





# The Perspective Web

Creating a More Transparent Internet

*Edited by*

Piek Vossen and Antske Fokkens



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# 1

## Introducing the Perspective Web

Piek Vossen and Antske Fokkens

### 1.1 What the book is about?

This book is about perspectives of people on people, information and knowledge, as expressed on the Web. We all have the feeling that the Web is a diverse and dynamic source of knowledge and information but most of all it is a source of opinions and perspectives. How much of what we find is true, what can be trusted? What is the origin of information and do people change their views or opinions? There is a lot that we do not know about the complexity, dynamics and impact of this medium on how we view the world, which mostly comes to us digitally. What if we could turn on our night vision on all information and knowledge available on the Web to see who is behind it, who believes what, how it is authorised, how certain/uncertain source state their claims, how it is twisted, who shares what believes? Can we build a Perspective Web in which this becomes visible and traceable? Can we understand group dynamics, radicalisation, identification and impact better when we have access to such a Web? Do we want such a view on the Web and will it enlighten people?

There has been no measles deaths reported in the U.S. since 2003,

says Dr Anne Schuchat, the director of CDC's National Center for Immunization and Respiratory Diseases according to Fox News, according to Associated Press, according to Brian Shilhavy, Health Impact News Editor of the website Vaccine Impact. Is this quote true or out of context: no death because of a successful vaccination program? Who can tell? Our working example is the vaccination debate. This vaccination debate goes on continuously and relates to a broader societal movement in which people do not trust the government, science, the media and the

industry (Big Pharma) and claim their right to choose their own truth with the effect that less and less people vaccinate their children. Information and knowledge is spread wildly and passionate groups are formed through online media. Traditional communication and authority appears to be by-passed by new ways of communication and new authorities. Discussions take place in bubbles and not across bubbles. Finally, there is little awareness of what is going on and who are involved for what reasons. The positions are relatively simple: vaccines are good or bad, but the argumentation and information is emotional, obscure, wrong, misleading. We find on the web all kinds of stories, opinions, facts and non-facts which make it very difficult for parents to find the 'right' information and to make a decision on the vaccination of their child. How to trace and trust sources? Can stories and information be traced to a single source or does it have many unconnected origins? How to separate emotions from logical arguments? How to detect false arguments? How to know what is out there, beyond your own bubble? How to find all the stances and arguments and how to position all stakeholders around it? The Perspective Web would be a layer that supports people in knowing what is out there and how to value it. It would help them to measure consistency and judge the quality of information according to their own standards. The Perspective Web requires the development of technology that can digest the current jungle of information and overlay it with a structured plan of arguments, positions and sources. It provides people with sign post to opinions and arguments so that they can find it, do not get lost and keep the overview. The vaccine debate is just an example of one use case in which the dispersed information on the web may play a role in the decisions people make. The Perspective Web is not just limited to this example but is relevant to many societal debates among which refugees, migration, climate change, fake news, gender issues and discrimination.

## 1.2 Our vision for this book

In this book, we want to discuss the idea of a Perspective web from different disciplines: Social Sciences, Media Studies, Computational Linguistics and Semantic Web scientists. We want to define the roadmap to a more transparent Web and discuss the hurdles we may find. We are looking for position papers from the different disciplines that look beyond the state-of-the-art research, which is often fragmented and mono-

lithic. We want to bring together these disciplines to address the same challenge. We call for papers that reflect on the Perspective Web from their discipline, connect it to the state-of-the-art and discuss the possible developments.

After introducing the basic notions and concepts in the field (Part 1) and introducing the overarching Perspective Web, we structure the book in different Parts (2, 3, 4, 5) corresponding with the different disciplines. Each part will have section editors that further instruct the authors to relate to the main topics and oversee overlap and connections with other chapters. The editors of a part provide an editorial chapter as a general framework for their discipline, guiding the reader through the specific chapters of the invited scholars and providing a critical reflection on the Perspective Web, i.e. is it desirable, is it feasible, will it be effective, what will it solve, are there any negative effects?

When reporting state-of-the-art research results in individual chapters, we would like authors to extend the discussion to the opportunities and hurdles when this would be applied to draw a compressive map of opinions, debates and beliefs reflected by the web, the social web and its dynamics. Are we capable of fully describing the complexity and the social impact on people? Can we provide more transparency to the users of the Web and what will be the effect of adding transparency?

