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Perceptions of Automated News: A meta-analysis

Future of Journalism Conference,
14.09.-15.09.2017,
Cardiff



Wordsmith SinnottSport > New Template Saved

Data

Add data to use in your stories.
Each row of data will generate one story.

[Download CSV](#) [Upload CSV](#)

You can edit the first 50 rows and first 35 columns of data here. Your dataset includes 28 rows and 61 columns. To work with larger datasets in Wordsmith:

1. [Download your CSV.](#)
2. [Make your changes.](#)
3. [Upload your changed CSV file.](#)

	home_team	away_team	venue	league	date	kick_off_time	attendance	hometeam
Story 1	Chelsea	Tottenham Hotspur	Stamford Bridge	Premiership	2 May	20:00	41,545	2
Story 2	Southampton	Manchester City	St. Mary's Stadium	Premiership	1 May	16:30	31,472	4
Story 3	Manchester United	Leicester City	Old Trafford	Premiership	1 May	14:05	75,275	1
Story 4	Swansea City	Liverpool	Liberty Stadium	Premiership	1 May	12:00	20,972	3
Story 5	Arsenal	Norwich City	Emirates Stadium	Premiership	30 April	17:30	59,989	1
Story 6	Watford	Aston Villa	Vicarage Road	Premiership	30 April	15:00	20,653	3
Story 7	Everton	Bournemouth	Goodison Park	Premiership	30 April	15:00	38,345	2
Story 8	Newcastle United	Crystal Palace	St. James' Park	Premiership	30 April	15:00	52,107	1
Story 9	Stoke City	Sunderland	Britannia Stadium	Premiership	30 April	15:00	27,667	1
Story 10	West Bromwich Albion	West Ham United	The Hawthorns	Premiership	30 April	15:00	25,031	0
Story 11	Tottenham Hotspur	West Bromwich Albion	White Hart Lane	Premiership	25 April	20:00	35,923	1
Story 12	Leicester City	Swansea City	King Power Stadium	Premiership	24 April	16:15	31,962	4

➔ Data-intensive beats, e.g. sports, finance, crime



The screenshot shows the Wordsmith interface. On the left is a sidebar with options: Data, Write (selected), Spell Check, Preview, Download, Tutorials, Help Videos, and Knowledge Base. The main area displays a news article template. A large red arrow points from the 'Write' option in the sidebar to the text in the main area. The text is as follows:

At Stamford Bridge today in front of a crowd of 41,545 Chelsea played Tottenham Hotspur 20:00 on 2 May.

Chelsea scored two goals, while Tottenham Hotspur scored two goals. The result was 2-2 Gary Cahill and Eden Hazard scored Chelsea two goals.

Chelsea had three yellow cards. The referee gave yellow cards in all 12.

Chelsea won.

Hometeam ball possession is greater, secured three points

At the top right of the main area are three buttons: Insert Data, Add Synonym, and Add Branch. The top blue bar contains the Wordsmith logo and the text 'SinnottSport > New Template' with a 'Saved' button.

- Data
➔ changes with each event in data
- Synonyms

... also works for video!

... And who uses this?

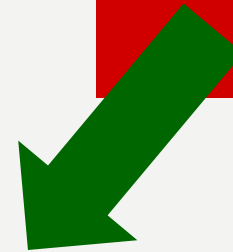
LE  FIGARO

TMZ

AP



PA



PA won €706,000 grant from Google
to fund a local news automation
service (July 2017)

What does the audience think?

- ➔ Quality, readability, credibility...
- ➔ Are computer-written news distinguishable from human-written articles?



ENTER THE ROBOT JOURNALIST Users' perceptions of automated content

Christer Clerwall

The advent of new technologies has always spurred questions about changes in journalism—its content, its means of production, and its consumption. A quite recent development in the realm of digital journalism is software-generated content, i.e. automatically produced content. This paper seeks to investigate how readers perceive software-generated content in relation to similar content written by a journalist. The study utilizes an experimental methodology where respondents were subjected to different news articles that were written either by a journalist or were software-generated. The respondents were then asked to answer questions about how they perceived the article—its overall quality, credibility, objectivity, etc. The paper presents the results from an initial small-scale study with findings suggesting that while the software-generated content is perceived as descriptive and boring, it is also considered to be objective although not necessarily discernible from content written by journalists. The paper discusses the results of the study and its implication for journalism practice.

