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HERE: Understanding gender differences to build better location & navigation tools

A case study in social data to drive product development and innovation

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Research

Social media intelligence has become an established tool for marketing and advertising insight, helping brands analyse audiences, measure campaigns and create more relevant content.

But this is not all it can do. Social media is not just a means to understand how people interact with brands, but how they interact with each other and the world around them too. It can be a powerful tool for understanding not only what people think, but what people do – as well as understanding their needs and motivations.

In this paper, we demonstrate how we used social data to inform new domains of innovation and product development – and propose a 'behaviour + bias' model, which works with psychological biases to understand behaviour and attitudes to deliver insight.

We hope you enjoy reading.

"Social media is not just a means to understand how people interact with brands, but how they interact with each other and the world around them too."

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1. Introducing the business problem

HERE is a global mapping and location data company, supplying maps and location data as both a business-to-business proposition and within their own consumer smartphone map application. A big discrepancy in the user base of the map application had been noted: a substantial majority of their users are male. Where a re the women?

HERE collaborated with audience intelligence specialists Pulsar and their research arm, FACE, to understand why this gender bias exists – and what design principles might help them overcome it and grow their female user base. The goal: ensuring the apps and website are reaching their total addressable market as effectively as possible.

Working together, Pulsar and HERE identified a key hypothesis to test. Given known gender-based variations in navigational and spatial preferences (see section 3.3), it seemed likely that the bias identified by HERE would not be unique to their product. Therefore, it was a question whether the gender skew was:

- A category issue
- A brand issue
- A product issue
- Or a mix

The goal of this research was to identify new opportunities for HERE's product and brand development. Working together, the team would help identify which opportunities offered the greatest potential and strategic advantage in the competitive landscape. Then, through in-depth visualisation of use cases, behaviours and pain points, the various HERE teams would be given the collateral they needed to design these features and user experience flows.

What makes this project different from any previous research we had done is the potential we saw for using social media data. This may seem an unusual choice for a study about behaviour. One might believe that social media posts only reveal people's attitudes.

However, social media provided both a quantitative dataset showing gender differences at mass scale and a source of vivid, emotive expressions of needs. Allied with traditional qualitative focus groups, we were able to combine the benefits of large-scale, naturalistic qualitative data, with a more targeted qualitative inquiry.

In this case study, we show why we chose the social approach, how it works in the research mix – and finally, we develop a model to explain what social data can offer to behavioural research.

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2. Our research approach

2.1 Social media listening

Using Pulsar, our online research platform, we ran two English language keyword-based searches:

- Mapping & navigation behaviour, tracking keywords such as "I'm lost" and "looking to get to"

- Mapping apps, tracking 15 apps (including Google Maps, Waze and Yelp) by name

Data was collected from public social media channels: Twitter, Tumblr, forums, blogs, and review sites (e.g. Google Play store app reviews). We chose not to use Facebook topic data in this project as we needed access to the exact text of consumer messages to confirm data accuracy and generate qualitative insights. In October and November 2015, tracking produced a large-scale dataset of 1 million social media posts. For a detailed analysis, we isolated a dataset of 590,000 posts.

Our analysis combined both machine and human-based techniques to understand the data. First, data visualisation and analytics enabled us to understand patterns on a wide, quantitative scale. Next, qualitative content analysis was used to dive into the detail, identifying emotional reactions, needs and pain points.

Outputs were twofold:

- Quantification of behavioural differences by gender (e.g. needs, issues, app usage)

- Qualitative insights into different behaviour patterns by gender, e.g. how women vs. men deal with being delayed

Insights and hypotheses were taken forward to the qualitative stage to be understood in greater depth. While this approach may appear to go against the traditional exploratory model, it was necessary to find reliable differences due to the need to explore gender at a mass scale (see section 3.1 & 3.2).

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2.2 Focus groups

We carried out eight two-hour focus groups in the US and Germany, split by gender (56 participants in total).

Goals for this stage were:

- To flesh out and validate insights which we uncovered in the social data by understanding users' own experiences.

- To expand our understanding of the social findings by using projective exercises and testing. The participants trialled multiple map applications prior to the groups, to give them a recent, immediate experience to draw on. Then, the groups were able to explore the underlying perceptions and mechanisms that drove gender differences, in order to derive further commercial implications.