### **1.3 Target audience**

We target an audience of scientists from different disciplines but aim at a level for each discipline that is understandable for the others.

### **1.4 Structure**

The book is structured into 5 main parts, preceded by an introduction and ending with a critical review. We expect chapters to be 10-15 pages. So far, we have about 20 chapter proposals in total. Part 1 will contain 3 background chapters that introduce the theoretical concepts relevant to the Perspective web. Part 2, 3, and 4 contain chapters from the social science, media studies, and natural language processing disciplines. Part 5 has chapters on modelling and specific applications involving the Semantic Web perspective.



PART ONE

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THEORETICAL BACKGROUND



## **2**

# Subjectivity in linguistics

Peter White

Subjectivity in linguistics:

# **3**

## Computational linguistic for subjectivity

Claire Cardie OR Ed Hovy

Computational linguistic for subjectivity

# 4

## Social psychology

Camiel Beukeboom

Social psychology



## PART TWO

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### SOCIAL IMPACT



# 5

## Social psychology

Camiel Beukeboom

## 6

# The micro level: Perspectives in individuals and individual texts

Kobie van Krieken and José Sanders

A perspective can be conceptualised as a personally held view, attitude or opinion about a given topic or object, residing in an individual's minds. We discuss psychological theory about individually held attitudes and beliefs, and how they are formed, maintained, and change in response to new incoming information. Conversely, a perspective can be conceptualised as an expression in verbal (or nonverbal) communication. We discuss the various communicative, and specifically linguistic, means through which perspectives on a given topic can be expressed. Next, we turn to the question whether, when, and how, personally held attitudes of senders are reflected in their communication and language use. Often, people's messages and language use (implicitly or explicitly) reflects their personal views or opinions. Research on biased language use, for instance, demonstrates that attitudes can be subtly expressed in small differences in word choice and formulations. However, because messages are intended to be communicated, messages and the language used to convey messages, can also be the result of adaptation to an (assumed) perspective of a recipient, or a motivated attempt to change the perspective of recipients. In such cases a message is not necessarily a reflection of the sender's personal perspective. This obviously complicates attempts to derive all perspectives that are at play in a given situation.

## 7

# The meso level: Perspectives in a Social Context

Rachel Neo

In this chapter, we no longer approach perspectives as held by individuals or as expressed in individual texts in isolation, but instead in their social context. What do senders want to achieve with their message? Who are they addressing? How do they adapt their message to their audience? And at the other side of the communication dyad: How do receivers deal with the perspectives they perceive in messages? How do they weigh and combine sender and text attributes into a perceived perspective? And to what extent do their own perspectives bias these perceptions? Building on psychological models of communication, ranging from message production factors to sender motivations, from theories about selective exposure to user experiences, and from models about information processing to those about attitude change, we discuss how perspectives can, and should, be considered in the social context in which they are constructed and consumed.

## 8

# The macro level: Perspectives embedded in society, culture, and technology

Hong Vu

Due to modern communication technologies, perspectives disseminate much faster than before. As a result, individuals are, potentially, confronted with much more, and much more diverse, perspectives than ever before. This may have positive effects, such as an increased interest in other people's cultural views, and perhaps even to an increased mutual understanding between individuals with a different cultural background. But just as often, confrontation to deviating perspectives makes people feel confused, overloaded, irritated, and insecure. To avoid such negative affective responses, people prefer to expose themselves to perspectives that are consistent with their own views. Moreover, modern-day online platforms employ social and technical mechanisms to selectively expose their users to information from others. By exposing users as much as possible to perspectives that are close to their own, they make sure that users feel they are still able to understand and trust the world around them. This chapter discusses such mechanisms in the context of large online platforms such as Facebook and Google. Furthermore it discusses the concepts such as echo chambers, filter bubbles, and networks of trust, investigates the role of social reputation and recommendation systems, and makes suggestions for technological solutions that might do a better job of compromising between creating a seamless online experience for users, and informing users of what might really be happening in the world.

