What Do They Meme? Exploring the Role of Memes as Cultural Symbols of Online Communities

Theresa Henn
University of Bamberg, theresa.henn@uni-bamberg.de

Oliver Posegga
University of Bamberg, oliver.posegga@uni-bamberg.de

What Do They Meme? Exploring the Role of Memes as Cultural Symbols of Online Communities

Short Paper

Theresa Henn
University of Bamberg
An der Weberei 5, 96047 Bamberg, Germany
theresa.henn@uni-bamberg.de

Oliver Posegga
University of Bamberg
An der Weberei 5, 96047 Bamberg, Germany
oliver.posegga@uni-bamberg.de

Abstract

Analyzing symbols shared within online communities (OCs) is essential to better understand communities' expressed cultures. To evaluate how OCs differ in their expressed culture and analyze the effects of community rules (CR) and moderation policies (MP), we examined meme sharing of subreddit and interaction communities on Reddit. To detect memes shared within subreddits automatically, we trained a convolutional neural network and applied a feature-matching algorithm to create meme networks with components consisting of visually similar memes. Based on each community's component composition, we created community-specific meme languages that we compared across subreddit and interaction communities. Our results show that memes can be aggregated to characteristic meme languages linked to individual OCs; yet MP and CR do not impact the homogeneity of shared memes. Based on these findings, we plan to analyze dynamically the relationship between memes and OCs, examining memes' textual content and diving deeper into users' individual meme languages.

Keywords: Online Communities, Memes, Cultural Identity, Social Media, Network Analysis, Image Classification

Introduction

We all use memes daily, but know little about their symbolic value and cultural meaning for online communities (OCs). Analyzing memes as cultural symbols representing an OC's shared values, identity, and ideology has, however, gained attention in recent years as a promising avenue for research (see, e.g., DeCook 2018; Nissenbaum and Shifman 2017; Nowotny and Reidy 2022). This is a welcomed development, as furthering the understanding of OCs' culture is essential for (1) gaining deeper insights into online user interaction that can be beneficial (e.g., support in mental health forums) but that may also turn toxic (e.g., sexist or xenophobic discussions) (Massanari 2017); (2) expanding the knowledge on OCs' shared norms and values, which have a significant impact on, for example, an OC's sustainability (Seraj 2012)); and (3) improving our understanding of reciprocal spillover effects between online behavior and offline consequences, such as effects on electoral turnouts (Nowotny and Reidy 2022). Given these far-reaching consequences of OCs' online culture, it is somewhat surprising that IS research has paid little attention to this field of research compared to other disciplines (see, e.g., Kozinets 2010). Only a few works have addressed, for instance, the effects of organizational culture on IS adoption in organizations (Jackson 2011), the impact of nationality and culture on knowledge sharing (Moser and Deichmann 2021), and the influence of language on an OC's culture and identity creation (Fayard and DeSanctis 2010).

This research gap should not mistakenly be attributed to a lack of relevance; rather, it speaks to the complex challenge of conceptualizing, operationalizing, and tracking OCs' culture in the online space's fluidity. While online culture has been studied through ethnographic (Kozinets 2010) and linguistic (Fayard and

DeSanctis 2010) lenses, for example, analyzing it through memes as cultural symbols of OCs' common values and identities has proven to be a promising complementary approach (e.g., DeCook 2018; Gal et al. 2016) that accounts for the increasing importance of user-generated visual content online (Marwick 2015).

This paper adds to this line of research by evaluating whether individual OCs share a characteristic "meme language"–by which we mean the composition of distinct memes and their variants shared within an OC– that symbolizes their shared culture, norms, and identity, demarcating them from other OCs. In doing so, we enter a debate. One line of the literature confirms memes' symbolic and identity-shaping effect for different OCs by highlighting their characteristic cultural value for distinct OCs (e.g., DeCook 2018). These findings suggest that we should be able to detect characteristic meme languages for distinct OCs that provide valuable insights into their shared culture. Another line of research emphasizes the rapid diffusion of memes across communities (e.g., Spitzberg 2014), thus assigning them a universal role that makes them rather inadequate for offering profound insights into distinguishable OC cultures.

Research findings have also shown that community rules (CR) and moderation policies (MP) significantly impact the type of content shared within an OC and how users interact with it (Seering et al. 2019). From this, we follow that the CRs and MPs in place can also affect the sharing of memes within an OC. Therefore, it is plausible to assume that OCs with defined CRs and MPs allow the sharing only of those memes that closely comply with their established norms and identity. Hence, the existence of CRs and MPs could lead to less diverse memes shared within an OC and, thus, a more uniformly expressed culture through a homogenous meme language.

