Momentary Symbols: Tracing the Visual Expressions of Protest Movements

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Abstract

While a growing sociological literature documents how visuality shapes collective identities, less attention is given to the temporal dimension of symbol construction, and the shifting meanings and practices associated with prominent images and objects. We introduce the concept of *momentary symbols* to describe and examine processes, where objects for a shorter period rapidly grow into a dominant symbol for a protest movement, but just as quickly acquire a less dominant symbolic role. We demonstrate the empirical relevance of this concept by tracing how umbrellas, lasers, and masks became dominant but temporally contingent visual symbols of Hong Kong's pro-democracy movement *Anti-ELAB*. Specifically, we use methods from computational sociology (including dictionary classification, object detection, and semantic ego network snapshots) and tweets about the 2019 Hong Kong protests (N = 1,615,832) to trace the provisional and unstable characteristics of Anti-ELAB's visual expressions. Drawing on actor-network theory (ANT), we analyze objects and technologies as nonhuman actants that visually express protest and oppositional voice alongside humans. Results show that the three actants (umbrellas, lasers, and masks) oscillate between symbolic-visual and practical-confrontative translations during the protest period. Our study demonstrates the relevance of using processual and temporal approaches to capture the erratic and volatile nature of visual expressions in social protests.

Keywords: actor-network theory, protest movements, visuality, symbols, object detection

Introduction

The largest demonstration in Hong Kong's history took place on June 16, 2019. Approximately two million residents took to the streets to show their dissatisfaction with a draft law enabling the Hong Kong government to extradite crime suspects for prosecution in China's judicial system (Legislative Council of the Hong Kong Special Administrative Region of the People's Republic of China 2019). Starting as a backlash to the extradition bill, the 2019 demonstrations would later evolve into a general opposition against China's involvement in Hong Kong and eventually a broader call for democracy, akin to other pro-democracy protests in the recent decade (della Porta 2015). Meanwhile, the protest movement behind the demonstrations, known as Anti-ELAB (Anti Extradition Law Amendment Bill), became infamous for using umbrellas, laser pointers, and masks in collisions with the local authorities (CNA 2019). In this paper, we trace how umbrellas, lasers, and masks became dominant visual markers of the Anti-ELAB movement, with a specific emphasis on the shifting meanings and practices associated with these objects throughout the protest period.

A growing sociological literature examines the visual expressions of social movements (SM) through symbols and images with a focus on embodied practices of protest (Doerr, Mattoni, and Teune 2015; Doerr and Milman 2015; Kwok 2021; Mattoni and Teune 2014; Neumayer and Rossi 2018; Pang 2021; Richards 2020). While this literature offers valuable insights into how visuality shapes collective identities and emotions, less attention is given to processes of symbol construction, and the shifting meanings and practices associated with prominent images and objects as SMs evolve. However, grasping the temporal dimension is key to understanding how pro-democracy movements' mobilize (della Porta 2015).

In this article, we introduce the concept of *momentary symbols* to describe and examine processes where objects for a shorter period rapidly grow into a dominant symbol for a protest movement, but just as quickly acquire a less dominant symbolic role.

The Anti-ELAB movement represents a rich case for studying such processes, as a series of objects (umbrellas, lasers, and masks) momentarily assumed symbolic status during the protest activities in Hong Kong. We use methods from computational sociology (including dictionary classification, object detection, and semantic ego network snapshots) and 1.6 million tweets about the 2019 Hong Kong protests, to trace the provisional and unstable characteristics of the Anti-ELAB movement's visual representations.

Sociologists have already theorized about the intermediary agency of (digital) images to communicate, mediate, and politically translate voices of protest and opposition movements (Doerr 2010; Schober 2019). Our analysis of momentary symbols differs from these approaches in that we apply a specific ANT-based focus on translation processes. That is, we follow the non-human actants (umbrellas, lasers and masks), describing their situational and dynamic character as they oscillate between practical-confrontational translations (e.g. as strategic weapons or shields in collisions with authorities) and more symbolic-visual translations (e.g. as symbols that visualize collective identity and resistance) during the Hong Kong protests. We assume that the protest movement's translations of the actants are temporally contingent on concurring events at a short-term level, leading to some objects becoming *momentary symbols*, i.e., ephemerally dominant symbols that quickly change meaning.

Our study adds to the scholarship on visuality and SMs by demonstrating the relevance of using processual and temporal approaches to capture the erratic and volatile nature of visual expressions in social protests. Further, we add to the on-going debate on online interaction ritual chains (DiMaggio et al. 2018) with an analytical framework that allows quantifying processes of symbol construction and the temporal dimension of symbols.

Background

A growing literature examines the visual and symbolic aspects of SMs' communicative efforts (Doerr, Mattoni, and Teune 2013; Doerr and Milman 2014, 2015; Doerr and Teune 2013; Matsilele and Ruhanya 2021; Mortensen 2015; Neumayer and Rossi 2018; Poell and van Dijck 2015). Doerr and Teune (2012), in one of the first empirical studies on visuality in social movements, define visuality as a key component of SMs that influences both how SMs are perceived by the outside world and how they act on conscious and subconscious levels. Visual sociologists highlight the open, ambivalent, and polyvalent quality of visual communication. A single visual symbol of protest can convey different and contrasting political meanings to different audiences simultaneously, making images susceptible to political conflict (Doerr 2010). SMs often rely on a repertoire of narratives and symbols that were previously used by other movements (Doerr et al. 2013), which contributes to their formation as collective actors. In this process of organizing, visual expressions play a central role, as continuity is maintained through symbols, colors, slogans, logos, and other such elements (ibid).

