MEMEography: Understanding Users Through Internet Memes

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ABSTRACT

In this paper, we propose a method we call MEMEography for HCI research to understand people and their interactional contexts from the remixed internet memes they post in internet communities. While memes might not be the most obvious choice of a research subject, they allow us to investigate unfamiliar domains even when access to the field is beyond reach. We describe an initial approach of data selection, collection, prioritization and analysis. In addition, we demonstrate the kinds of insights we can gain through MEMEographies by analyzing a corpus of memes in the intensive care unit (ICU) context posted 2020 on Instagram. ICU memes open up insights into the environment, work practices, challenges, emotions and familiarized us with ICU practitioners' language, even though access to an actual ICU was completely impossible during 2020.

CCS CONCEPTS

• **Human-centered computing → Interaction design process and methods**; *Empirical studies in HCI*; *User studies.*

KEYWORDS

ethnographic study, internet memes, intensive care medicine, intensive care unit

1 INTRODUCTION & BACKGROUND

Ethnography is a common research method in HCI [12] evolving around the researcher observing (a certain group of) people within their natural environment. It primarily helps in *understanding*: people themselves, their activities, relationships, beliefs, roles, and goals within that environment [12]. The main advantage of ethnography (over, e.g., interviews or focus groups) is the collection of ecologically valid data on a broad scope of topics, minimizing the

Figure 1: Still image of an internet meme about planning a day at an intensive care unit posted at Instagram: In addition to the humorous listing of ethically questionable practices to make the shift more pleasant, it also shows the engagement with memes during work. Explanation: Nurses use the term *snow the patient* "when they over medicate their patients. This happens a lot in the ICU as they don't like patients that talk etc." as stated in one of the comments below the post.

risk of omitting potentially important ones [12]. Ethnography is especially valuable for understanding unknown, specific or complex domains [12] – for example, hospitals. Pedersen and Wolff [16] entered two physical therapy clinics to conduct an ethnography of the process of small health operations. Their original plan was to enter general health-clinics, but they were not granted access. Similarly, when we wanted to conduct fieldwork for a research project to develop an AI-based expert system for intensive care units (ICU) in 2020, we faced legal departments' reservations about non-medical studies in hospitals. Just when we were ready to start fieldwork, the visitation bans and other measures related to the COVID-19 pandemic destroyed our plans. Both examples demonstrate how difficult, if not impossible, it is to enter specific environments, such as ICU, for observation.

Luckily, many people today engage in online communities, be it forums, blogs or social media [20, 21]. Within this trend, we can search for an alternative to physically observing our field sites. Virtual ethnography [12] or netnography [10] are novel research methods based on ethnography, that emerged with users generating content in Web 2.0. These methods involve observing groups of users "online", i.e., online communities centered around a certain topic of interest on, e.g., text-based forums, Facebook groups or Reddit threads. In other words, with large quantities of user-generated content, we can observe users "there" in online settings [2, 3].

We propose *MEMEography* – a kind of netnography, which uses internet memes as the subject of inspection. An internet meme is

an information item, often bearing a humorous note [7], that is being copied or imitated via the internet [5] either from person to person, e.g., via e-mails, texting, or within and across online communities. Memes can be any piece of multimedia (e.g., text, GIFs, or videos). However, traditionally, they come as image macros: a combination of a known image and an altering, mostly humorous, catchphrase. The image usually stems from pop culture, politics or everyday life, but has been given a new meaning in the context of memes [15]. Memes can cover various topics or "genres", both on a political or societal level, as well as themes and experiences on a personal level [18, 19]. Some memes are universally understood, while others may require a high degree of knowledge of the subgroup that created and published them [18]. Nonetheless, memes are "fundamental building blocks of digital culture - understanding them means understanding ourselves." [18]. Below, we demonstrate the use of internet memes as a *methodical unit* to learn about ICUs in hospitals – a community that is distant from HCI in terms of topic and currently impossible to get into physically. We base our approach of studying the ICU through humorous internet memes on previous works claiming that humor in the ICU field can reduce negative feelings associated with an event, both in the sender and the recipient (emotion-focused coping) [6, 22]. To do so, we conducted a textual analysis of 1,637 and a thematic analysis of 419 image macro memes from Instagram evolving around the context of the ICU. We gathered insights on experiences, emotions and work tasks reflected in individual meme variations within the context of ICUs, without ever setting foot into an ICU. We discuss some benefits and challenges of MEMEography compared to (n)ethnography and outline the steps researchers have to take and the decisions to be made when running a MEMEography on a broader spectrum of topics and user groups.