KEYWORDS automated content; experimental study; online journalism; robot journalist

Introduction

Our technology humanizes big data sets by spotting patterns, trends and key insights and describing those findings in plain English that is indistinguishable from that produced by a human writer. (Automated Insights 2012)

Imagine a car driving down a dark road. Suddenly a moose crosses the road. The driver fails to react in time, and the car crashes into the moose at high speed. The car, being equipped with modern collision detection technology as well as GPS, sends information about the collision to the appropriate authorities. At the same time, data about the accident are gathered by a news story service, and in a few seconds a short news story is written and distributed to subscribing online newspapers. At the online newspaper, algorithms in the content management system (CMS) make the judgment that this is a story that will attract reader interest, forward it to the online editor, together with a recommendation for positioning (e.g. "this is a top 10 story"), who finally approves the story for publication.

WHEN REPORTERS GET HANDS-ON WITH ROBO-WRITING Professionals consider automated journalism's capabilities and consequences

Neil Thurman, Konstantin Dörr and Jessica Kunert

The availability of data feeds, the demand for news on digital devices, and advances in algorithms are helping to make automated journalism more prevalent. This article extends the literature on the subject by analyzing professional journalists' experiences with, and opinions about, the technology. Uniquely, the participants were drawn from a range of news organizations—including the BBC, CNN, and Thomson Reuters—and had first-hand experience working with robo-writing software provided by one of the leading technology suppliers. The results reveal journalists' judgements on the limitations of automation, including the nature of its sources and the sensitivity of its "taste for news". Nonetheless, journalists believe that automated journalism will become more common, increasing the depth, breadth, specificity, and immediacy of information available. While some news organizations and consumers may benefit, such changes raise ethical and societal issues and, counter-intuitively perhaps, may increase the need for skills—news judgment, curiosity, and scepticism—that human journalists embody.

KEYWORDS algorithmic journalism; automated journalism; computational journalism; journalism ethics; media economics news production; professional skills; robot journalism

Introduction

In recent years, there has been increasing discussion about the use of computation in journalism practice (Anderson 2012; Omering 2010). With advances in algorithms and the availability of big data, the ways in which journalists search for, analyze, and distribute information are changing, giving rise to technical, cultural, economic, political, and ethical questions (Flew et al. 2012; Coddington 2015; Surawein, Just, and Latzer 2015; Omering and Ferrer Conill 2016; Thurman 2011). These technical developments have also impacted on news writing. Using structured data, algorithms are generating news reports on crime statistics, sports matches, and company results. For example, the Associated Press uses natural language generation¹ technologies to automate up to 3700 quarterly earnings reports about US and Canadian companies (AI, n.d.). Until recently, software producers—like Arelia, Narrative Science, AI Semantics, Retresco, and Automated Insights—have mostly developed bespoke products for their journalistic

Article

Readers' perception of computer-generated news: Credibility, expertise, and readability

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Mario Haim
LMU Munich, Germany

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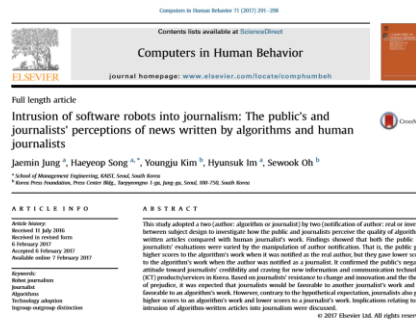
Hans-Bernd Brosius
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Abstract

We conducted an online experiment to study people's perception of automated computer-written news. Using a 2 × 2 × 2 design, we varied the article topic (sports, finance, within-subjects) and both the articles' actual and declared source (human-written, computer-written, between-subjects). Nine hundred eighty-six subjects rated two articles on credibility, readability, and journalistic expertise. Varying the declared source had both consistent effects: subjects rated articles declared as human written always more favorably, regardless of the actual source. Varying the actual source had larger effects: subjects rated computer-written articles as more credible and higher in journalistic expertise but less readable. Across topics, subjects' perceptions did not differ. The results provide conservative estimates for the favorability of computer-written news, which will further increase over time and endorse prior calls for establishing ethics of computer-written news.

