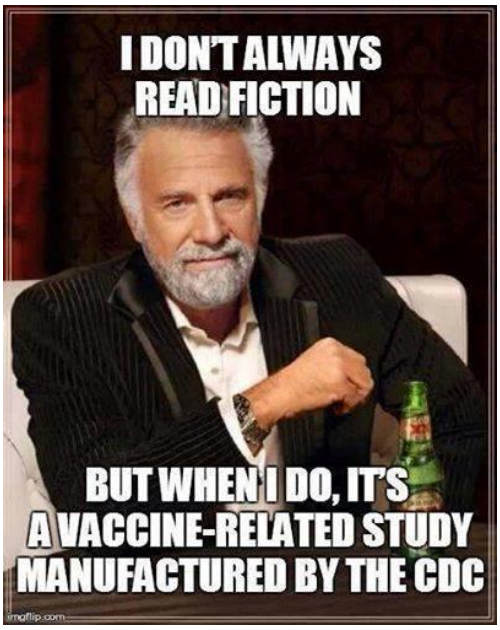




Many of these photos are so-called memes or pictures with meme-like qualities.
A meme can be described as a captioned picture, which is remixed, iterated and re-distributed through social media (Wiggins & Bowers 2014, 5, 7-8, 15). Memes follow certain conventions, such as repeated phrases or textual style coupled with a specific image, but are in nature highly customisable entities (Wiggins & Bowers 2014, 7-8). Indeed, the customisable element is central to the nature of the meme -

it is purposefully and intentionally altered by users to create recognisable points of identification, which can be translated into an array of different contexts and conversations (Wiggins & Bowers 2014, 14-5).

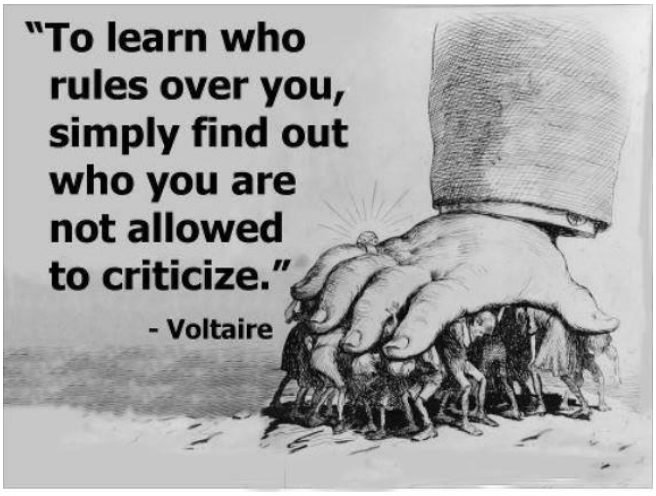
The most frequently used memes by NVIC can be categorised into two different types:
1) The classical meme, which entails elements of humour, parody and satire to convey criticism and can be endlessly remixed and repurposed (Wiggins & Bowers 2014, 8).
2) The "inspirational quote meme, which features inspirational quotes by famous authors, thinkers etc. set to a fitting image. These can be repurposed and re-contextualised to fit almost any message, but cannot be altered or remixed, as this would threaten the integrity of the original quote.



Classical memes such as "Success Kid[1]" and "The Most Interesting Man in the World[2]" are featured on the NVIC page frequently but with modified and customised text as to fit the context and purpose of the page.

The example to the left shows "The Most Interesting Man in the World" with his conventionalised caption of "I don't always do X, but when I do, I Y" (Wiggins & Bowers 2014, 16). However, in this remixed version, the well-known meme is used as a critical commentary towards vaccine studies produced by the CDC, thus reconceptualising the meme to fit the page's agenda.

The inspirational quote memes are used by the page in a way that serves to both legitimise the position of the page by linking it views to a famous thinker or author. However, the beauty of this type of meme is that they represent universal truths, which can be repositioned into a vast array of ideological positions and be seen to support them.



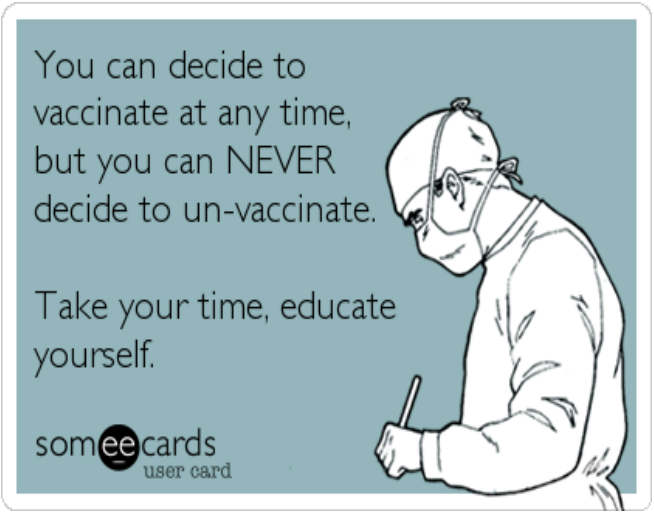
The example to the right, featuring a quote from Voltaire, has neatly been re-contextualised to fit the anti-

[1] http://knowyourmeme.com/memes/success-kid-i-hate-sandcastles
[2] http://knowyourmeme.com/memes/the-most-interesting-man-in-the-world

vaxxer agenda, when accompanied by statements such as:

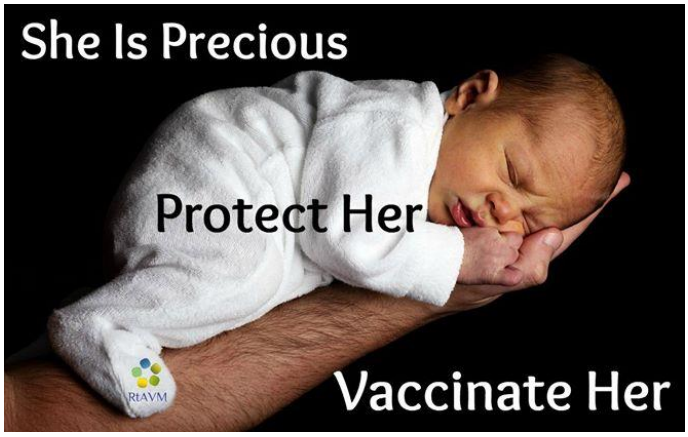
“HPV Vaccination Program in Colombia: Undermining the Truth?”
"Vaccine Free Children Are Healthier! Now there is proof from an official German source" this in-depth report has been disputed so ...YOU be the judge and post your opinion…”
"...As for the anti-vaccinationists, the day will come, several generations from now, when they will be dragged kicking and screaming to be vaccinated for the good of all."

When reframing the picture and using the Voltaire quote in this way, the universality of the statement is used to brand anti-vaxxers as freedom fighters challenging authority.



What is also interesting about the use of memes on the NVIC page is the repeated use of the same memes connected to different status updates. As an example of this, the meme to the left (generated through someecards[3], where you can generate your own message on an old school postcard), was featured no less than 44 times during the period of investigation.

This is what Wiggins and Bowers refer to when they speak of memes as being part of a continuing conversation in a participatory digital culture (Wiggins & Bowers 2014, 6). By re-contextualising the meme within a new conversation the memes becomes a focal point of recognisability, which lets the users identify and continue a discussion, even though the theme might diverge somewhat from the original one (Wiggins & Bowers (Wiggins & Bowers 2014, 14-5).



It is worth mentioning that the use of memes is not a trait, which is exclusive to the anti-vaxxer community. IPVC uses memes to a large extent as well and often use ones, which are heavily laden with emotional content such as the one shown here.

[3] http://www.someecards.com/ecards/all/?sort=popular

IPVC also features several memes referencing what they perceive as authorities, like Neil Degrasse-Tyson, and even features several references to a pro-vaxxer "meme community" where users construct and share memes, which refute anti-vaxxer claims, or even make fun of them[4]

Links are the preferred method of communication when investigating the content posted by the NVIC page itself, and is the second-most engaging type of content when measuring user engagement.
As a large percentage of the links are shortened using ow.ly[5], a service that makes links shorter and easier to share, it was a difficult task to determine their origin. Thus, I used a sample of 2.850 links from 2012 to get an overview of linking practices. In this sample, I identified the most linked-to sites and categorised them according to type of site: News sites, blogs, official organisations, alternative news sources and social media (Bessi et. al. 2014, 2). All results can be found in Appendix A.
I then proceeded to create a top 10 of the sites receiving most links, and the results showed that alternative news sources comprised seven out of 10 of the pages most linked to. The majority of these were sites related to the anti-vaccination movement.
The number one site was Facebook, with 98 links, with the pages linked to being a combination of the NVIC page - other related pages and links to photos, notes and status updates of undetermined origin.

Site number two, mercola.com, which received 73 links, is the personal site of Dr. Joseph Mercola, who has been a leading figure in the anti-vaccination movement and has been heavily criticised by the FDA for his views on "alternative medicine"[6].
The same goes for site number four, ageofautism.com with 64 links, a site that is dedicated to investigating the "autism epidemic" and believes in a direct link between autism and vaccinations[7].

The only sites on the list that do not pertain to the domain of alternative news/vaccine scepticism are news sites huffingtonpost.com (35 links) and washingtonpost.com (19 links).

In conclusion, what is most noteworthy about the linking practice of NVIC is the fact that a large portion of the links seem to be self-referential (Rogers 2004, 7). Self-referential links are both links that direct back to yourself, evident by the fact that NVIC's own website and Facebook page were placed very high on the top 10 list. However, self-referential links are also links that refer to "your own kind", pages and organisation that share your views and ideology, as evidenced by the presence of sites such as mercola.com, ageofautism.com and vaxtruth.org in the absolute top of the sites receiving most links (Rogers 2004, 7).

[4] https://www.facebook.com/The-Vaccine-Meme-Machine-302477036534120/timeline/
[5] http://ow.ly/url/shorten-url
[6] https://en.wikipedia.org/wiki/Joseph_Mercola
[7] http://www.ageofautism.com/a-welcome-from-dan-olmste.html

What is even more interesting is the fact that IPVC, the pro-vaccination community, uses a linking practice, which is similar to the one outlined above. Here, I examined the entire sample in a manner identical to what is outlined above and found no less than 865 links to Facebook pages, both the IPVC page, related pages and an assortment of photos, notes and updates. This is striking as the number two on the list, skepticalraptor.com, received only 101 links.
For IPVC, only three sites on the top 10 list can be described as "alternative news sources" however, blogs were strongly represented as well with four out of the top 10 sites being blogs. When examining content of the sites, the majority of the ones linked to by IPVC could be described as self-referential in a similar manner as for NVIC - all blogs and alternative news sources represent views with correspond to the ones being expressed on the IPVC page. Examples include number two on the list, skepticalraptor.com, which is a blog dedicated to debunking myths about vaccinations (with the author being a professional within marketing and product development in the medical industry) and number three, vaccinenewsdaily.com, which describes itself as being *"Internet-based newswire dedicated to 24/7 coverage of communicable diseases and vaccine development.".*

In conclusion, linking practices of both NVIC and IPVC are quite similar as they display a tendency towards self-referential linking, linking to sites that share and reinforce their own views, and stay within media types which display similar characteristics and are opinion-based and non-mainstream in nature.

4.2 Keywords and terms

In the analysis of keywords and terms, the focus will primarily be on nouns and noun-constructs. Nouns are important because they are what can described as "content-words", which denominate the objects, persons, places and actions that direct the themes of a conversation (Chung & Pennebaker 2005, 3). The purpose of exploring content-words is to identify the most salient topics through the years and compare them to both each other and the control sample.

Arguello et. al. (2006) distinguishes between two forms of online communities: bonds-based groups that are held together by social ties such as friendship or family and topic-based (or identity) groups, which are held together by a common interest in a certain area of interest (Arguello et.al. 2006, 2). As the communities examined are far too large and diverse to be held together by friendship alone, it is safe to say that we are dealing with a topic based-group that gains cohesion and continuity through a shared interest in a certain topical area. Group cohesion is closely linked to topical coherence, and conversations that veer off track, are not very likely to receive responses or generate engagement (Arguello et. al 2006, 3). Therefore, by uncovering and exploring topics and their continuity through

time, I aim at exploring the repeated patterns of conversation that establish and maintain the identity of anti-vaxxer communities and keeps these groups coherent over a period of time (Arguello et. al. 2006, 3).

Terminology, or determining the noun constructs that appear most frequently together, ties into the topical coherence touched upon above; extracting terms helps uncover the common language that are characteristic of the group (Arguello et. al. 2006, 4).

4.2.1 Keywords

NVIC 2012	NVIC 2013	NVIC 2014	IPVC
Noun	Noun	Noun	Noun
vaccine	vaccine	vaccine	vaccine
child	child	child	child
people	people	people	people
kid	flu	kid	disease
parent	kid	year	year
year	shot	parent	study
flu	year	disease	kid
doctor	parent	shot	vaccination
shot	time	time	case
vaccination	baby	doctor	time
health	vaccination	article	parent
time	doctor	vaccination	risk
article	article	flu	%
baby	health	baby	baby
food	way	way	thing
way	disease	thing	flu
school	thing	autism	autism
drug	ow	health	doctor
thing	food	research	measles
disease	school	life	page
family	family	%	pertussis
%	day	day	health
choice	money	family	way
money	study	school	rate
company	research	study	link
day	drug	body	shot
autism	body	son	evidence
!!	life	money	science
body	%	food	day
state	!!	drug	death

The following list is the Top 30 most frequently used nouns across the three years examined including the control group. They have been colour-coded to display the differences and similarities observed: if a word is highlighted in green, it means that it occurs in all four samples. If it is yellow, it occurs in two or three samples. If it is red, it only occurs in one sample.

When examining the table of keywords it is evident that there are remarkable similarities across the three years examined, extending to the control group as well. This suggest that there is a great deal of topical coherence across the samples; people are, to some degree, using the same content-bearing words (Arguello et. al 2006, 3).

Especially in the Top 10, almost all words appear in all samples, and the first three even with the same frequency. It is also noteworthy that the majority of the words marked with yellow, appear primarily in the NVIC samples, suggesting an even higher degree of topical coherence within these three samples. In addition, most of the words marked in red appear in the IPVC sample, suggesting that some content-bearing words are exclusive to this community.

Going beyond the mere frequency of the words, and digging deeper into semantics, we can identify four "clusters" of words whose meanings are closely associated to each other, which demonstrate the main topics of interest and concern within the samples. These are:

Health/biology: vaccine, vaccination, doctor, flu, health, food, disease, autism

Parenthood: parent, child, kid, baby, school, family

Relativity (time, space): year, time, rate, way

Science/research: %, article, research, study, case, evidence

4.2.2 Terminology

By using the TermExtract module in khCoder, and applying it to the aggregate texts (post and comments) for each sample, you can extract word combinations that appear together at such a high frequency that they can be labelled "terms". The table illustrates the top 30 terms from the three NVIC samples and the IPVC sample. They have been colour-coded for comparison in the same manner as described above.

NVIC 2012	NVIC 2013	NVIC 2014	IPVC
flu vaccine	flu shot	flu vaccine	flu vaccine
flu shot	flu vaccine	flu shot	chicken pox
big pharma	big pharma	immune system	immune system
immune system	immune system	big pharma	whooping cough
drug companies	flu shots	many people	pertussis vaccine
flu shots	many people	side effects	flu shot
chicken pox	flu vaccines	polio vaccine	public health
flu vaccines	side effects	vaccine injury	mmr vaccine
whooping cough	hpv vaccine	whooping cough	hpv vaccine
health care	vaccine choice	mmr vaccine	vaccine injury
many people	chicken pox	hpv vaccine	chicken pox vaccine
hpv vaccine	polio vaccine	herd immunity	measles vaccine
side effects	health care	chicken pox	many people
vaccine injury	vaccine injury	flu shots	polio vaccine
vaccine choice	drug companies	health care	flu vax
public health	hep b	unvaccinated children	vaccine safety
national vaccine information center	hep b vaccine	vaccinated children	herd immunity
pertussis vaccine	whooping cough	great article	unvaccinated children
vaccine exemptions	mmr vaccine	many vaccines	vaccination rates
new vaccine	one vaccine	one vaccine	vaccinated children
health care workers	unvaccinated children	flu vaccines	vitamin c
many vaccines	chicken pox vaccine	many children	disease control
vaccine safety	public school	other side	flu vaccines
one vaccine	own research	vaccine safety	other side
source of vaccines	many vaccines	own research	side effects
raw milk	other people	other people	measles cases
polio vaccine	other vaccines	vaccinated people	other vaccines
medical care	herd immunity	measles vaccine	other people
chicken pox vaccine	same thing	hep b	other children
unvaccinated children	religious exemption	immune systems	big pharma

The terms extracted show both a lot of similarity across the samples and a very salient concern with topics related to vaccines, health and disease. Especially the first half of the list shows remarkable congruence in the word constructions used. However, as we move further down more diversification takes place.

If we cluster the terms in a manner similar to the clustering keywords, we can identify five overarching thematic categories. The most salient clusters of terms are those related to vaccines and types of vaccines. Furthermore, we can identify a cluster related to health in general, one related to people, one related to institutions and a last one concerned with risk and safety.