2 PROCEDURE OF A MEMEOGRAPHY

Within a MEMEography, we analyze memes as a means of understanding an "offline" population. Unlike true ethnography and on-site observations in a potentially challenging environment, MEMEography allows us to spend as much time as we need with the situations presented and described. Below, we first describe the basic steps of MEMEography before showing its application to a concrete example in the next section.

1. Selecting and collecting memes: As a first step, we collect internet memes in online communities. Suitable sources of memes are social media platforms like Facebook, Reddit or Instagram. We can either collect memes over a longer period of time or take a snapshot of existing memes. We propose to download them using a web crawler so that we can use automated analysis methods later. We can focus on topics (in the form of hashtags or groups) or users for collecting data. If the volume of collected data is too high, we need to use an appropriate subsample.

2. Analyzing memes: In contrast to ethnographies, MEMEographies can combine automatic and manual analysis methods without first transcribing or coding the original data. The methods could support each other, e.g. by using Optical Character Recognition (OCR) and text analysis to gain prior knowledge about the content of collected memes and form hypotheses. Insights gained through

manual analysis can then in turn be verified through text analysis. When analyzing memes, we have to keep in mind, that not all instances of memes are equally comprehensible [18, p. 101]. Specialized internet-meme databases, such as *knowyourmeme.com*, can help us understand memes by providing knowledge on their meaning and evolution even if we are not familiar with the phenomena represented.

3 USING MEMEOGRAPHY IN AN INTENSIVE CARE UNIT CONTEXT

Within a larger project, whose goal is to design a novel AI-based expert system for the ICU, we first wanted to understand people and current practices in the ICU. Given the limited accessibility of the ICU in 2020, we developed MEMEography as a suitable method to understand people and their relationships in ICUs, even without physical access. Figure 5 shows examples of some ICU-related memes we found.

3.1 Data Selection and Data Collection

We decided to collect internet memes on *Instagram* because it is a widely used social media platform focused on sharing videos and images, unlike other broader social media platforms such as Reddit or Facebook. As the data were publicly available, no ethical approval was required according to our ethics committee's guidelines. Nevertheless, following best practices in using public social media data [3, 13], we asked the Instagram users whose memes we wanted to publish for permission to anonymize and display the images and comments.

In a first step, we collected public posts, including images, videos, and series posts including both formats (mixed), the respective numbers of likes and comments, as well as the posts' threads of comments. We decided to filter by hashtags to capture a snapshot of the existing meme posts. We found relevant hashtags by observing public accounts that post ICU-related memes and then collected posts tagged with the hashtag #icumemes as well as the five hashtag combinations #icu & #medicalmemes, #icu & #hospitalmemes, #icu & #nursememe, #icu & #nursememes, #icu & #doctormemes. Using these hashtags, we retrieved a sample of 3,396 individual posts from 480 users on Instagram in December 2020. The collected posts span the period between the 15th of July 2015 and the 9th of December 2020, with the amount of posts increasing over time (see Figure 2). Considering that memes change rapidly and that their analysis heavily depends on understanding the underlying phenomenon, as well as the fact that a sufficient number of memes was posted in 2020, we reduced our data set to posts from 2020. We focused on still image macros, which represent the predominant form of memes (see Section 1) and were also most frequently used in the ICU context (see Figure 2). Our final corpus comprised 1,531 posts containing 1,637 static image macros posted by 225 users in 2020.