Findings from both stages were then workshopped internally by the Pulsar team and presented
in a combined insight report to HERE's insight team (led by Anja Niehof), who then communicated the results to and worked with the respective teams throughout their organisation on ways to apply them.

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3. Considerations in research design

3.1 Creating mass scale exploratory research

Psychology research has identified traits in behaviour, cognition and interaction that cluster into 'masculine' and 'feminine' types – but huge variations within genders exist as well. Consequently, the research had to be conducted at scale to overcome individual effects - which would typically require quantitative methods.

However, scripting a survey requires a prior definition of the categories we are researching. Conventionally, small scale qualitative exploratory work would identify attributes for the survey to investigate. But here, in order to indicate whether the identified differences in behaviour were actually gender-based phenomena at all, we needed large scale enquiry.

"Social data was a solution allowing us to take a relatively open scope for the research"
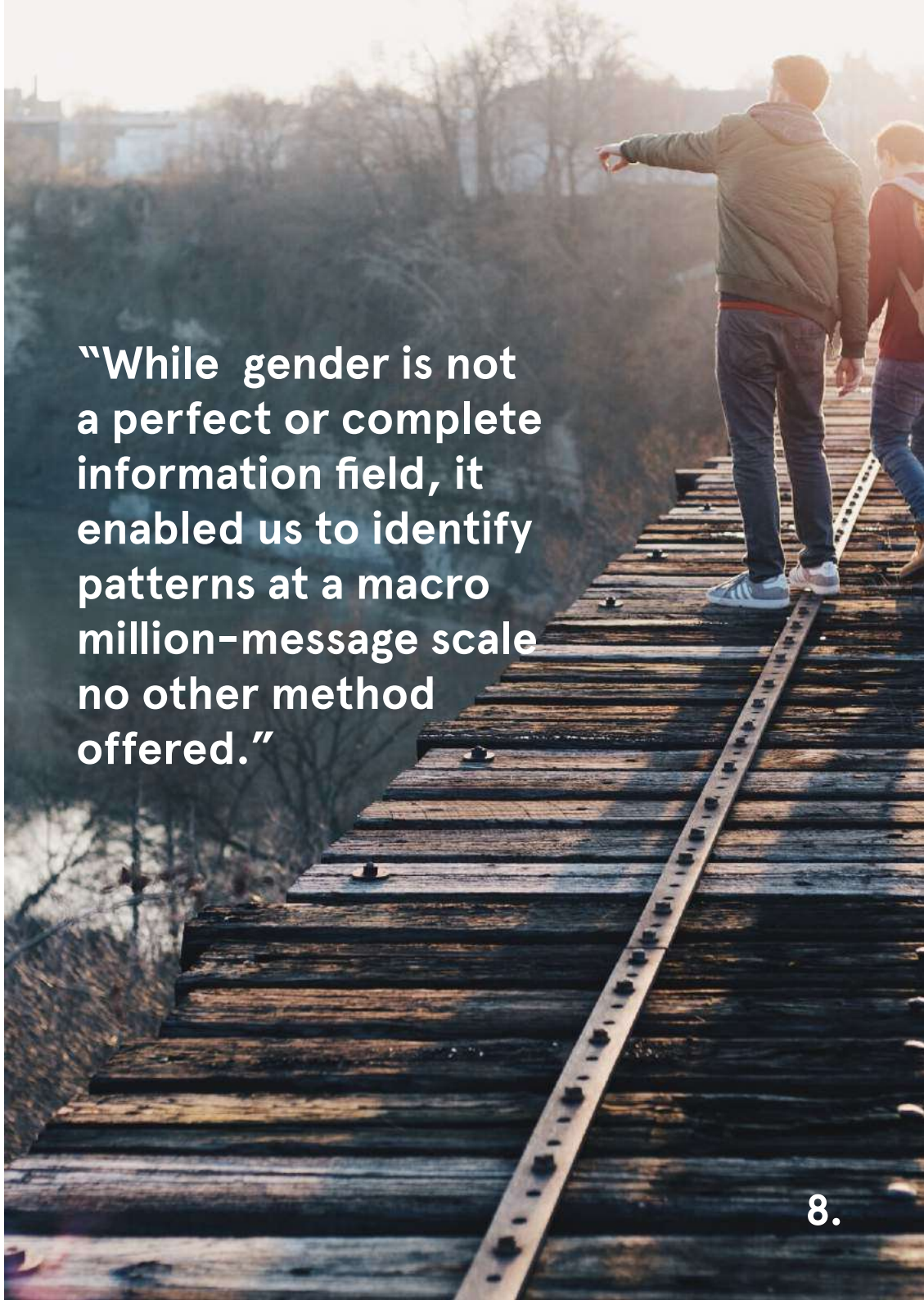
Social data was a solution allowing us to take a relatively open scope for the research, using broad search terms to gather diverse behavioural and attitudinal data. Content visualisations let us identify naturally-occurring topics rather than imposing a predetermined coding structure – that is, we could work from the conversation 'up' rather than from hypotheses 'down'. This allowed us to find behaviours and user priorities that we would otherwise not have known to search for – making it truly exploratory research.