Vaccines: flu shot/shots/vaccines, hpv vaccine, mmr vaccine, pertussis vaccine, chicken pox vaccine, polio vaccine, many vaccines, one vaccine, other vaccines
Health: immune system, health care, herd immunity
People: many people, other people, unvaccinated children, vaccinated children, many children, other children, other side
Institutions: big pharma, drug companies, public health, public school
Risk & safety: side effects, vaccine injury, vaccine safety

It is interesting to observe that the term "Vaccine choice" is present in all the NVIC samples but is notably absent from the IPVC sample. This suggests that the NVIC community is associating the issue of vaccines with CHOICE, either implying that vaccines are or should be an individual choice- an opinion which is clearly not shared (or not as important) by the IPVC community.

4.2.3 LIWC Results - writing style

The first notable observation derived from the LIWC results is that the differences across the years sampled from NVIC as well as the control sample IPVC, are negligible.
This high degree of similarity is best witnessed in Appendix B, which creates a visual representation of the similarities.

The most interesting and telling similarities will be explained in detail below, as they point to a unique way of talking to each other and discussing the topics relevant to the group (Arguello et. al. 2006, 4).

Use of 3rd person plural - A dominant "them":
The use of pronouns is a good indication of the attentional focus of the speaker: the person(s) or object(s) you are referring to are consequently the focus of your attention at the present (Tausczik & Pennebaker 2010, 31). If you, e.g. use a high amount of impersonal pronouns, one might conclude that you are speaking of non-human entities like objects, facts or events, and if you are experiencing physical or emotional pain, your language might exhibit a high amount of self-referential pronouns (Tausczik & Pennebaker 2010, 31-2). Further to this, if you are engaged in a conversation with another person, one might expect to find many second person pronouns, addressing and acknowledging your conversational partner (Tausczik & Pennebaker 2010, 31-2).

Both NVIC and IPVC display high degrees of the 3rd person plural, with levels that far exceed those of both the scientific article and ANY of the categories developed by LIWC for comparison. Especially NVIC displays extremely high levels of 3rd person pronouns, up to 1,70 in 2014, far exceeding the highest of the comparative samples, novels (0,98) which are very often written from a 3rd person perspective. This suggest that the communities analysed are focusing a lot of their attention on a pervasive and dominant "them" a group separate from the communities, whose actions and existence are the focus of a lot of attention, discussion and scrutiny.

Discrepancy: In the LIWC dictionary, discrepancy is associated with words that display "wishful thinking" - could have, would have, should have, want, wish etc. (Pennebaker et. al 2007, 5-6). In the samples examined, the levels of discrepancy are very high, being more than three times higher than the language used in a scientific article. This might suggest a highly opinionated language where the sender has clear ideas on how the world could, should and ought to be. It also suggest the sender is speculating in alternative paths or ideals to the existing ones. As an argumentation strategy, however, this kind of speculation does not hold water. Basing your argumentation on utterances such as "if only people would do X, then everything would be different" is highly speculative, as you cannot know for certain if this is the effect your "wishful thinking" will actually produce.

Quantifiers: Quantifiers are words that denominate or magnify a value. This can be words like amount, bunch or part, or many, extremely or greatest (Pennebaker et. al. 2007, 5-6). Using high levels of quantifiers, like both the NVIC and IPVC communities do, might suggest a tendency towards generalisation; you use words that denominate values or amount, but they are *non-specific* and vague. The phrase "many people" can mean anything from your closest friend to an entire country. A generalisation such as this is almost impossible to prove or disprove as opposed to using concrete numbers or percentages.
Furthermore, using generalising quantifiers such as "most", "extremely" and "majority" might also be signalling a language that is prone to exaggerations - or approach something like statistics in a less rigid way than what you might see in a scientific article.

Affective processes - emotional language: Both the IPVC page and the three years of NVIC samples display a very high degree of affective processes - levels that at times are higher than emotional writing. The emotional writing samples used for building the LIWC system, are essays where participants were asked to write journals of their innermost thoughts and feelings about personally relevant and emotion-laden topics (Pennebaker et. al 2007, 10).
Naturally, these texts use a high degree of words related to emotions, feelings and personal opinion. Thus, it might be safe to say that our samples display similar characteristics - a high degree of words related to emotionality and affect. When comparing to the scientific samples the difference is especially

striking. Our control sample, the article about the MMR-vaccine had a score of 1.42 in the affective processes categories, where the aggregated samples of scientific articles used to build the LIWC dictionary had a base level at around 2.18. In comparison, the IPVC and NVIC samples scored between 6.52 and 5.51. Similarly, our samples displayed a level of positive emotion at around 3.7-2.95 and negative emotion at around 2.5 whereas the scientific article had levels of 0.68 for both categories. The aggregate scientific articles scored respectively 1.33 for positive emotion and 0.84 for negative. Interestingly, the NVIC sample shows very high levels of anger-related words, even higher than blogs, which have been measured to display a significant amount of words related to anger and indignation.

Social orientation:

The NVIC and IPVC samples all show high levels in categories, which point to social orientation - being part of a community and having concerns related to social events and relationships (Chung & Pennebaker 2007, 353-4). All four samples display high levels of auxiliary verbs (which relate to social interactions, norms and rules), a characteristic that is often linked to conversation and high relational orientation (Chung & Pennebaker 2007, 353-4).

Also, the word category "social processes" is distinctively salient in all of the samples, using almost as many words from this category as someone engaged in conversation- and 3 times more than the scientific article. Attention to family-related words and words related to people and humans in general are at the very high end of the scale, alluding to with a high amount of conversation circling around social topics.

Agreement:

When people engage in conversation words denomination assent, such as absolutely, agree, okay etc., combined with positive emotion words suggest that people are agreeing both with what is being said and with each other in general (Tausczik & Pennebaker 201, 32).

This construction is found in a convincing degree in both the NVIC and IPVC, suggesting that people generally agree with each other about the topics being discussed. The agreement construction also points to a prevalent sense of community - people are alike, share the same views and are affirming the opinions of others rather than challenging them.

Cognitive processes- Thinking, reasoning and logic:

Analysing the way people use language can give a lot of insight into the way they think and reason, as well as the level of abstraction, concreteness and complexity characterising their cognitive processes (Tausczik & Pennebaker 2010, 35).

The cognitive processes category in LIWC can give clues to how complex people's level of reasoning is - if a text exhibits high levels of cognitive words, it points to it being of a more abstract nature (Tausczik & Pennebaker 2010, 35).

In the NVIC and IPVC samples, cognitive processes are very high overall, consistently at a level around 17. This alludes to thinking, pondering, wondering about something - conversations related to speculation and abstraction rather than dealing with concrete and factual events (Tausczik & Pennebaker 2010, 35).
Furthermore, all samples show very high levels of causation, a subcategory of cognitive processes. High levels of causation is also found in the scientific article, which alludes to abstractions, and searching for causes, connections and explanations (Tausczik & Pennebaker 2010, 35).
Interestingly, all samples from Facebook show low levels of perceptual processes (words concerned with the material world - what you can see, hear and touch), which suggests more abstraction and less concern with observable facts and phenomena. In other words, descriptions of the world are replaced with interpretations of it.
In conclusion, this alludes to the IPVC and NVIC communities engaging in conversations, which are highly abstract and aimed at making sense of, and finding causal explanations for, the phenomena at hand.

Another interesting aspect of the cognitive processes of the communities sampled is the fact that they consistently display high levels of exclusive words combined with high levels of both certainty and causation.
Exclusive words are used to make important distinctions and definitions about what pertains to a certain category or not (Tausczik & Pennebaker 2010, 35).
These, combined with high levels of certainty, suggest that these communities are not afraid of speaking in absolutes - they draw a high amount of distinctions between categories and are convinced about the veracity of these distinctions (Chung & Pennebaker 2005, 15). Combining this with high levels of causation might tell us that they trying to categorise and find causal explanation for events, thereby constructing “absolute truths”. This construction is not found in the scientific samples where exclusion and causality might be high, but certainly, levels are significantly lower and levels of tentative language significantly higher. This might point to scientific articles being less inclined towards absolute truths and more about concerned with proposing theories, probabilities and possible solutions.

5. Intermediate coding

The initial coding gave a somewhat superficial picture of the communities surveyed. What has been made clear by this exercise is what kind of activities are most prevalent on the two pages surveyed, the themes they talk about and the similarities in the way they talk about them.
However, this does not go further than the descriptive dimension. It describes the WHAT, and to some degree HOW, but does not even vaguely touch about the WHY. What is needed now is a more

interpretive approach that explores not only the observable characteristics but also the deeper meaning of them.

Because of this, I decided to take on a more classical grounded theory approach to the next stage of coding - extracting samples from the aggregate texts, coding them by hand, and developing meaningful, explanatory categories from them.

However, I did use the khCoder tool to guide the sampling of text to be coded. I decided to use the 2012 sample for coding and category development. I will then proceed to testing the validity and relevance of the categories developed by applying them to samples from 2013 and 2014, further refining and consolidating them as I go along. Then, I will proceed to testing them against the control sample.

5.1 Intermediate coding I

The theoretical sampling and intermediate coding was done using KhCoder, where I extracted samples from the enormous amount of textual data, through word frequency lists and keyword in context analysis. In total, 750 samples were extracted for manual coding.
The word frequency list in itself does not provide deep insight but rather an overview of popular themes and word use. The deep insight comes through placing these keywords in CONTEXT, and extracting the most significant examples. Using the most popular nouns as the base unit, I extracted samples for more thorough analysis and coding. Coupling the nouns with the words they are most frequently used in context with, their placement, POS and meaning, I am able to extract meaningful concepts without having to go through the entire text manually - using the KWIC as pointer and indicator of the most interesting and relevant themes of the text.

KhCoder was used in the following way in an iterative and comparative work process:

1. Extract all text from this year (fields marked “Text Value” in data extracted from SODATO).
2. Clean the data for unwanted information, like “http” and “www” denominating links, < and > signifying a mark-up (which will cause the khCoder to either shut down or treat it as a headline) and emoticons, as these bring no real value nor insight.
3. Running the cleaned text through khCoder, in order to generate a word frequency list, determining and ranking the most frequently used nouns, proper nouns, foreign words, adjectives, verbs and words.
4. Using the most popular nouns as the base unit and coupling these nouns with the 10 words (regardless of POS-tag) that are most commonly appearing in connection to, I extract approximately five to six posts containing this connection for manual coding.

5. Manual coding is done by reading through the selected samples and interpreting them, trying to identify common and recurring themes and arguments. When a pattern is observed with some regularity, it is turned into a code. The codes are described and elaborated in textual form, assigned a colour, which is used to demarcate sentences belonging to this code.
6. Codes are constantly evaluated and consolidated, turning them into categories.

When developing the categories I took an interpretative approach that differs significantly from the computerised coding taking place during the initial coding, going beyond the mere words and attributes of the text. Following the colour-coding of each sample, I wrote out a "thick description" of each sample, trying to go beyond what was being said and instead focusing more on goals and motivations; *why* is this being said, *what* does the sender wish to accomplish and *what* is she doing to accomplish it.

5.1.1 Result for the 2012 sample

So far, the sampling and coding process described above have generated a total of seven categories, which demarcate both the themes being discussed and the rhetorical strategies and arguments employed (Arguello et. al. 2006, 2-4). These categories serve to both frame the conversation (what is being talked about and in which way) as well group identity (who we are, our motivations and goals) (Arguello 2006, 3).
The description of each category below is a summarisation of the patterns observed and consolidate through the coding exercise, emphasising interpretative dimension that was lacking during the initial coding:

Canonisation of "the natural": Everything that is natural, unaltered and untouched is always better and healthier than anything else is. This entails organic food, natural remedies and supplements, natural immunisation and clean chemical-free living in general. The natural stands in opposition to the "unnatural"; everything that has been industrially processed and produced or has been altered or tampered with by man; chemicals and additives, vaccines, pharmaceuticals in general, GMO's, antibiotics etc.

Being a good parent: Anti-vaxxers are driven by deep urges to be good parents and protect their children from harm. The most salient argument is that parents are the experts of their own children - they know them the best and know what is best for them. No outsider can ever decide which course of action is right for another person's child. In addition, where an outsider might be driven by other motivations or interests, a parent is seen as always putting the best interest of their child first. No one should be able to take a parent's freedom of choice away when it comes to his or her children.

Mistrust in authorities: No kind of authority figure be it the government, doctors, scientists or pharmaceutical company are to be trusted in full. They all have a hidden agenda of some sort, or other motivations and interests that may taint their perception of what is right and good. They are always trying to push their own agenda (e.g. vaccines) and are often motivated by profit. Anyone calling himself an expert should be questioned. The modus operandi is fear mongering through "science".

We, the enlightened: Anti-vaxxers belong to a community of enlightened and privileged individuals with their own approach to science, truth and fact. Anecdotal evidence and personal experience is accepted as legitimate forms of evidence. Self-education and research, using the internet as well as discussions with peers, are seen as legitimate ways of building expertise. Expertise that can rival that of publically acknowledged experts. Simple and direct causality are the argumentation of choice. Many "conversion stories" where people used to vaccinate, but then saw "the light".

Knowing the hidden truth: Anti-vaxxers have uncovered a hidden truth through research and experience that makes them a threat to the status quo. They know vaccines do not work and/or are harmful and are continuously under attack for it. Authorities are constantly trying to discredit and ridicule them, so the rest of the public will not discover the veracity of their claims. Even their children are marginalised - they are in many cases not allowed in public schools. This is due to their potential to expose the authorities for what they are.

Fact, evidence and logic: Knowing the hidden truth and enlightening themselves have created a unique approach to science, truth and fact. Anecdotal evidence and personal experience is accepted as legitimate forms of evidence and treated as facts. The same with historical anecdotes and chains of causality. Simple and direct causality (the easiest explanation) is the argumentation of choice - "vaccines cause….".
Scientific facts can be stated without supporting evidence or sources, and still be stated as fact.

The categories in the sampled and annotated material presents the following distribution:

Canonisation of the natural:	83	11%
Being a good parent:	152	20%
Mistrust in authorities:	155	20,78%
We, the enlightened:	143	19,17%
The hidden truth:	123	16%
Fact, evidence & logic:	90	12%
Total annotated samples:	746	100%

5.2 Intermediate coding II

In order to ensure the validity of the categories developed from the 2012 sample, these were tested out on the 2013 and 2014 samples as well but in a random selection of posts.
The randomness approach was chosen to ensure VALIDITY - making sure that the categories developed above were not a result of purposeful, computerised sampling but instead indicative of the sample as a whole.
To ensure complete and bias-free randomness in selecting posts for coding I extracted all posts from the 2013 and 2014 samples by themselves and allocated each post a number. A string of random numbers within the range of posts was then selected using the website random.org[8]. The posts randomly selected by this random number generator were then extracted, along with their comment string, for further analysis. In total, 350 samples were extracted for analysis.

When sampling in a directed way results were ensured to be pertaining to the topical clusters identified as the most salient and continuous.
The random sampling approach produced a lot more results that was off-topic and not necessarily related to vaccines. In addition, some of the initially developed categories quickly became obsolete.

The "canonisation of the natural" and "being a good parent" categories have a significantly smaller presence among the 350 samples as seen in the distribution table for the 2013 and 2014 results below. This is not to say that these categories are not important, But it seems that sampling from the most frequently used words, especially those related to parents and children, seems to have exaggerated their importance as separate categories.

Canonisation of the natural:	11	3%
Being a good parent:	29	8%
Mistrust in authorities:	114	32,02%
We, the enlightened:	63	17,70%
The hidden truth:	75	21%
Fact, evidence & logic:	64	18%
Total annotated samples:	356	100%

As coding came along on the newer samples, the "canonisation of the natural" category became increasingly difficult to separate from the "fact, evidence & logic" category. The importance of things being "natural", was often used as an argumentative strategy: vaccines, which are manmade and chemical are bad, thus, everything "natural" and untouched

[8] https://www.random.org

by man must be its logical counterpart. An example of this could be the one presented below, where natural alternatives are presented as the logical counterpart or alternative to vaccination:
"I want to see the numbers from positive flu tests in this age group that justifies this insanity? Why doesn't the government hand out vitamin D, garlic and juicers???" (NVIC 2013-14)

A similar thing happened with the "being a good parent" category. It is still present in the samples but not nearly in the same volume. In addition, it seems to naturally merge with the "We, the enlightened" category as it increasingly becomes linked to self-definition and identity; we know better than the "sheeple" and educate ourselves because we want what is best for our children. This can be illustrated with an example where the speakers link their own status as good parents with being about the dangers of vaccines:
"I am educated about vaccines, no one knows what is best for my child except for me and if you won't take responsibility in any way for any possible harm done to my child, you're hiding something."(NVIC 2013-14)

An issue that was not as obvious in the directed sampling is the question of morality. Anti-vaxxers seem to see themselves as morally superior to the authorities and the ones that follow their recommendations, because they are motivated by nothing else than concern and love for their children. In most cases, morality is used to brand the ever-present "them" as being immoral, evil and manipulating.
The authorities are immoral and this means that their truth is not to be trusted as in the following example:
"Our elected leaders are without intelligence or morals. they must be replaced asap!"(NVIC 2013-14)

Or even comparing schools, which give out treats to vaccinated children to paedophiles:
"What a lowdown trick, taking advantage of their innocence and trusting nature. It is like a perv using candy as a bait to get a girl into his van. Sick!" (NVIC 2013-14)

Furthermore, it seems that health and science increasingly becomes intertwined with morality, and morality in turn becomes an argumentative strategy that is just as defining for truth as statistics; if something is moral, it is better than something immoral, and thus, more true. The following example equals a health issue like vaccines and abortion to moral issues, blurring the lines between the two:

"There are far more important issues in the the world! Yet all I see in America are stupid social issues! Btw, I do not consider vaccine and abortion issues social ones those are health issues and moral issues!"(NVIC 2013-14)

Morality has been added to both the “We, the enlightened” category as it defines them as more moral than the opposition, and the “Fact, evidence & truth” category, as it becomes a defining trait in the way anti-vaxxers reason.