So, to evaluate the characteristic value of meme languages for distinct OCs and analyze the effects of CRs and MPs thereupon, we pose two research questions using Reddit:

RQ1: *To what extent do OCs on Reddit share a characteristic meme language?*

RQ2: *How do Reddit CRs and MPs affect the diversity of an OC's meme language?*

To answer the two research questions, we analyze memes posted on Reddit's 100 largest subreddits (measured by the number of members). To test whether specific memes can be aggregated to a characteristic meme language of individual OCs, we examine the extent to which distinct communities share particular memes and their variants. We differentiate between two types of Reddit OCs, as both evolve through different logics of formation and vary in their levels of MPs and CRs that could affect the exchange of inherent symbols such as memes: subreddit communities (SCs) that develop through Reddit's internal platform structures and that create predetermined boundaries for communities of interest with defined CRs and MPs; and interaction communities (ICs) that go beyond platform-imposed community boundaries and evolve across individual subreddits and their MPs and CRs based on user interactions.

Memes have symbolic value, and we assume that users from individual OCs share specific memes and their variants as an expression of their culture, leading toward a characteristic meme language, that demarcates them from other communities. In addition, we assume that this behavior is moderated by an OC's CRs and MPs. To verify these assumptions empirically, we need to detect memes and their variants within our data. We use the method introduced by Courtois and Frissen (2022), who uncover "meme families" by linking similar memes by matching of visual features associated with the original meme. Based on the similarity detected, memes are mapped to a network graph that comprises components with the original memes and their variants. Knowing which meme was posted in which community enables us to detect all meme components of visually similar memes within each community (SCs and ICs). The composition of these components then constitutes an OC's individual meme language. To answer RQ1, we examine the detected meme language of all SCs and ICs and evaluate their resemblance. To answer RQ2, we calculate a similarity score *s* for each community that quantifies the homogeneity of a community's meme language and statistically compare these scores between SCs and ICs.

The remainder of this paper is structured as follows. We briefly define our conception of culture and memes and provide an overview of the current state of research on the identity-shaping power of memes for OCs, their diffusion across OCs, and our theoretical foundation and causal model grounded in Stuart Hall's two systems of representation; we then describe our methods, including our data collection on Reddit and our procedures for creating the interaction network and labeling the SCs and ICs, generating a network graph of memes and their variants within each community, comparing the meme languages across communities, and evaluating the homogeneity of shared meme languages between SCs and ICs. We conclude our paper

with an overview of our preliminary results and a description of the next research steps.

Theoretical Background

Definition of Culture and Internet Memes

"Culture" is a multifaceted and complex concept that authors from various disciplines have tried to narrow down for decades. In this paper, we decided to follow Donal Carbaugh, a cultural communication researcher, who defines "culture" as "a system of symbols, premises, rules, forms, and the domains and dimensions of mutual meanings associated with these" that is "implicated, employed, or creatively invoked in conversation" (Carbaugh 1993, p. 182). Thus, for Carbaugh, culture is constituted through communication. This understanding of culture aligns perfectly with the online sphere, as the communicative traces left by users can be used as a proxy for their expressed culture. In our case, we focus on one specific type of trace: Internet memes that are often regarded as "a key fixture of digital culture" (DeCook 2018, p. 485) having symbolic and identity-shaping value for OCs (Nowotny and Reidy 2022).

Richard Dawkins introduced the meme concept, defining a meme as "the idea of a unit of cultural transmission, or a unit of *imitation*" (Dawkins 2016, p. 249, emphasis in original). In the online world, an Internet meme can be described as "(a) a group of digital items sharing common characteristics of content, form and/or stance, which (b) were created with awareness of each other, and (c) were circulated, imitated, and/or transformed via the Internet by many users" (Shifman 2014, p. 41). Like Nissenbaum and Shifman (2018), we focus herein on "image macros" as a specific type of meme that "consist of a repeating image overlaid with text and usually deal with a specific topic or situation." (Nissenbaum and Shifman 2018, p. 298). These memes are known for their "cultural biographies" (Nowotny and Reidy 2022, p. 34), as their initial composition of text and image is continuously altered, refined, and transformed, which supports their rapid dissemination through the Internet often related to their humoristic and sarcastic messages. This type of meme is, however, more than a simple compilation of varying humorous texts and images; instead, it depicts reproducible combinations of cultural elements that are continuously remixed and constitute, based on their aggregated interplay, specific values and meanings for OCs (Nowotny and Reidy 2022). Not all memes on the Internet are image macros, but they are one of the most common types and have been used by several other researchers as their analytical foundation (e.g., Nissenbaum and Shifman 2018). Thus, we are confident in considering them to be representational.