While the visuality literature offers rich insights into SMs' use of symbols, limited attention has been given to the temporal contingencies of visual expressions and symbols. Focusing on the construction of symbols is essential if the goal is to understand *how* and *why* some visual objects and technologies emerge as symbols in SMs. Hence, drawing on interaction ritual (IR) theory and actor-network theory (ANT), we outline an analytical framework that allow us to investigate such processes over time.

Symbol construction within interaction rituals

Our understanding of the symbol construction processes that SM's enact is grounded in Randall Collins' theory on interaction ritual chains (Collins 2005). Collins argue that symbols are outcomes of IRs, which are situations where a collective shares a joint focus of attention and experiences

emotional energy through collective effervescence (Liebst 2019). Through the joint attention toward, for example, objects, words, or images, a collective we-identity arises as IR participants imitate each other's practices and expressions. Further, symbols are shaped by the barriers and boundaries that separate different groups through contrasts and conflicts. One example of an IR is the Anti-ELAB assembly at the Hong Kong Space Museum, where a large collective of protesters imitated each other's expressions by pointing lasers toward the museum's façade (Figure 1), enabling rhythmic entrainment (DiMaggio et al. 2018). By doing so, they collectively demonstrated their presence and solidarity, turning the laser into a symbol through joint attention and emotional energy. This allowed the collectives to prolong their collective effervescence by "storing" it in the laser as a symbol (Collins, 2005:81). While Collins originally was initially skeptical about whether IRs can generate effervescence online, newer work indicates this can be the case (DiMaggio et al. 2018; Mizrahi-Werner et al. 2022).

In the offline domain of social life, the joint attention and boundary-setting of IRs can often be directly observed through qualitative methods. However, identifying the presence of symbol-inducing interaction rituals in a large dataset of digital traces is less straightforward and requires different approaches. We contribute to previous research on online interaction rituals (DiMaggio et al. 2018; Maloney 2013; Mizrahi-Werner et al. 2022) by providing an analytical framework that enables researchers to use social media data to (i) identify IRs with joint attention toward objects, (ii) map out changes in the objects' translations through actor-networks, and (iii) assess the temporal longevity of symbols that result from the IRs.

Actants and agency in social movement research

Analytically, we draw on actor-network theory (ANT), and analyze objects and technologies as nonhuman *actants* with agency just like humans (Callon and Latour 1981; Czarniawska 2017; Latour 1993). According to this view, the act of protesting is not exclusive to humans but can also

be carried out by for example umbrellas that countervail surveillance or express collective identity. Further, with the concept of translation, we highlight that actants do not possess a singular identity or essence independent of the social situation. Instead, the role of the actant depends on the network of other actants with which it is associated and thereby translated. The concept of chains of translations highlights the dynamic nature of this process, whereby the translation of an actant can evolve over time, resulting in a series of temporarily fixed translations that resemble a chain. ANT provides a useful vocabulary for describing such chains. The concept of "translation" (Callon 1984, 1990; Callon and Latour 1981; Latour 1999) helps us understand how actants, whether human or non-human, are enrolled and transformed through networks of association. Figure 1 illustrates our line of thinking. When a laser is enrolled in a network that involves, among others, adversaries such as surveillance cameras and policemen, we can interpret its translation to be confrontational. On the other hand, when it is enrolled in a network with many human protesters, and in the absence of adversaries, it is transformed into a symbol.

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Previous ANT-inspired SM studies demonstrate heterogeneity of human and non-human actants taking part in SMs. Scholars such as Jerne (2018), Kemmer (2020), Rajão and Jarke (2018), Rodríguez-Giralt (2011; 2018), Solli (Solli 2010), and Yun (2020) have highlighted the ways in which non-human actors are mobilized in confrontations with state authorities. Additionally, a few studies have focused on the agency of objects and technologies in concrete protest situations. For instance, Clifton and de la Broise (2020) investigate how non-human actants communicate through YouTube videos in alliance with human protesters. With this approach, movements are examined temporally as forms of organizing rather than as static entities (Czarniawska 2017; Law 1994; Martín Sainz de los Terreros 2018). Thus, sharing images of

umbrellas, slogans and gas masks on Twitter becomes an asset in the creation of the Anti-ELAB movement, rather than something that follows the establishment of the movement.