Another interesting issue that becomes very apparent during random sampling is the question of freedom of choice. This adds another dimension to the relationship between the anti-vaxxer community and “the other”. “The other” - the authorities and those that blindly follow them - are essentially seen as someone trying to take something away from the anti-vaxxer community. They are violating their rights to choose what they think is best for themselves and their children. Like in this example where a bill allowing a 12-year old to have the HPV-vaccine without parental consent is being heavily criticised:

“Why would any government enact a law that allows your child to be injected with ANYTHING without your knowledge or consent? Street-level drug dealers operate this way.” (NVIC 2013-14)

This is a prime example of how this perceived violation rights helps to further demonise “the other” - they are taking away our rights, and their methods can be compared to street-thugs.
The question of freedom of choice is extremely interesting as it underlines how anti-vaxxers are displacing the issue of vaccines from the realm of science and public health, into one heavily infused with political opinion and morality. The example below clearly illustrates how they feel vaccines are a question of individual liberty, which should only be decided by parents:
“Parents should do the research and make a informed decision for their children, NOT the Government!! Personal!” (NVIC 2013-14)

The moral perspective of this might be understandable, as all parents want to be included in decisions regarding their children, but it also completely bypasses the social dimension of vaccines - that they are only effective if a large enough portion of the population are protected. This concept, herd immunity, is quickly dismissed as being a scare tactic that authorities use to push vaccines:

“Their concern always comes down to herd immunity. That's what they always fight about. They are ignorant and can't think for themselves. They need to learn how to read.
Yes ignorant people who does not think, get educated. believe everything pharma tells them.....” (NVIC 2013-14)

Further distance is created between the anti-vaxxer community and “the other” when linking the vaccine debate to other conspiratorial claims, which are used to highlight the many ways the “authorities” are violating the rights of “the people”. All examples below link “the authorities” to other conspiratorial claims of oppression:

“It's no mistake, the media is intentionally on blackout because of Monsanto's money and threats of pulling advertising.”(NVIC 2013-14)
“Bill Gates has openly admitted that all vaccines are to depopulate the world as much as possible. As far as he is concerned, as well as his followers, the heat from our human bodies are also causing the ozone layer to breakdown, that's why we have global warming according to him”(NVIC 2013-14)
“Vaccines are a scam, just like GMO's, war, fluoride, and many more.”(NVIC 2013-14)

This is used as a strategy to frame “the others” as oppressors, and the anti-vaxxers community as freedom fighters, seeking to expose what the others are trying to keep hidden. This serves to consolidate and legitimise the self-image anti-vaxxers have of themselves as being “the little man” fighting against governments and corporate conglomerates trying to take away the freedom of the people.

At this stage, we can tentatively begin to observe the fact that the debate about vaccines among laymen on social media is starting to look like a very different entity than a scientific debate on the same issue. It is based on opinion, emotion, morality and group norms and is motivated by a drive to reclaim freedom and independence from authorities and experts.

Furthermore, it seems as if a very distinct pattern is appearing - the conversations circle around the same dichotomy (albeit in different forms) - US VS THEM and the epic battle for the truth - trying to determine who “owns” the truth.
The debate, when moving away from the directed sampling, seems to become politicised and more of an issue of choice, rights, values and morality rather than a discussion of the scientific merits of vaccines and their perceived dangers.

This makes the interpretative categories that frame both the self-image of anti-vaxxers, and their perceptions of truth, as well as their image of “the other” and their truth, look quite different from the initial categories produced when sampling in a directed fashion. We can consolidate these categories into two generalisable ones, which encompass all the dimensions discussed above.

5.2.1 Them and their truth

Authorities of any kind, like the media, governments, experts and big pharma are motivated by monetary concerns and political power plays and do not really care about the “common good”. They will try to push their truth on people in order to accomplish their own agenda. They try to discredit anti-vaxxers and brand them as child abusers, ignorant etc., because they are afraid we will expose what they are trying to hide. But groups like anti-vaxxers have discovered that they are not actually cleverer than the rest of us - we can access the same information and draw our own, and better, conclusions.

They hide their own agenda behind “science”, and use studies and statistics that they think normal people will just accept as they are awed by their expertise. They use different scare- and pressure tactics to push their “product”, making people feel like bad parents or ridiculing them/ostracising their children in order to make them conform.
Essentially, they are oppressors that are trying to discredit anyone who wants to challenge their authority, as they are afraid to lose their grip on “the people” and thus, their power.

5.2.2 Us and our truth

We are not “normal people” nor sheep that just blindly follow experts and authorities. We do our own research and are enlightened and knowledgeable (to the same extent as they are - you do not need a degree for that). We are driven by morality and will oppose any kind of external pressure that seeks to limit our personal freedom.
It is our firm belief that parents are the only ones who know what is best for their children and act in their best interest.
We know that vaccines are just part of the issue but luckily, we know the truth and will continue fighting to expose it.
Our evidence is based on personal experience, both from ourselves and people who have experienced the truth on their own body, and we believe that the easiest chain of causality will always be logical and right. If you need to explain something in a complex and diffuse manner, it means you are hiding something (or simply do not know what you are talking about).
Essentially, we are freedom fighters who are driven by an urge to preserve the rights and freedom for both ourselves, as parents, our children, and even the poor misguided sheeple.

The categories outlined above gives us a good picture of how anti-vaxxers see themselves, the truth and the world. What becomes interesting now is to examine whether these categories are broad and universal enough to explain the dynamics of debates on vaccinations on social media when applied to another data set - in this case, one belonging to the opposition: the Informed Parents of Vaccinated Children.

6. Advanced coding- Core category selection & Generalisation

In order to develop theory that has fit and relevance to the subject matter at hand, it is necessary to select a core category around which a generalisable theory can develop (Birks & Mills 2015, 97-8).
The concept presented above, us and our truth vs. them and their truth, will serve as a core category for the rest of this analysis, which will aim to achieve generalisation.

This concept is chosen due to its pervasiveness; all of the discussions and arguments presented so far are, at their core, driven by these dichotomies. Moreover, if these dichotomies were not as pervasive as they are the whole purpose of the pro vs anti-vaccine discussion would be non-existent. Being for or against something entails having a counterpart, which stands in opposition.

For the purpose of generalisation, I extracted 300 samples for manual coding from the IPVC community - the "antagonist" group of the NVIC, which represents the "them and their truth" part of the core category. By coding these samples around the core category presented above, the dichotomy of "us and our truth vs. them and their truth", I aim to identify the IPVC community's conceptualisation of self and the other, as well as their representation of truth. These concepts will be contextualised and generalised by comparing them to the insight about the NVIC community generated above.

6.1 "Them" and "us"

When extracting linguistic features with the LIWC program, the results suggested that both sides of the discussion had a distinct orientation towards 3rd person plural -a dominant "they" or "them". As witnessed in the section above, a defining trait of the anti-vaxxer community is a predominant construction and definition of an "other" as an antagonist, which represents everything this community is against. When digging deeper into the IPVC community, this ever-present other is similarly important and dominant throughout the discussions.

The existence and continual construction of this other can be seen to serve multiple purposes.
First of all, emphasising the other and its separateness serves as a means of categorisation; defining what belongs in a category and what does not (Tausczik & Pennebaker 2010, 35). Constructing and defining an other serves to eliminate the boundaries of the community itself and its identity - we are everything that they are not.
The construction of otherness as a means for defining identity and group membership is a central theme treated by many social theorists, seen as the way we achieve a sense of identity and social belonging (Zevallos 2011). Zygmunt Bauman argues that identities are set up as dichotomies, always defining what you are in relationship to an other:

"Woman is the other of man, animal is the other of human, stranger is the other of native, abnormality the other of norm, deviation the other of law-abiding, illness the other of health, insanity the other of reason, lay public the other of the expert, foreigner the other of state subject, enemy the other of friend " (Bauman 1991, paraphrased in Zevallos, 2011).

In this context, the other is used to determine that the community is something special and different. This generates a sense of group identity and belonging, which is always juxtaposed with the other by

defining traits of the other, which are then used for defining yourself as their opposition as in the following example:
"I think most people are not vaccinating because they misunderstand the science and are misled by the antivax brigade." (IPVC 2012-4)
This quote establishes the other as someone who is manipulated and misled by "the anti vax brigade", and who does not understand the basic science behind vaccinations. By defining the other in this way, the community is also defining itself as being someone who understands science and is not misled nor manipulated because of it - thus, more enlightened and independent than their counterpart is.

Many of the traits used by the NVIC community to define themselves, moral superiority and the urge to protect children, being a good parent and serving the greater good are also exhibited by the IPVC community when speaking of the other. They define the other as morally corrupt and as bad parents, like in this quote, where they are accused of wanting to bring eradicated diseases back:
"Get your facts together. Look at the diseases you are bringing back and ask yourself who are you to participate in harming the community. Look at these diseases and ask yourself what kind of parent would put their child at risk in this way." (IPVC 2012-4).
In addition, they question their dedication to the greater purpose, protecting children from harm, by highlighting the fact that their decisions are putting other children at risk:
"I think it is despicable that the antivax brigade is trying to turn vaccines into a parental right issue. You have the right not to vax your child. You do not have the right, unless you have a valid exemption, to put MY child and others at risk by not vaxing." (IPVC 2012-4)

This adds a further layer to the image created of the other, which in turn serves to define the community itself: they are morally superior and driven by an urge to protect ALL children, as they do not want to bring back preventable diseases, and care about the effects of their decisions on the wider community.
Apart from being used as a means of establishing identity, the constant definition and reaffirmation of the characteristics of the other can also be seen as a tool for establishing *purpose.* Having an other, which is defined by characteristics that are deemed the exact opposite of what the community wants to define itself by, makes it possible to establish the purpose of the community as being *against.* Their raison d'etre is to be against the other, act as a counterpart and combatant against everything they represent as this is perceived as being wrong. This purpose of opposition is clearly exhibited in the following quote:
"Let me put it simply. I stand apart from you. As a citizen, I stand apart from you. As someone interested in public health, I stand apart from you. As a parent, I stand apart from you. As the parent of an autistic child, I stand apart from you. And I am far from alone." (IPVC 2012-4)
The same dynamic is evidenced in the following example, where the "battle lines" are drawn up:

"You think you are the leading edge fringe: those with vision. But you're just a garden variety fringe. Causing harm and making it hard for those of us who want a better future to accomplish our goals." (IPVC 2012-4)

Here, we are not just against you; you are also against us, as you are countering our noble purpose.

If we accept this dichotomy of the other being the opposite of oneself, then, defining oneself will in turn define the other as well (Zevallos 2011). In a statement such as the following, an IPVC member first defines herself, making general assumptions about what people who are not like her will then be:

"I vaccinated my kids. I'm just saying, people that don't are misinformed and think they're somehow protecting their children"(IPVC 2012-4)

Therefore, if you vaccinate your children, you are well informed and sensible, protecting your children in the *right* way - and if you do the opposite, you are misinformed and misguided.

The other is not only defined by individual and inherent characteristics but also by their relationships and associations. A good example of this can be found in the way authorities are conceptualised by both sides.

Above, we established the fact that the NVIC are dominantly mistrustful of authorities, seeing them as manipulative entities, which always operate with a hidden agenda. Sampling from the pro-vaxxer community puts this view into a broader perspective.

These communities are not necessarily anti-authoritarian in the general sense, but they do mistrust and demonise the authorities of *the other side;* the ones they turn to for answers and expertise. By discrediting the authorities from which the other side draws evidence and legitimacy, you are effectively positioning your own authorities in opposition. As a result, if the authorities of the other side are not credible nor legitimate, the ones you turn to are their exact opposite - lending merit and legitimacy to your own cause.

The picture to the left is a good example of this dynamic as it shows prominent figures from the anti-vaccination movement, who are viewed as

authoritative and knowledgeable figures.

Notice that the strategy used to discredit them are not very different from the one used by anti-vaxxers to discredit authorities. They use blatant demonisation and name-calling, referring to Jenny McCarthy as a "3rd rate celebrity airhead" and Andrew Wakefield as an "all-round discredited hack". And the appeal to recipients is purely emotional and opinionated, stating *"I am responsible for the needless deaths of innocent children"* and "*"...the work of these individuals have wrought: Pain, misery and sorrow."*

Another observable facet of the relationship to authorities is the fact that they by the IPVC are seen as being immoral, unethical and motivated by hidden agendas. A good example of this is said of a doctor who apparently approves of the anti-vaccination agenda:
"Sears is nothing more than a quack. I feel sorry for parents that follow that idiot. Sears is just out to make money and has no moral compass. "(IPVC 2012-4)
The before-mentioned Jenny McCarthy is treated similarly, and is positioned as someone who is clearly "in it for the money" and not for the greater good:
"Time magazine uncovered that he really had a disorder unrelated to vaccination that improved when he got treatment. He is now basically fine but she still parlays this idea into money for herself and is the most prominent antivax spokesperson in the USA,". (IPVC 2012-4)
Furthermore, a commonly used source from the anti-vax community, VaxTruth, is discredited in a similar fashion as someone who lies and manipulates to further their own agenda:
"How do they have the nerve to put the word 'truth' in their name when they publish this load of lies?"(IPVC 2012-4)

Furthermore, the IPVC community displays a similar attitude towards the media as witnessed in the sampling of NVIC. In general, the media seems to be seen as being biased and not displaying a nuanced and fair view of the debate. The following quote demonstrates how the pro-vaxxer community feels that their cause is being overlooked by mainstream media:
"I wish the media would at least present both sides of the argument. They are happy to show programs promoting NO vaccinations." (IPVC 2012-4)
Interestingly, this same attitude was displayed by the NVIC community where the media is seen as purposefully covering up stories about the dangers of vaccines:
"The media etc hide bad reactions, poisoning of vaccine" (NVIC 2013-4)
And trying to discredit the anti-vaxxing community:
"main stream media is labeling parents who choose not to or question vaccinating their kids as child abusers" (NVIC 2012).

The need to retain *agency* over a domain that is notoriously conducive to feelings of powerlessness, the health of your child, was a recurrent topic in the material from the anti-vaxxer community. Agency, in this context, can be defined as an individual's *potential* for action within a certain social structure (Orlikowski 1992, 404). Agency enacted by individuals serve to either affirm and solidify existing social structures or change them through action (Orlikowski 1992, 404-5).

This agency is obtained and reinforced by making active, informed decisions in regards to your child's health in lieu of just following the mainstream opinion.
This issue of taking direct action in order to "take charge" of the health of your child, is something attributed to anti-vaxxers in the IPVC community with statements such as:
"they said something along the lines of "why would i take the chance of my baby dying from a vaccine. i would rather have him die of a disease that might be prevented by the vaccine that doesnt work anyway. that way at least i know it was in God's plan because diseases come from God. i couldnt live with myself if i injected toxins in his blood and he died." "(IPVC 2012-4)
And:
"I think it feels like you can control whether they die from a disease because you can keep them healthy but dying from a vaccine is something you could have prevented." (IPVC 2012-4)
Anti-vaxxers rationalise the choices of pro-vaxxing parents in a similar way in statements such as:
"I think that the fear '' emotion is what plays into the decision FOR vaccination . Those who choose not to vaccinate do so because of the abundant scientific research and the ability of those more educated parents to think for themselves . '' (NVIC 2012)

This tendency towards trying to overcome powerlessness through active choice is thus a salient characteristic in both communities.
For the IPVC community the emphasis is on making an informed choice **to vaccinate**, defining what is right and true as being in direct opposition to the other. In order to be in opposition to anti-vaxxers, you then need to research vaccines and then actively choose to vaccinate instead of letting others decide for you. This can be witnessed in statements such as:
"So, in reality, vaxing is one thing you can control to keep your kids healthier." (IPVC 2012-4).
And:
"I make sure in my daughter's private school that all kids are protected and not putting my daughter at risk. :)"(IPVC 2012-4).

Therefore, even though the means are different, the goals are the same: as a parent, you feel the need to retain some sort of control over the health of your child in order to reduce feelings of powerlessness and you cannot let others, experts or authorities, who do not know your child, make these decisions for you.

In summary, the “us” in this central dichotomy, whether it is the anti - or pro-vaxxer “us”, is always defined against an “other”, which is its direct opposite. Otherness defines identity and categorises group membership with “us” being morally superior, well informed, guided by the right values and principles and independent of thought. The other, in turn, is morally corrupt, misinformed and misguided, is not guided by values and virtue and is easily manipulated by questionable authorities with suspect and ulterior motives. Both “us” and “them” are motivated by a drive to reduce the powerlessness associated with parenthood but use means, which are in direct opposition to each other to retain agency.