Should news outlets let their readers know that they are reading automated content? Effects of algorithmic transparency on perceptions of automated news

Andreas Graefe (Macromedia University, Germany), Mario Haim (LMU Munich, Germany), Nick Diakopoulos (University of Maryland, USA)



1. Introduction

The rise of the Internet has changed not only how news is distributed and consumed but also how it is produced. The Internet has driven more people and organizations into news production. Beyond journalists in traditional news companies, there are also independent bloggers and online news startups, from the personal

early market phase, automated journalism has arrived in newsrooms. For example, Forbes uses an artificial intelligence platform provided by the technology company Narrative Science to generate automated news on corporate earnings and stock prices from big datasets and content harvested from previous articles (Curtis & Iudicone, 2015). AP partnered with Automated Insights to begin automated quarterly earnings reports and news publishing (2009).

AUTOMATED NEWS Better than expected?

Mario Haim and Andreas Graefe

We conducted two experiments to study people's prior expectations and actual perceptions of automated and human-written news. We found that, first, participants expected more from human-written news in terms of readability and quality, but not in terms of credibility. Second, participants' expectations of quality were rarely met. Third, when participants saw only one article, differences in the perception of automated and human-written articles were small. However, when presented with two articles at once, participants preferred human-written news for readability but automated news for credibility. These results contrast previous claims according to which expectation adjustment explains differences in perceptions of human-written and automated news.

KEYWORDS automated news; expectation-confirmation; perception; quality; robot journalism

Introduction

Automated journalism refers to the process of using algorithms to automatically generate news stories from data without human intervention beyond the initial development of the algorithms (Carlson 2014; Lemelshtrich Latar 2015; Napoli 2014). Once the algorithm is developed, it allows for automating each step of the news production process, from the collection and analysis of data to the actual writing and publication of news stories. Automated journalism—often also referred to as algorithmic (Anderson 2013) or robot (Clerwall 2014) journalism—works in situations where clean, structured, and reliable data are available. In such cases, automation can create content on a large scale, personalized to the needs of the individual reader, quicker and cheaper than human journalists. In his "Guide to Automated Journalism," Graefe (2016, 5) concluded that "[a]lthough the technology is still in an early market phase, automated journalism has arrived in newsrooms and is likely here to stay." The main drivers are, first, ever-increasing availability of structured and machine-readable data and, second, news organizations' aim to cut costs.

Yet, we still know relatively little about how people perceive the quality of automated news. This question is important since news consumers' satisfaction with auto-

Journalist versus news consumer:

The perceived credibility of machine written news

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ABSTRACT

This research aims to contribute to the unexplored field of audience studies with a focus on the credibility of automated journalism. In this paper, we take a systematic look into the perceived credibility of robot-written news articles, searching specifically for differences and similarities between journalists and news consumers. In total, 232 native Dutch speakers (the language of the experiment) took part in this research, and among them were 64 journalists. The participants were asked to evaluate the perceived levels of the expertise and trustworthiness of five news articles based on algorithms outlined in the data-to-text systems (DTS) and created by Thomson et al. (2001). We used a 2 (article) computer as journalist (2 binary topic: sport or finance) between-subject design to determine the perceived credibility of the news writer (source) and the contents of the news story (message).

Within the group of news consumers, no main effect was found. News consumers perceived the levels of the trustworthiness and expertise of the computer writer and journalist equally. Within the group of journalists, we found a significant effect on the perceived trustworthiness of the news source. In our experiment, journalists perceived the trustworthiness of a journalist to be much higher than that of the computer. Further, journalists perceived the expertise of the computer to be higher than the expertise of the journalist.

It will be interesting to investigate this topic further, as it is possible that these differences between journalists and consumers will increase along with the use in automated storytelling.

journalism robot journalism (Van Driel, 2012; Greg Silverman, an award-winning journalist and Adjunct Faculty at the Poitres Institute). Indeed, these new techniques will support the levels of accuracy and quality of journalistic reports. Van Driel (2012) adds that journalism on the advantages of algorithms as an unbiased reporter. However, does the general audience agree? Previous research on the evaluation of natural language generation (NLG) systems often focused on the quality of the generated text. Research on the levels of credibility of human-written news articles is abundant in the field of Media Studies. Further, the way journalists evaluate their own skills in the light of new technological developments is well discussed by Jaeger (2001) and Van Driel (2012). However, as far as we are aware, the only previous study that addressed this is one recently published by Clerwall (2014). Building on the "small-scale study" (in the words of the author), we look more systematically into the perceived credibility of robot-written news articles, searching specifically for differences and similarities between journalists and news consumers in how they rate computer-generated news.