Analyzing OC's Culture: The Role of Memes as Cultural Symbols

There have been several attempts in research to analyze OCs' culture. One prominent example, widely applied, is Kozinets' (2010) "Netnography" approach, which uses methods from ethnography to study online cultures and communities. Other scholars have focused on the analysis of language as a characteristic feature of online culture that creates a common sense of "we-ness" (Fayard and DeSanctis 2010). However, as online social media platforms have increasingly become a "visual medium" (Marwick 2015), shared images have become an essential part of an OC's expressed culture, resulting in a "digital visual culture" that affects how groups communicate and are received by others (McSwiney et al. 2021).

Memes are a significant expression of this digital visual culture. One line of research has addressed the growing online importance of memes by focusing on them as characteristic cultural symbols of specific online groups that express an OC's values, identity, and shared ideologies. Posting memes is regarded as important for creating a feeling of belonging to an in-group (DeCook 2018; Nissenbaum and Shifman 2017) as it aids in developing a common identity and attachment to a community of like-minded people (DeCook 2018; Nissenbaum and Shifman 2017; Nowotny and Reidy 2022; Shifman 2014). As memes shared by OCs tend to be "typically unique to each individual community" (DeCook 2018, p. 488), they aid OCs in their boundary work toward other online groups (e.g., Gal et al. 2016). Thus, although memes are known to mutate, their origins can usually be associated with specific OCs, particularly grounded in a distinct type of humor shared by specific OCs (Nowotny and Reidy 2022). Hence, memes can be regarded as identity-shaping cultural symbols for individual communities that "function as cues of membership" and "constitute forms of cultural capital." (Nissenbaum and Shifman 2017, p. 485). This identity-shaping effect becomes quite evident when analyzing the use of memes in alt-right online groups. Several researchers have identified the prominent "Pepe the Frog" meme, for instance, as symbolic of the alt-right (see, e.g., Nowotny and Reidy 2022). Moreover, research has shown that particularly memes' humoristic nature is used by alt-

right groups as "weaponized irony" (Nowotny and Reidy 2022, p. 139) to expand these group's reach toward mainstream audiences, as they try to win them over to their ideology.

Although memes can usually be traced back to "local" cultures related to specific OCs that coin them with an initial meaning, many memes eventually diffuse through the Internet and are picked up by the general public (Nowotny and Reidy 2022). Thus, there is another line of research that has addressed memes as a "phenomenon that transgresses social and cultural boundaries" (Bauckhage 2011, p. 42) and analyzed how memes from "peripheral communities ... diffuse to the mainstream core" (Morina and Bernstein 2022). Spitzberg (2014) introduced a multilevel model to track the complex landscape of meme diffusion on the Internet; it emphasizes that memes, depending on internal and external factors, "will continue replicating throughout the systems to, between, and beyond which they are communicated." (Spitzberg 2014, p. 316). Nowotny and Reidy (2022, pp. 121–136) thematized how memes of Captain America were simultaneously used by supporters of the so-called "social justice" movement and adherents of the alt-right to promote their values and ideology. These findings stress that memes not only have symbolic value for distinct OCs but that the same memes have the potential to connect opposite communities.

This paper makes two main contributions. First, the literature review reveals a theoretical discrepancy regarding the role of memes for OCs; here, we address the two research strands by empirically testing the extent to which specific memes, because of their symbolic value, can be linked to distinct OCs. By introducing the concept of "meme languages" (composition of distinct memes and their variants), we provide a novel conceptual approach to empirically measure and differentiate between OC's cultures, aiming to initiate a fruitful discussion in IS research. The second is that we analyze how CRs and MPs impact the sharing of similar memes by differentiating between communities based on platform boundaries (SCs) and cross-cutting communities that build upon user interaction beyond subreddit affiliation (ICs). These insights will be valuable to enhance the understanding of how MPs and CRs can be applied to prevent negative user behavior (e.g., toxicity) and promote positive user interaction (e.g., social support). These contributions of our short paper are the first step toward a more profound analysis that will continue to evaluate (1) the role of memes that are strongly connected to individual OCs and memes that "bridge" the cultural boundaries between different OCs; (2) meme languages on a visual and textual level, which enables a more profound meme analysis; and (3) the detailed effects of different CRs and MPs on an individual user's meme language across communities.