3.2 Data Analysis

In our ICU MEMEography, we analyzed images, captions, and likes of a post. We also manually included posts' comments supporting our thematic analysis when there were ambiguities in the meme's message or language (see Section 3.3.5). We chose a mixed-methods approach, including text analysis and thematic analysis [4]. Posts
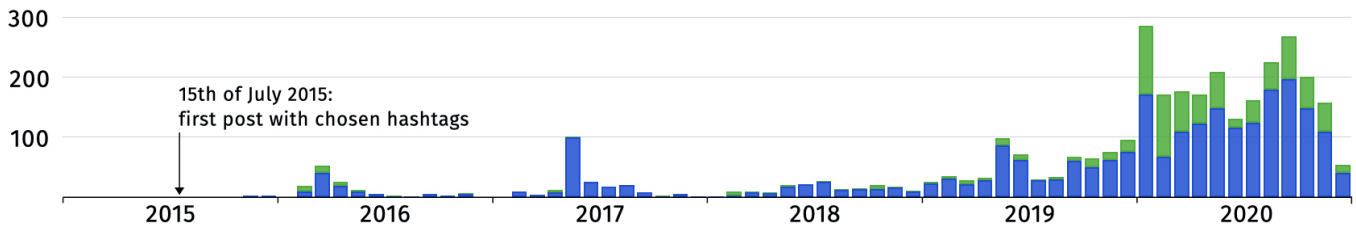
Figure 2: Number of Instagram posts with hashtag #icumemes (348 posts) or the hashtag combinations #icu & #medicalmemes (1,138 posts), #icu & #hospitalmemes (290 posts), #icu & #nursememe (985 posts), #icu & #nursememes (1,969 posts), #icu & #doctormemes (340 posts) since 2015. Green bars (■) represent (mixed) video posts, while blue bars (■) represent still posts only.

reached a median of 23 likes (min: 0, max: 4,891) and a median of 1 comment (min: 0, max: 211). Posted by 225 users with a median of 360 followers (min:6, max: 350,102). The posts ranged from popular unedited image macros to photoshopped (see Figure 1) image macros – sometimes revealing considerable design effort for the image macro's pictorial part. However, other image macros indicated through watermarks that they were created using meme generators, with which one can only customize the text of an image macro. Only very few image macros repeated within our data.

3.2.1 Text Analysis. We used the Google Cloud Vision API's[1] OCR feature to detect and extract text from the image macros. Captions had a median length of 36 words (min:0, max:365), image texts of 16 words (min:1, max:553). On manual inspection, we found that most images with a high number of words in the image did not represent image macros. However, memes such as the so-called Math Lady[2] would also contain high numbers of words, which is why we decided not to exclude images based on their image text amounts in our analysis. We further used the Google Cloud Natural Language API[3] for sentiment analysis of the detected texts and captions. Sentiment scores indicate *which* type of emotion – ranging from -1.0 (negative) to +1.0 (positive) – the text expresses, while sentiment magnitudes indicate *how much* emotional content is present in the text – ranging from 0 (low) to ∞ (high). In line with the premise that humor is used in ICUs to process negative emotions, less than 10% of posts' captions and image texts indicated a positive sentiment, as shown in Figure 3.

Through a word count analysis, we identified common topics in captions and detected texts: 92% (1507) of the image macros contained text about nursing ("nursing", "nurse"), whereas only 47% contained text about physicians ("doctor", "doc", "resident", "physician"). 55% (894) included text about challenges ("problem", "challenge"), 29% (478) text about patients ("patient", "pt"), 22% (338) text about shifts ("shift"), 22% (364) text about emergency situations ("alarm", "code", "resuscitation", "emergency") and 19% (319) covered the pandemic COVID-19 ("corona", "covid", "pandemic"). Figure 4 shows the occurrence of posts addressing these common topics over time. While the topic clusters "nursing", "shift", and "physician" are mentioned relatively consistently, the topic cluster "problem" is mentioned increasingly throughout the year. In the case of the topic cluster "COVID-19", a peak is reached particularly

in March, April and May and, similarly in terms of time, a more frequent mention of the topic cluster "emergency". Other AI-based analysis methods, like data-labelling or content classification, did not yield meaningful results.