PART THREE

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MEDIATING PERSPECTIVES



## 9

# The Mediation of Online Information

Julia Noordegraaf and Thomas Poell

Information and knowledge emerge in a network of actors and technology that influence the perspectives embedded in its individual manifestations. The means of communication, as well as the social, cultural, political and economic context in which the production, exchange and reception of information takes place, influence the perspectives embedded in the actual messages. Being the product of people and changing techniques of communication, perspectives are situated in time and space and never 'universal', although certain perspectives become shared and may be maintained over longer periods of time as 'social realities'. Based on a discussion of the communication model that originated with Shannon's information theory, this chapter conceptualises the various dimensions of the mediation of online information, such as the textual and (audio)visual content of the message, its provenance, the politics and techniques of the communication platforms used and the reception of the message. Online media not only enable users to communicate information, but also shape what and how they communicate. The contributions to this part of the book focus on the ways in which we can model the various dimensions of this mediation process. After a conceptual chapter that introduces the different dimensions, the subsequent chapters zoom in on: 1) the source and its encodings, 2) content and reception, 3) technicality, economics, and politics. Each dimension is crucial for evaluating specific information, and understanding particular 'perspectives' embedded in this information. The final chapter investigates a human-computer interaction approach for tracing the perspectives in online documents via an assessment of their quality.

# 10

## The Source and its Encoding

Eric Hoyt

This chapter focuses on the sources of online information. It aims to identify the parameters that indicate how the identity and intentions of the source of a message are encoded in the messages and/or media as they appear online. Which parameters allow us to reconstruct the encoding process that took place when the sender produced and communicated the message via particular online media? How do we account for the "noise" (technical, semantic, etc.) that communication of information entails and that complicates the identification of the source and the decoding of its intentions?

# 11

## Content, Form and Reception

Christina Neumayer

This chapter models the factors that shape particular perspectives in online information at the level of content, as well as of the form in which it is delivered and received. Information is often communicated in textual form, but a comprehensive understanding of the perspectives embedded in a message also requires an analysis of its visual and audio-visual elements, which are becoming increasingly important in today's web. Moreover, the context in which information is shared and received is also crucial. In particular in messages communicated via online platforms, the perspectives embedded in them are shaped through processes of reception, that is by commenting, liking, sharing, voting, and flagging.

## 12

### Channel Politics and Technicity

Jonas Anderson Schwarz and José van Dijck

This chapter examines how the techno-commercial architecture of online media shapes information exchange. The web is populated by a wide variety of media, ranging from news websites to search engines and from encyclopedias to social media platforms, which are each characterised by particular technological and economic architectures. These architectures enable specific types of information exchange and forms of curation, but also inhibit others. To gain insight in these politics of technology, the chapter presents a case study on Facebook, which plays an increasingly central role in the circulation of online information. Through this case study, we demonstrate how the analysis of the techno-commercial architecture platforms can contribute to exploration of perspectives in online environments.

# 13

## Quality and Perspectives

Davide Ceolin and Lora Aroya and Julia Noordegraafs

The analysis of the perspectives in online information is inherently tied up with an assessment of the quality of that information. The democratization of the Web allowed for multiple views to be voiced and the users of online information adopt diverging criteria for judging the relevance of that information for their specific purposes. Therefore, assessing the quality of Web documents, defined as best meeting the information needs of their users, means also to partially characterise the perspective therein presented by their authors. Vice-versa, when deciding which documents meet the requirements of users, we are implicitly characterising the user perspective. To support a better fit between the information provided and the needs of its users, document quality assessments can be computed through human and automated computation. However, human and machine computation bring in yet two other level of perspectives, i.e., that of the crowd workers and that of the algorithms used to automatically evaluate the documents. This chapter analyses the connections between perspectives and quality in the literature, and through an analysis of a quality and perspective assessment tool developed in the context of the QuPiD project.



PART FOUR

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MINING PERSPECTIVES



**14**

Semantic parsing of Perspectives

Sabine Bergler

**15**

Opinion Mining — product review  
perspective insights

Bing Liu

## Beyond Opinions and Sentiment: Exploring Multiple Dimensions of Perspectives

David Bamam

Perspectives are conveyed in many ways. They are reflected in choices concerning what information is considered relevant and how this information is expressed. The perspective displayed by explicit opinions is obvious, but they are also expressed by, e.g. lexical choices (e.g. president vs dictator) or choices between generalising expressions versus specific behaviour. For instance, a small Dutch corpus study reveals that Moroccan perpetrators are easily called thieves (implying generic behaviour), where other perpetrators stole something (implying incidental behaviour). Some of these distinctions are so subtle that, when observed in isolation, they are likely to stay unnoticed. They can, however, enforce stereotyping when used systematically. In this chapter, we provide an overview of NLP methods that investigate various aspects of perspectives in text that go beyond mining explicit opinions and sentiment. We investigate both choices of words and framing that are associated to specific social groups or people who share a particular point of view as well as methods that can be used to detect these more subtle ways in which perspectives are expressed.