3.2 Identifying gender in big data

In order to use social data in this way, we needed to consider how to identify gender. We were able to use social data in this analysis because the Twitter search API (available through Gnip, and built into Pulsar) offers 'gender' as an analytical field. This gender data is inferred rather than user-declared.

Twitter does not disclose its methods, but it is likely to include Bayesian inference on probabilities generated by analysing names, word choice, topics of discussion, and accounts followed. Other computer scientists have reported an accuracy of 92% for gender detection on Twitter data using these data points (Burger et al. 2011). Within social media searches on Pulsar, we found similar rates of accuracy when comparing Twitter's gender attribution against users' photos and profile information.

So, while gender is not a perfect or complete information field, it enabled us to identify patterns at a macro million-message scale no other method offered. Qualitative social media analysis, followed by focus groups, then enabled us to identify nuances that algorithmic analysis may have missed.

"While gender is not a perfect or complete information field, it enabled us to identify patterns at a macro million-message scale no other method offered."

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3.3 Putting this research in wider context

A review of the literature reveals very little previous research on gender differences using mapping apps that could guide HERE in their product development. Therefore, in designing our study, we took a broader look into research on technology products and map usage.

Gender biases in technology design are well established. As Oudshoorn et al. (2004) note, there is a genuine risk of designers in the technology sector relying too heavily on implicit data (designer as the user, 'I'-methodology). Technical teams in tech companies are consistently extremely male-skewed: Google's technical team is just 19% female, Facebook's 17%, and Twitter's 13%.

"Google's technical team is just 19% female, Facebook's 17%, and Twitter's 13%."

Design and development teams with a majority of males are, thereby, at substantial risk of building gender-biased products: both in terms of prioritising a masculine user's needs and imposing masculine norms in the view of the world they portray (e.g. the design cues they use, the information they include and exclude).

In one example given by Oudshoorn et al., the virtual city technology has relied on the user learning the system through trial and error – a process preferred by men.

Zeynep Tufecki (2013) notes that the iPhone is designed for larger male hands. Microsoft researcher Danah Boyd (2014), analyses how the virtual reality headset Oculus Rift utilises technologies, such as a reliance on parallax shifts rather than shading for depth perception, which leads to women experiencing nausea more often due to gender differences in physiology – something their product development team overlooked.

The conclusion here is that while technology use is now nearly universal for both genders, biases in design demographics and methodologies indicate there is still a high risk of technologies reflecting a masculine bias – potentially the cause of HERE's audience skew towards men.

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The literature on map usage and gender difference also reveals substantial variation by gender:

- Overall pattern of higher male performance on mapping tasks: faster and more efficient route-finding, and greater ability to recall larger geographical areas from memory (survey knowledge)

- Women are more likely to use a landmark-centric strategy for wayfinding and direction-giving, whereas men are more adept with a route-based or relational approach, i.e. left/right turns (Brown, Lahar & Mosley 1998; Hurts 2006)

- Women tend to show less confidence in their navigational abilities, even in individuals who do demonstrate an equal standard to men in performance on mapping (Bryant 1982, O'Laughlin 1998)

For product developers and designers, therefore, it is apparent that gender is a critical factor in building mapping solutions. Not only do preferred navigational strategies differ by gender, but women's lower confidence in their mapping abilities – compounded by the 'stereotype threat' that women are popularly reputed to be worse at reading maps – means that female map users are likely to be substantially impacted by design cues and affordances in the mapping software they use.