3.2.2 Thematic Analysis. We manually reviewed our data set and saw that posts with about 100 likes and more were more likely to depict factual internet memes (compared to selfies or non-humorous educational content). We thus proceeded qualitatively analyzing the 500 most-liked images posted by 82 users – the minimum of likes in that data set was 82. Further manual analysis excluded posts that did not display memes, were not in English, or were irrelevant to the critical ICU context. This resulted in a final data set of 419 internet memes to analyze thematically. The first author – a researcher with an HCI-background – performed the thematic analysis. We conducted the thematic analysis with respect to the question of what insights we could gain through memes and analyzed data through manual coding using the qualitative coding software MAXQDA2020. We started with a set of 35 initial codes after familiarizing ourselves with our data and added new codes whenever new aspects emerged during our analysis (data-driven approach) [4]. This process resulted in a list of 94 codes. We then formed themes and sub-themes from the codes and iterated over our data again. The thematic analysis of the images macros yielded five recurring themes.

3.3 Results

Below, we briefly present the five recurring themes that emerged from our analysis, accompanied by example memes.
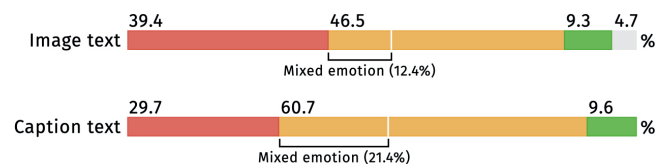
Figure 3: Sentiment scores detected texts and captions: Green (■) = positive (sentiment score > 0.25), orange (■) = neutral (-0.25 < sentiment score < 0.25) and red (■) = negative (sentiment score < -0.25). A neutral sentiment score with a high sentiment magnitude (> 0.5) indicates mixed emotions. 4.7% of images contained too little text for analysis.

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[1] https://cloud.google.com/vision

[2] https://knowyourmeme.com/memes/math-lady-confused-lady

[3] https://cloud.google.com/natural-language/

Figure 4: Time series of word counts clusters in 2020
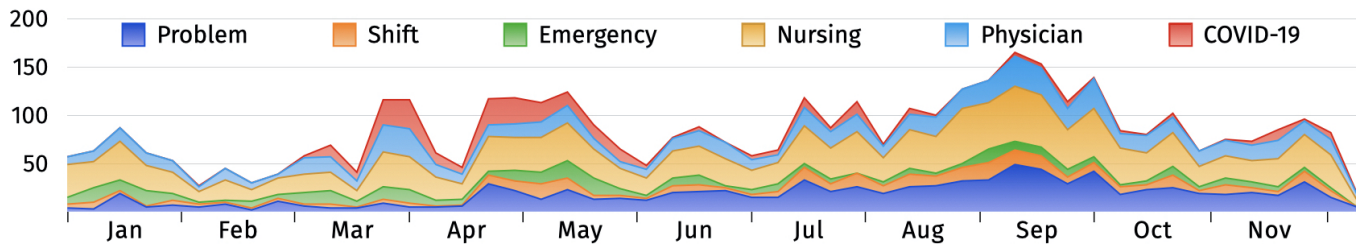
3.3.1 ICU environment. In line with prior research [9], our analysis reveals the ICU to be an interdisciplinary environment. Besides nurses and physicians, we found 17 more nominations, e.g., clinical dietitians, respiratory therapists, or emergency department staff, that make sure the ICU is running smoothly. In terms of physical space, some memes indicated clutter with medical devices (monitors, ventilators, etc.), cables and tubes in the rooms – implying that finding things is hard. Apart from the most shared meme in our data set showing a person wearing Crocs (see Figure 5a), other dress code memes were mainly related to protective clothing for handling COVID-19 patients. Furthermore, a few memes addressed a seasonal environmental factor known as the July effect ("...the phenomenon of adverse impacts on patient care arising from the changeover in medical staff that takes place during this month at academic medical centres in North America" [17]).