Stuart Hall's Two Systems of Representation

We use cultural sociologist Stuart Hall's work on the two systems of representation to create a causal link between the sharing of memes and the representation of an OC's culture while also including the notion of CRs and MPs. Like Carbaugh's definition of culture introduced above, Hall (1997) emphasizes the role of language and meaning as the two essential components representing culture. Against this background, he developed his idea of two systems of representation in which the first system of representation comprises the idea that all of us possess a mental "conceptual system" that correlates "all sorts of objects, people and events ... with a set of concepts or *mental representations* (1997, p. 17; emphasis in original). Thus, based on our mental representation of real-world objects, people, and events and their interconnected relationships, we create "conceptual maps" that aid us in interpreting the world in a meaningful way. To adequately communicate these conceptual maps with other people and construct meaning, we need Hall's second system of representation: a common language system. For Hall, "language" refers to spoken or written words and comprises sounds and images, which he summarizes as "signs" that carry meaning. Thus, the composition of these "signs" constitutes a culture's common "language" for communicating meaning.

When translating Hall's theoretical considerations to the online sphere, we can only make inferences about the second system of representation, as digital traces do not provide insights into a user's interpretation of signs' cultural meaning. We can, however, evaluate whether shared signs (memes), based on their composition, lead to a characteristic cultural language (meme language) that represents a specific culture (OC culture). Following these considerations, we assume that SCs' and IC's individual cultures are expressed through distinct memes that can be aggregated into characteristic meme languages for each community. Thus, our first hypothesis:

H1: Individual SCs and ICs share characteristic meme languages.

Sharing these signs in the online space frequently happens within the boundaries of MPs and CRs. These

MPs and CRs guide what signs should be shared within a community (Seering et al. 2019). Therefore, it is plausible to assume that they affect the diversity of shared signs within a community and lead to a more homogenous cultural language and representation. As a first analysis, we thus assume that SCs share more homogenous meme languages than ICs, as the former is constituted around at least a minimum level of concrete CRs and MPs. In contrast, the latter evolves around user interaction across subreddit boundaries that is free of centralized supervision. From this, we derive our second hypothesis:

H2: The meme language of SCs is more homogenous than that of ICs.

Methods

Collecting Submissions and Comments on Reddit

Reddit, our choice for analyzing the relationship between memes and their characteristic association with specific OCs, is regarded as "the front page of the Internet" (Gaudette et al. 2021), bringing together users who "participate in, contribute to, and even develop like-minded communities whose members share a common interest." (Gaudette et al. 2021, p. 3493). These OCs, called subreddits, have their own moderators, CRs, and topics of interest that facilitate the development of a collective identity among users (Gaudette et al. 2021). In addition to these pre-defined subreddit communities based on boundaries set by the platform, users are free to engage with multiple communities and interact across SC boundaries. The patterns that arise from the interactions resemble structures of social interaction and reveal communities of users that span the boundaries of SCs. Thus, these interaction communities (ICs) evolve naturally and serve as the ideal foundation for analyzing the diffusion of memes in heterogeneous communication spaces. The availability of data on both types of OCs makes Reddit a suitable platform for our analysis.

We downloaded six months' worth (August 2022–January 2023) of Reddit submission and comment dumps obtained from Pushshift. These files comprise the entire 245-GB Reddit feed during this period. Our goal was to analyze the 100 largest of all unique 709,747 subreddits as measured by number of members in January 2023. We used that month's submission dump as our reference and extracted the number of members per subreddit. We then extracted all submissions and comments posted within those 100 largest subreddits, yielding 7,109,414 submissions and 178,286,358 comments (28.6 GB). Thus, although representing only 0.014% of the number of subreddits, our sample covers 11.673% of the shared submissions and comments within that period, allowing us to analyze a substantial proportion of the shared Reddit content and thus, obtain insights regarding the role of memes within the most prominent subreddits. To control for potential bots that would bias our results, we tested whether users within our dataset were part of a publicly available list of 392 bots as of April 14, 2023, published by Reddit.[1]. After dropping all submissions and comments that were posted by bots or whose authors were deleted, we ended up with 4,925,264 submissions and 155,598,892 comments, posted by 8,710,321 unique authors.