6.2 Truth

In the previous section, we have determined that the core category around which the debate about vaccines revolve, is a dichotomy of “us vs. them” and “our truth vs. their truth”, where “we” is continuously constructed against an “other” - and the other in turn is defined against a “we”.
Hence, it might be useful to continue using the concept of otherness as a vehicle for analysis. This will enable us to determine how the truth is conceptualised in the current sample from IPVC, and how this constructs the image of truth pertaining to the other side. Furthermore, this will also allow us to identify similarities where the other might stand in opposition, but the goals, motivations and strategies employed are generalisable across the “battlefield”.

The quote featured above in relation to Vaxtruth is a prime example of the perceived relationship between truths:
“How do they have the nerve to put the word 'truth' in their name when they publish this load of lies?"(IPVC 2012-4).
This stand at the core of the dichotomy of our truth vs their truth - we are right and they are wrong. What they present as truth is a lie and thus, what we present as truth is the direct opposite.

How this truth is obtained is very clearly defined by the IPVC community as being through science. Science, however, is never clearly defined. It is an entity implicitly understood as being good and rational, but the processes through which science reaches the truth is never conceptualised. ”Science” becomes a diffuse and abstract concept, which everybody is presumed to understand and trust as being good and true. As in the following quote where the concept of science is described as the only trustworthy source of truth:
“So, what can you trust? Science. Talk to a licensed healthcare professional about the pros and cons of vaccines and vitamins and supplements”(IPVC 2012-4).
And in this example, where science as a concept again is exemplified as being a means for reducing uncertainty:

"Probably, which is why I trust the science." (IPVC 2012-4).

When relating the concept of science to the dichotomy of otherness, one could presume that the truth of the other side would then be conceptualised as the complete opposite, as unscientific (Zervallos 2011). However, the truth of the other is never directly referenced as being unscientific but rather a distinction is drawn between "good science" and "bad science":
"If you have half a brain and know how to use it, you can tell the difference. It is astounding to me to read the BAD science on Natural News, The Refusers, etc." (IPVC 2012-4).

In this quote, "science", as presented by authoritative sources of the other, is dismissed as being "bad". However, it is not clearly defined what distinguishes bad science from good science, other than the fact that this "science" pertains to the opposition and presents a different truth and thus, must be conceived as "bad".

Also, a distinction is drawn between "real" science and its counterpart:
"Humphries, you have all of this time to cherry-pick through questionable sources, but cannot be bothered to take the time to learn any of the real science. As such, all you do is rant and make ad hominem attacks. " (IPVC 2012-4).
If your science is not "real" or "true", you are automatically dismissed as being uninformed and following the herd, like in this quote from NVIC:
Let 's show the sheeple that we value true science over the herd '' mentality ! (NVIC 2012)

The degree of science is also used as a distinguishing marker:
"There is very little science behind naturopathy. There is basically no science behind chiropractic. In fact the premise of chiro is complete hogwash. The very few conditions chiro does actually work for is basically by accident., and in those few conditions does not substantially differ from traditional medicine treatment." (IPVC 2012-4).

Even though the pro-vaxxers might put a larger emphasis on "science", both sides agree that the way, which you obtain truth, is through concepts related to the scientific domain: research and studies. Research is the activity an individual does in order to obtain studies, which are then used as the primary qualifying evidence behind statements. What the activity of research consists of is never clearly defined, and it can apparently take many forms. In this quote, from IPVC, research is seen as being an activity, which can be done through Google:
"This isn't an informed choice, nor is it a result of research, even on Google."(IPVC 2012-4).
A sentiment, which is echoed by the NVIC community:

“I wish I had been made aware of all the cancer causing & disease causing crap they were injecting my child with 13yrs ago . Or google had been around back then. It is insane to research the rise in vaccines…” (NVIC 2012)

So, what research consists of is not particularly specific. And how to judge the quality of research is not as easy as the dichotomies surrounding “science”. However, what is clear is that research is an activity that is crucial to obtaining truth. Preferably, you have to perform the activity yourself, in order to be able to utter qualifiable statements on the subject at hand. In this example from IPVC, the activity of research is described as something that should be done on the individual level:
“... is charging you money to look up research you could find for yourself for free at your local library.”(IPVC 2012-4).

The other is defined by *not* doing their own research, thus disqualifying their statements as being less true, like in this example from NVIC, where the opposition is defined by a lack of proprietary research:
“Most of the people I know who don't vaccinate , or delay or selectively vaccinate , have done hundreds of hours of research on the subject , while most of those who follow the recommended schedule don't do any. At all.”(NVIC 2012)

Accordingly, truth is determined by your ability to do your own research. If you do “the research”, your statements will automatically become more truthful:
“Yes it's true, if you do the research you will find it to be true” (NVIC 2013-4).

Doing your own research will also allow you to “see the light” and agree with the “right” truth. The other is perceived as having not done their research - because if they had, they would know without question that their version of the truth is wrong:
“I wish more people would do proactive research instead of living in fear and touting comments that just propagate more ignorance and fear” (NVIC 2012)

Thus, the viewpoint of the other, which is defined as the direct opposite if the truth, stems from a lack of research as well as an active choice to ignore the facts, which contradicts their conception of truth. The following quote from NVIC is a good example of this dynamic:
“They ignore the science that doesn't agree with their viewpoint . They also ignore the science contained in the contraindications for vaccines .” (NVIC 2012)

So, science and hence, truth is also seen as something which can be obtained or acquired by any interested party, regardless of their level of education or training, by doing proprietary research. In fact,

even experts such as doctors are not always seen as possessing (as much) truth as any dedicated or interested layman as in the example from IPVC:
"I know what the science says but I also know that many people have bad experiences with medicine or medical doctors (me!) and are suspicious or mistrustful. I try to separate the bad choices and bad advice I have been given by a few MDs from the science of vaccination."(IPVC 2012-4)

If you do the research, you have no need for a mediating authority such as a doctor, which often will have an ulterior motive when presenting you with information. If you just trust what an "expert" tells you, your concept of truth automatically becomes less valid as you pertain to the realm of "followers", which blindly trust what other people tell them even though "the experts" are just people like everybody else:
"they are just humans who learned information in medical school and err on a daily basis…" (NVIC 2012)

Doing your own research becomes the qualifier for obtaining truth - but how is this research, and the truth it generates, evidenced? Through the concept of studies.
Studies, like research, are presented as rather abstract concepts. It is not defined what a study is, and what makes a study valid evidence. The existence of studies, which back up your research, is often enough to qualify the version of the truth presented as in this example from NVIC:
"Studies show children that are unvaccinated are healthy than children that are vaccinated!!!!" (NVIC 2013-4)
And in the following quote from IPVC, where a statement is backed up by referring to studies, which the sender has of course obtained through research:
"There are sound studies behind all of that. Again, I could find some if you like." (IPVC 2012-4)

Apart from the mere existence of studies, the number of studies, which can be presented to back up your research, acts as a qualifier for truth:
"I've cited 6 studies that SUGGEST there is an effect even with low dose." (IPVC 2012-4)
This quote suggest that having a higher number of studies backing your statement up, makes this more truthful - essentially, if you can find more studies than the opposition, your argument is more true. As a result, the absence of studies become the identifying marker of an argument pertaining to the other, as in this example from IPVC:
"And, the fact that there is no study of vitamin C effectiveness on whooping cough (pertussis) in massive doses, compared to any control, is the point!"(IPVC 2012-4)

Both sides apply studies as evidence, and both sides are able to produce studies that support their argument. But how to determine the quality of a study is never explicitly defined. However, it is

explicated that a study supporting the argument of the other must in some way be disqualifiable, fabricated and "fake", as it is used to propagate an agenda, which is in opposition to the "right one".
"another one of those rubbish studies to get people to believe what they want them too" (NVIC 2012)
A study, which supports the argument of the other, might thus be a product of untrustworthy authorities, seeking to further their own agenda:
"*Also - my guess is McDonalds also sponsors a lot of these studies ." (NVIC 2012)*
A suspicion, which is also echoed by IPVC, when presented with a study that does not support their version of the truth - such a study, must be funded by a questionable source with a hidden agenda:
"And who funded this study?" (IPVC 2012-4)

Whilst studies are in some cases cited or referenced, the most common evidencing strategy when using studies is to paraphrase their content without providing direct reference to the source. This paraphrasing is often done in a manner, which demonstrates certainty and presents the truth as being absolute like in this example from IPVC:
"There have been no deaths caused by the DTaP vaccine." (IPVC 2012-4)
And:
"In the year 2000, the USA was declared free of measles. In 2011, we had 222 cases of it, mostly in unvaxed individuals and often imported from other countries"(IPVC 2012-4)

This manner of evidencing is used by both sides, and is clearly accepted within the respective communities as being truthful and trustworthy. However, when paraphrasing studies that support the truth of the other, the lack of sources and referencing is often used as a means of discrediting opposing information. Like in this example where an NVIC member directly attacks IPVC for not presenting studies, which back up their argument:
"Informed Parents of Vaccinated Children -- Can you show me studies done that prove the efficacy and safety of vaccines ?" (NVIC 2012)
And in this example from IPVC, where an argument is taking place between the speaker and a representative from the anti-vax community:
"David. tell me your evidence that there is a toxic concentration in toxin mediated disease and what it is." (IPVC 2012-4)

Evidence is most frequently drawn from before-mentioned studies, but both sides show a tendency towards using experience as evidence, preferably from a first or second-hand source - someone you know, who have experienced something, which supports your argument. Personal experience becomes a qualifying factor when determining truthfulness and the closer you are to the source of the experience, the better. Anecdotes from one's own life rate the highest in truthfulness, like in this example from a discussion on naturopathy on IPVC:

“my personal experience is that MDs miss a lot of diagnoses that naturopaths find thru bloodwork. Not sure why. Many MDs completely missed that I have thyroid disease. One ND figured it out quickly and confirmed with bloodwork and ultrasound. And so on.” (IPVC 2012-4)
And in a similar one from the NVIC:
“Although we know what the vaccines have done to our family - don't need a study for that !” (NVIC 2012)

However, when presented with anecdotal evidence from the other, this is quickly discredited in a manner very similar to the paraphrasing of studies supporting the opposite argument:
“Tammie, your personal experience is not universal. There's a difference between “I've not heard about that" and "That has never ever been heard of".”(IPVC 2012-4)

In summary, truth is determined through the application of scientific means, such as research and studies, with the support of empirical evidence and anecdotes.
You can put a value on science; it can either be good or bad, real and trustworthy or fake and untrustworthy. In addition, the degree of “science” applied determines the degree of truth: a substantial amount of “science”, proprietary research and studies signifies a higher of truth whereas little or no science, proprietary research and studies mean a low degree of truth. It is almost a given, that the truth presented and defined by the other must be lacking in value.
Even though the essence of what is true might stand in direct opposition to each other, both sides of the debate conceptualise it in a similar way - as an ABSOLUTE entity and something that anyone can obtain by doing research.

7. Theoretical integration and discussion

From this point on, I will attempt to take the insights generated directly from the data to a higher level of abstraction by drawing on existing theories and concepts. The point of this is not only to discuss the meaning of the data, but also to conceptualise it further in order to achieve theoretical integration - a generalisable framework, which can move the insights gained from the data from mere description to interpretation and explanation (Birks & Mills 2015, 108-9).

This will be done by trying to answer the three main questions posed by the introduction: how can the discussion on vaccines be conceptualised, how do they relate to the realm of expertise and what role does the media play in shaping them.

7.1 Conceptualisation - establishing a frame

At this point, we have derived from the data a main dynamic that drives debates about vaccines on Facebook, which can be presented as a dichotomy between us and them, our truth and their truth. Condensing this even further, the main dynamic behind the debates on vaccines is a **battle of truths**, where "us and them" battle each other in order to determine who is in possession of the right truth about vaccines.
Even though the correct idiomatic expression might be "a battle for truth", I would like to underline a significant semantic difference between these two expressions:
Naming something a battle for truth entails the attempt to uncover the truth behind a specific phenomenon where it is a given that one singular truth can be determined.
A battle of truths, on the other hand, entails opposing parties claiming privileged possession of the truth and battle the other party for this privilege.

When speaking of different interpretations of truth, the first and most obvious theoretical concept that comes to mind is the concept of framing. Framing can be defined as viewing an issue from a certain perspective, involving four specific dimensions: defining the problem, diagnosing its cause, making moral judgements about its consequences and suggesting how it should be remedied (Entman 1993, 52-3).
In other words, framing is an activity where we actively select and highlight particular aspects of an issue, in our communicative actions, in order to promote a certain interpretation of the phenomena at hand (Entman 1993, 52-3). Depending on the way an issue is framed, it can influence the way we view the problem at hand: who is responsible, why and what we should do about it (Entman 1993, 52-3).

Applying these four dimensions of framing to the discussions about vaccines and the battle of truths, makes for a useful conceptualising tool in order to structure, summarise and further interpret the insights gained from the data.
The frames at work within the data can be conceptualised in the following way:

Problem definition: Vaccines are bad and still people are accepting them/Vaccines are good and still people are refusing them.
Cause diagnosis: People are misinformed and misguided - if they knew what we know, they would not think the way they do.
Moral judgements: Someone is purposefully manipulating people to further their own agenda, or people are just too scared or used to following the "herd" mentality that they do not dare to think for themselves.

Remedy suggestions: People should do their own, active research in the *right* way (our way) - read the "science" and studies, which prove our point. Then they would become convinced of the right truth - that vaccines are bad and should not be accepted/vaccines are good and should not be refused.

When speaking of framing in regards to an issue, which is subject to controversy, it is often assumed that the controversy will present itself as a framing contest (Just & Mouton 2014, 736). In such a framing contest, two different interpretations of the reality in question, struggle to become the dominant one, winning the power of definition of the problem, its diagnosis, judgment and remedy (Just & Mouton 2014, 736). In the vaccine controversy, the only discrepancy in framing can be found in the fundamental, ontological question of whether vaccines are good and should elicit acceptance or are bad and should be refused (Just & Mouton 2014, 736-7). On all other levels of framing, the argument takes on a similar form. And if the remedy is applied correctly, both sides agree that it will persuade the opposition to accept the original premise of good/acceptance or bad/refusal. Thus, the argument takes on a similar, circular pattern on both sides. If the same arguments are applied in a similar matter, and no consensus is reached, it goes to show that there must be something very wrong with the logic of the argument. As both sides never recognise the similarity of their frame but insist on separateness, it essentially becomes a democratically defunct debate, which can never effectively be resolved.

Entman also defines four locations within the communicative situation wherein the frame can be witnessed at work: communicator, text, receiver and culture (Entman 1993, 52-3)
The circular tendency witnessed above can also be seen in the relationship between the communicator and receiver. Entman defines the communicator as the sender of a piece of communication, the one who constructs the message and, consciously or unconsciously, frames it in a particular way (Entman 1993, 52). The receiver is the one being communicated to, who may interpret the message in the way it was framed, or may subject it to other frames and receive it in a way that differs from the intended (Entman 1993, 52).
In the vaccination debate, the communicator and receiver of this particular frame is, in fact, one and the same - the pro-vax or anti-vax communities. The discussions are more or less parallel group monologues taking place between group members who already agree with each other. Little to no interaction is observed between the two opposing parties and the purpose of the communicative action is not a question of convincing or persuading, but rather defining and elaborating on the community's interpretation of truth and reinforcing this interpretation through community acceptance.
The other becomes not an active part of a discussion but a negative mirror image used as an instrument for promoting one's own position and purpose. As a result, the other becomes a central concept in the shared culture within the frame: a shared stereotype, which forms the core of the dichotomy that defines identity and truth (Entman 1993, 53).

Culture in a framing context has to do with shared concepts, categories and beliefs, which are accepted within the social group and helps make sense of the world around it (Entman 1993, 53-4).
In the cultural location of vaccination discussions, the frame is expressed through a universal conceptualisation of the world as being structured by dichotomies: us/them, true/false, pro-vaxx/anti-vaxx, good/bad, misguided/enlightened, moral/immoral and, most importantly, identity/otherness.

The concept of the other as being in opposition and wrong creates an interesting co-dependence between the community and the other - one group cannot exist without the other. Curiously, the two sides do not only depend on each other for existence. The success of one will also inevitable result in its own destruction. If its purpose is fulfilled, winning the battle for truth, then it would have no one to define itself against and no one to fight, and therefore not serve a purpose in society.

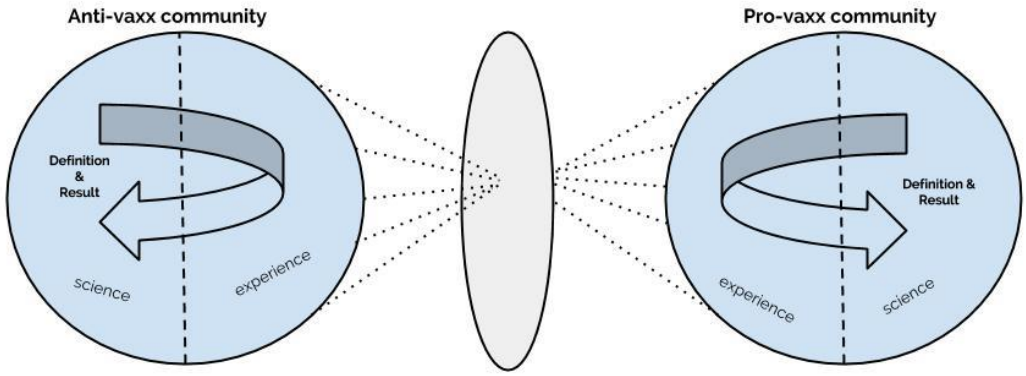
The last point I want to make, is how the frame manifests itself in and through the text. Text can be defined as the piece of communication in question, and its particular characteristics; genre, use of keywords and terminology, linguistic and stylistic trademarks and conventions (Entman 1993, 52).