Computer writers and journalists: what they have in common

News writing often relies on basic formulas, and there are key elements to every news story, as follows. The first step is to look for a news occasion. News stories are backed by proper research, but the researchers had a common world context, but enough for the journalist to understand and connect their reader of their angle or story point (Clerwall, 2010). The next step is to select the main elements of the story, determine what details to provide to a

1. General perception of automated content
2. Differing perception of the general public and journalists
3. Manipulation of the article byline and transparency

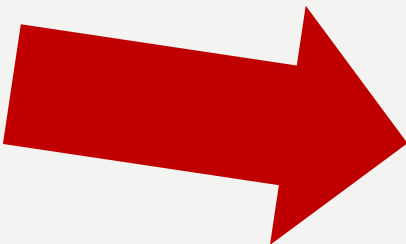
Apple tops Street 1Q forecasts

Apple posts 1Q profit, results beat Wall Street forecasts

AP. January 27, 2015 4:39 PM

CUPERTINO, Calif. (AP) _ Apple Inc. (AAPL) on Tuesday reported fiscal first-quarter net income of \$18.02 billion. The Cupertino, California-based company said it had profit of \$3.06 per share. The results surpassed Wall Street expectations. The average estimate of analysts surveyed by Zacks Investment Research was for earnings of \$2.60 per share. The maker of iPhones, iPads and other products posted revenue of \$74.6 billion in the period, also exceeding Street forecasts. Analysts expected \$67.38 billion, according to Zacks. For the current quarter ending in March, Apple said it expects revenue in the range of \$52 billion to \$55 billion. Analysts surveyed by Zacks had expected revenue of \$53.65 billion. Apple shares have declined 1 percent since the beginning of the year, while the Standard & Poor's 500 index has declined slightly more than 1 percent. In the final minutes of trading on Tuesday, shares hit \$109.14, an increase of 39 percent in the last 12 months.

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This story was generated by Automated Insights (<http://automatedinsights.com/ap>) using data from Zacks Investment Research. Access a Zacks stock report on AAPL at <http://www.zacks.com/ap/AAPL>.



- **Clerwall (2014):**

Chargers Take Down Chiefs, 37-20

Even with an unexceptional outing for Philip Rivers, the Chargers handled the Chiefs, 37-20, at Arrowhead Stadium.

Rivers found the end zone for two touchdowns against the Chiefs on 18 of 23 passing for 209 yards and one pick. Matt Cassel went 24 of 42 with 251 yards passing, two touchdowns and three picks for the C

Jackie Battle carried the ball 15 times for 39 yards with a touchdown in addition to four receptions yards and another touchdown. Antonio Gates caught three passes for 59 yards.

The San Diego defensive unit led the way to a victory, allowing 119 yards rushing and 234 passing bringing back one interception for a touchdown. They brought down Cassel for two sacks.

Lastly, Nick Novak was perfect, hitting all three of the field goals he attempted.

Chiefs running back Jamaal Charles provided some spark with 92 yards rushing, 23 receiving and touchdowns. Wide receiver Dwayne Bowe also gave a strong effort with 108 receiving yards and a touchdown.

The Chargers travel to New Orleans next week to meet the Saints (0-3) while the Chiefs are at home on the Ravens (3-1).

Los Angeles Times

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SAM FARMER / ON THE NFL

Three quarterbacks are walking a tightrope

Matt Cassel, Russell Wilson and Mark Sanchez have struggled, and their starting jobs are in jeopardy.

October 05, 2012 | Sam Farmer

Their passes might sail high, but three NFL quarterbacks have landed far short of expectations.

Kansas City's Matt Cassel, Seattle's Russell Wilson, and the New York Jets' Mark Sanchez aren't the only starting quarterbacks who are struggling — there are several — but they're the ones inching ever closer to the bench.

Through four games, the three have combined for 14 touchdowns and 15 interceptions, and each plays for a team in danger of falling behind early in their respective division races.

In the brightest spotlight is Sanchez, and not only because he plays in the country's biggest market. He has Tim Tebow looking over his shoulder, and it's only a matter of time until the Jets give Tebow a chance — a telegraphed pass if there ever was one.

Van der Kaa and Krahmer (2014):

RKC Waalwijk speelt gelijk tegen PEC Zwolle

RKC Waalwijk ging op bezoek bij PEC Zwolle en speelde gelijk. Het duel eindigde in 1–1. Twaalfduizend toeschouwers kwamen naar het IJsseldelta stadion.