There is a clear competitive advantage, then, for software companies who can build maps that appeal successfully to this target group.
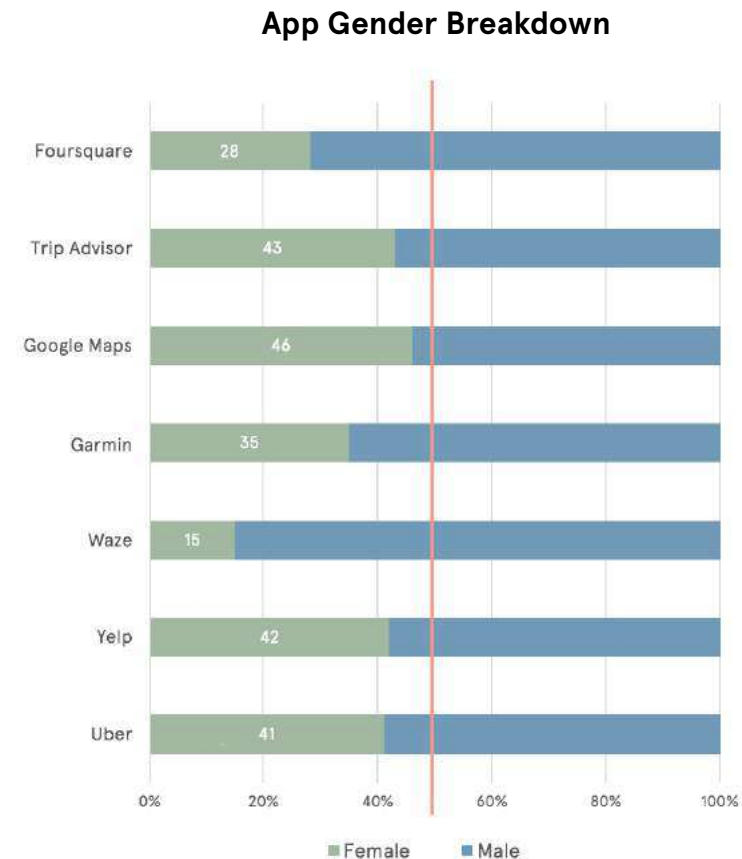
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4. The results

4.1 From social data to insight

As intended, the combination of methods allowed us to follow a path from exploratory, large-scale research, through to depth and detail. This led to insights that were surprising, scalable and linked to real human experience.

First, social media data gave us the ability to quantify a huge difference in interest in mapping apps. We found women talked 18% less about maps as a category – and substantially less about individual apps, too:

App Gender Breakdown

App	Female
Foursquare	28
Trip Advisor	43
Google Maps	46
Garmin	35
Waze	15
Yelp	42
Uber	41

■ Female ■ Male

Share of posts about each app by gender (source: Pulsar)

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On the behavioural side, a combination of text analytics and qualitative content analysis revealed distinctively gendered practices. For example:

Men were vastly more likely to share disruption via Waze's automated messages:

Helped nearby drivers by reporting a traffic jam on I-40 E, Kernersville on @waze - Drive Social. goo.gl/2glAhU

Only women were willing to share their own weaknesses or errors, a behaviour we found almost zero men doing. We hypothesised that women were (consciously or subconsciously) leveraging their own fallibility to appear more likable, known in social psychology as the Pratfall Effect:

Ugh I told my boyfriend to give me an hour 😂 an hour almost up 🙈 I suck at estimating my ETA...

Women were also more vocally concerned with safety, in a way that men did not appear to consider – for example, encouraging others to plan ahead and ensure they had a safe ride home:

Off to tuck the girls into bed, & me into a bubble bath.
Play safe Twittah. Keep your phone charged and @lyft or @uber handy this weekend.