Collecting Images and Detecting Memes

To analyze whether the composition of specific memes is characteristic of individual OCs, we needed to detect memes within our data. We began by downloading, where possible, all images attached to the submissions from the 100 largest subreddits posted in August 2022. This yielded 173,771 images (106.3 GB) in what we called the "image dataset." We then filtered these data to obtain those images matching our definition of "meme" above. We avoided laboriously going through all images manually by using a convolutional neural network (CNN) model–having demonstrated outstanding performances in similar classification contexts (e.g., Sherratt et al. 2023)–to automate meme detection.

To train the binary CNN (meme/non-meme), we used the following openly available datasets: (1) the Memotion Dataset 7k for obtaining memes, which contains 6,992 memes from different genres and thus complyies with our meme definition (images overlayed with text); (2) a subsample of four different datasets available from TensorFlow. These include PASCAL VOC, which covers twenty general image classes; SVHN, which comprises images of digits; LFW, which includes images of faces and persons; and wider_face, a face detection benchmark dataset to receive non-memes. As training a CNN with a balanced data sample is advised, we extracted 6,990 images from these four datasets (60% PASCAL VOC, 15% SVHN, 15% LFW,

---

and 10% wider_face) to match the meme sample obtained from the Memotion Dataset 7k. These approximately 14,000 images were the training and testing data for the CNN model.

We used the CNN architecture of Keras' pre-trained EfficientNetB4 as our baseline model. To adjust the model to our context, we used transfer learning, freezing all pre-trained layers and retraining the last layer by compiling the model with a sigmoid function. After performing a hyperparameter tuning, we decided on adam as an optimizer, with a learning rate of 0.01. We included an early stop callback function to monitor the testing accuracy, with a patience parameter of 5. As increasing the sample size leads to better-performing models, we also applied image augmentation throughout the training process. We used 80% of the data as training data and 20% as testing data, beginning the training process with 100 epochs and a batch size of 32. Due to the early stop callback function, the model stopped at epoch 18 and achieved an accuracy of 89.9%, a precision of 95.0%, a recall of 84.3%, and a loss of 24.0% on the testing dataset.

Applying the meme classifier to our image dataset from Reddit resulted in 29,778 images classified as memes and 143,809 as non-memes. To ensure the quality of this classification, we manually labeled 100 meme-classified and 100 non-meme classified images; we identified 64 of the former as memes and 82 of the latter as non-memes–receiving an overall accuracy rate of 73%. This value was within an acceptable range compared to the accuracy obtained with the testing dataset and was above 70%, so we continued working with the detected memes. We called this the "meme dataset."

Network Creation and OC Labeling

To receive ICs, we created the interaction network I. Our node set $U = \{1, \ldots, n\}$ comprises all unique users of the 100 largest subreddits who either authored a submission or comment. Each user $i \in U$ is connected with another user $j \in U$ if they interacted at least once, with an interaction defined as a user commenting on another user's submission or comment. The network this created comprised 7,743,544 nodes and 93,107,759 edges. In its structure, we detected one giant component with 7,721,402 nodes and 92,843,239 edges; the remaining 5,599 components had at most 10 nodes. The giant component accounted for 99.7% of all the nodes depicting user interaction, so we continued working with it, dropping all nodes and edges from the other components.

To create SCs, we simply used Reddit's pre-defined subreddit boundaries, which in our case led to 100 SCs. To detect interaction communities, we applied to the interaction network I the commonly used Louvain algorithm, which is based on a modularity-maximizing approach and known for its scalable performance when applied to large networks. To control for the quality of the detected communities, we calculated the modularity score, which ranges from -1 (partitioning is worse than chance) to 0 (partitioning is as good as change) to 1 (perfect partitioning). After computing the communities with different resolution parameters, we decided on the resolution = 1.5, as this parameter leads to the modularity score of 0.44. By using this parameter, we yielded 1,846 different ICs.

Detection of Memes and their Variants and Analysis of Meme Languages

To evaluate an OC's meme language and answer our two research questions, we need to detect memes and their variants. To do so, we followed the approach introduced by Courtois and Frissen (2022), who created a mapping algorithm that detects similar meme features across images. Thus, even modified images that still contain essential elements of the original image are considered similar. The authors calculate the distance between image pairs based on visual similarity for their feature matching: the smaller the distance, the more likely that images share the same features and belong to the same original meme. If a meme cannot be matched with any other meme, it is dropped and not further processed. Once similar memes are detected through feature matching, a meme network X is created, consisting of components B that include memes detected as similar. For further information, please see Courtois and Frissen (2022).