Towards a theory of momentary symbols

Sociologists have focused on the persistency and continuity of SMs (Meyer and Whittier 1994; Taylor 1989) and how new SMs draw on rich repertoires of visuals and symbols from previous SMs (Doerr and Teune 2013; Milman and Doerr 2023). As such, symbols such as "the clenched fist of Black Power" can endure over time and yet is constantly transformed and renewed, translated, and also coopted and culturally appropriated by a variety of different movement groups or counter movements in place specific settings and periods (Milman and Doerr 2023). However, as a function of the acceleration of the social that the advent of digital communication technologies carried with them (della Porta 2015; Rosa 2013), emergent themes and topics now experience shorter, but more intensive, attention-spans in the digital realm (Lorenz-Spreen et al. 2019). In the accelerated temporality of digital media logics, new events and issues that SMs encounter – the emergence of which SMs center their symbol construction in IRs – may receive accelerated bursts of attention that quickly decelerates again in favor of a new topic. This change in attention-spans influences the symbol construction process, as the IRs may be intensive in strength, but experience quick decay in attention, suggesting that the "storing" of collective effervescence in the symbol (Collins 2005) is only momentary. SMs therefore need to engage in new IRs and producing new protest symbols to uphold the collective effervescence, visual representation in media, and we-identity that the SM require to mobilize and survive, because the attention received from symbol construction is defined by both high acceleration and deceleration. For this reason, SMs would need to react swiftly and strongly to emerging events and incidents taking place at their point in time, as these are ample opportunities for spawning IRs, construct symbols, and grab attention from the outside world through visuals. Thus, SMs symbol construction no longer resemble overlapping streams that

endure over long periods, but rather temporarily contingent chains of momentary fixations of symbols that may be quickly substituted in the next link of the chain.

We therefore argue that there is a need for deepening the current conceptualization of symbols and visuals in protest movements, moving away from perceiving symbols as atemporal and stable entities to an understanding of symbols as fluid, highly dynamic, and volatile constructs that often obtain only momentary status as a dominant protest symbol (Askanius 2013; Doerr and Teune 2013). By this, we do not mean that symbols cannot become enduring and long-lasting: the symbols that are part of SMs shared visual repertoires are examples of symbols that were not momentary. However, tracing how SMs construct symbols – both those that are momentary and those that end up enduring over time – provides an opportunity to obtain saturated knowledge on a SMs we-identity, the issues they target, and their developments over time. We therefore need to develop a theory that accommodates temporality and process in its conceptualization of protest symbols to better grasp contemporary SMs. Our notion of momentary symbols is a step in this direction.

Momentary symbols are defined by three traits. First, momentary symbols are *temporally contingent*, meaning that they are highly bound to time, as they are constructed in relation to concurrent events and issues, in the case of Anti-ELAB for example anti-mask laws or student arrests. Without these events, the IRs that translated the specific actants into symbols would not have spurred or would so in a different manner, leading to a different symbol construction process. Second, momentary symbols are *volatile*, due to the speed and acceleration that characterizes contemporary digital communication. The outcome of this trait is that the translation of momentary symbols may swiftly change as the SM reacts to new events and issues, in turn abandoning the previous symbol. Finally, momentary symbols involve strategic use of the *visual*. In a digital world of information abundance, the power of images to attract attention to the SM means

that protesters will ensure a visual dimension of its momentary symbols to grab the attention that the new event briefly generates.

Our contribution to social movement studies

Our proposed ANT approach and focus on momentary symbols contributes to SM studies in two important ways. First, while scholars have previously pointed to the transformative power of visual images and aesthetic objects as triggers of communicative action and democratization (Doerr 2010; Ikegami 2005; Schober 2019; see also Special issue Visual Studies 2023), we know too little about how visual symbols, digital images and objects shape protest activities. In particular, there is a need, in research on pro-democracy movements, to understand how visuals and symbols translate or intermediate the we-identity of a movement (Flam and Doerr 2015; Polletta and Jasper 2001). In contrast to earlier work on movements' we-identity, this paper draws on ANT's concept of translation and visual theories of protest (Awad 2016) to understand how identity is constructed through actants' digital encounters.

Second, we need empirical studies on how visual objects translate and intermediate the development of movements' confrontational repertoire of strategies, including strategies of resistance and confrontation (Rossi et al. 2022). Empirical research shows the we-identity formation through specific symbols of pro-democracy protests (like the national flag) in for example the Egyptian pro-democracy movement (Awad 2016, 2020). However, while numerous scholars have studied the visual communication of protest through symbols of graffiti and street protest, we lack systematic research on the practical-confrontational power of symbols, particularly of nonhuman actants that become widespread visual images, voicing protest to millions of users through digitally mediated images. Moreover, if we focus on human actors only, we will not learn how various visual, digitally mediated symbols interact with each other online and become potentially powerful

actants, broker media, and communicators of protest messages. As an example, once millions of users post tweets, the strategic meaning of a symbol is no longer controllable by protest leaders. We argue that there is a need to study these visual objects as non-human actants that become translated into "brokers" of protest, as well as their collective behavior online. We want to empirically explore how umbrellas and other symbols of the Anti-ELAB protests translated the meaning of protest – interacting with each other, human protesters and with other non-human objects. Thus, the contribution of ANT to a visual sociology of pro-democracy movements is to empirically study how non-human actants, including visual objects, can become translated into broker media that is enacting dissent and translating the meaning of protest (Awad and Wagoner 2015; Doerr 2017; Milman and Doerr 2023; Schober 2019).