De ploeg uit Zwolle nam na 44 minuten de leiding door een treffer van Saymak. Na achtenveertig minuten bracht Joachim van RKC Waalwijk de teams op gelijke hoogte.

De wedstrijd werd gefloten door scheidsrechter Kamphuis. Hij deed geen rode kaarten uit. Tomas en De Boer van PEC Zwolle en Sno van RKC Waalwijk liepen tegen een gele kaart aan.

Dit bericht is geschreven door een mens

- **Haim and Graefe (2017):**
 - 618 German respondents from non-commercial national panel, 61% female, mean age of 35.9 years
- **Graefe, Haim and Diakopoulos (2017):**
 - N=31, mean age of 44 years, recruitment via Amazon Mechanical Turk
 - Special population: people had to have voted in the 2012 US elections

- **Descriptors** (mostly adapted from Sundar 1999):

- Quality
- Credibility
- Readability
- Expertise
- Trustworthiness



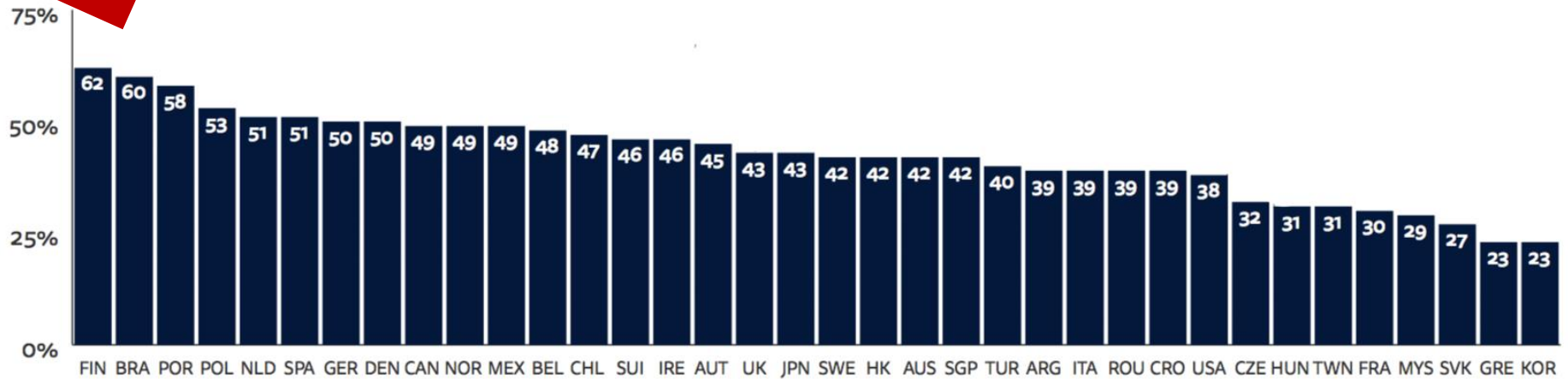
- ... But: different variables in the studies!
➔ inhibits comparison!
- Graefe, Haim and Diakopoulos (2017): fewer variables

What about external effects?

- Media usage patterns? Interest in different topics?
→ Graefe et al. (2016): no effect!
- **Culture?**
→ Jung et al (2016):
journalists rated the quality of an article higher if the work was attributed to an algorithm – and not to a human!



OVERALL TRUST IN NEWS MEDIA – ALL MARKETS



Q6_2016_1/6. Please indicate your level of agreement with the following statements. - I think you can trust most news most of the time/I think I can trust most of the news I consume most of the time
Base: Total sample in each market.

Source: Reuters Digital News Report 2017, p. 21

- **The stimulus material should...**
 - Come from the same journalistic genre
 - Be of the same length
 - Be in the native language of the respondents
 - Cover the same topics
 - be familiar to the respondents (topic choice)
- **The sample should...**
 - Be taken from a representative national panel
 - ... Or from a sub-population
 - Feature an even gender distribution



- **The descriptors and variables should...**
 - Be unambiguously defined (what's „boring“?)
 - Not come in an overwhelming number to avoid survey fatigue
- **Also, what about...**
 - Intervening variables? (cultural context)
 - Theoretical explanations? (e.g. expectation-confirmation theory)
 - To which extent are „computer-written“ stories actually written by a computer?

Thank you!

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