The Courtois and Frissen (2022) model is finetuned for a context very similar to ours, so we used the model with their hyperparameters. We began with a subsample of 3,000 detected memes posted in August 2022 (approximately 10% of memes in that period). After manually screening these images, we continued to work with 1,892 memes that matched our definition (63%, aligning with the previous sanity check). The discarded images were most often screenshots of social media conversations or news articles that would have biased our result if not dropped. These 1,892 memes were posted in 30 SCs and 22 ICs; we dropped all communities with less than ten shared memes to guarantee a meaningful visual feature-matching

process, resulting in 11 SCs and 9 ICs, each containing a certain number of memes defined as $y \in Y$.

We applied the feature-matching algorithm to all memes $y \in Y$ of each of the remaining SCs and ICs and created a meme network X for each community that consisted of components B comprised of memes and their variants as nodes defined as $x \in X$. We manually validated whether the matched memes belonged to the same original meme and adjusted–if necessary–the feature matching parameter m (see Courtois and Frissen 2022) and the individual components until all components represented one meme and its variants. To create and compare meme languages, we manually labeled each component B of each meme network X with a number representing the distinct type of meme it comprises (note that components of the same meme were labeled alike). Thus, an OC's meme language is constituted by its individual component composition and can be compared between SCs and ICs, respectively.

To analyze how the meme language of SCs and ICs differs in their homogeneity, we calculate a similarity score s for each community, with $s = \frac{x}{y}(1 - \frac{c}{y})$, where x represents the number of matched memes used as nodes in the network graph X, y the number of initial memes from each individual community and c the number of matched meme components B in each community's meme network X. Thus, scores closer to 1 denote that a community shared predominantly visually similar memes (nearly all memes could be matched with other memes and could be aggregated to a few meme components), representing a relatively homogenous meme language, whereas scores closer to 0 indicate a heterogenous meme language with many visually different memes (see Table 1 for an overview of all SC and IC values). Because of the small sample size, we performed a Wilcoxon Rank-Sum Test comparing the s values between SCs and ICs, assuming that SCs should display greater values (more homogenous meme languages). Yet, with a p-value of 0.65, we cannot reject the null hypothesis and, thus, cannot conclude that the s scores for SCs are significantly higher than for ICs. Therefore, SCs' meme languages are not more homogenous than the ones of ICs.

OC	OC name	y	x	c	m	Meme language composition	s
SC	AdviceAnimals	43	22	9	4	1;2;3;4;5;6;7;8;9	0.40
SC	dankmemes	283	29	13	20; B_1: 50	10;11;12;13;14;15;16;17;18;2;19;20;21	0.10
SC	funny	58	0	0	1	/	0
SC	gaming	37	0	0	1	/	0
SC	HistoryMemes	155	18	6	20; B_1: 90	10;22;23;24;25;26	0.11
SC	MadeMeSmile	11	0	0	1	/	0
SC	me_irl	61	0	0	15	/	0
SC	memes	1,020	170	49	20; B_1: 200	27;28;29;15;30;31;21;22;33;34;2;35;36;37;11;38;39;40;41;42;43;44;45;46;47;48;33;49;50;14;12;51;52;53;54;55;56;47;17;58;59;60;61;62;63;64;23;65;66;67	0.16
SC	pcmmasterrace	27	2	1	4	68	0.07
SC	wallstreetbets	85	12	4	4	69;70;71;22	0.13
SC	wholesomememes	37	0	0	4	/	0
IC	10	1,075	212	63	4; B_1:400	44;72;47;19;40;29;45;24;15;73;52;74;75;14;11;76;53;41;66;2;58;22;77;42;12;28;78;79;80;56;36;81;82;83;84;85;13;86;33;87;54;31;65;49;37;46;43;17;34;57;88;62;89;60;90;59;91;61;64;23;48;92;93	0.19
IC	24	123	8	3	20	38;94;10	0.06
IC	69	53	8	4	4	2;3;6;7	0.14
IC	81	92	12	4	4	71;95;70;22	0.12
IC	89	137	0	0	15	/	0
IC	121	16	0	0	4	/	0
IC	679	38	2	1	4	41	0,05
IC	1133	127	12	4	4; B_2: 25	25;96;26;22	0.09
IC	1187	25	2	1	4	2	0.08

Table 1. Overview of different values of SCs and ICs.