Previous research on the ANTI-ELAB protests

Numerous studies have already examined the role of technology in the 2019 Anti-ELAB protests, including the use of communication devices and services for SM organization and resistance (Kow, Nardi, and Cheng 2020; Lee et al. 2022; Leung, Hsiao, and Garimella 2022; Liang and Lee 2021; Su, Chan, and Paik 2022; Teo and Fu 2021), urban and surveillance-related aspects of the demonstrations (Li and Whitworth 2022b, 2022a; Liao 2022; Stokols 2022), and the movement's online visibility and use of imagery (Lee 2023; Lui 2022; Ng 2021). Liu and Li (2022) show that the evolution of online topics on the Chinese micro-blogging service, Sina Weibo, was both spatially and temporally dependent on the events on the ground in Hong Kong, indicating that the online and offline domains were closely linked. Researchers have also examined the symbols of the Anti-ELAB movement, with masks being underscored as its primary emblem (Kwok 2021; Pang 2021). As such, the Anti-ELAB movement has been studied from multiple angles. Our study expands on previous research about the temporal link between online and offline events during the

protests and qualify previous studies on the role of masks as a dominant symbol to the movement, by adopting a processual and granular approach to investigating processes of symbol construction.

In summary, we integrate perspectives from visual sociology, IR theory and ANT-research on SMs to capture the temporal contingency of protest symbols. Our study offers a novel perspective on how protest symbols evolve and acquire new meanings as they move through networks of association. Previous studies have focused on time and images of protest focusing and on long-term shifts of visual protest in street graffiti (Awad and Wagoner 2015), on TV and videos (Askanius 2013; Uldam and Askanius 2013), and on historic shifts in images of protests (Doerr and Teune 2012; Safaian and Teune 2022). However, to our knowledge, this article is the first to use social media data to map SMs with a focus on non-human actors, such as physical objects and technologies. Specifically, we use Twitter data for the entire 2019 protest period and trace the chains of translations undergone by umbrellas, lasers, and masks. We construct ego networks for all actants at different time points and use network metrics, node interpretation, and qualitative inquiry to show how these actants' translations vary over time. We find that actants oscillate between symbolic-visual and practical-confrontative translations in the Anti-ELAB protests, reflecting the changing dynamics of the SM.

Research design

In this article, we analyze scraped tweets about the Hong Kong protests and evaluate the translations of three actants (umbrellas, lasers and masks) on the media platform over the course of the protest period. Drawing on Carlsen's (2019) quali-quant strategy for analyzing social media data, we adopt a mixed methods approach oscillating between qualitative and quantitative modes of analysis. This approach allows us to 'test' our interpretations across domains (Nelson 2021), i.e., testing whether interpretations based on quantitative results can be validated through qualitative insights and vice versa.

Data

Our focus on social media data has two advantages. One advantage is that social media interactions are always on, meaning that metadata about these interactions is continuously captured and stored in databases. This allows for precise timestamps and the ability to investigate unexpected events. Another advantage is that social media data is nonreactive, meaning that researchers do not influence the interactions taking place on the platform. This allows us to observe more naturalistic behavior than we might see in a laboratory setting (Salganik 2018). Analyzing data from Twitter, for example, can provide valuable insights into how people communicate and interact in real-world situations.

We used the official Twitter API to scrape tweets that mentioned Hong Kong-related hashtags during the protest period. We identified relevant hashtags through qualitative immersion into protest-related tweets during different periods of the protests and identifying novel words and hashtag usage (Kozinets 2019) (see Appendix A). As we aimed to map the actants' temporal developments on Twitter during the protests, we limited the time period to the day before the proposal of the extradition law bill, February 11th, 2019, until the end of the year, December 31st, 2019, after which the intensity in protests decreased. After cleaning the data and removing duplicates and spambots (see Appendix B for details on this process), our empirical foundation for the project consists of 1,615,832 tweets and 671,164 tweet images. It should be noted that the tweets included in our dataset are not solely from protesters, but also cover tweets from anti-protest actors, journalists, news media and online spectators.

Methods

To map the temporal developments of the actants' translations, we use a combination of digital methods: dictionary classification, object detection and semantic ego network snapshots. Dictionary

classification is used to estimate the textual prevalence of the actants in the data. This process involved creating lists of words that are commonly used in relation to each actant (Wiedemann, 2019). These lists were generated using the similarity function of the Word2Vec algorithm, which calculates vectors between all words in the dataset (Mikolov et al. 2013). This allows for the identification of words that are semantically related to each actant, and for the addition of new words to the lists as necessary (Evans and Aceves 2016). To refine the dictionary model, we manually assessed a sample of tweets that had been classified as being about a particular actant. If the model's classifications were imprecise, words were removed from the actant's list as needed (see Appendix C for more details). This process was repeated until the model's estimations were considered to be sufficiently precise (Nelson 2017), i.e., above a threshold of 70 % accuracy.

Table 1 shows the number of tweets per actant as classified by the constructed dictionaries. With the classifier, we can graph each actant’s activity in tweets over time. This is used to identify peaks in activity for the actant, after which we segment the protest period into multiple time periods for each actant, allowing for temporal analysis.

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Symbol mobilization is a practice that heavily relies on visual elements. To account for this aspect in our data analysis, we utilize a deep learning-based object identifier. Specifically, we employ YOLOv4 (Redmon and Farhadi 2018) to estimate the prevalence of one crucial element in the mobilization, namely the umbrella, within approximately 700,000 images in our dataset (for more details, please refer to Appendix D). Unfortunately, YOLOv4's object detection performed poorly for masks and lasers, and therefore, we only present the results of umbrella detection.