On the textual level, the frame is expressed in a shared vocabulary, centered around vaccines, health, biology and science - juxtaposed with a vocabulary, which expresses experiences related to parenthood. The first aspect of the vocabulary relates to a legitimising purpose where the communities situate themselves in a scientific discourse, and ascertain their right to take part in said discourse. The second, however, serves to lend purpose and motivation to their cause; they are concerned parents, who only want what is best for their own, and everybody else's, children. This juxtaposition can also be witnessed in the way legitimate sources of information is framed; "studies" and "science" is given equal importance to stories, anecdotes and personal experiences, something which presents a quite paradoxical situation in which personal evidence is granted high status within a supposedly scientific frame.
Certain shared linguistic qualities can also be identified, such as heavily emotional and opinionated language, generalising quantifiers, certainty and causality, theorising and abstraction and an inclination towards speaking in absolutes. These linguistic qualities are further supported by a range of accepted stylised features, such as emotional appeals, anecdotes and stories, paraphrasing of "studies", memes and linking to sources established as credible by the community. These too represent an interesting tension between textual characteristics relating to a scientific frame, embedded within the digital culture of the medium; the scientific and the personal, the factual and the opinionated, the objective and the subjective.

The tendency towards organising the world in dichotomies can thus be described as being a salient characteristic of the frame established - pro- and anti-vaxxers might share a causal diagnosis of the

problem at hand, make the same moral judgements and suggest the same remedies, but are, at an ontological level, different. Their primary conceptualisation of the problem leads to using otherness as a defining characteristic of identity, and antagonism and opposition as a raison d'etre. At the same time, they create a pervasive co-dependency, where one cannot exist without the other, and the success of one will mean the destruction of both.
Even though their identities are built around strong concepts of belonging and otherness, these too, are fragmented on both a textual and cultural level, and, as witnessed in the co-dependent relationship with the other, essentially fragile. They struggle with consolidating their legitimacy as factual scientists and researchers on a quest for truth, with their emotional and moral dedication towards being good parents, dedicated to people instead of numbers. This creates a discrepancy in the framing, where the conventions of one field are deemed as legitimate as that of the other.

Trying to visualise this conceptualisation could look something like the figure below. Here, the communities are imagined as separate entities, which negatively mirror each other and are dependent on each other for existence and survival, where circular discussions that end and start with the same definition take place within the community. The focus on science is where the communities are the closest to each other, as the definition and result are rooted within a shared interpretation of "science", whilst experience is what sets them apart. The equal distribution of importance attributed to experience is what allows the two communities to have different ontological starting points and reach different conclusions, even though their argumentation is remarkably similar.



7.2 Vaccine communities and expertise

We have now established that the frames, within which vaccine communities operate, are almost identical in form. They can be seen as parallel, circular group monologues, which are the negative mirror image of each other, and are co-dependant on each other for existence.

Having defined the frame as being similar in form, we now turn to the next question posed in the introduction: how do vaccination communities relate to the concept of expertise?
I will commence by defining an expert and the role and function of experts in society. In addition, I will attempt to define the realm of expertise as a communicative and rhetorical strategy.
Then, I will proceed to situating the anti- and pro-vaxxer communities within this rhetorical domain, seeking to compare their rhetorical strategies to the ones exhibited by traditional experts within a medical science domain.

7.2.1 What constitutes an expert?

HOME > OXFORD ADVANCED LEARNER'S DICTIONARY > EXPERT

Back to main dictionary

expert *noun*

BrE /'ekspɜːt/ ; NAmE /'ekspɜːrt/

a person with special knowledge, skill or training in something

- *a computer/medical expert*

The example above, from the Oxford Advanced Learner's Dictionary, explains expertise a something a persona can *have;* a superior and specialised knowledge acquired through training. Whilst not incorrect, this popular definition places sole emphasis on the individual qualities of the expert, where knowledge is a possession of an individual.
Experts do possess superior knowledge acquired through training or schooling, but in order for this superior knowledge to have an impact, an expert needs an audience. And he needs this audience to accept and acknowledge his expertise in order to gain legitimacy (Hartelius 2011, 5). Thus, becoming an expert entails two different processes; the autonomous aggregation of individual knowledge and a social process of attribution of expertise (Hartelius 2011, 6).
The latter entails persuading the public of both your merits as an expert, as well as convincing them of your importance to society: establishing *why* you have the right to speak about this particular topic and *why* they should listen to you (Hartelius 2011, 6-7).
One manner of examining how this attributed status can be achieved is by examining the rhetoric of expertise; how experts use language, communication and performance to frame their knowledge and legitimise their expertise (Hartelius 2011, 10). Following this string of thought, an expert is someone with a privileged and specialised knowledge, who employs domain-specific rhetorical strategies to obtain audience acceptance and acknowledgement of his expertise. In other words:
"To be an expert, in short, is to rhetorically gain sanctioned rights to a specific topic or mode of

knowledge" (Hartelius 2011, 5).

The function of experts in society is, primarily, to act as liaisons between realms of specialised knowledge and the public. Furthermore, experts serve to reduce *uncertainty* by limiting the number of possible interpretations of a phenomenon available to the public (Hartelius 2011, 2-3). By acting as liaisons, their schooling and knowledge enable them to narrow down the number of possible truths in a complex and confusing world (Hartelius 2011, 2-3).

The expert does this by having the necessary training in place to sort, select and critically evaluate the information, which pertains to his domain (Hartelius 2011, 5-6). Through his schooling, he know the criteria for quality within his field and is therefore able to distinguish between good and bad sources. All domains of expertise have criteria of demarcation and conventions, which must be, upheld (Hartelius 2011, 5-6). The expert knows these conventions of his domain of expertise and is able to present his evidence and sources in the right and acceptable way.

7.2.2 The rhetoric of expertise within medical science

The first part of creating a rhetoric of expertise is establishing the *ethos* of the expert, the privileged position from which he speaks, which frames his legitimacy and usefulness to society. Ethos can be loosely translated as the *character* of an expert, which, according to Aristoteles, is the sum of a theoretical triad, *phronesis, arete* and *eunoia* (Hoff-Clausen 2008, 31-2).
Phronesis can be defined as a practical wisdom or competence; knowing how to act rationally and practically in a given situation (Hartelius 2011, 12).
Arete can be loosely translated into virtue (Hartelius 2011, 12). Virtue however, in the modern sense of the word, does not encompass all the qualities of *arete*. *Arete* can more correctly be defined as the public display of one's willingness to fulfil moral obligations towards the community - serving the greater good publicly (Hartelius 2011, 12).
Eunoia denotes goodwill, or the ability of the speaker to invoke the goodwill of the audience. To have *eunoia* means to be able to generate an image of inherent goodwill and benevolence, actively convincing the audience that you have their best interests at heart (Hartelius 2011, 12).
In the tradition of Aristotle, *ethos* is both a somewhat inherent quality in the individual as well as a performative one - *ethos* is both expressed and constructed through rhetoric (Hoff-Clausen 2008, 33-4). *Ethos*, in this tradition, is especially important when dealing with issues where no clear and absolute truth can be established, where the *ethos* of the expert can be the final tip of the scale, which leads to persuasion (Hoff-Clausen 2008, 33-4).

In the context of medical science, where our vaccine communities attempt to situate themselves, the *ethos* of the expert is almost a given qua his profession. Medical scientists perform an important civic

duty, which is noble and good at its core, and thus, have a somewhat inherent *ethos* (Hartelius 2011, 12). Medical scientists attempt to find solutions and cures *(phronesis)* for diseases that have the ability to affect the lives of all people *(arete)* in an attempt to rid humanity of the maladies that plague them *(eunoia).* Of course, less noble intentions can be at the heart of any medical scientist, such as money, fame or power, which can influence their *ethos* and result in scientific misconduct. However, within the scientific community, the *ethos* of the domain as a whole is upheld through a rigorous compliance with the *techne* of the domain.

Techne is the explicit formulation of the epistemology and methodology pertaining to a certain area of expertise (Hartelius 2011, 20). Techne is essentially domain-specific, and serves to persuade the public of your privileged position within your formal area of expertise. By defining your knowledge and how you have come to possess it, you are creating criteria of demarcation - actively defining what belongs in your area of expertise, and how it is different from other areas of expertise, or the knowledge of a layman (Hartelius 2011, 22).

7.2.3 Expert techne

In the following, I will attempt to explain how the *techne* of an expert within medical science is rhetorically constructed by defining some of the key concepts applied by both the communities examined and the scientific community in general; science, research and studies.

Science

Science is a method of inquiry: Science is often conceptualised as some kind of abstract entity, ranging from a type of knowledge, an institution or community to a subject taught in schools. For the sake of clarification, I will define science as a method of inquiry. According to one of the founding fathers of modern science, Francis Bacon, science is driven by empirical experimentation, observation, mathematical measurement and inductive logic (Jacob 1997, 30). When we construct science rhetorically in this way, we are than speaking of a methodically rigorous way of obtaining knowledge through certain practices.

Science operates in paradigms: Science can further be conceptualised as working and progressing in paradigms. A paradigm can be described as the traditions pertaining to a certain scientific domain: the conventions, assumptions, theories and methods, which are generally accepted within a scientific field at a given time (Kuhn 1962, 67-8). Paradigms, however, are never static. When anomalies present themselves, and continues to do so, the paradigm needs to be revised, resulting in a paradigm shift (Kuhn 1962, 152). The rhetorical consequence of viewing science as operating in paradigms is the fact that science does not produce **absolute and universal truths.** What is considered true under the current

paradigm, might shift through continuous examination and be replaced with a new truth under a new paradigm. Because of this, truths are more correctly described as theories.

Science is dynamic: If we accept that the scientific method of inquiry is not producing absolutes truths, and that scientific paradigms can shift through continuous methodological application, we must also accept that science is never static. Rather, science is a process that aims to generate theories, which provide the best possible foundation for further research. Using Isaac Newton's famous metaphor "standing on the shoulders of giants", we can define science as a dynamic process, which builds upon layers of knowledge accumulated through the years by rigorous application of the practices of a specific paradigm. Rhetorically speaking, this means that a scientist will always strive to place his inquiry within a framework of prior knowledge and build upon this to approximate a more accurate theory.

Research:

Research is an activity: Research can be described as an activity or the practical application of the scientific method of inquiry widely accepted within a scientific paradigm, to empirical data. Here, rigorous application of theoretical foundations and methodology to data results in scientific knowledge. In order to be "scientific", research must build upon the prior knowledge accumulated within its paradigm, by e.g. doing a literary review or presenting existing theoretical assumptions. Research will then entail applying the methods of the paradigm on empirical data, in order to clarify, rectify or redefine the existing theories or assumptions.

Research can be falsified: The principle of falsification entails that any good theory must open up for the possibility of falsification (Popper 2005, 57-60). You can never gather enough observations to conclude that your theory represents an absolute truth - and rather than working from a hypothesis and gathering evidence to confirm one's view, a scientific inquiry should instead focus on disproving the initial hypothesis (Popper 2005, 59-67). For research to comply with the principle of falsification, it searches for the anomalies and incongruities, which can lead to a shift in paradigm (Popper 2005, 60-74).

In a rhetorical perspective, this means that research must refrain from determinism (Hartelius 2011, 8-9). A truth can never be absolute, and certainty can never be achieved within science. A theory is an approximation of truth, and you can never present evidence, which serves to prove it true - you can only present evidence, which serves to prove it not-false (Popper 2005, 60-74).

Research must be original: Even though good research stands upon the shoulders of giants, it is important to emphasise the principle of originality, in the sense that the researcher does not engage in plagiarism. When performing research, the researcher must clearly demonstrate which parts of his research builds upon the ideas, theories and data accumulated by others, and which parts are original.

Evidencing originality is obtained rhetorically by clearly referencing second-hand sources and evidence, whilst rigorously documenting both the proprietary research methodology and results obtained (Hartelius 2011, 19).

Studies

Studies are attributable products: Doing scientific research eventually will result in a product, a study, which details the method of inquiry, the research process and its results. In the context of a scientific/medical rhetoric, studies are attributable products where the author and his legitimate authority to produce knowledge is clearly demonstrated - through the explicit demarcation of titles and institutional affiliation (Hartelius 2011, 106-7). In order to lend further legitimacy to the product, studies are also attributed to certain types of publications or journals, which are accepted authorities by the scientific community the author belongs to (Hartelius 2011, 106-7).

Studies are reproducible: In order for a study to adhere to the principles of science defined above, a study must be reproducible. All steps and methods in the research process needs to be documented, and the theories used are evidenced, in order to ensure validity. This also ensures that a study can be replicated and consequently falsified (Hartelius 2011, 107-8). It also facilitates the process of "standing on the shoulders of giants", allowing other researchers to build upon the results of this particular study.

Studies follow conventions: In order to ensure the validity and legitimacy of a study certain conventions are in place within the medical science community. Firstly, it is widely accepted that the IMRAD model is the conventional way of presenting research (Sollaci & Pereira 2004, 369-70). This model entails an introduction, which specifies the research question, a description of methodology, presentation of results and a discussion of the impact of these results, and their implications for further research (Sollaci & Pereira 2004, 369-70).

Secondly, depending on the scientific domain, there are standardised conventions on how to use references, citations and bibliographies to evidence a study, like the APA standard described previously[9]. Furthermore, the systems of peer-reviews often applied by scientific publications ensure that studies adhere to both the formal conventions of the field, as well as the accepted scientific methods of inquiry within the specific paradigm (Hartelius 2011, 18-20, 104-5).

Specifically within the domain of medical science, references to standardised classification systems, such as the International Classification of Diseases, tenth revision (ICD10), is a commonly used rhetorical strategy to enhance the expertise of the researcher (Hartelius 2011, 110).

[9] http://www.apastyle.org/

7.2.4 Rhetorical congruities within medical science

Although having *ethos* is an important part of the rhetoric of expertise, it is only one building block of the necessary performance. Experts also employ a range of rhetorical or congruities, which can be applied by experts regardless of their domain of expertise and serve to establish and demonstrate their legitimacy and credibility as an expert (Hartelius 2011, 18). Hartelius identifies six such congruities, which form a rhetorical model of expertise across domains (Hartelius 2011, 18).
I will proceed to define these six congruities and demonstrate how they can be applied in a practical context, using a scientific article on vaccines as a case (Taylor et. al. 1999).

This particular scientific study (Taylor et. al 1999), which examines the links between the MMR vaccine and autism, was used as a basis for linguistic comparison earlier on, and will serve as a backdrop for evaluating the expertise demonstrated rhetorically by the vaccination communities examined.

1. Expert Networks: strategically situating oneself within a network of other experts can be seen as a way of "standing on the shoulders of giants" - building your own expertise upon the legitimacy and credibility of others through association (Hartelius 2011, 19). The study by Taylor et. al. places itself within an expert network in several ways. Firstly, the study is published in a recognised medical publication, The Lancet. Secondly, the titles and institutional affiliations of all authors are clearly stated in the first page, and the roles of each and their area of expertise is explicitly defined on the last page, demonstrating where they belong in a network of experts (Taylor et. al. 1999, 2026-9).
Thirdly, the term "We" is consistently used throughout the text, emphasising the collaborative effort behind the research presented, and letting the authors capitalise upon the reputations of each other (Taylor et. al 1999, 2026-9, Hartelius 2011, 9-11).
Lastly, the authors situate themselves within the current discourse on vaccines and define their own stance on the issue by strategically mentioning their research as an effort to refute the claims made by Andrew Wakefield (Taylor et. al 2026, 2028). They even describe the claims made by Wakefield as "postulated", firmly asserting their stance towards his research, and demonstrating their place within the scientific community (Taylor et. al 1999, 2026).

2. Expert techne: Expert techne entails explicating how you know something, how you have come to acquire this knowledge, and what you use it for (Hartelius 2011, 20). By defining your knowledge and how you have come to possess it, you are creating criteria of demarcation - defining what belongs in your area of expertise, and how it is different from other areas of expertise or the knowledge of a layman (Hartelius 2011, 22). The most obvious demonstration of techne is the use of the IMRAD-structure for presentation, which both rhetorically and visually demonstrates an adherence to the scientific method of inquiry (Sollaci & Pereira 2004, 369-70). In addition, continuous references are made to the ICD10 classification system, as well as frequent in-text references to the work of other researchers, lending further credibility to their claims of techne. It is explicated that the research as well

as the results obtained are built upon previous findings, as in this quote:
"Our findings, based on a large study, confirm and extend those of Gillberg and Heijbel, which showed no evidence of a causal association between MMR vaccine and autistic disorder in Sweden." (Taylor et. al 2029).
Furthermore, both the methodology and the research process pertaining to the specific scientific domain is continuously documented, both through thorough descriptions of the data collection, presentation of calculations and visualisation in the form of figures and tables (Taylor et. al. 1999, 2026-9). This demonstrates an adherence to the relevant method of inquiry as well as ensuring reproducibility (Hartelius 2011, 107-8).
It is also worth mentioning that the study demonstrates adherence to the falsification principle by only suggesting that the results solidify what other studies have shown so far, without proving nor disproving anything. The authors conclude that their findings do not affirm the findings of Wakefield, but neither do they directly disprove them. They merely make it unlikely that his findings correspond with the data:
"This study does not rule out the possibility of a rare idiosyncratic response to MMR. However, if such an association occurs, it is so rare that it could not be identified in this large regional sample." (Taylor et. al 1999, 2029).
Also, they recognise that their study might have limitations, and that there are insecurities related to the way data has been compiled through the years, thus further demonstrating their work as a theory, which cannot be seen as deterministic or absolute (Taylor et. al. 1999, 2028).

