

# Humour Reactions in Crisis: A Proximal analysis of Chinese posts on Sina Weibo in Reaction to the Salt Panic of March 2011

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## ABSTRACT

This paper presents an analysis of humour use in Sina Weibo in reaction to the Chinese salt panic, which occurred as a result of the Fukushima disaster in March 2011. Basing the investigation on the humour Proximal Distancing Theory (PDT), and utilising a dataset from Sina Weibo in 2011, an examination of humour reactions is performed to identify the proximal spread of humorous Weibo posts in relation to the consequent salt panic in China. As a result of this method, we present a novel methodology for understanding humour reactions in social media, and provide recommendations on how such a method could be applied to a variety of other social media, crises, cultural and spatial settings.

## Categories and Subject Descriptors

J.4 [Computer Applications]: Social and Behavioural Sciences

## General Terms

Measurement, Experimentation, Human Behaviour.

## Keywords

Social Media Research, Proximal Distancing Theory, Weibo, Humour Research, Geographic Spread

## 1. INTRODUCTION

Humour in crisis is noted as being a coping mechanism [7] that contributes to an individuals' healing process after a crisis. The healing process is perceived as being divided into four primary distancing theories: 1) The 'Proximal Distancing Theory (PDT)'

notes how individuals can heal as a result of how far they are physically from the crisis, as such those individuals farther from the epicentre are less likely to be directly affected by the crisis [5], 2) The 'Temporal Distancing Theory (TDT)' shows that an individual will naturally heal over time after a crisis [3], 3) The 'Psychological Distancing Theory' relates to the subjective and emotional distancing of an individual from a particular crisis [6], and 4) The 'Hypothetical Distancing Theory' underlines the idea that a subject is distanced from a crisis if that particular event is perceived as 'unreal' or 'hyper-real' [3].

Humour interventions also can be deemed as a therapeutic activity to reduce the stress of others in times of need [8]. During this process social media is used a platform that enables such individuals to depict these coping mechanisms and share their emotions. As such, we are able to retrieve such social media interactions and visualize them so that we can obtain a more solid understanding of the coping mechanisms that are taking place. In this example, we use the case of the salt panic that occurred in China on the 16<sup>th</sup> of March 2011. This was depicted as being as a result of the Fukushima nuclear disaster that transpired on the 11<sup>th</sup> of that month. Primarily, the PDT of humour is used as a foundation for this research in social interactions on Weibo.

## 2. HUMOUR IN CRISIS

Different theories have attempted to explain the phenomenon of humour arising in situations of panic, stress, and crisis. Very often, the use of gallows humour and dark humour is present in these situations [4]. Veacht [11], for example, proposed the so-called violation theory by which the perceivers (in the case of this paper, Weibo users) have to violate their commitment to what is perceived as morally correct. There is also a need from the perceiver to feel that the situation is normal and manageable, as it seemed to be the case in most Weibo posts considered 'humorous' in the dataset we analysed. People react to situations of stress in many different ways, and being receptive to humour or producing

it are just two examples of them. Moreover, the salt crisis was soon considered to be just a moral panic. Therefore, the perceivers in the case of the salt panic in China felt that the situation was manageable, and in many cases violated their commitment to what would be morally correct by ridiculing those who took it seriously.

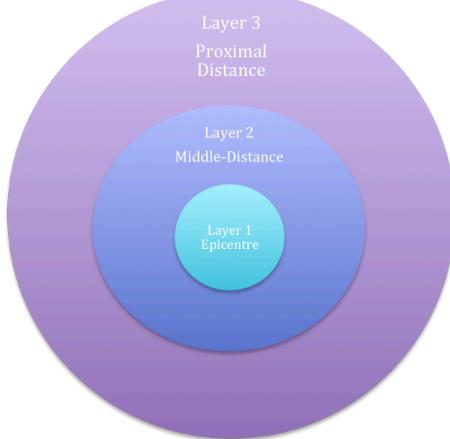
### 3. THE 3 LAYERS OF PDT

The PDT states that a subject is psychologically distanced from a crisis by being in a locale that is not in its 'epicentre' (the source of the crisis) [5]. It is noted that anyone within the epicentre of the crisis will not output humour due to the emotional, physical and/or psychological effect(s), which the crisis has on him or her personally. This is presented as the first layer of the PDT in the graphic below.