There are two significant advantages to incorporating data from image-based object detection in our analysis. First, even if umbrella-related terms are infrequently used in tweets, the object may still be prevalent in images. Second, object detection provides valuable insights into the

translation of umbrellas over time. By extracting images with varying numbers of umbrellas, we can qualitatively interpret their translations during different periods. However, a common limitation of object identifiers is their inability to detect small or closely spaced objects in images (Hui, 2019). Given that umbrellas are often clustered together in Hong Kong protests, the recall of the model is quite low. To estimate its precision and recall, we manually evaluated a sample of images that were identified as containing umbrellas. After assessment, the model obtained a F1 score of 0.60, and the prevalence of images with umbrellas were estimated to be 13.8%. In detail, the object identifier had a detection rate of 68% (fraction of detected umbrellas versus manually counted umbrellas), a recall of 44% (fraction of images with at least one umbrella that was detected by the model), and a precision rate of 94% (fraction of images correctly classified as containing at least one umbrella) (see Appendix D). Given protest situations do not provide the best environment for object detection due to distorted objects, foggy and blurry images, and overlapping umbrellas, the performance of the model was deemed adequate.

To map the relation between actants in tweets and uncover their translations, we employ an analysis of semantic ego network snapshots based on co-word analysis (Callon et al., 1983). In co-word network analysis, words are considered inscriptions that mediate the translations of actants and establish relationships (Callon et al. 1983). By temporarily fixing the translations of other actants, actants in the network create chains of translation that evolve over time. We assume that the co-occurrence of keywords reflects the contents of a document, and in our case, documents take the form of tweets, with keywords being nouns related to selected actants. In contrast to social network analysis, we are not concerned with node position, clustering measures and other statistical features of networks, but rather the strength of ties between the words in the semantic networks. We use the Force2Atlas algorithm to construct ego networks for each nonhuman actant and analyze their immediate relationships. The size of nodes in the networks is based on their degree score,

which is the number of times a node connects to other nodes in the network (Scott 2012). We use Gephi's modularity algorithm to assess clustering in the network (Blondel et al. 2008), as it can identify multiple translations that exist simultaneously. We visualize clustering through the colorization of nodes (Blondel et al. 2008; Shwed and Bearman 2010). Despite the limitations of a node only being able to belong to one cluster, the approach still provides a view into how different words are strongly grouped together. To capture potential changes in translations over time, we manually construct actant-specific time periods by identifying peaks and valleys of activity for each actant, including one peak per time period. Ego networks are constructed for each of these periods of the actant, which we refer to as "translation snapshots." These snapshots allow us to analyze the evolution of actants over time, specifically their chains of translation. We present only translation snapshots for the time periods in which we observe shifts in the actants' translations.

In line with the quali-quant strategy, the quantitative analyses are informed by and triangulated with qualitative results and inquiry. Qualitative work was carried out both before, in the form of earlier work on the Anti-ELAB symbols (Johansen, Mariager, and Nissen 2019) and immersion into tweets (Kozinets 2019), and after the production of quantitative results, where samples were drawn from our data to provide qualitative context, interpretation and exemplars. As the success of the dictionary-based method hinges on alignment between chosen words and how words are used in a particular context (Carlsen 2019), the former was useful in obtaining this insight. The intention with the latter was to qualify our interpretation and ensuring knowledge about the objects of analysis (Carlsen 2019). Samples were randomly drawn from the actant-related datasets, conditioned on co-occurrence of the words of interest. For the object detection analysis, samples were drawn randomly, but conditioned on time spans. We do not draw random samples from the entire dataset, as the likelihood of encountering tweets related to the actants of interest would be very low due to the relatively low fraction of actant-related tweets in the data. While this

approach does enable the risk of confirmation bias, it was a necessity in this instance. To mitigate this, however, if translation snapshots indicated unexpected associations between actants, a sample with those word pairs were randomly extracted to challenge our existing interpretations and potentially reconfigure them.

Analysis

In this section, we trace the Anti-ELAB movement's symbol construction with a specific emphasis on processes of contestation and competition between actants. From a visual sociology perspective, we expect that the public image of the protest will shift across time due to contentious visual battles and visual shifts of meaning making around a variety of (competing) protest symbols and visual objects, with each symbol meaning different things to various audiences (Milman and Doerr 2023; Schober 2019). We describe the trajectory of each actant chronologically according to when it was dominant as a symbol of the Anti-ELAB movement, beginning with the umbrella. Through our analysis, we show how actants oscillate between two types of translations: (i) a practical-confrontational translation, where actants take on a practical function (e.g. to combat authorities or surveillance) and (ii) a symbolic-visual translation, where actants function as symbols of the SM without a distinct practical purpose.

Figure 2 displays the temporal development of the three actants. Each actant has distinct peaks in tweet activity, indicating points in time, where it is more associated in the protest network. Given that translations are most likely to occur during periods of high activity due to the many associations (Callon and Latour 1981) and increased joint attention towards the actants (Collins 2005), we segment the protest period into sub-periods according to these peaks (see Appendix E for defined time periods).