## Identifying Factuality and Argumentation: Processing subjectivity for perspectives

Roser Morante and Chantal van Son and Piek Vossen

Processing subjectivity for perspectives In this article we will define the requirements for extracting perspectives from a Natural Language Processing (NLP) approach, exemplifying our proposal with an analysis of the vaccination debate. We will start by establishing what kind of information a perspective should ideally provide in order to reflect the diversity of beliefs, attitudes, and opinions that people hold towards a topic (vaccinations in this case), as well as the arguments that people use to motivate them. We will continue by describing core linguistic phenomena that languages provide to encode subjective information in texts and we will summarise whether and how these phenomena have been addressed in NLP. The phenomena that we expect to discuss are among others factuality, modality, uncertainty, negation, attribution, opinion, and argumentation. We aim at determining to which extent the computational treatment of these phenomena is mature enough to allow for the automatic extraction of perspectives (based on the requirements that we have previously defined), identifying the limitations of the current approaches, and proposing new directions. Finally, we will make a proposal about how the information that is extracted by processing independently each of these phenomena can be integrated into a model of perspectives. The proposal will be exemplified by generating gold perspectives from the vaccination debate.

Figurative speech, sarcasm, and irony. All  
The President's Metaphors: Aligning  
Figurative Perspectives to Newsworthy  
Events

Tony Veale

Foremost amongst our many uses of language is the shaping of perspectives. Whether a perspective is packaged as a headline, a metaphor, or a joke, each is the product of a specific world-view that encourages others to view the world in much the same way. Different modes of expression offer their own affordances in the construction of perspectives: headlines are punchy and factual, while jokes are knowing and insolent (leading Aristotle to define wit as educated insolence). Metaphors marry the concision of headlines to the conceptual tension of jokes, to present a linguistic perspective that is as resonant as it is ambiguously elastic. In this chapter we explore the challenge of aligning figurative perspectives (in the form of pithy metaphors) with headlines for breaking news events, in such a way that each metaphor is apt for the news event to which it is attached. Although metaphors and headlines may describe the same events from complementary perspectives, significant differences in form and register make it convenient to think of these perspectives as occupying their own linguistic and conceptual spaces. We thus approach the problem of alignment at the level of spaces, to explore how elements in one space ? the space of figurative expressions ? can be meaningfully aligned to the elements of another, the space of headlines. It is useful to think of the space of metaphors as a Platonic space in which every metaphor is a pre-existing star with its own fixed coordinates, while a dynamic view of the headline space offers a better fit for the fluid and highly perishable products of the news cycle. In this chapter we consider the construction and large-scale population of both of these spaces, and show how alignment is made possible by the compression of two distinct spaces into a single perspective space. The specifics of this approach to alignment by compression are discussed in the context

of an automated news reader bot, named @MetaphorMirror, that aligns machine-generated metaphors to freshly-minted news tweets on Twitter.

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### Alternative interpretations

Lora Aroyo and Chris Welty

Language is, without a doubt, our shared vocabulary - that we use to communicate with others. Perspectives, on the other hand, are individual - intensely personal, and there may be overlapping individual perspectives in very narrow, or very shallow, ways, but aligning oneself, or even worse, aligning something one has written, with some predefined set of labels will be error prone and frustrating. Only in the broadest possible sense might we find alignment, and even then there will be differences derived from a less personal association - can I be a republican if I do support access to abortion? Conversely, if I do not support access to abortion, am I a republican? Perspectives are not 'logical' - they do not follow the rules of deduction. What is the perspective of this article? Perspectives are also tacit, meaning that people are largely unaware of them. Thus it would be hard, perhaps even counter-productive, to get people to identify their own perspectives. Language modelling (simply counting word and ngram frequencies) would likely be far more reliable in engendering true perspectives than self-assignment. But if perspectives are the dark matter of language understanding, accounting for 80% of language understanding errors (both in people and machines), then clearly some account of it must be made. Traditional methods, we argue here, will leave us empty - the individual and tacit nature of perspectives put it in unfamiliar territory. In psychology and social science, there is a lot of community experience with trying to get at tacit information in people. Computer science, and the hard sciences in general, tend to be more direct, treating humans rather like blunt instruments, expecting they should be able to answer something like a bunch of questions 'factually?'. As if there was some universal truth in a Platonic sense, and it's our job to get to it. Several obvious techniques from psychology