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We then used focus groups to test these hypotheses and learn more about underlying frustrations. In these sessions, we were able to attribute this difference to men's perception of ETAs (Estimated Time of Arrival) and plans as rigid, making the violation of these frustrating. Transforming this into knowledge and sharing it via Waze helped them feel more in control, hence Waze's success.

Women, in contrast, shared their vulnerabilities more openly, using them to either amuse their friends or consolidate relationships through honesty. This explained why Waze sharing was lower. The app did not facilitate the way they preferred to communicate.

On the basis of insights such as these, and many more, we hypothesised that product issues have led to category issues: maps do not fit women as well as they do men – and as a result women tend to engage with mapping apps less across the board.

From this, we were able to confirm that gender differences in mapping uptake were indeed a category-wide issue – and also identify the use-cases, needs and barriers that HERE could address to optimise their product for this audience and achieve competitive advantage. The final report delivered ten opportunities to redress the gender bias in HERE's audience through developing new experiences for location discovery and navigation.

"…and as a result maps do not fit women as well as they do men"

4.2 Impact on HERE's business

HERE are using this research in order to shape their product development pipeline:

- Prioritising features for development
- Setting KPIs for the experiences new features need to deliver
- Having an overall vision of the different groups of users to serve

The research gives the design, product development and marketing teams access to a new, expanded set of communication and emotional scenarios to build against, helping them avoid "designer-as-user" assumptions and consciously guard against bias in their feature development process. Conceptually, it opens up a wider horizon in terms of "what a map should do", bringing in considerations of imagination as well as efficiency, and spontaneity, alongside planning in advance.

The ability to quantify insights from exploratory work (e.g. degree of interest in mapping as a topic) enabled the research to persuade stakeholders in a technology company who like 'hard numbers' over purely qualitative insight. The scale of the number of people listened to also boosted confidence in the research's robustness: with 1 million posts analysed, this was clearly not just anecdotal data.

Within HERE, the insight team weres positively surprised and impressed by the depth of insight of the qualitative data derived from social media posts. What they lack in length, tweets make up for in emotional language and the vivid, concise pictures painted of particular moments in time – particularly frustrations. This has validated the use of social media in future research projects as a cost-effective exploratory method, able to provide both quantitative and qualitative insight into customer behaviour and the competitive landscape.

Anja Niehof, Head of Consumer and Customer Insights, comments: "We are thrilled with the depth and close the gap between consumer insight and product research. We believe it's not only down to the innovative method the team used, but a testament to their ability to work with us as true consultative partners, collaboratively developing the research set up and analysing the data to generate insightful knowledge for very different parts of the HERE organisation. We are continuing to use social media as an insight tool for the company to address ongoing user behaviour changes in an efficient way that still produces reliable data."

We can already begin to see that the HERE application is introducing characteristics which connect with some of the more female-oriented needs. For example, HERE's new bicycle route topography shows how flat or hilly the ride will be, plugging into the desire for a more holistic and contextual understanding of the journey experience.

It allows a more considered approach to journey planning, allowing users to assess routes for their desired emotional experience, and plan for factors such as clothing, baggage and how this journey will relate to the wider purpose of the trip. These changes are an exciting step forward, with many more opportunities to transform the app into a more gender-balanced user experience.