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Before zooming in on individual actants, we conduct an audience analysis to investigate if tweets that mention actants receive more engagement than non-actant tweets. We measure engagement based on likes, retweets, user followers and image associations. We include image associations, as these may indicate a visual focus in the tweets. As shown in Figure 3, tweets that mention actants spur substantially higher engagement than other tweets, indicating that the actants are given a somewhat important role in the Anti-ELAB movement's Twitter activities.

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Umbrella

During the Hong Kong protests in 2014, demonstrators primarily used umbrellas to symbolize peaceful, civil disobedience, e.g. through marches (Gilmore 2020). With the uprising in 2019, umbrellas were no longer just a symbol of peaceful disobedience, but also a practical tool of resistance in the collisions between protestors and police forces. For instance, protestors used umbrellas to shield off tear gas cannisters and baton beating, and to avoid being recognized by surveillance cameras (Johansen et al. 2019).

In Figure 4, we use object detection to trace developments over time in the occurrence of umbrellas in images associated with Hong Kong tweets. According to the YOLOv4 algorithm, the visual prevalence of umbrellas is remarkably higher than its textual prevalence, with 5.8% of all images containing umbrella(s).

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As shown in the figure, the prevalence of umbrella images fluctuates throughout the protest period, with distinct peaks along the way. To give a sense of this variation, we present an image from the beginning of the protest period (April 30th), where images had a high umbrella

density, and an image from the final stages of the protest period (November 17th), where there were more images of umbrellas, but fewer umbrellas in each image.

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In the left image, the umbrella actant does not play a practical role as a tool of resistance. Instead, its translation seems to be more symbolic-visual, with protesters associating themselves with the umbrella to visualize a collective, peaceful disobedience. While it is raining in the image, a robustness check linking umbrella prevalence and downfall statistics in Hong Kong verifies that umbrellas are not only present on days with rain (see appendix G).

The right image shows a practical-confrontational translation of the umbrella in the context of masked protestors during collisions at universities in Hong Kong. The practical function of the umbrella is to protect the protesters, rather than to symbolize peaceful, collective resistance. Many images with umbrellas from this period resemble the right image. This indicates that the umbrella actant has developed from a symbolic-visual translation into a more practical-confrontational translation as the protests grew more violent and intense.

To elaborate on this interpretation, we turn to analysis of semantic ego network snapshots. Figure 6 shows ego networks for the umbrella actant during three different protest periods, with the left network representing the earliest period and the right network representing the latest period (for full size, see Appendix H).

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In the left network in Figure 6, we identify three clusters. The purple cluster includes ‘democracy’ and ‘protest’. In the green cluster, nodes such as ‘extradition’ and ‘law’ are present, connecting the actant to the concurrent events in Hong Kong. By contrast, in the orange cluster, we observe rights and protest-related words, such as 'freedom', 'expression' and 'umbrellamovement'. This latter node explicitly points to the previous Hong Kong movement. With this translation, the

act of tweeting umbrella-related content becomes a way to voice dissidence and attract attention to the protests, as exemplified by the tweet in Figure 7.

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As indicated in the tweet-text, the umbrella is associated with a vision of collective struggle. Based on this ego network, we can conclude that the symbolic-visual translation of the umbrella actant dominated in the beginning stages of the Hong Kong protest.

In the middle ego-network, symbolic nodes still dominate in the purple cluster. However, the orange cluster now encompasses confrontational nodes such as ’police’, ’pepperspray’ and ’teargas’. This indicates that the umbrella is also translated into a practical-confrontational actant used to resist police violence, tear gas and pepper spray. While the second network covers both a symbolic-visual and practical-confrontational translations, the third network is dominated by a practical-confrontational translation, where umbrellas are mobilized in protest situations to resist violence and oppression. Here, we se an overrepresentation of nodes with combat-oriented words in the teal and green clusters, such as ’war’, ’watercannon’, ‘rubberbullet’ and ’fight’. During this period, violent collisions between protesters and riot police at universities in Hong Kong received great attention on Twitter, as exemplified by the tweet in Figure 8.

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In Figure 8, blue-dyed water is used by authorities, reportedly to mark protesters with the aim of later arresting them (Hamilton 2019). Protesters in turn, use umbrellas as a counter-surveillance strategy to avoid being marked by the policy.

In summary, we show how the umbrella, over time, develops from a symbolic-visual actant into a more practical-confrontational actant. This translation is evident in both the object detection analysis and semantic network analysis. Symbols in the Anti-ELAB movement are therefore neither fixed nor stable but can oscillate between different translations.

Laser

Like the umbrella, the laser actant undergoes different translations during the Hong Kong protests. In some situations, the laser is translated practically, e.g. as a tool of resistance used to obfuscate the gaze of surveillance cameras, or to blind police forces in the streets (Bostock 2019; CNA 2019). In other situations, lasers are used for more symbolic-visual purposes, e.g. to express peaceful, collective disobedience.