3.3.2 Challenges in the ICU. We identified a broad spectrum of challenges reported in the memes. Many reported **problems on a human-to-human level between colleagues** within the ICU and across other departments. These problems are: 1) lack of confidence in the work of colleagues, 2) practice of shifting unpleasant tasks to others (see Figure 5c and Figure 1), 3) frustration caused by not being taken seriously, 4) conflicts between professional groups, 5) disagreement about patient treatment and 6) critique on management for pandemic handling.

Furthermore, our analysis showed that ICU employees face **problems with patients and their relatives**. These problems ranged from mean patients, to patients' and their relatives' unrealistic demands up to many cases of disobedient behavior: unstable patients attempting to walk around or patients trying to remove crucial medical equipment from themselves. Moreover, ICU employees face **difficult or unpleasant tasks**. For example, the unpredictability of emergencies complicates any other (time-consuming) task, such as transporting intubated patients to CT. Some memes covered **problems handling the COVID-19 pandemic**. Furthermore, meme posts addressed **stressors**, such as overtime, long shifts, on-call duties, and uncomfortable protective clothing. An example of a meme reflecting a high workload reads: "When you finally pee after holding it for a 12 hour shift" showing an image of a seemingly relieved Tom Hanks with subtitles saying: "Urinating fully and easily". Dealing with such stressors was discussed in some memes such as drinking "2 cans of Red Bull". Other and more exaggerated examples illustrated shadier behavior patterns, like stabbing oneself in the eye with a scissor rather than being assigned to one more

patient, sedating patients, getting drunk, or taking drugs (stolen from a patient admitted with a drug overdose).

3.3.3 Processes and Tasks. Within the memes, processes and work tasks were mentioned or reflected upon. The naming of involved persons within the image macro or caption often allowed us to draw conclusions about the person performing the work or the collaboration of various actors. Many of the memes showed that not everything always goes according to plan in the ICU – for example, when colleagues or patients undid tasks that had just been completed. Similarly, emergencies (see Figure 5a) would disrupt every other task. Overall, memes mentioned a number of different tasks: e.g., handling documentation, taking blood samples, educating inexperienced personnel, placing tubes, transporting patients to CT scans, deciding on orders, medicating patients, tube feeding, medical rounds, absolving e-learning modules, and helping patients. On top of that, many memes mentioned making errors, like forgetting orders or giving wrong amounts of medication. In some cases, memes even shed light on ethically questionable practices (sedating patients) that are meant to ease the daily workload in stressful ICUs.

3.3.4 Emotions. The most frequently reported emotions were frustration and anger. Positive emotions, such as pride or happiness, were strongly underrepresented. An example of being happy to have finished the shift without overtime, revoked this emotion right away because the punctuality was only due to two patients' death – displaying an emotional conflict. Another example showed pride in one's achievement, only to reveal at the same time that there was no other appreciation. Many memes, like Figure 5b, indicated psychological stress and low job satisfaction.

3.3.5 Language and Inside Jokes. The highly specialized knowledge of critical care medicine is reflected in the jargon used in the memes. In our corpus of 419 image macros, we found 231 specialized, but wide-ranged (e.g., organizational, medication, equipment) abbreviations (e.g., BVM: bag-valve massage, DNI: "Do Not Intubate" order, BKA: below-knee-amputation), medical terminology, as well as idioms like "pasta water" meaning Normal Saline or "hard stick" meaning a person whose veins are difficult for medical personnel to find and successfully access. To clarify the meaning of the individual terms, abbreviations and idioms, we first searched within the post in the caption and comments for references or clarifications of the terminology. In a second step – if necessary – we used search engines for clarification. In this way, we managed to understand all unfamiliar words within our data set of 419 images.

(a) Most liked (7469) and commented (358) image macro in our data set. "Code" refers to a (medical) emergency.

(b) Second most liked (6887) image macro in our data set.