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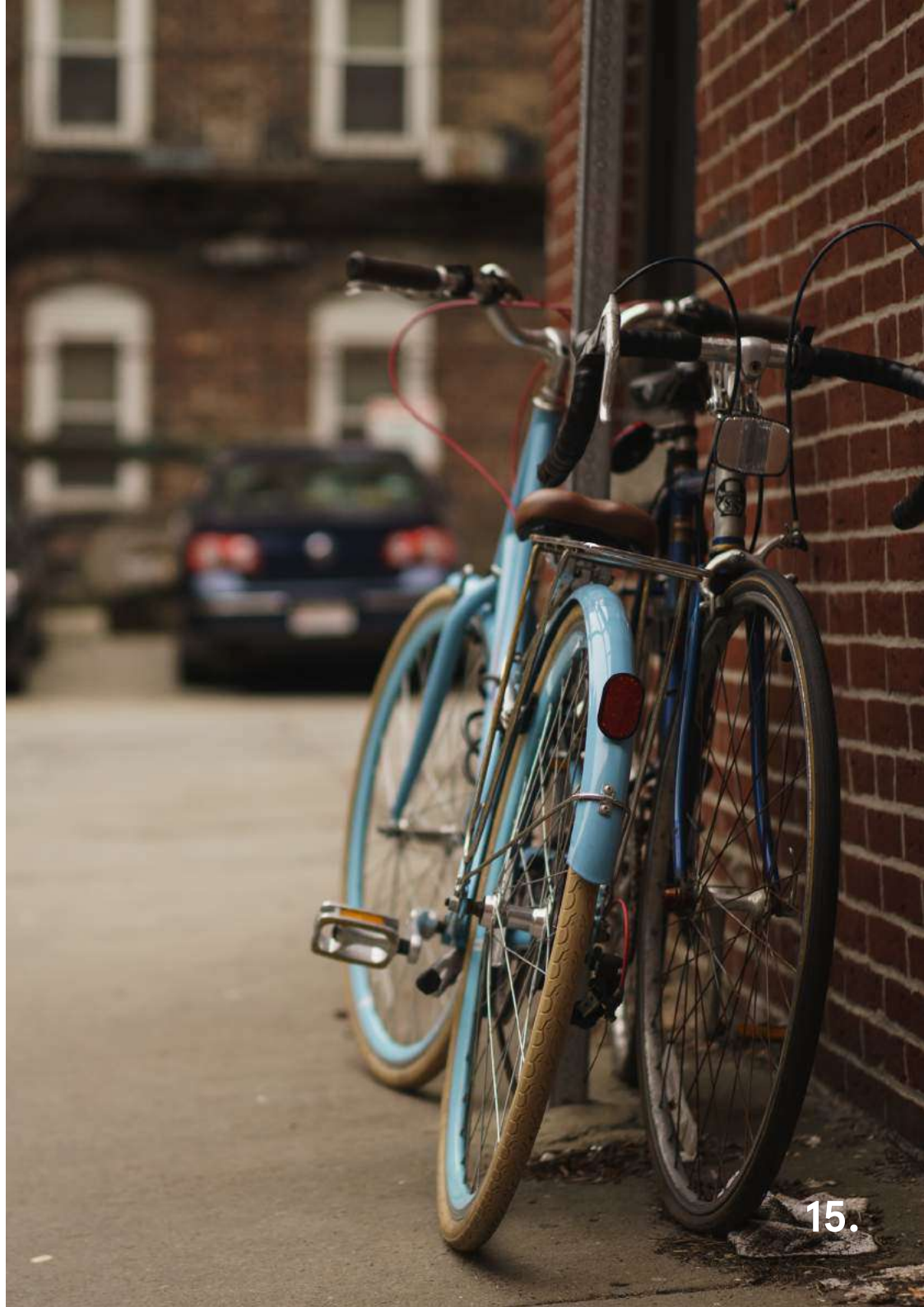
5. Discussion: implications & opportunities for further research use

Our goal in publishing this as a white paper is to expand the conversation on the role of social media data in research and encourage the use of social media data for new, more strategic product and business problems.

In the last five years, the role of 'big data' in consumer research has often been framed as a clash of cultures, with grand claims made about big data rendering obsolete not only surveys, but the research industry as a whole, even the scientific method itself (Anderson, 2008).

A more constructive relationship was introduced by a small group of ethnographers and digital sociologists, particularly Tricia Wang's 2013 essay 'Big Data Needs Thick Data'. This – and the insight of Pulsar VP Product & Research Francesco D'Orazio, that "Social data is not quantitative data, rather qualitative data on a quantitative scale" – have informed our approach to using social data in research at Pulsar: big data methods work best when combined with focused qualitative enquiry, allowing testing of hypotheses, greater depth, and in the end, more actionable and commercially viable outputs.

As a result, we believe that takeaways for the wider research industry can be gained from this study in three key areas:

1. Social media research can deliver on behaviour and innovation objectives

2. Big social data still needs qualitative research – to dive deeper and test hypotheses

3. Analysing social data as 'behaviour + bias'

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5.1 Social media research can deliver on behaviour and innovation objectives

Social media data is now well established within market research, though often more as a brand and communications measurement tool than as a source of deeper insight. We intend for this case study to show that keyword-based research can as easily cover behaviours and needs as brand and product names, and that this opens up this methodology to a wide range of behavioural, UX and innovation research uses.