Preliminary Findings and Next Steps

To answer RQ1, we compare the meme language compositions between the individual SCs and ICs, respectively (see Table 1), making two interesting observations. First, for both types of OCs, meme languages vary highly between the individual OCs, with only a few memes and their variants appearing in several OCs (e.g., memes 2, 10, and 22). Second, for seven out of the 20 OCs evaluated, the memes could not be mapped to a network graph *X*, which indicates that these OCs shared visually diverse memes that do not constitute a characteristic meme language. Based on these findings, we can accept *H1* insofar as the following: if SCs or ICs feature a detectable meme language, it differs between the individual communities and is thus characteristic for distinct OCs. These preliminary findings show that certain memes can be seen as cultural symbols that are, in their composition, tied to particular OCs. To answer RQ2, we evaluated the meme languages' homogeneity between SCs and ICs by calculating a similarity score *s*. The Wilcoxon Rank-Sum Test's result showed, however, that SCs and ICs do not vary in their meme language homogeneity, meaning that an OC's CRs and MPs did not impact the sharing of homogenous memes within our data. Thus, we must reject *H2*.

In conclusion, we found initial evidence supporting research that considers memes as cultural symbols for individual OCs (SCs and ICs) that can be aggregated to characteristic meme languages. Yet, our results also show that some memes, and thus the culture expressed through them, overlap in some of the SCs and ICs. This suggests that specific memes have the potential to "bridge" the cultural boundaries of communities and are not tied exclusively to any individual OC. In addition, our preliminary results demonstrate that CRs and MPs do not affect the sharing of homogenous memes within an OC, as the meme language of SCs and ICs did not significantly differ in their level of homogeneity. This finding shows that communities based on platform-imposed boundaries and communities established through cross-cutting user interaction feature a complex and multifaceted culture that a single symbol cannot represent; instead, the compositions of these symbols provide more profound insights into an OC's expressed culture. These findings entail first important implications as they not only aid in providing a deeper understanding of an OC's shared values and norms being essential for, an OC's sustainability, for example, but also in expanding our knowledge on cultural diffusion online, which, for instance, can be important to track and prevent online radicalization.

These preliminary findings provided valuable initial insights into the analysis of memes as cultural symbols for OCs and pave the way for several promising future research avenues. However, while the analysis of memes shared within the 100 largest subreddits allowed us to cover a substantial portion of the shared mainstream content on Reddit, our findings are not representative of all subreddits on Reddit. It is reasonable to assume that smaller, niche-oriented subreddits with a more solidified user base share a more homogenous meme language with specific memes tightly linked to individual OCs. Yet, these niche-oriented subreddits are also known to influence each other reciprocally across subreddit boundaries, making a combined analysis of ICs and SCs an interesting subject for future research. Therefore, our findings should be seen as a first step toward analyzing the role of memes as cultural symbols for OCs, which we plan to complement with the evaluation of meme languages shared in different types of subreddits. Likewise, as we analyzed only a subsample of memes posted in August 2022, we would like to expand our analysis by examining the relationship between meme languages and OCs within the entire six-month period of our collected data. Doing so would allow us to dive deeper into analyzing newly emerging meme languages and explore, for instance, which memes are tightly connected to OCs, and which ones diffuse within the network, bridging the cultural border across (opposing) communities. After answering such questions for the platform Reddit, we would like to analyze whether similar findings could be reproduced on other platforms. These findings will be valuable in evaluating how different platform architectures, user bases, and affordances affect the sharing of memes, providing a more holistic picture of OCs' culture. We recognize that defining an OC's meme language based on memes' visual similarity is only the first step in uncovering the profound potential of memes as cultural symbols of different OCs. To fully understand memes' symbolic and cultural meaning for distinct OCs, we want to complement our quantitative visual analysis with a qualitative examination of the memes' content, which would enable us to define an OC's meme language more profoundly and compare them across OCs in more depth. One possible approach for an in-depth evaluation of a meme's visual and textual components could be a multimodal discourse analysis, as applied by, for instance, Yoon (2016). Finally, we would like to investigate how varying levels of CRs and MPs affect

the meme language within an OC and an individual user's meme language across communities. Such insights could help to answer questions about the mechanisms behind the emergence of an OC's culture and whether users adapt their cultural communication according to changing environmental conditions. Thus, our work has great potential to be expanded, initiating novel ways to analyze, track, and compare OCs' online culture and offering profound insights into OC's reciprocal cultural influence.

References

Bauckhage, C. 2011. "Insights into Internet Memes," in *Conference on Web and Social Media*, pp. 42–49.