Nevertheless, anyone residing outside of this epicentre is dictated by his or her psychological level of construal [10], which changes according to the physical distance of the subject from the epicentre of the crisis. For instance, those residing in the middle layer of the PDT are presented as being the individuals most likely to output humour for two primary reasons. Firstly, such an individual is physically distanced from the epicentre so much that they are not directly affected by it, whether physically, emotionally or psychologically. Secondly, the individuals maintain a large amount of knowledge about the crisis due to their 'middle-distance' from its epicentre. Thus, we present the second layer of the PDT.

The final layer consists of individuals that have a lack of knowledge about the crisis and are not affected by the crisis itself at all. Therefore, it is hypothesized that such individuals are lacking in enough knowledge about the crisis to make humorous responses to it [5]. Furthermore, this may be viewed as an immoral action to those that are situated closer to the epicentre of the crisis.

**Figure 1. The 3 Layers of PDT**



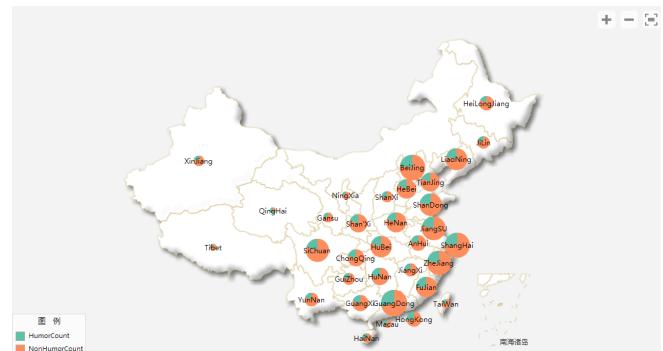
In this example we represent the Fukushima disaster of March 2011 as the epicentre of the crisis (Layer 1) with the respective salt panic in China as being in a locale outside the epicentre of the crisis (Layers 2 and 3). Therefore the theory suggests that those that lie outside of the epicentre of the crisis, but are not too proximally distanced (Layer 2), are the most likely to output humorous remarks related to the crisis in question. However, those that reside within the epicentre and in Layer 3 are either directly affected by the crisis itself or proximally distanced, respectively, and so will output limited or no humour.

## 4. METHODOLOGY

Basing our research on the PDT, we used a microblogging social media site, namely Sina Weibo, as our main source of data for extraction, analysis and visualisation. Location (provincial) data regarding the Sina Weibo users was taken from where each of the accounts were registered. This allowed us to map the geographic spread of the posts and divide them into their respective provinces. Once this data was collected the posts were analysed using a sentiment analysis user typology selection of 10 of the most used humour keywords to deliberate between the humourous and non-humourous posts [1]. All other keywords related to humour produced such a minor proportion of the posts that this would not affect the data and findings. As discussed in the paper by Halcrow *et al* [1] the user typology used a mixture of human coders, by our Chinese research colleagues, to determine the strength and weighting of the humour within a post. Nevertheless, it must be detailed that crowdsourcing the verification of the lexicons may provide the sentiment analysis with more strength.

The filtration method provided us with a proportion of the humourous posts against the overall population of the provinces' posts related to the salt panic. With respect to the PDT, we could view the proportions of each of the provinces and plot them on numerous map visualizations of the Chinese provinces. This analysis allowed us to view the provincial spread of proportions of humour/non-humour posts in reaction to the crisis. For example, the visualisation displays that Shanghai (25%), had respectively higher proportions of humour than the more proximally distanced provinces: SiChuan (21%) and XinJiang (19%).

**Figure 2. Humour Vs. Non-Humour Proportion Visualisation**



From this we cross-referenced this data alongside Baidu indexing and Google Trends data, which enabled us to enrich the data, and provided a comparison point between the reactions of the population search and the reactions of the individuals through Sina Weibo. From cross-referencing these datasets we are able to provide both temporal search and proximal reaction dimensions to our analysis.

### 4.1 Data and Dataset

The dataset used consisted of a pre-filtered collection of posts related to the Chinese salt panic of March 2011. The data ranged from March 16<sup>th</sup> of 2011 until May 23<sup>rd</sup> of the following year. This included a total number of 120,093.