Of course, social data doesn't solve all behaviour and innovation needs: its optimal role is at the exploratory phase at the start of a project, allowing researchers to listen wider than ever before.

Exploratory research is generally conducted through qualitative work, as it allows for a degree of flexibility that quantitative surveys cannot provide. With social data, there are new opportunities for wide-reaching methods which are low in cost and allow for emergent findings. We would argue that our approach to social and the improvements in social tools have made social media data a strong contender as a powerful method in this area.

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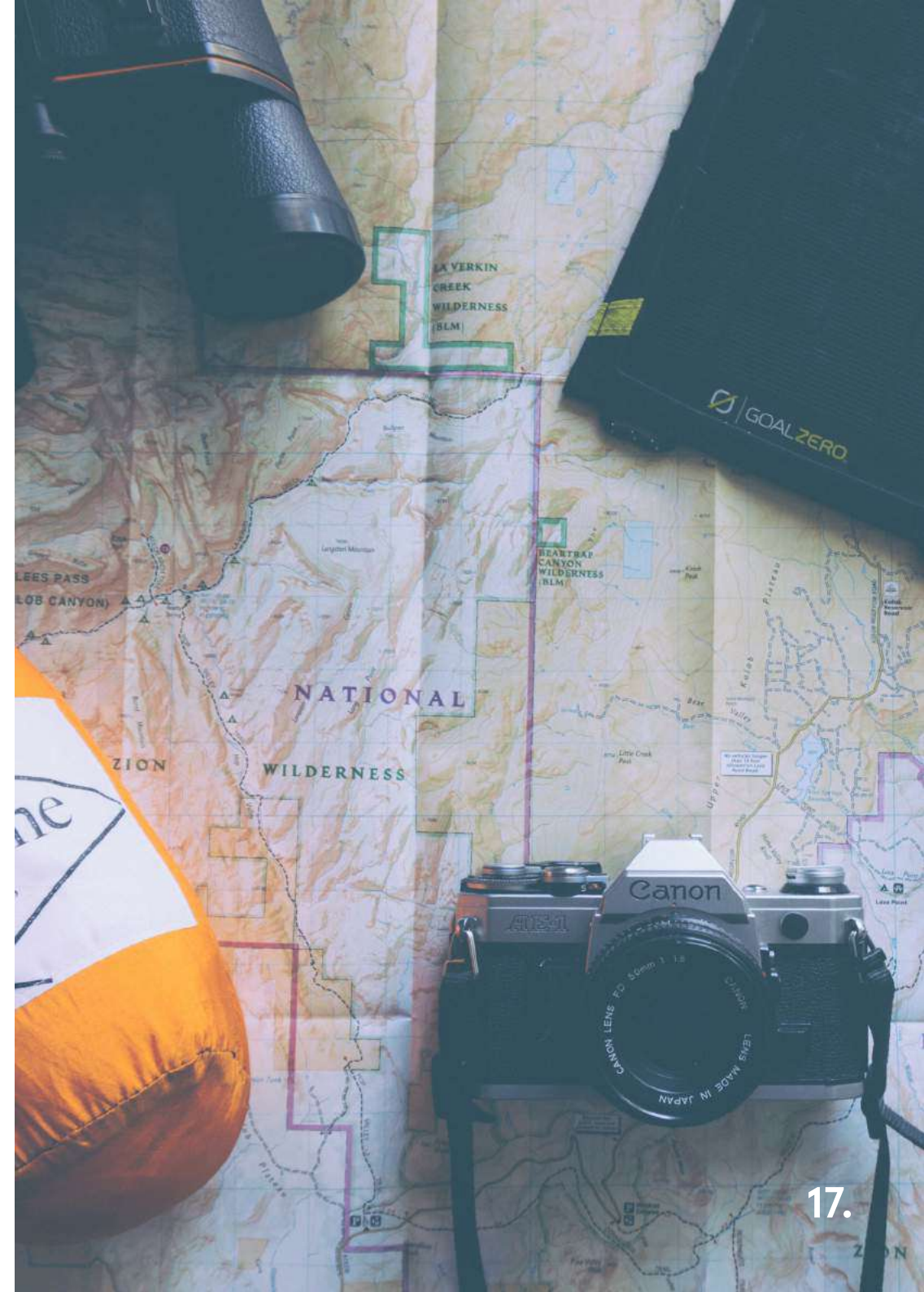
5.2 Big social data still needs qualitative research – to dive deeper and test hypotheses

Although social data is compelling, we argue that qualitative work is, nonetheless, necessary alongside big social data analytics – which is why we included the second, focus group stage in this project.