Carbaugh, D. 1993. "'Soul' and 'Self': Soviet and American Cultures in Conversation," *Quarterly Journal of Speech* (79:2), pp. 182–200.

Courtois, C., and Frissen, T. 2022. "Computer Vision and Internet Meme Genealogy: An Evaluation of Image Feature Matching as a Technique for Pattern Detection," *Communication Methods and Measures* (17:1), pp. 17–39.

Dawkins, R. 2016. *The Selfish Gene*, (40th ed.), Oxford: Oxford University Press.

DeCook, J. R. 2018. "Memes and Symbolic Violence: #proudboys and the Use of Memes for Propaganda and the Construction of Collective Identity," *Learning, Media and Technology* (43:4), pp. 485–504.

Fayard, A.-L., and DeSanctis, G. 2010. "Enacting Language Games: The Development of a Sense of 'We-ness' in Online Forums," *Information Systems Journal* (20:4), pp. 383–416.

Gal, N., Shifman, L., and Kampf, Z. 2016. "'It Gets Better': Internet Memes and the Construction of Collective Identity," *New Media & Society* (18:8), pp. 1698–1714.

Gaudette, T., Scrivens, R., Davies, G., and Frank, R. 2021. "Upvoting Extremism: Collective Identity Formation and the Extreme Right on Reddit," *New Media & Society* (23:12), pp. 3491–3508.

Hall, S. 1997. "The Work of Representation," in *Representation: Cultural Representations and Signifying Practices* (2nd ed.), London: SAGE, pp. 15–64.

Jackson, S. 2011. "Organizational Culture and Information Systems Adoption: A Three-Perspective Approach," *Information and Organization* (21:2), pp. 57–83.

Kozinets, R. V. 2010. *Netnography: Doing Ethnographic Research Online*, London: SAGE.

Marwick, A. E. 2015. "Instafame: Luxury Selfies in the Attention Economy," *Public Culture* (27:1), 137–160.

Massanari, A. 2017. "# Gamergate and The Fappening: How Reddit's Algorithm, Governance, and Culture Support Toxic Technocultures," *New Media & Society* (19:3), pp. 329–346.

McSwiney, J., Vaughan, M., Heft, A., and Hoffmann, M. 2021. "Sharing the Hate? Memes and Transnationality in the Far Right's Digital Visual Culture," *Information Communication and Society* (24:16), pp. 2502–2521.

Morina, D., and Bernstein, M. S. 2022. "A Web-Scale Analysis of the Community Origins of Image Memes," in *Conference on Human-Computer Interaction*, pp. 74:1-74:25.

Moser, C., and Deichmann, D. 2021. "Knowledge Sharing in Two Cultures: The Moderating Effect of National Culture on Perceived Knowledge Quality in Online Communities," *European Journal of Information Systems* (30:6), pp. 623–641.

Nissenbaum, A., and Shifman, L. 2017. "Internet Memes as Contested Cultural Capital: The Case of 4chan's /b/ Board," *New Media & Society* (19:4), pp. 483–501.

Nissenbaum, A., and Shifman, L. 2018. "Meme Templates as Expressive Repertoires in a Globalizing World: A Cross-Linguistic Study," *Journal of Computer-Mediated Communication* (23:5), pp. 294–310.

Nowotny, J., and Reidy, J. 2022. *Memes-Formen Und Folgen Eines Internetphänomens*, Bielefeld: transcript Verlag.

Seering, J., Wang, T., Yoon, J., and Kaufman, G. 2019. "Moderator Engagement and Community Development in the Age of Algorithms," *New Media & Society* (21:7), pp. 1417–1443.

Seraj, M. 2012. "We Create, We Connect, We Respect, Therefore We Are: Intellectual, Social, and Cultural Value in Online Communities," *Journal of Interactive Marketing* (26:4), pp. 209–222.

Sherratt, V., Pimbblet, K., and Dethlefs, N. 2023. "Multi-Channel Convolutional Neural Network for Precise Meme Classification," in *Conference on Multimedia Retrieval*, pp. 190–198.

Shifman, L. 2014. *Memes in Digital Culture*, Boston: MIT Press.

Spitzberg, B. H. 2014. "Toward A Model of Meme Diffusion (M ^{3} D): Toward A Model of Meme Diffusion," *Communication Theory* (24:3), pp. 311–339.

Yoon, I. 2016. "Why Is It Not Just a Joke? Analysis of Internet Memes Associated with Racism and Hidden Ideology of Colorblindness," *Journal of Cultural Research in Art Education* (33:1), pp. 92–123.