### 4.2 Sample

All posts related to the salt panic between March 16<sup>th</sup> 2011 and April 16<sup>th</sup> 2011. Data after this point was extremely limited with populations of 10 or under per day, therefore sample sizes of dates after this point were too limited to justify within this research study. Akin to this, it was found that provinces farther from the

epicentre of the crisis also were limited in their sample sizes. This is primarily due to the demographic and geographic nature of the provinces, which indeed had an affect on the population densities of the provinces themselves, as well as on the number of Weibo registered accounts. Nevertheless, the primary aim of the research was to focus on the proportions of humour/non-humour with the data that was available at that current time.

### 4.3 Extraction Method

The dataset, which consisted of posts within a month and containing the keyword "salt" in them (it should be noted that Weibo does not use hashtags), had been obtained by a third party from Tsinghua University. Firstly, the word "salt" was used in order to search and get a 50-page list of posts about "salt" each page contained 20 posts (because Weibo's limited search result only returns 50 pages). From this, we used the ID of one thousand posts and the Breadth First Search (BFS) algorithm was applied in order to get all the 'reposts' and comments using the Weibo API. After this, the resulting dataset was formatted in a MySQL database, and stored in the University of Southampton Web Observatory platform. From this selection of posts, a second set of queries in SQL extracted as many humorous posts as possible from the data. For example, in order to search for the number of humorous keywords, we executed the following query:

```
SELECT count(*) FROM [table name] where [column name]
like "%[the word we wanted to find]%";
```

The dataset also contained information about the region where the Weibo account was created, and thus we were able to count how many of the words appeared in the posts of each region. For this, we used the following query for each of the keywords:

```
SELECT count(*) FROM weibo.users,weibo.salt_comment
where salt_comment.user_id = users.id and
salt_comment.text like '%哈哈%' and users.location like
'%安徽%';
```

Once this query was completed for each of the ten words (Table 1.), they were added together, and quantified in proportion to the total number of posts in each of the respective provinces. This query of is as follows:

```
SELECT count(*) FROM weibo.users,weibo.salt_comment
where salt_comment.user_id = users.id and users.location
like '%安徽%';
```

The posts were categorised as 'humorous' if they contained at least one of the list of ten keywords that denoted humorous content. For example, the written representation of a giggle, 哈哈 ('ha-ha') was one of the keywords in this list. We were aware that there are many other words that may denote a post the content of which is humorous. However, as it will be shown in the next subsection, there were three terms that conformed the majority of all humorous keywords, and we considered that a longer list of keywords would not have altered the study's conclusions.

**Table 1. The ten keywords selected to denote humour in the Sina Weibo posts**

哈哈——haha	可怜——pitiful
嘿嘿——heihei	委屈——grievance/black humour
嘻嘻——xixi	吃惊——amazing/surprised
偷笑——giggle	笑——smile (to die for)
贊——like	。 。 。 ——... (pause for reaction)

These words were selected qualitatively after a discussion between the Chinese and European team members of the research team on what kind of words a humorous post may contain. From this method the majority of humorous posts were extracted. Although, it was considered that some humorous posts would not be extracted using this method. This is because all posts would need to be qualitatively examined through sentiment analysis. However, due to the size of the population(s), such an analysis was not feasible.

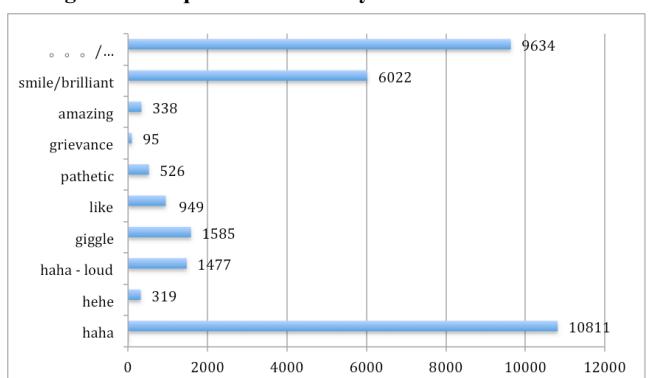
### 4.4 Findings

#### 4.4.1 Humour Reactions

We found that, due to the high proportions of humour in the posts, the salt panic was perceived as a relatively benign crisis that in many cases it was not taken seriously, misunderstood or undermined. This is evident in the fact that overall approximately 25% of the Weibo posts were of a humorous nature. For example, 'ha ha' was the most frequent term (34% of the total of 'humorous' comments), followed by the three dots (...) which usually depicts a prompt for the reader to laugh. Examples including such keywords are shown below.