3. **Expert pedagogy:** Essentially, the pedagogy of experts entails teaching the public the object of your expertise but not the process (Hartelius 2011, 23). When sharing what you know, but never teaching the public how they can achieve this level of knowledge, you effectively place yourself in a position of privilege where your special skills are indispensable (Hartelius 2011, 23).
Taylor et. al. present their results in the form of calculations, tables and figures, which are not instantly understandable to the layman. This demonstrates a pedagogy, which aims to highlight the special skills and training of the expert, as well as his indispensability: we need the expert to interpret these results for us, in order to understand their significance (Hartelius 2011, 23). In the discussion section of the paper, the deeper meaning of these results are explained and contextualised and recommendations on how to act on them are given (Taylor et. al. 1999, 2028-9). But the process of going from the data presented to the conclusions drawn is somewhat hidden from the reader (Hartelius 2011, 23).

4. **Audience response - deference or participation:** an expert strategically and rhetorically appeals to the audience for a certain response, which can either be one of deference or participation (Hartelius 2011, 24). Asking the audience for deference essentially means asking them to trust the experts, and leave the task applying specialised knowledge to those who are deemed most suitable (Hartelius 2011, 24). Participation, on the other hand, is used as a strategy to generate support and increase popularity (Hartelius 2011, 25). The commonly elicited response within a medical-scientific context is one of deference (Hartelius 2011, 24-5).

This article is no exception, as it does not depend on popularity but rather re-affirming the privileged position of "real" experts. Deference is demonstrated most clearly in the concluding sentence of the study:

"*We hope our results will reassure parents and others who have been concerned about the possibility that MMR vaccine is likely to cause autism and that they will help restore confidence in MMR vaccine"* (Taylor et. al. 1999, 2029).

This sentence is a clear display of *eunoia*; the researchers have undertaken this work to reassure parents that they are not putting their children at risk. However, it is also an appeal to "trust the experts and their results" even though this is expressed as a "hope" (Hartelius 2011, 24).

5. **Exigence:** exigence refers to the rhetorical construction of an urgent situation to which the offered expertise is the most obvious, fitting and necessary response (Hartelius 2011, 25). Exigence feeds into the privileged and indispensable nature of the expert, as he tries to place himself and his knowledge strategically, as the solution to an urgent problem (Hartelius 2011, 25). Urgency is established by placing the research within the current debate on vaccines, initiated by Dr. Wakefield, and clearly demonstrating its consequences:

"...received much media attention and have had an adverse effect on immunisation uptake.The consequences of these events are that many children are now at risk of measles, mumps, and rubella…" (Taylor et. al. 1999, 2026). There is a problem: people are not vaccinating their children because they are afraid vaccines may cause autism. Thus, we need to undertake a study, which examines this (unproven) correlation, something that these specific experts are uniquely qualified to do (Hartelius 2011, 26-7).

6. **Expertise and everyday life:** contextualising expertise within the reality experienced by the public is crucial in order to persuade the public of its relevance (Hartelius 2011, 27). If the knowledge of an expert cannot be linked to the problems of the mundane world, it becomes useless in the eye of the public (Hartelius 2011, 27).

The contextualisation with the area of expertise to everyday life is demonstrated in the quotes used in section four and five. There is a problem, which concerns everybody: the fact that lower vaccination rates, due to media attention to a specific study, have made diseases as measles a genuine risk (Taylor et. al. 1999, 2026). This should be taken seriously - but the concerns of parents not wanting to risk autism by vaccinating, should be taken seriously as well (Taylor et. al. 1999, 2029). It is a public health question, which affects everybody - a question, which can be answered through science.

This study, even though it expresses hope that it will persuade and reassure parents, takes on a very privileged position indeed, which might be part of the reason why communities like anti-vaxxers persist. This very exclusive way of communicating expertise might seem condescending to some people and make them feel excluded. It seems as though a study like Taylor et. al has more focus on preserving the

privileged position of science rather than contributing to public enlightenment, which suggests that the scientific community has not yet adjusted to changed communicative conditions.

7.2.5. Are vaccination communities experts?

We have now established how experts demonstrate *ethos* and use rhetorical strategies to establish and maintain a privileged position (Hartelius 2011, 2-5, 20-5).
We have also demonstrated how an expert within the medical science domain might establish his *ethos* and demonstrate *techne* through explicit demonstrations of the conventions of his field.
Finally, we have shown how the six congruities of expert rhetoric manifest themselves in a scientific paper on the exact topic treated by vaccination communities on Facebook.
Now, we should be able to examine how vaccination communities like NVIC and IPVC express their brand of expertise through rhetoric. This will be done by firstly, examining how they construct their *ethos*. Then, I will proceed to analysing their use of the six congruities of expertise, focusing on the similarities and differences between those employed by a "traditional" expert within medical science and vaccination communities.

Ethos in vaccination communities

The *ethos* of vaccinations communities is heavily based on their identity as parents and the continuous reinforcement of the argument that parents are the only people with pure and true intentions when it comes to the health of their children. It is an effective strategy - no one can argue with a parent's dedication to the well-being of his or her child. It is a deeply fundamental drive embedded within all human beings, and thus, the *arete* of the communities stands beyond reproach. Questioning their virtue as parents would entail insinuating that they are not good parents, a claim, which seems outrageous and socially unacceptable to most people unless you have direct proof of the opposite.

The *arete* created by references to parenthood, is also instrumental in generating *eunoia* - a dedicated parent wanting to do right by his child is almost guaranteed to elicit sympathy, as the feeling is so basic to human nature. This inherent *eunoia* embedded within the notion of parenthood is further reinforced by shifting between references to "my child" and "children", demonstrating an almost parental concern towards children in general.
Furthermore, the continuous referencing of stories and anecdotes makes their *eunoia* tangible and understandable. Having seen and witnessed either bad reactions to vaccines, or children affected by diseases we vaccinate against, tugs at the heartstrings - because no one wants that to happen to an innocent child.

Phronesis is demonstrated by placing themselves firmly into a category of active agents; someone who takes action in ensuring the health of their child and educating themselves, in order to be better

equipped for handling an uncertain world. As witnessed in section 6.1, this strategy not only serves to demonstrate *phronesis* rhetorically, but is also used to convince themselves that they actually possess the potential for action when faced with uncertainty and powerlessness.

Congruities of expertise in vaccination communities

1. Expert Networks: Linking is one of the practices employed by vaccination communities in order to place themselves within a network of experts. By actively linking to what is considered authorities by the communities, they evidence their claims and arguments, and embed themselves within an ongoing debate with many different actors, who can lend them authority and legitimacy.
As witnessed in section 4.1, both communities display similar linking practices, which are heavily centered on alternative media, blogs and other Facebook pages - the majority of which share similar views on the issue at hand. This can result in a very one-sided approach to the subject, as the communities are only placing themselves within a context where everybody agrees.
This essentially goes against Popper's principle of falsification, as it demonstrates a tendency towards seeking out information, which confirms you argument - instead of actively trying to disprove it (Popper 2005, 59-67). Furthermore, this type of reasoning is a logical fallacy, dubbed "*ad verecundiam".* This entails only adhering to the arguments of one side in a controversy or accepting the argument of someone just because of his authority (Stanford encyclopedia of Philosophy 2015). As such, there is no logical problem with deferring to authority - the problem arises when authority is taken at face value, and no effort is made to disclose why this person merits authority. If authority becomes an argument just because it is widely accepted within a certain group, it becomes *assumed* authority, not *established,* and it thus an ineffective persuasive strategy.

The fact that the authorities linked to are often alternative media, blogs and Facebook, stands in stark contrast to the strategy employed by Taylor et. al., where the official and institutional merits of the network of expertise is explicitly vocalised. In some cases, however, members of the vaccination communities use officially sanctioned titles and professional affiliations in order to demonstrate their position within a network of expertise - both their own, and second-hand affiliations, like in the following examples:
"I apply this with my patients, as do most all the doctors in the clinic. We use Scripts[10] as a LAST resort." (IPVC 2012-4)
"When I was an Infection Control nurse (USA)," (NVIC 2013-4)
"Our family doctor has six kids and does n't vaccinate" (NVIC 2012)

[10] In this context, "Scripts" is shorthand for prescriptions.

Being a doctor or a nurse, or knowing a doctor who supports your claims is all well and good. The problem with this is the fact that they are not, and cannot be, evidenced, and the claims made cannot be attributed, thus rendering them invalid within a medical science context (Hartelius 2011, 106-7).

2. Expert techne: The communities in question actively try to demonstrate *techne* rhetorically using a quasi-scientific vocabulary, a focus on science, research and studies when making claims and the use of statistics and scientific results as evidence (See section 4.2 and 6.2). However, their efforts have significant flaws of reasoning and understanding of basic scientific principles, which demonstrates the lack of *techne* pertaining to a medical/scientific domain.
One of the most salient misunderstandings of scientific principles is most accurately expressed in this quote:
"I respect science but can you really trust something that is so often wrong." (IPVC 2012-4)

This illustrates the fact that these communities conceive science as something that produces *absolute truths.* This is the foundation of their battle of truths - taking for granted that science can produce something, which is and will always be, true. But science is not about being right or producing absolutes truths. Science is, fundamentally, about creating the best possible foundation for further research, generating theories and expanding accumulated knowledge one study at the time.
And science is allowed to be wrong. If scientists never fail, or their research is never questioned, science cannot evolve (Kuhn 1962, 152-5).

The evolution of science and its inherent dynamic nature is another concept, which is misinterpreted by the vaccination communities. Instead of accepting science as dynamic, they have instead fixed themselves into position which science has moved beyond. Wakefield has been proven wrong several times but we are still seeing an ontological separation, which is based on his research. A fact-checked infographic[11] have made an overview over all the studies done in order to debunk the autism-vaccines link proposed by Wakefield (Taylor et. al 1999 being the first of them), and has found no less than seven large studies proving him wrong.

The autism-vaccines connection is also one of the areas where a widespread tendency towards speaking in absolutes is most clearly witnessed amongst vaccination communities:
"my childs Autism WAS caused by her vaccines ... it is a FACT" (NVIC 2012)

The linguistic analysis in section 4.2.3 showed high levels of exclusive words, combined with high levels of both certainty and causation, suggesting a propensity toward speaking in absolutes and

[11] http://www.healthcare-management-degree.net/autism-vaccines/

demonstrating certainty. This is often expressed by drawing "easy" conclusions and suggesting logical causalities between events such as:
"Yeah, dogs produce their own vitamin C internally. They need only a normal dog diet. Yet, puppies die of bordetella all the time." (IPVC 2012-4)
"Fifty years ago , when the immunization schedule contained only four vaccines - for diphtheria , tetanus , pertussis , and smallpox - autism was virtually unknown" (NVIC 2012).

These are all examples of a deductive logic and argumentation, which is not suitable in a medical science domain as it is not empirically driven and can lead to conclusions, which are logically sound even though the premises might be false. Many of these arguments can be described as "*post hoc ergo propter hoc"* - fallacies of logic, which presume a temporal connection between events (Stanford Encyclopedia of Philosophy 2015).

In section 6.2, we established that many studies are presented as evidence through paraphrasing, or picking out bits and pieces of information, and presenting them out of context. This is problematic in a scientific setting as it effectively violates the principles of research being *original* and studies being *attributable* (Hartelius 2011, 19, 106-7). Taking information out of context, and without naming sources or references, is essentially an act of plagiarism. It means that the studies referenced and their origins cannot be verified, making them essentially useless in a scientific context. Furthermore, it violates the principle of studies being *replicable.* If a research process cannot be recreated, there is no way of testing its veracity - nor attempting to falsify it.

In the same section, we also witnessed how personal experience is presented as evidence carrying the same strength as studies and research. At times, the communities recognise that this might not be standard practice within the domain, however, they also verbalise the fact that this is wrong:
"I think the VERBAL stories should be taken into consideration ! Some of you people think that just because a study says it 's not true, that a parent can't be right" (NVIC 2012)

If these communities were to base their *techne* solely on personal experience, like the "lived-experience-experts" examined by Hartelius, using anecdotes as evidence would not be problematic, as their expertise would be solidified through the narration of personal experience (Hartelius 2011, 117-24).
However, if you are trying to place yourself on level with experts in medical science, making personal experience as valuable as research becomes paradoxical. If the *techne* of an expert within medical science is based on the premise that science works in paradigms, and adheres to rigorous methodology, equating the value of personal experience with scientific research is simply an impossibility. In direct

opposition to a scientific research process, a personal experience can never be replicated and is not scientific in nature.

Finally, the communities in question undermines the privileged position of the expert and his *techne* by reducing the epistemological activities of the domain to something everybody is able to do. As established in section 6.2, research is viewed as an activity everybody can and should engage in. Moreover, authorities including experts are generally not completely trustworthy as they might have ulterior motives and are - after all - just human.
The vaccination communities view this as a liberating activity - being able to educate themselves and question authorities - and some even think they could do a better job than some authorities could. They feel a moral obligation towards attaining expertise, as it reduces the chance of being manipulated:
"THEY JUST WANT YOU TO SHUT UP AND REMAIN STUPID AND FEARFUL OF THEIR expertness" (NVIC 2012)
However, devaluing the importance of expert *techne* ends up not just undermining the privilege of the expert, but essentially, it also undermines the foundation the communities themselves are built upon. If science itself does not contribute anything to the discussion, why are they so fixed upon basing their own claims on concepts such as *science, research* and *studies*?

3. Expert pedagogy: The pedagogy employed by vaccination communities is classical - they share the results of their "own research", but never explicitly demonstrates how these results are obtained, nor how the elusive activity of "research" is performed (Hartelius 2011, 23). This essentially makes them "special" and torchbearers for a certain truth, which is not easily obtained by others.
And it is an efficient strategy when dealing with opposition. By never explaining your epistemology, you can effectively undermine the argument of the other, discrediting them by saying they are referring to "bad" science, using questionable studies created with ulterior motives, or are not doing proper research, as witnessed in section 6.2.
This, however, becomes another demonstration of logical fallacy. This logical fallacy, "*ad hominem",* uses some attribute of the opposition to discredit his statement like his inability to do proper research. It is, however, not logically sound (Stanford Encyclopedia of Philosophy 2015).

4. Audience response: As we are dealing with vaccination *communities,* who engage in circular group monologues, participation is the preferred audience response. Users are encouraged not only to do their own active research, but to share it with the community as well (see section 6.1). The call for participation helps build group identity, and reinforces accepted views by gaining strength in numbers. However, deference is applied strategically when dealing with challenge or opposition. In essence, the communities are asking the audience to "share your research - but only if it is the right one". They have a noble purpose of wanting people to do research and share it so we can become more enlightened -

but if this research contradicts the acceptable arguments, you be asked to defer to those who know better/know how to do "proper" research.

5. Exigency: As previously established in section 5.2, both communities use a heavily emotional language, dramatic anecdotes and appeals to morals and values. These are the primary means for demonstrating exigency. Referencing death tolls and horrible injuries as the results of vaccinating/not vaccinating is an effective way of convincing people that the problem you are talking about is real and urgent, like in this example:

"We tend to see it as a harmless childhood disease, but measles still kills children. I mean, according to the newest estimates in 2010, 139,000 children died of measles, so it's a very serious disease still" (IPVC 2012-4)

And:

"My Daughter lost 2,5 years of her life sitting at home not being able to walk or move her arms or legs ... Headaches and hair loss ... Seizures and cramps , pain in the neck , back arms and legs" (NVIC 2012)

These horror stories are effective means of persuasion, especially as they usually refer to children. Denying their relevance or urgency, and refusing to act upon them, essentially would mean that the opposing party does not care about innocent children, making them less moral than the speaker is.

6. Expertise and everyday life: The expertise of vaccination communities is linked to everyday life in two ways: using personal experience, anecdotes and stories and by emphasising the *ethos* of their own status as parents.

The rhetorical use of personal experience is another way of democratising the domain as it lends as voice to "the people", which is viewed as being ignored by authorities. Continuously referencing the *ethos* of community members as concerned parents provides a point of identification - we are all parents and understand your concerns, as well as the inherent drive to do right by your children. These strategies lend relatability to the vaccination communities, as they display themselves as dealing with problems that every parent have experienced at some point - effectively linking the cause and purpose of the communities to mundane life (Hartelius 2011, 27).