(c) GoLYTELY is a laxative solution used for bowel cleansing prior to examinations such as colonoscopies.
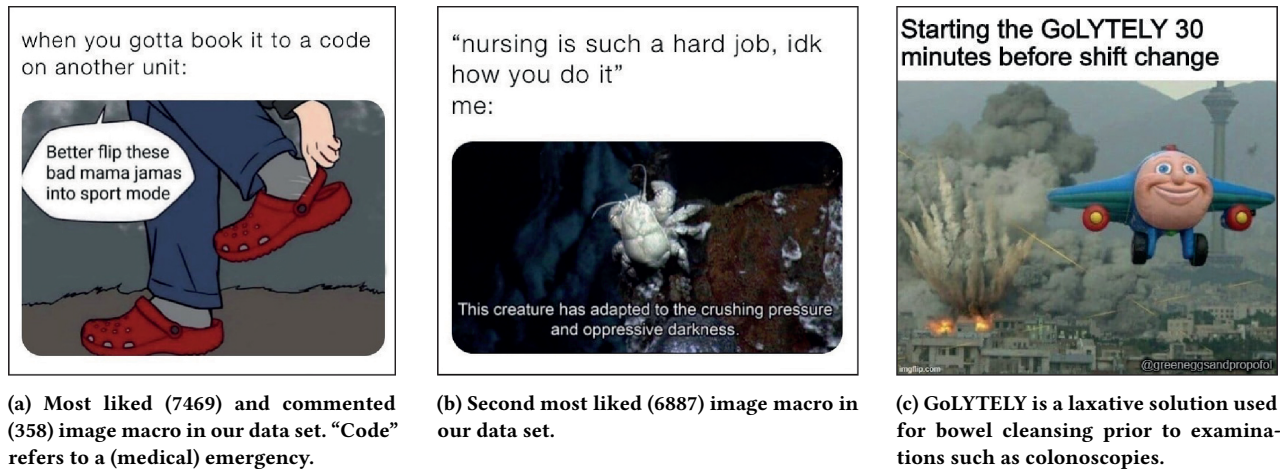
Figure 5: Image macro examples from our data set. Numbers of likes and comments are merged data from posts and re-posts.

Above that many memes depicted medical jokes in the form of puns or personification of physiological processes or medical procedures. For example, reaction images, that typically are used as a response to a prompted event or situation, were used to describe human reactions and as a humorous personification of, e.g., lab-values or organ's reactions.

4 DISCUSSION

In our MEMEography in the ICU context, we used memes as an analytical window to understand experiences and thoughts wrapped in humor. We demonstrated that we were able to obtain rich and valuable insights through quantitative and qualitative analysis of memes, without ever setting foot in an ICU. We discovered experiences and opinions around challenges, processes, emotions and learned about the language used by ICU practitioners along the way. The high usage of jargon indicates that the memes we saw were addressed to internet community "insiders" – namely, ICU practitioners. Despite memes being humorous, we should take them seriously (to some extent) as a source of information, based on the fact that they cover, e.g., many challenges and practices in the context of ICU as reported in previous work [1, 9]. Moreover, they can offer us insights into the individual perspectives of ICU practitioners. As in classic netnography [10], we take on the role of a complete observer of an online community's interactions within MEMEography. The online community's members do not know they are being observed by outsiders, mitigating the risk of social desirability bias [8, 14].

The text analysis yielded few insights. We have uncovered the seasonality of topics (compare Figure 4) and found first evidence to support our assumption that rather negative experiences are depicted in memes. Only a small percentage (<10%) of the texts revealed a positive sentiment, whereas around 30% revealed negative sentiment. The qualitative analysis confirmed this finding in a second step. To this end, manual and automated analysis should be intertwined and performed iteratively. We can thus propose MEMEography as a way to primarily understand the problems and challenges people face in their environments. We attribute the large proportion of neutral sentiment in the texts to the fact that texts in

memes tend to be short and riddled with jargon and abbreviations. Text analysis may also have yielded few insights because memes thrive on humor and the combination of text and image. For our thematic analysis of memes, we manually excluded images that did not display memes. As observed in section 3.2.1, this method could further be refined by using (combined) automated methods for data selection of factual memes (e.g., based on image text length and a verified meme database).