- 哈哈哈 人家还10箱10箱的买 (Hahaha, they buy salt in ten cases and another ten cases.)
- 很惊讶你也会去抢... (I am so surprised that you also went robbing salts...)

**Figure 3. Frequencies of ten keywords in Weibo dataset**



With regards to the proportions of keywords used in the humorous posts, we found that in all provinces, 'ha-ha' and '...' were the keywords with the largest proportions. This finding is shown in Figure 4.

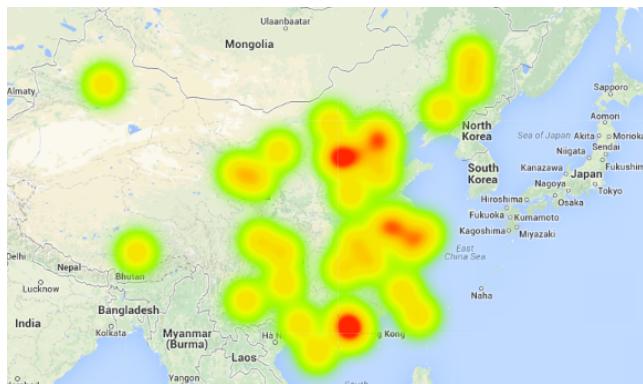
**Figure 4. Frequencies of the ten keywords by province**



#### 4.4.2 Proximal Distancing Evidence

The proximal data shown in the heat map visualization in Figure 5 detail a correlation towards demonstrating the PDT. As is revealed, the provinces that had the highest proportion of humorous comments are those that are of the ‘suitable’ distance to be situated in the second layer: ‘Middle-Distance’. In addition, as shown, those provinces farther away from the epicentre detailed a lower proportion of humour. The red areas in the heatmap represent provinces with a higher proportion of humorous posts with regards to the salt panic. As is shown in the heatmap, the provinces of Macau (31%), and Hong Kong (27%) ranked high in the proportions of humorous posts. The province with the highest proportion of humorous comments was the Qinghai province (64%). This province is known for being one of the main salt producers in the country, and so could be detailed as an anomaly in the data.

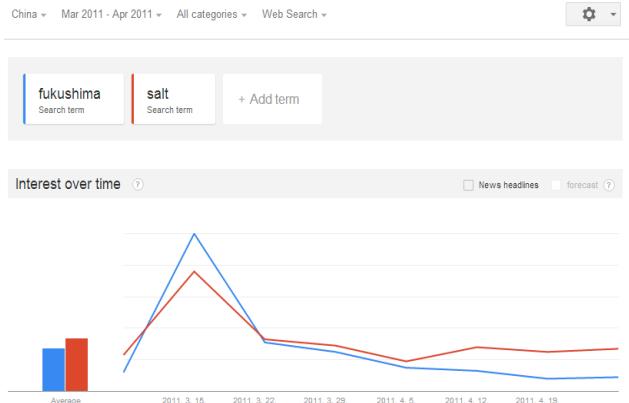
**Figure 5. Heat map of proportions of humorous comments**



As the PDT notes, persons must be aware of the crisis prior to creating humorous reactions to it [3]. This factor is detailed in the ‘Proximal Distance’ section of Figure 1. Therefore, it is to be understood that persons that search for such events, through search engines, are inclined to create humour due to an increased knowledge regarding the crisis itself. In order to quantify this we used Google Trends and its equivalent in Baidu (the primary search engine in China). It was found that the Google Trend and Baidu data peaked at a very similar position in the timeline in the searches for the word ‘salt’ in Google Trends and ‘盐’ (Salt in Mandarin Chinese) in the Baidu data, as shown in the respective Figures 6 and 7.

Note: The respective red and orange lines in the Google Trends and Baidu data show the amount of searches for the keyword search ‘salt’ and ‘盐’.