In conclusion, vaccination communities examined have mastered the art of "expert mimicry". They use a quasi-scientific vocabulary, and they display a rhetoric that closely resembles that of an expert, but without actual *techne* to back it up. They employ faulty logic, which does not pertain to an empirically driven domain, and commit several logical fallacies.

Furthermore, they effectively undermine the privileged position of the expert, by acting as *partisan experts*, setting privileged knowledge free from grip of authorities, and making it something everybody can access and apply. Furthermore, they make official *experts hostages* by only referencing sources that agree with their views, or taking pieces of information out of context in order to serve their purpose.

The *experts hostages*, as well as the opposition, is also effectively discredited if they do not agree by pointing out their hidden agendas and drive for manipulation.

7.3 The effects of materiality – affordances and their consequences

By now, we have explored how discussions on vaccines are framed as circular group monologues with the only direct clash being at the ontological level. We have also examined their relationship to expertise, determining that vaccine communities engage in expert mimicry – acting as partisan experts without actual techne and taking real experts hostage.
Now, as this study is socio-materialistic in nature, the time has come to disclose the role of the medium in shaping the discussions in both form and content.
The medium used for communication and discussion has some inherent, material properties that makes some types of action possible while restricting others. The nature of these properties can be conceptualised through affordance theory.

7.3.1 Affordances of Facebook

Affordance theory, in short, occupies itself with the unique qualities of a technology, based on its material aspects, that enables and constrains certain forms of action (Hutchby 2001, 444). Affordances are described as "the technological shaping of sociality"; they are real material properties of a piece of technology that exist independently of human interpretation, and frame and shape the interactions that goes on between the people using them (Hutchby 2001, 441, 443-6).

In terms of practical application, Treem & Leonardi has shown how affordance theory is a good starting point for analysing social media as:
"they afford behaviors that were difficult or impossible to achieve in combination before these new technologies..." (Treem & Leonardi 2012, 143).
Treem and Leonardi's analysis is based around four affordances of social media used inside organisations: Visibility, persistence, editability and association (Treem & Leonardi 2012, 147-9).

I will use the affordances of visibility and editability, as they are applicable to the use of social media in general as well as inside organisations. I will add two additional affordances, which are essential to the understanding of Facebook as a medium, accessibility and customisability that will be explained below. Whilst describing each of the affordances, I will apply them directly to the case of vaccination communities, in order to determine the impact of Facebook as a medium on the discussions taking place.

Visibility:

As described by Treem & Leonardi, visibility is an affordance of social media, as it:
"afford users the ability to make their behaviors, knowledge, preferences, and communication network connections that were once invisible...visible to others..." (Treem & Leonardi 2012, 150).

On Facebook, this displays itself through the fact that everybody is allowed to comment on, or post, anything they like at any time, making their opinions and experiences visible to everybody (Treem & Leonardi 2012, 150).
Before social media, debate and commentary on many subjects treated on a diverse range of Facebook pages were limited to arenas with some sort of gatekeepers, such as organised debates and newspapers, or private discussions with peers. These discussions were in nature never meant for the broader public, but Facebook affords users with the means for making them visible for anyone can see. As these accounts are often based on personal experience, they can become very emotional and biased, as personal profiles participate in, and become intertwined with, public debates.

The first and foremost effect of visibility on vaccination debates is the fact that it brings discussions and viewpoints, which people might never know existed or were shared by others, visible for all to see. The visibility afforded by Facebook effectively breaks with the "Spiral of Silence", which makes people keep silent about opinions, which they fear are not shared by the broader public (Noelle-Neumann 1974, 43-5).
Discussions or doubts about vaccines may have existed all along, but as a fringe phenomenon, where the fear of questioning established institutions have kept people from voicing them in public (Noelle-Neumann 1974, 43-5). When these types of debates are displaced onto Facebook, it makes adherers of "fringe opinions" more comfortable voicing them in public as it becomes visible for all that they are not alone.

Visibility also affords the opposing vaccinations communities the possibility to "spy" on each other - looking at posts and extracting statements and arguments for opposition and refutation, without ever having to like a page or go into direct dialogue with its users.
This shapes the circular group monologues as it makes it possible to talk to each other about the other, without ever talking directly to the other.

Secondly, visibility blurs the lines between what is public and what is private. You are not discussing vaccines in a professional or exclusively public capacity; you are discussing it from a personal platform. The personal profiles of participants in debates on vaccination become entangled with the communities in which the debates take place. When participating as a private person in a public debate, you bring all of your personal identity into the public sphere, drawing on all of your experiences, emotions and

attitudes. And in turn, your public participation in certain debates becomes a part of your private identity.

Editability:

Editability as an affordance is described as, in part, the: *"ability of an individual to modify or revise content they have already communicated"* (Treem & Leonardi 2012, 159).

Online and social media platforms, like Facebook, are dynamic in nature and allow for the information presented by users to be edited or deleted at any time. Users and organisations are afforded the possibility of retaining some sort of editorial control over the content they post, as they can always go back and edit or delete it (Treem & Leonardi 2012, 159). At the same time, it also becomes easier for users and organisations to lose control over the content they post, as everybody else is able to copy or share your content, use it for other purposes, or embed it within a different context.

Memes or the application of meme-like communication is a prime example of editability at work. Memes and similar forms of online communication are often referred to as being part of a "remix culture", where proprietary content can be edited and repurposed by placing it in another context than for what it was constructed. This activity might be a part of digital culture, but it inhabits a grey area of legality (Smith 2015). This is not exclusive to Facebook, but Facebook is one of the primary arenas where this type of remixed content is shared.

This type of "cherry-picking" content, selecting and modifying it to suit your own agenda, is heavily used amongst vaccination communities. It can both take the form of memes, paraphrasing scientific studies or quoting expert authorities, but is, more often than not, incompletely evidenced or referenced. Being able to take content out of context, enables vaccination communities to take real experts *hostages* by repurposing their content – without them being likely to know about it.

Furthermore, it enables misappropriation. Even though you provide a link to reference your sources, you can always claim that a source has been removed or modified, without anyone being able to prove it. This can be the truth, due to the dynamic nature of online media, but it can also be a strategy used to disguise the fact that you may have altered the original content.

Finally, editability reduces the fear of speaking in absolutes, which is often seen among scientists. When your words are not written in stone, you do not need to fear having your statements proven wrong, as you can always go back and delete or edit them. Even though some claim that "the Internet never forgets", they forego the fact that changing the wording on a webpage or deleting an unpopular post takes no more than a few clicks.

Accessibility:

The affordance of accessibility is not treated by Treem & Leonardi, as their focus is on intra-organisational social media where accessibility is naturally limited by organisational membership. However, I have chosen to include it as it is a very salient characteristic of Facebook and has a great influence on the interactions taking place (Ravn & Nielsen 2012).
As described in relation to visibility, debates such as the ones witnessed on Facebook were, during the analogue days, limited to mediated arenas. Here, you had to live up to certain standards of knowledge, writing skills and merit in order to voice your opinion and have your contribution assessed by an editor before publishing. In contrast, Facebook has created a sort of "free-for-all". Anyone, regardless of knowledge, social and educational status and skills, is able to post anything they want, at any time (Ravn & Nielsen 2012).

In relation to the vaccination debate, the primary effect of accessibility is the fact that everyone can participate in discussions that were previously reserved for recognised experts. It enables anybody to comment on and contribute to scientific debates even though they might lack the specialised knowledge required to BE actual experts. Hence, we get the *partisan experts* described above who negate the privileged position of the expert and feel like the internet has allowed them to obtain a knowledge which is equivalent to or even surpasses that of an institutionalized experts.

Accessibility also gives users an unprecedented access to public resources of information and knowledge. Information and knowledge, which can be shared, linked, repurposed or paraphrased, in order to construct networks of expertise. However, accessibility also cancels out the need for formalized affiliation or association with experts or institutions. You do not need to know someone in order to capitalise on their expertise and reputation.

Customisability:
There has been a lot of talk about social networks such as Facebook creating "filter bubbles", where the algorithms that sort your news feed, limits the kind of content you are exposed to. This essentially creates an ideological "bubble", where the information you are shown conforms to previous behavioural patterns (Bakshy, Messing & Adamic 2015).
However, a new study published in Science Magazine, based on data from 10 million Facebook users with a declared political affiliation on their profile, shows that the main factor that determines what kind of information users is exposed to on Facebook, is in fact their friends (Bakshy, Messing & Adamic 2015).
As a result, one might say that Facebook affords users with *customisability*; by letting you choose who to befriend, what pages to like, events to participate in and groups to join, you actively construct your own digital universe. Here, the content you are exposed to is limited by the choices you have made, and is further customised by liking, commenting and clicking on certain posts, "feeding" the Facebook

algorithm with data about your interests and preferences. Customisability creates a dynamic network of people and content that might have great influence on the diversity of opinions you are exposed to - but is never written in stone. You can always unfriend people, choose to like other pages and leave certain groups, customising the social universe to suit your particular preferences at a given time.

In term of vaccination communities, customisability contributes to the circular tendencies we see in both the argumentation and linking practices. As users become immersed in the communities, following their links, befriending peers and liking similar pages they are increasingly creating barriers around themselves and blocking out information, which might challenge or oppose their views. Both because their friends and pages they like will become an increasingly narrow circle, presenting them with homogenous information. But also because the Facebook algorithm will adjust itself to the practices of community members, ranking and sorting information according to recent actions taken (Bakshy, Messing & Adamic 2015).
In time, this might lead to a dangerous "bubbling" effect where users in vaccination communities become increasingly isolated from opposing views, further contributing to circular group monologues, which can continue indefinitely without ever being exposed to the opposition.

In regards to the concept of framing contests explored in section 7.1, the isolation of both sides of the argument will be perpetuated as an effect of customisability, meaning that the argument can never be won. Essentially, the vaccination debate becomes a non-debate as neither side engages with the other, nor recognises their remarkable similarity.

8. Conclusion - Towards a generalisable theory?

The initial question this study aimed to answers was: What happens to scientific discussions, when they become accessible to everyone on social media platforms?
The answer I have arrived at, through the study of the vaccination debate as it plays out in two Facebook groups, is that the discussions become displaced, in both form, content and context. Displacement, in this respect, means that a discussion is transferred into an arena where it did not belong. Here, new actors, structures, rhetoric and rules will affect the discussion in ways, which are uncharted and unpredictable - transforming it into something other than what it was.
The discussion is displaced in form, as it is transformed into circular group monologues, which are mutually dependant for continued purpose and existence. This form significantly differs from a regular discussion, as there is no hope for, nor wish to, consolidate the ontological differences between the two sides. As both sides never recognise the similarity of their frame, but insist on separateness, and define

themselves against the other, the discussions become more of a pseudo-debate, which can never effectively be resolved.

The discussion becomes displaced in content, as it takes on characteristics of a scientific debate, but fails to recognise the most basic principles of scientific inquiry and elevates personal experience to a status equal to that of scientifically generated knowledge. Hence, the content of the discussion becomes an act of *expert mimicry* or even pseudo-science.

Furthermore, participants in the discussion conceptualise themselves as *expert partisans,* who undermine the privileged position of traditional experts and reduce their epistemological efforts to something everybody is able to do. At the same time, they take traditional experts as *hostages* by re-contextualising and repurposing their research to suit other aims.

Finally, the debate is displaced in context by taking place on Facebook, a technological arena that makes all these displacement processes possible. The affordances of Facebook fuse the personal and private, making it possible for personal experiences to enter the scientific domain. *Visibility* makes community building around controversial opinions possible, and *accessibility* allows anyone to participate. *Editability* allows content to be repurposed to back up and reinforce the opinions of the community, whilst *customisability* serves to effectively build walls between the community and information, which goes against the established "truth" of the community.

This study contributes to the current research of new media and informational democracy in several respects.

Empirically, it contributes with deep insights into the dynamics that drive and perpetuate the vaccination debate; a debate, which the scientific community has effectively moved beyond. And it sheds light on the factors, which make pseudo-scientific discussions thrive on social media.

Methodologically, this study illustrates the usefulness of a mixed methods approach, which combines grounded theory with computational tools. Pang and Lee's seminal paper on sentiment analysis demonstrates clearly that the scientific community exploring computational text analysis is mostly concerned with method - developing tools that can make the human experience evidenced in text easily computable (Pang & Lee, 2008). The present study shows how these methods may be applied, but at the same time, it proves that they cannot stand alone when one is concerned with deriving r insights that go beyond description.

Theoretically, this study has generated explanations of the dynamics, which drive collaborative processes of opinion forming on social media. Whether these theoretical insights are actually generalisable, or are firmly grounded within a very specific situation, remains to be seen.

8.1 Perspectives

"Everything we hear is an opinion, not a fact. Everything we see is a perspective, not the truth."
— Marcus Aurelius, *Meditations*

Both in relation to the conclusions made by this study, and to process of developing grounded theory, this quote from Marcus Aurelius still rings true.
Doing a study grounded in data, especially large amounts of it, always involves a process of selecting some perspectives as being more salient than others, leaving loose ends and roads not taken. The researcher's own schooling, the methods applied and the chosen philosophical position all play a part in drawing forth some aspects of the data, and leaving others in obscurity. A grounded theory is never 100% objective - and nor does it aim to be.
In regards to this particular study, I have most certain left loose ends which could have been interesting avenues for further research; the impact of healthy/clean living trends on the vaccination debates, cultural attributions of the importance of personal freedom vs the collective good, how discussions on social media bleed out into mainstream media and so forth.

Those are roads not taken. However, if we focus on the road that was indeed taken, the most interesting avenue for further research would be exploring the pervasiveness of the dynamics uncovered. Can these dichotomy-based and co-dependent communities of expert partisans be identified in other types of scientifically controversial discussions taking place on social media?
If we look into communities, which discuss topics such as GMOs or climate change, would these pan out in a similar pattern? Have this study generated a genuinely generalisable theory from very specific data? Or is the social media landscape, and its effects on scientific discussions, a more fragmented and diverse arena than assumed in this study?

As established above, good research stands "on the shoulders of giants". Hopefully, this study can add an inch or two to the giant's shoulders, in order to further research into the dynamics of scientific discussions on social media.

9. Bibliography:

Arguello, J., Butler, B. S., Joyce, E., Kraut, R., Ling, K. S., Rosé, C., et al. (2006): *Talk to me: Foundations for successful individual-group interactions in online communities.* In: Proceedings of the CHI'06 conference on human factors in computing systems, (pp. 959-968). New York: Association for Computing Machinery Press.

Bakshy, Eitan, Messing, Solomon & Adamic, Lada (2015): *Exposure to ideologically diverse news and opinion on Facebook,* retrieved 12/5-2015 at: http://www.sciencemag.org/content/early/2015/05/08/science.aaa1160.full?sid=44243d5f-d13d-45e0-9496-e3749d44fef4

Bessi, A., Scala, A., Rossi, L., Zhang, Q. & Quattrociocchi (2014): The economy of attention in the age of (mis)information, Journal of Trust Management 1:12,

Birks, Melanie & Mills, Jane (2015): *Grounded Theory; A practical guide*, second edition, Sage Publications: Los Angeles, London, New Delhi, Singapore, Washington DC

Caroll, Rory (2015): *Too rich to get sick? Disneyland measles outbreak reflects anti-vaccination trend*, retrieved 15/4-15: http://www.theguardian.com/us-news/2015/jan/17/too-rich-sick-disneyland-measles-outbreak-reflects-anti-vaccination-trend

Cattaneo, Elena, & Corbellini, Gilberto (2014): *Taking a stand against pseudo-science***,** Nature, Vol. 510, 19 june 2014, pg. 333-335.

Chung, C & Pennebaker J. (2007): *The psychological functions of function words,* In: K. Fiedler (ed), Social Communication (pp. 343-359), New York: Psychology Press

Chung, C. K., & Pennebaker, J. W. (2005): *Assessing quality of life through natural language use: Implications of computerized text analysis,* In: W.R. Lenderking and D.A. Revicki (eds.), *Advancing health outcomes research methods and clinical applications* (pp 79-94). Washington, DC: Degnon Associates.

Davies, P., Chapman, S. & Leask, J. (2002): *Antivaccination activists on the world wide web*, Arch Dis Child 2002/87. pp. 22–25

Deutsche Welle (2015): *Berlin Measles Epidemic reaches new high,* retrieved 15/4-15 at: http://www.dw.de/berlin-measles-epidemic-reaches-new-high/a-18301149

Dieckmann, M & Askgaard, S.W. (2015): *Vaccine-debat: Forældre opretter smittegruppe på Facebook*, retrieved 15/4-15 at: http://jyllands-posten.dk/livsstil/familiesundhed/sundhed/ECE7607881/Vaccine-debat%3A+For%C3%A6ldre+opretter+smittegruppe+p%C3%A5+Facebook/

Entman, Robert M.(1993): *Framing: Toward Clarification of a fractured Paradigm*, Journal of Communication 43(3), pp. 51-58

Foucault, M. (1980): *Prison Talk*, in C. Gordon (ed) *Power/Knowledge: Selected Interview and Other Writings 1972-1977,* pp. 37-52. Brighton: Harvester Press.