However, unlike the umbrella actant, the symbolic importance of the laser pointer does not date back to the 2014 protests. We find very few tweets regarding lasers before August 2019, where its prevalence starts to accelerate, specifically in relation to an event, where a citizen is arrested for using laser pointers (Cheng 2019). Temporally, the laser actant rises to symbolic status in a period (Figure 9, network 2) where the umbrella begins to take on a more practical translation (Figure 6, network 2), taking over the (temporary) mantle as the key Anti-ELAB symbol. Figure 9 visualizes three ego networks for the laser actant, one before the activity for the laser actant increased, and two surrounding peaks in activity.

-------- *Insert Figure 9 here* --------

In the left network, which covers about 1.5 weeks between July and August in 2019, we identify three clusters. The orange cluster encompasses nodes such as ‘facialrecognition’, ‘camera’ and ‘surveillance’, indicating a focus on lasers as tools for practical-confrontational purposes. In contrast, the purple cluster covers nodes, such as ‘policestation’, ‘shine’ and ‘antielab’, indicating the presence of a symbolic-visual translation. In Figure 10, we show examples of both translations contained in the clusters.

-------- *Insert Figure 10 here* --------

While the symbolic-visual translation (Figure 10, right image) is clearly present in the first network, tweets associated with the practical-confrontational translation (Figure 10, left image)

remain dominant during the first period (Figure 9, left network). This is also evident in the over-all higher degree-score for the orange cluster, compared to the purple cluster in the left network.

During the second period (Figure 9, middle network), starting on the date where a protester was arrested for using lasers, nodes associated with the symbolic-visual translation are dominant. High-scoring nodes in this network (e.g. 'spacemuseum', 'show' and 'paper') point to demonstrations taking place in response to the arrest of the protestor, and to the authorities' decision to categorize laser pointers as offensive weapons. The examples below relate to these demonstrations:

-------- *Insert Figure 11 here* --------

In the left image, protestors are pointing lasers towards Hong Kong's Space Museum to signal collective presence in the streets. In the right image, protesters point multiple lasers towards a piece of paper to debunk the claim made by the Chinese authorities that lasers can be used as offensive weapons.

The swiftness of the laser's translation from a practical-confrontational actant to a symbolic-visual actant is remarkable, and so is its temporal dependency on the authorities' counter-translation of lasers as offensive weapons.

Fast-forwarding two months, the third network indicates a hybrid translation covering both practical-confrontational nodes (e.g. 'camera', 'eye' and 'violence') and symbolic-visual nodes (e.g. 'support' and 'barrack'). During this period, violent collisions were taking place at the universities in Hong Kong, which may be why the practical-confrontational translation resurfaces. Further, police began to counter protesters and journalists' sousveillance efforts by shining lasers/flashlight into their cameras, i.e., mobilizing a counter-sousveillance strategy. This is shown in the right example below:

-------- *Insert Figure 12 here* --------

In the right image, police forces use flashlights to blind the cameras of protestors and journalists, while protestors retaliate by using lasers to blind surveillance cameras. The authorities appear to be copying the protestors' use of the laser as a means of hindering sousveillance. However, this strategy is not entirely foolproof as protestors use social media platforms such as Twitter to document the authorities' attempts to impede their legitimate sousveillance efforts.

In the left example, a symbolic-visual translation of the laser actant is present. Here, protestors use lasers to criticize the Chinese military's presence in Hong Kong by highlighting their barracks. There is some ambivalence regarding the dominant translation of the laser actant during this later period, as it becomes not only associated with protesters but also with authorities. This mobilization by the authorities might be why there is less agreement on the actant's symbolic-visual translation, and why the tweet activities associated with the actant decline during this period.

To conclude, the laser oscillates between a practical translation and a symbolic translation and then back to a hybrid between the two translations. While the laser actant stabilized as a dominant symbol during one period of the demonstrations (Figure 9, middle network), it ceases to be as dominant during the later period. This trajectory exemplifies how periods of symbolic translation are temporally contingent on concurrent pushback from authorities toward the actant.

Mask

The mask actant emerges as a key actant quite late in the Hong Kong protests. Protesters initially wore masks as protection against facial recognition and teargas. However, on October 5th 2019, the Lam administration passed a security law that included a ban on the use of all facial masks in public spaces. As a response, thousands of masked protesters marched the streets, well aware of the potential consequences of being jailed (BBC News 2019). In this case, masks came to serve as a

visual symbol of resistance. Figure 13 shows ego networks for the mask actant during two different protest periods.

-------- *Insert Figure 13 here* --------

In the left network the ‘teargas’, ‘protection’ and ‘face’ nodes indicate a practical-confrontational translation, and the ‘attack’, ‘violence’ and ‘police’ suggest an orientation toward combat. Nodes related to a symbolic-visual translation are also present, e.g., ‘freedom’, ‘support’ and ‘people’. However, the practical-confrontational translation dominates in degree centrality, as tweets mentioning masks are primarily in relation to police violence.

-------- *Insert Figure 14 here* --------

In these examples, we observe two types of practical-confrontational translations of the mask actant. In the left tweet, protestors use masks to protect themselves against tear gas and pepper spray. In the right tweets, protestors use masks to avoid being identified as dissidents by the authorities (through surveillance technology).