A major risk for research is falling into the trap that behaviourism fell into, namely labelling phenomena with little or no understanding of the mechanisms lying behind them. Similarly, with social data, we can identify patterns, but our understanding of the drivers of people's behaviour comes from inference.

For robust insights, we need to test these inferences more directly to ensure we have sufficient understanding to use the results to guide various business decisions, including commercial ones.

" The mix of large-scale social data and in-depth qualitative research created a powerful and robust findings."

The mix of large-scale social data and in-depth qualitative research created a powerful and robust combination of large scale exploration and deep, detailed findings.

This testing can take a range of forms: for this work, we used focus groups as we needed to use qualitative methods such as projective techniques and product testing to gain further insight into perceptions and norms.

However, in other mixed methodology studies we have used ethnographic observation alongside social data, to gather further insight on behaviour and actions. Similarly, we have used self-ethnography and communities to gain a window on private behaviour, with social behaviour used as a window into public behaviour.

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5.3 Analysing social data as 'behaviour + bias'

Social data is often criticised for being in some way 'untrue' – from our gilded Instagram photographs to concerns with irony, playing to the crowd, and selective disclosure. Inherently, the information it carries about what people have done is filtered through the prism of what they are willing to say, a 'bias' in the psychological sense, where what we hear is biased by how we want to be seen.

Of course, the same is true for every other research method: the information we can gain about behaviour is shaped by what the participant is willing to disclose to the researcher. That, however, is a defensive argument. Instead, we acknowledge this bias and agree that social is far from an unmediated record of behaviour – but this skew is actually a valuable opportunity.

"By analysing the differences in the description of being lost, we can identify gender norms about place-finding."

With the current interest in behavioural data, social data provides a unique way to gather a combination of behavioural data and insights on perception and cognition. This latter element is, itself, useful. For example, both genders may report being lost, but they tend to describe the experience in different ways. By analysing the differences in the description of being lost, we can identify gender norms around place-finding.

Astrophysics provides us with a metaphor to understand how we can still learn from this complex, fuzzy data: the 'red shift' of light from distant stars. Black holes distort a star's light as it passes through their gravitational fields, stretching its wavelength and making it appear redder. However, this distortion actually allows astronomers to understand black holes – something that they couldn't otherwise see - by observing the changes to starlight passing by.

Social data might be said to work in a similar way:

- A given behaviour is the 'star'

- How users describe the behaviour is the 'red shift'

- The 'black holes' are perceptions, beliefs and attitudes that we can understand indirectly, by observing how people distort behaviours in social data

This approach, identifying biases and distortions, is not a new approach. As well as its use in the physical sciences, it resembles theories from social psychology, such as the fundamental attribution bias. In this way, we gather not only behavioural data but also data on perceptions, attitudes and behaviours.

This information allowed HERE to identify previously unseen 'black holes' of customer needs and norms that could inspire product development, design and innovation in new ways. We believe it can inspire many other brands and technology companies too.

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Who are we?

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Pulsar is an advanced audience intelligence platform that helps you nd the story in the data. Pulsar leads the evolution of social listening by bringing all the digital signals of your audience in one place and leveraging the power of data visualization and AI to help you uncover the personas, the trends, the behaviors and the a nities that will make your marketing bullet-proof.

HERE, the Open Location Platform company, enables people, enterprises and cities to harness the power of location. By making sense of the world through the lens of location we empower our customers to achieve better outcomes – from helping a city manage its infrastructure or an enterprise optimise its assets to delivering drivers to their destination safely. To learn more about HERE, including our new generation of cloud-based location platform services, visit 360.here.com

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Would you like to find out more about your audience?

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