Gambino, Lauren (2015): *California measles outbreak fueled by parents who failed to vaccinate children – study*, retrieved 15/4-15 at: http://www.theguardian.com/us-news/2015/mar/17/measles-california-disneyland-vaccination-research

Glaser, Barney G. (2014): *Applying Grounded Theory*, The Grounded Theory Review (2014), Volume 13, Issue 1, pp. 46-50

Haberman, Claude (2015): *A discredited vaccine study's continuing impact on public health,* retrieved 15/4-2015 at: http://www.nytimes.com/2015/02/02/us/a-discredited-vaccine-studys-continuing-impact-on-public-health.html?_r=0

Hancock, J. T., Curry, L. E., Goorha, S., & Woodworth, M. (2008). *On lying and being lied to: A linguistic analysis of deception in computer-mediated communication.* Discourse Processes, 45, pp. 1-23.

Hartelius, E. Johanna (2011): *The rhetoric of expertise*, Lexington Books: Plymouth PL6 7PY UK

Hoff-Clausen, Elisabeth (2008): *Online Ethos; webretorik i politiske kampagner, blogs og wikis,* 1, udgave, Forlaget Samfundslitteratur: 1970 Frederiksberg C

IPVC FB (2015): Informed Parents of Vaccinated Children's Facebook page, retrieved 15/4-2015 at: https://www.facebook.com/Informed-Parents-of-Vaccinated-Children-236107336440146/timeline/

IPVC (2012-4): List of coded passages from Facebook 2012-2014, can be accessed at: https://www.dropbox.com/s/mmzaryt7pu5mhbn/List%20of%20codes%20passages%20IPVC%202012-14.xlsx?dl=0

Jacob, Margaret C. (1997): *Scientific culture and the Making of the Industrial West*, New York: Oxford University Press

Just, Sine Nørholm & Mouton, Nico (2014): *Framing financial culture – rhetorical struggles over the meaning of "Liborgate"*, Journal of Organisational Change Management, Vol. 27, No. 5, pp. 732-743

KhCoder (2014): *Quick Start Tutorial Guide*, retrieved 2/12-2014 at: http://khc.sourceforge.net/en/

Kuhn, Thomas S. (1962) *The Structure of Scientific Revolutions*, Chicago: University of Chicago Press

Medvedev, S.V (2014): *How pseudoscience snowballs,* Human Physiology, 2015, Vol. 41, No. 1, pp. 109–114.

McKee, Maggie (2004): *Controversial MMR and autism study retracted*, retrieved 9/12-14 at: http://www.newscientist.com/article/dn4743#.VIbnKx8k5wA

Noelle-Neumann, Elisabeth (1974): T*he Spiral of Silence: A Theory of Public Opinion,* Journal of Communication, Volume 24, Issue 2, pp 43–51

NSF (2016): Science and Engineering Indicators 2006, Chapter 7: *Science and Technology: Public Attitudes and Understanding,* retrieved 30/8-2015 at: http://www.nsf.gov/statistics/seind06/c7/c7h.htm

NSF (2014): Science and Engineering Indicators 2014, Chapter 7: *Science and Technology: Public Attitudes and Understanding,* retrieved 2/9-2015 at: http://www.nsf.gov/statistics/seind14/index.cfm/chapter-7/c7h.htm

NVIC FB (2015): *National Vaccine Information Center's Facebook Page,* retrieved 15/4-2015 at: https://www.facebook.com/national.vaccine.information.center/timeline

NVIC (2012): *List of coded passages from Facebook 2012*, can be accessed at: https://www.dropbox.com/s/qnr71scpw3q3lyd/List%20of%20coded%20passages%202012.xlsx?dl=0

NVIC (2013-4): *List of coded passages from Facebook 2013 & 2014*, can be accessed at: https://www.dropbox.com/s/sn6jf6mvewdg2cj/List%20of%20coded%20passages%202013%2B4.xlsx?dl=0

O'Connor, Brendan, Balasubramanyan, Ramnath, Routledge, Bryan R. & Smith, Noah A. (2010): *From Tweets to Polls: Linking Text Sentiment to Public Opinion Time Series,* retrieved 2/12-2014 at: http://www.aaai.org/ocs/index.php/ICWSM/ICWSM10/paper/viewFile/1536/1842

Ohlhorst, Frank J. (2012): *Big Data Analytics: Turning Big Data into Big Money*, Chapter 1, Cary, NC: SAS Institute Inc.

Pang, Bo and Lee, Lillian (2008): *Opinion Mining and Sentiment Analysis, Foundations and Trends in Information Retrieval*, Vol. 2, Nos. 1–2 (2008) 1–135

Park, Alice (2011): *Study linking vaccines to autism is "fraudulent"*, retrieved 9/12-14 at: http://healthland.time.com/2011/01/06/study-linking-vaccines-to-autism-is-fraudulent/

Pennebaker, J.W., Chung, C.K., Ireland, M.,Gonzales, A. & Booth, R.J (2007): T*he development and psychometric properties of LIWC2007*. Austin, TX, LIWC.Net.

Popper, Karl (2005): *The Logic of Scientific Discovery* (Taylor & Francis e-Library ed.). London and New York: Routledge / Taylor & Francis e-Library

Rogers, Richard (2004): *Information Politics on the Web,* The MIT Press: Cambridge, Massachusetts, London, England

Smith, Jonas Heide (2015): *Undskyld, men må vi remixe dit indhold*, retrieved 1/10-15 at: http://www.kommunikationsforum.dk/artikler/teorier-og-tanker-om-remix-kulturen

Sollaci, Luciana B., & Pereira, Mauricio G. (2004): *The introduction, methods, results and discussion (IMRAD) structure: a fifty year survey*, J Med Libr Assoc. 2004 Jul; 92(3): 364–371.

Stanford Encyclopedia of Philosophy (2015): *Fallacies*, retrieved 24/9-2015 at: http://plato.stanford.edu/entries/fallacies

Tausczik, Yla, R. & Pennebaker, James W. (2010): *The Psychological Meaning of Words: LIWC and Computerized Text Analysis Methods*, Journal of Language and Social Psychology Volume 29(1) , 2010, pg. 24-54

Taylor, Brent et al. (1999): *Autism and measles, mumps, and rubella vaccine: no epidemiological evidence for a causal association*, The Lancet , Volume 353 , Issue 9169 , 2026 - 2029

Vatrapu, Ravi & Hussain, Abid (2014): *Social Data Analytics Tool:* Design, Development and Demonstrative Case Studies.
Paper presented at The 18th IEEE EDOC (Enterprise Computing Conference) 2014, Ulm, Tyskland.

Vatrapu, Ravi (2013): "Understanding social business." in Emerging Dimensions of Technology Management, K. B. Akhilesh, Ed. Springer, 2013, pp. 147–158.

Wiggins, B.E. & Bowers, G.B (2014): *Memes as genre: A structurational analysis of the memescape*, New Media & Society May 26, 2014

Wombles, Kim (2012): *Too good to be true: Facebook as a medium for spreading pseudo-science,* retrieved 24/6-2015 at: http://www.science20.com/countering_tackling_woo/too_good_be_true_facebook_medium_spread_pseudoscience-88065

Zevallos, Z. (2011): *'What is Otherness?,'* The Other Sociologist, retrieved 14/10-2015 at: http://othersociologist.com/otherness-resources/

Appendices:

Appendix A: Full data sets and social graph stats for NVIC 2012-14 and IPVC 2012-14, available at: https://www.dropbox.com/sh/8bir9k5pvp6dmbn/AAD_04y7mOYuL4GQiaougAKwa?dl=0

Appendix B: LIWC comparative analysis results

Appendix B

Category	Emotional writing	Blogs	Talking	Control writing	Science Articles	Novels	IPVC	NVIC 2014	NVIC 2013	NVIC 2012	Taylor et. al.
Linguistic Processes											
Word count (mean)	443	7.304	596	405	2.704	70.033	185959	2066705.00	1315226.00	1003467.00	3233.00
Words/sentence	19,56	46,81	25,87	19,84	14,61	22,02	12,11	16.21	16.62	17.09	38.04
Words>6 letters	13,27	14,12	9,43	13,87	29,55	16,33	19,38	19.52	19.52	20.08	28.09
Dictionary words	93,42	83,83	91,49	88,55	53,66	83,57	81,1	82.90	83.04	82.41	69.01
Total function words	63,93	55,29	60,48	57,53	34,72	57,17	52,79	53.13	52.96	52.31	43.18
Total pronouns	20,23	16,07	21,52	14,29	3,18	14,89	14,38	13.86	13.71	13.44	3.84
Personal pronouns	14,23	10,67	13,63	10,78	0,82	10,29	8,26	8.06	7.93	7.80	1.08
1st pers singular	10,4	6,42	6,3	8,5	0,12	2,55	3,64	3.08	3.02	2.95	0.00
1st pers plural	0,73	0,88	1,09	0,93	0,37	0,55	0,64	1.01	1.02	1.11	0.80
2nd person	0,39	1,23	3,94	0,2	0	1,29	2,05	1.54	1.41	1.32	0.00
3rd pers singular	2,01	1,48	1,46	0,73	0,04	4,92	0,83	0.79	0.85	0.72	0.06
3rd pers plural	0,71	0,65	0,84	0,41	0,28	0,98	1,09	1.64	1.64	1.70	0.22
Impersonal pronouns	6	5,4	7,89	3,51	2,36	4,61	6,12	5.81	5.78	5.64	2.75
Articles	4,97	5,89	4,42	6,63	7,67	8,21	5,89	5.91	5.99	5.99	6.59
Common verbs[a]	17,44	14,61	19,94	13,59	4,98	13,01	14,71	14.47	14.42	14.10	6.28
Auxiliary verbs	10,65	8,81	12,38	7,42	3,9	7,76	9,87	9.72	9.57	9.37	5.04
Past tense [a]	5,76	3,83	3,98	4,55	1,45	6,29	2,62	2.89	2.78	2.54	3.71
Present tense [a]	9,16	8,68	13,97	6,74	2,7	4,57	10,16	9.46	9.44	9.31	1.61
Future tense [a]	1,12	1,06	0,99	1,54	0,37	1,14	0,96	1.06	1.12	1.15	0.34
Adverbs	6,29	5,46	6,22	4,48	1,35	3,76	4,93	4.57	4.45	4.37	1.39
Prepositions	12,94	12,06	9,33	16,06	12,87	14,06	10,75	11.18	11.38	11.55	18.16
Conjunctions	7,39	6,39	5,67	7,71	4,3	6,65	5,31	5.87	5.78	5.70	5.38
Negations	2,24	1,78	2,92	0,84	0,4	1,69	2,59	2.58	2.58	2.39	1.24
Quantifiers	3,12	2,79	2,23	2,46	1,93	2,27	2,92	2.98	2.93	2.85	2.20
Numbers	1,31	1,96	1,95	2,73	7,05	1,17	1,74	1.62	1.72	1.76	8.32
Swear words	0,11	0,33	0,37	0,03	0	0,06	0,11	0.15	0.15	0.12	0.00
Psychological Processes											
Social processes[b]	9,09	8,65	11,75	5,55	2,61	12,26	9,67	10.31	10.21	10.17	3.56
Family	0,99	0,38	0,24	0,33	0,08	0,41	0,48	0.66	0.68	0.69	0.56
Friends	0,5	0,25	0,16	0,42	0,04	0,17	0,12	0.06	0.06	0.07	0.03
Humans	0,84	0,79	0,81	0,38	0,24	1,05	1,43	1.80	1.71	1.65	0.87
Affective processes	6,02	5,84	4,93	2,57	2,18	4,89	6,25	5.53	5.58	5.51	1.42

Appendix B

Positive emotion	3,28	3,72	3,42	1,83	1,33	2,86	3,7	2.96	3.00	2.95	0.68
Negative emotion	2,67	2,07	1,49	0,71	0,84	1,98	2,49	2.53	2.52	2.51	0.68
Anxiety	0,68	0,3	0,18	0,21	0,16	0,44	0,57	0.50	0.49	0.49	0.31
Anger	0,66	0,76	0,58	0,14	0,13	0,55	0,73	0.88	0.87	0.86	0.00
Sadness	0,63	0,42	0,19	0,14	0,29	0,57	0,4	0.42	0.43	0.42	0.03
Cognitive processes	19,66	15,97	15,66	14,42	11,28	15,23	17,01	17.20	17.07	17.00	15.68
Insight	3,25	2,17	2,34	1,31	1,82	1,99	2,89	2.47	2.44	2.46	2.66
Causation	1,85	1,42	1,55	1,28	2,16	1,02	2,01	2.22	2.18	2.21	1.95
Discrepancy	2,13	1,54	1,73	1,08	0,48	1,52	1,73	1.76	1.84	1.84	0.53
Tentative	2,93	2,65	2,36	2,31	1,33	2,16	2,78	2.57	2.55	2.50	2.78
Certainty	1,73	1,4	1,34	0,8	0,56	1,43	1,54	1.81	1.74	1.66	0.80
Inhibition	0,46	0,47	0,37	0,38	0,63	0,61	0,86	0.87	0.90	0.91	0.56
Inclusive	5,09	4,66	3,88	6,37	4,08	5,35	3,37	4.14	4.12	4.14	5.72
Exclusive	3,49	2,78	3,26	1,71	0,92	2,22	3,25	2.92	2.91	2.85	2.01
Perceptual processes[c]	2,08	2,27	2,27	1,91	1,15	3,28	1,41	1.38	1.40	1.43	0.62
See	0,53	0,87	0,99	0,83	0,65	1,26	0,55	0.52	0.52	0.54	0.43
Hear	0,44	0,65	0,69	0,35	0,06	1,15	0,54	0.50	0.50	0.51	0.03
Feel	0,96	0,6	0,48	0,62	0,24	0,74	0,25	0.24	0.25	0.26	0.03
Biological processes	1,95	2,05	1,52	2,97	1,02	2,13	2,95	4.07	4.29	4.25	2.54
Body	0,51	0,75	0,59	1,05	0,28	1,21	0,45	0.62	0.67	0.64	0.03
Health	0,93	0,54	0,31	0,49	0,57	0,44	2,19	2.90	2.95	2.90	2.47
Sexual	0,34	0,41	0,32	0,05	0,06	0,18	0,25	0.23	0.26	0.29	0.00
Ingestion	0,26	0,44	0,37	1,44	0,15	0,36	0,21	0.46	0.58	0.63	0.03
Relativity	13,77	13,75	12,77	20,13	10,19	13,92	8,86	10.07	10.24	10.24	16.02
Motion	2,07	2,06	2,69	3,57	1,21	2,18	1,02	1.27	1.32	1.32	0.90
Space	5,38	5,61	5,46	7,92	6,08	6,83	4,31	4.48	4.57	4.72	6.62
Time	6,03	5,72	4,34	8,2	2,65	4,65	3,48	4.19	4.17	4.03	8.38
Current Concerns											
Work	2,14	1,71	1,67	3,74	1,74	1,01	2,08	2.31	2.49	2.58	2.29
Achievement	1,63	1,45	0,95	1,47	1,6	1,13	1,13	1.35	1.48	1.49	1.14
Leisure	0,78	1,6	1,04	1,86	0,41	0,69	0,84	0.67	0.66	0.65	0.06
Home	0,64	0,52	0,36	1,86	0,14	0,63	0,16	0.27	0.31	0.33	0.00
Money	0,34	0,59	0,6	0,56	0,36	0,51	0,55	0.67	0.81	0.86	0.37
Religion	0,17	0,34	0,19	0,17	0,06	0,39	0,18	0.26	0.30	0.30	0.00
Death	0,18	0,15	0,07	0,03	0,06	0,23	0,35	0.32	0.31	0.28	0.00
Spoken categories											
Assent	0,11	0,64	3,61	0,07	0,08	0,19	0,84	0.98	0.44	0.42	1.36
Nonfluencies	0,19	0,32	0,73	0,13	0,06	0,14	0,22	0.18	0.18	0.18	0.03
Fillers	0,03	0,02	1,2	0,01	0	0	0,23	0.21	0.19	0.20	0.00
Punctuation											
Total Punctuation	12,19	23,8	49,37	12,85	33,94	22,05	26,28	21.95	20.99	21.34	15.16

Appendix B

Periods	6,12	10,66	9,81	6,6	11,73	5,51	9,6	8.93	8.72	8.61	3.56
Commas	2,9	4,09	5,05	3,24	7,63	7,36	3,68	2.65	2.77	2.79	4.42
Colons	0,05	0,73	0,07	0,58	0,21	0,16	0,92	0.52	0.37	0.34	0.15
Semicolons	0,04	0,11	0,05	0,03	0,38	0,63	0,06	0.06	0.07	0.06	0.34
Question marks	0,17	0,6	2,33	0,04	0,05	0,57	1,22	1.22	1.13	1.19	0.09
Exclamation marks	0,12	1,27	0,21	0,07	0	0,46	1,51	2.14	2.38	2.48	0.00
Dashes	0,32	1,11	0,75	0,45	2,54	1,6	1,82	1.24	1.37	1.58	1.45
Quotation marks	0,27	0,71	0,17	0,21	0,18	3,39	0,83	0.58	0.62	0.66	0.19
Apostrophes	1,69	2,37	3,82	0,95	0,16	2,11	2,29	2.10	2.07	2.04	0.43
Parentheses	0,15	0,5	0,01	0,2	4,87	0,05	0,29	0.32	0.38	0.35	1.58
Other punctuation	0,2	1,08	27,11	0,29	1,32	0,14	3,68	1.85	0.75	0.87	1.36