We sampled data for our thematic analysis by using the number of likes for sampling. We argue that this "like-based" approach of sampling provides a quick and guided exposure to the topics that resonate most with the ICU practitioners' online community. However, sampling and ranking via comments or other factors might have also been an option for this purpose. In our case, comments and likes correlated strongly ($r_S(1531) = 0.78$, $p < 0.001$) such that both approaches would have generated a very similar subset of data. Since we did not choose a random sample, we could even argue that similar to an anytime-algorithm [23], the analysis produces increasingly detailed results the longer it runs.

To collect memes for our MEMEography, we used the social media platform Instagram, which provides metadata such as likes and comments. Yet, other platforms could provide other interesting kinds of metadata for analysis, such as groups in Facebook or subreddits in Reddit. While our MEMEography approach allowed us to investigate many experiences, emotions and work tasks, we would argue that MEMEography data sets – in the same way as all types of netnography data sets – are biased and not representative of the entire offline population. They represent only those that are posting to social media, and more so only those users that are posting to the specific platform (e.g., Instagram) being studied [10]. Future research might analyze internet memes on other types of social media platforms. Additionally, we must keep in mind that the people who post publicly on social media may want to attract attention by posting "more extreme" and "polarized" content than those who only consume or do not use social media [11, p.204]. Due to memes' emotional connotation, this might be even more exaggerated compared to using texts as netnographical analysis unit.

5 LIMITATIONS AND FUTURE WORK

For future work, we intend to validate our findings from the ICU context. Although we did a rough comparison to previous work [9], our findings from the ICU context are to be treated as preliminary and rather serve to illuminate the nature and scope of possible outcomes of MEMEography as a method. Furthermore, our approach did not collect demographic data from the people who post memes, e.g., to confirm their employment as ICU practitioners or gather information about their role and work experience or their purposes and circumstances when they post memes. We suggest that future work combines MEMEographies with interviews or online surveys to collect more information about the people posting memes. In this way, we could further investigate the robustness of the studied memes' statements and interpret the statements with regards to user characteristics.

In our use case for the ICU, we used hashtags to collect memes. However, not all posts use hashtags, so it captures only a portion of the ICU-related meme posts. Nonetheless, we were able to understand a range of experiences, spanning an entire year, from multiple Instagram users across different disciplines (e.g., ICU nurses, clinical dietitians, respiratory therapists), and varied follower counts.

In this late-breaking work, one of the authors qualitatively analyzed 419 ICU-related image macro memes. While most memes are self-explanatory, we can only fully interpret memes if we can decode the underlying meme (e.g., a particular scene in a movie or series) and the attached ICU-related text. In a context highly foreign to our own, this decoding can be time-consuming. Moreover, the risk of misinterpretation as a *"complete observer"* is not negligible. Different researchers might interpret memes differently. Yet, common ethnographic studies too thrive on the experiences of the conducting researchers. To tackle this limitation, we used posts' comments and – whenever necessary – search engines for decoding the sentiment and message the memes conveyed. For future work, we can imagine asking questions in comments to provide answers helpful for decoding (as observed in section 3.3.5). Additionally, we suspect that we can learn a lot more about social patterns and the perception of memes by analyzing the comments and likes of comments of a meme post: Do the viewers agree or disagree with the meme's message? Do viewers share the post? What discourse takes place? Are more examples shared? Furthermore, it remains to be explored whether MEMEographies can be applied in different contexts: is there a sufficient number of memes to learn from other populations?

6 CONCLUSION

Driven by the concrete problem that we needed to understand people and their actions and thoughts in an environment that suddenly had become inaccessible due to the COVID-19 pandemic – namely, the Intensive Care Unit (ICU) in hospitals – we had to find a different way to achieve this understanding. We started from the concept of netnography and chose internet memes as the subject of observation. In an iterative process, we collected memes that contained certain hashtags and further cleaned and narrowed the collected data set. From a final corpus of 1,531 posts containing 1,637 static image macros posted by 225 users, we managed to gain a number of interesting insights about the topics and sentiments in online communication between ICU practitioners, including daily problems they face, the specific language they use, their insider jargon, and type of humor. We argue that this method, which we call MEMEography, can be generalized to other contexts and provides great potential for contact-free user research, especially in the ongoing pandemic.

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