seem plausible to be used to design studies that can get at the heart of perspectives.

PART FIVE

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MODELLING AND APPLYING  
PERSPECTIVES



**20**

Modelling and applying perspectives

Lora Aroyo

**21**

A Semantic Web View of the Perspective  
Web

Bahar Sateli

## GRaSP: Grounded Representation and Source Perspectives

Antske Fokkens and Piek Vossen and Marco Rospocher

The Grounded Representation and Source Perspective (GRaSP) framework is a generic framework for representing perspectives around specific topics, entities, events or concepts. In this chapter, we illustrate how this formal (RDF) representation can be used to investigate stances, visions, lines of reasoning and networks in the vaccination debate. We show how the framework can both be used for fine-grained representation of close-reading as well as how it incorporates information obtained by automatic text analysis.

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# Formal representation and extraction of perspectives

Aldo Gangemi and Valentina Presutti

Perspectives in language emerge from higher interpretation layers wrt lexical meaning, presuppositions, and implicatures. On one hand, perspectives can be mined as patterns in annotated text, on the other hand, there is a clear relation between compositions of multiple semantic phenomena, and those patterns, which can help understanding perspectivisation in some detail, and to make it generative as well. In this chapter, we will contribute: (1) a formal semantics for perspectivisation, and (2) an empirical study in creating a dataset of knowledge graphs automatically extracted from text.

## User perspectives in Information Search

Suzan Verberne

In this chapter we discuss the perspectives web from the angle of information seeking. Queries in web search engines are short and underspecified with respect to the underlying information need. A user issuing a query has a search intent in mind; this intent is the result of the user's background information, current task context and information state. These user aspects together constitute the perspective of the searcher. The user perspective is highly individual. It plays a relatively small role in generic web search, where the popularity of the results among other searchers is an important ranking factor. For more specific search contexts however, the user's perspective is of high importance. We will address two specific search contexts: professional search, where a query is embedded in the user's expertise and background knowledge; and opinionated search, where the search has strong subjective aspects. In both cases, the relevance of the results heavily depends on the perspectives of the individual user. We will for both cases describe the state-of-the-art recent research directions and challenges. Two central challenges in perspective-aware information search are: to make the individual information search process transparent to the user, and to avoid the filter bubble by allowing diversified results and serendipity. We will propose possible solutions for coping with these challenges.

Beauty is in the Eyes of the Beholder:  
Perspective Framing in News on Refugees  
and Migration

Alexandra Balahur

When reporting news in the media, journalists are supposed to adopt an objective vocabulary, describing facts as closely to the reality of the events as possible. Despite this objectivity, the context or frame in which events and participants are described can change the manner in which they are interpreted by the public and thus trigger a multitude of emotions. In this chapter, we investigate the different framings on the topic of refugees and migration in Europe. Subsequently, we apply a method for implicit emotion detection based on the Appraisal Theories to determine the possible emotional reactions these different reporting perspectives have the potential to trigger in the public.

## Controversial News Prediction Using Facebook Reactions

Tommaso Caselli and Malvina Nissim

The chapter/article will report on experiments based on distant supervision to predict the level of controversy of a news. News controversy is modelled as the entropy of the reactions of Facebook users' to the news. We have already developed a model for the prediction of the controversy. We are currently extending the model to predict and correlate controversy among different user communities, especially when they have different political positions/opinions. Furthermore, we will address the problem of predicting controversy according to the event type reported by the news.

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Reflection on the Perspective Web

Noah Smith

**28**

## A roadmap to the Perspective Web

Piek Vossen and Antske Fokkens



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