**Figure 6. Google Trend data of ‘fukushima’ and ‘salt’ in China**



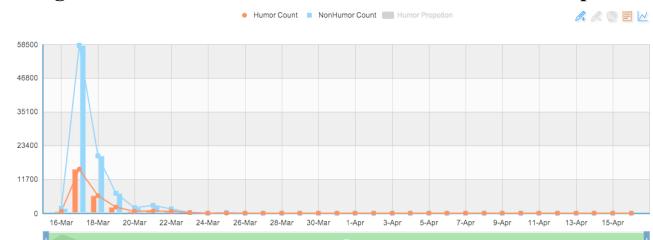
**Figure 7. Search trends of ‘盐’ in Baidu in China**



#### 4.4.3 Temporal Distancing Evidence

The data analysed with this methodology did not provide enough evidence to prove or disprove TDT, and so remains inconclusive until further research in this area is determined. The theory suggested that the peak number of humorous posts should have come some time after the peak number of the rest of posts. However, in the timeline we visualised, this ‘humorous’ peak of 15220 posts appeared the same day as the peak in the total count, which consisted of 73341 posts. In the graphic below (figure 8), red bars represent the total number of humorous posts over time, and the blue bars represent the total number of non-humorous ones. It should be noted, however, that the results were inconclusive, as there was no information of the time in which the posts were posted. This panic lasted very few days, and having had hourly accounts of the proportions would perhaps have provided a more precise calculation of when humorous comments started to rise.

**Figure 8. Timeline of humorous vs. non-humorous posts**



## 5. DISCUSSION

### 5.1 Social Media and Humour Research

We underpin the idea that humour research through social media is becoming an important area of study: specifically with regards to understanding social and cultural contexts of a particular country, region, or geographic location. In this instance, social media can facilitate the storing, cataloguing, collecting and visualising of humour data. Furthermore, with the assistance of particular capturing software, live data can be extracted and visualized ad-hoc. This aspect of social media research allows us to view the distribution of humour, both proximally and temporally, in real-time after a crisis. Understanding the flow of humour after a crisis will indeed allow us to predict when and where humour will occur and the cultural implications associated with it. Furthermore, we are able to gain insight into how humour is used through social media channels and whether there is variety between the types of humour that are used in the different types of social media.

### 5.2 Researching Across Distancing Theories

As we can see the PDT is only one of the types of distancing theories that are noted in the Introduction. Therefore, studying across a number of other distancing theories through social media may indeed lend fuller conclusions with regards to the humour culture of a society after a crisis. Through an analysis of a variety of different distancing effects we can obtain more rounded conclusions of the cultural contexts of a particular society and develop more grounded predictions upon when and where humour will take place. Furthermore, we can also have a more wholesome understanding of how humour is utilized within that society, and develop cultural comparisons between the social contexts. Moreover, distancing theories can support our understanding of other emotional responses in crisis, such as fear, worry or consolation. Increasing such emotional axes may allow us to better develop a methodology for understanding and predicting humour occurrences and sources, and the impact it has on a respective social, cultural and geographical location.

## 6. CONCLUSIONS

Our approach to understanding humour responses to crises through social media has allowed us to map how humour is distributed across geographical regions. The PDT is cited as a foundation for this research and coincides with the distribution of posts that were retrieved from the Sina Weibo dataset. There is a large amount of potential for further research in humour through social media, many of which are noted in the subsequent sections. As we currently understand, humour research in social media allows us to draw conclusions with regards to the societal, collaborative and cultural nature of a geographic location. We found that the Macau, Hong Kong and Qinghai provinces rated highly in terms of proportion of humour and non-humour: 31%, 27% and 64% respectively. Parallel to these proportions we are able to see the content of the posts. With this, we concluded that these provinces scored highly for comparatively different reasons. For example, Macau and Hong Kong were qualitatively examined and consisted of a high percentage of posts that were humourous against the other Chinese provinces rather than as a result of the salt panic itself. This suggests that there are cultural differences between mainland Chinese provinces, Hong Kong and Macau.

It was also noted that the spread of the data was an interesting find, with samples of total posts varying from 103 (Qinghai province) to 17033 (BeiJing province). This may be due to the geographical locations of those particular provinces. For example,

those provinces with the smaller total of post outputs were situated in sparsely populated areas of the country. Therefore, it is believed that providing proportions of those provinces in regards to population figures would be a beneficial next step in gathering more concluding data. Nevertheless, as this study maintained its focus on the proportions, the spread of data is a justified example of the PDT being carried-out in social media.

### 6.1 Limitations of the Research

#### 6.1.1 Provincial Data

It is evident from the research that there are a number of limitations with regards to the level of data available to us at the time of researching. Firstly, the research is performed on the basis of the location of Weibo account registration, rather than of the location of the posts themselves. This may indeed skew the data in the sense that such users were not residing in that location/province at the time of posting. However, the registration data allows us to pinpoint the original location of that user, and therefore gives us an understanding of the culture of a particular province. For instance, we found that the posts being outputted from the Hong Kong (27%) and Macau (31%) provinces were of a highly proportional humourous nature. Moreover, such posts were of a humourous nature against the mainland China rather than about the crisis at hand. Thus, the exploratory nature of the research allowed us to understand the cultural variances between each of the provinces with regards to crisis and humour output.

#### 6.1.2 International Data

In order to develop calculations of epicentre size we would be required to perform social media humour research across a number of other nations and crises. For instance, Japanese social media data would us allow to understand the humour output of that particular country in this particular crisis, and furthermore may allow us to validate the size of the epicentre itself. In addition, this would indeed allow us to calculate the subsequent layers of the PDT and predict the areas that are covered by the 3 layers on a global visualisation. Additionally, data obtained from South Korean and/or Filipino social media would also allow us to create area calculations of the 3 layers with increased accuracy, and also enable us to produce cultural comparisons between the nations in this particular crisis.

### 6.2 Applications of the Methodology

The methodology can be applied to a number of international, national and regional contexts. For example, it may be used as a method to better understand the culture and social context of a particular geographic location against others. From this it may be possible to draw various conclusions regarding the culture of specific locations, and potentially produce a taxonomy of location-based humour culture. For instance, the methodology may be used as an analysis of the humour output of the USA and Canada with regards to the 'Big Freeze' crisis of 2013-2014. An analysis of this could determine the areas that are most psychologically and physically affected by the 'Big Freeze', and also allow for humour research into crises that have multiple epicentres. This invaluable research will not only allow us to examine the cultural implications associated with such a crisis, but also allow for us to realize which areas are most in need of support and aid.

## 6.3 Future Works

### 6.3.1 Social Media Type

It is evident from the research that future investigation is required in a number of areas within this field. Firstly, it would be beneficial to analyse how other social media channels are used as part of an individual's coping mechanism. For instance, whether humour is more likely to be used through 'microblog' sites such as Twitter and Weibo, or whether there is a correlation between humour use in microblogs and other social media types. Using this methodology, we could perform analyses of humour outputs in channels such as QQ, Facebook, and/or YouTube. Humour use in these social media types may indeed differ from the form of use within microblog sites and therefore would produce different results to the above study. Therefore, it may be noted that a mean average of proportional data is required across multiple social media channels further develop the existing methodology and produce more valuable results.

### 6.3.2 Alternative Emotional Responses

We suggest that analyses of other emotional responses would be beneficial to the development of this methodology, enabling us to track live responses to a crisis across a wider range of emotional axes. For example, if we were to focus primarily on the TDT, it is hypothesized that fear and worry responses to crisis would enable us to predict when humour is likely to occur, to peak, and to decay as a result of a crisis. Cross-referencing this aspect with PDT will enable us to examine and track the spread of humour across geographical locations, and research potential correlations between the geographical proximity of the location to the epicentre and its uptake of humour response to the crisis.

### 6.3.3 PDT Epicentre and Crisis Severity

#### Measurement

We have found from this study that crisis severity is indeed an important factor that has the potential to affect the uptake, spread and distribution of humour response. As such, it is understood that future research into the PDT in relation to humour response requires a quantitative measure of the severity of a crisis in order to better calculate the size of the epicentre, and size of the subsequent layers. Therefore, it is considered that providing a formulaic calculation of the severity of the crisis against the size of the epicentre would provide more solid conclusions for future research in this area. Moreover, understanding this calculation will enable us to review the size of the epicentre in proportion to the outer layers, and therefore, use this methodology more effectively and efficiently in future analyses.

### 6.3.4 Humour Research for the Web Observatory

Web Observatories (WOs) aim to provide an understanding of big data and its respective social context(s) through the use of visualizations and linked data [2]. As we have discovered, humour research in social media provides us with the essential social

contexts and allows us to extract the necessary data to develop static and live visualisations of big data. Taking this further, it is evident that larger scale datasets are required to further understand respective social contexts. Alongside the developments of the WO, as a potential global data resource [9], we must develop social and cultural questions that can be quantitatively and qualitatively tested using this methodology. Having a platform such as the WO to perform such analyses is indeed an opportunity that humour research needs to take advantage of.

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