The network for time period 2 covers the period from the days leading up to the passing of the anti-mask law and three weeks onwards. In the pink cluster, the nodes 'antimasklaw', 'freedom' and 'chinazi' appear. The nodes indicate that the mask is seen as an actant that, like Hong Kong, is subject to China's repression. In the green cluster, the nodes 'support', 'please' and 'world' are present, which indicate that the mask actant is translated as a symbolic-visual actant, through which the movement invokes visibility and sympathy from the international community. This is also reflected in the tweets below.

-------- *Insert Figure 15 here* --------

In the left example, the Chinese attack on the mask actant translates it into symbol of oppression and restriction of freedom in Hong Kong. Protesters use this symbol to gain sympathy and attention from the outside world, making the movement visible internationally (Pang 2021).

The right example also shows a symbolic-visual translation of the mask actant. Here, the mask actant acts ironically, ridiculing Chinese President Xi Jinping and the anti-mask law, as an exercise of symbolic resistance to China. However, there is also a practical element in the translation, as the mask obscures the identities of the protesters.

Where the practical-confrontational translation of the mask actant was dominant during the previous period, the symbolic-visual translation dominates in time period 2. This is seen partly by the nodes present in the network and in the presented examples, partly by the fewer and smaller nodes indicating a practical translation, such as 'violence' and 'teargas'.

As the laser actant, the mask actant's trajectory flows from an initial practical-confrontational translation toward a symbolic-visual translation as it is faced with a counter-translation from authorities: the anti-mask law. Unlike the laser and umbrella however, there is no evidence in the data that the mask's symbolic mobilization decreases and is later replaced by practical-confrontational translations. Rather, qualitative inquiry in the data suggests that the symbolic-visual translation persists for the remaining protest period, although the practical-confrontational translation never disappears completely.

Discussion and Conclusion

In this paper, we introduced the concept of momentary symbols to describe and examine processes, where objects for a shorter period rapidly grow into a dominant symbol for a protest movement, but just as quickly acquire a less dominant symbolic role. Building on insights from visual sociology, ANT and research on online interaction rituals, we have described the evolution of three objects that became (temporarily) crucial visual symbols of Hong Kong's Anti-ELAB movement over the span of the protest period in 2019.

Our analysis shows that the three outlined objects (umbrellas, lasers, and masks) oscillated between practical-confrontational translations (e.g. as weapons or shields in collisions

with authorities) and symbolic-visual translations (e.g. as symbols that visualize collective resistance). Further, the shifts from practical-confrontational translations to symbolic-visual translations arose largely from clashes between authorities' surveillance efforts and protesters' counter-surveillance tactics. Therefore, an object's translation at a given point in time hinged on the issues that were addressed by the SM at that time. This means that an object may be translated as a tool to fight off watercannons, pepper spray or video surveillance one day, while the next day being translated into a symbol for the SM's struggle or visual expression, for example if authorities outlaw its mobilization.

From our findings, we conclude that the process of symbol construction is temporally contingent in the case of the Anti-ELAB movement. Further, the objects were less stable and lasting as symbols than expected, suggesting that such processes may also be highly volatile in contemporary movements.

Methodologically, our study demonstrates the advantages of adopting a processual focus on visuality in social movements. The temporal contingency of the protest symbols that we highlight suggests that protest symbols are highly volatile constructs and that some objects may only become what we term *momentary symbols.* With this we mean visual objects that for a limited time achieve a symbolic position in the SM before transforming into (or reverting to) a practical or non-symbolic position through quick acceleration and deceleration. In our analysis this was for example the case for lasers that quickly became a dominant symbol but was just as quickly replaced. Adopting the chains of translations from ANT gives a framework for tracing, and a vocabulary for talking about, these momentary symbols as actants that are temporarily translated into symbols at one link in a temporal chain of translation, and in another a practical translation. Beyond the understanding that non-human actants also carry out acts of protests, adopting the description-focused analytical lens from ANT facilitates a serious engagement with how symbols

emerge and change over time in the inquired SM. Lastly, the turn to digital trace data in sociology enables rigorous and granular temporally oriented analyses that can identify both lasting and momentary symbols.

Previous research on the Anti-ELAB movement's symbols largely revolves around the mask (Kwok 2021; Pang 2021), and does not describe lasers or umbrellas as symbols. The temporal contingency that we highlight indicates that such non-temporal studies run the risk of assigning too much weight to symbols that are only of momentary importance. By adopting a processual focus, researchers can track events throughout the entire protest period and identify a longer chain of momentary symbols that, like the mask, relate to counter-surveillance. By so doing, it is possible to attain a more dynamic and saturated understanding of SMs' visual expressions. In the specific case of Anti-ELAB, this provided the insight that the SM's symbol construction centered around issues of (counter)-surveillance (Ullrich and Knopp 2018).

That objects become symbols through political mobilization is well-documented in the SM literature (Doerr et al. 2013; Doerr and Teune 2012; Mattoni and Teune 2014). This was unsurprisingly also the case in our analysis. However, that such translations can occur within days or hours suggests that the temporal contingency of visual symbols, in particular, short-term immediate changes, is more granular and volatile than previously expected. We think that the temporal and the (short-term/immediate) processual dynamics of time in contentious politics, protest and prodemocracy movements deserve more theoretical and empirical attention inviting for future comparative studies. Such studies could benefit from deploying a mixed methods design like ours, using multi-modal data sources to identify situations of interaction rituals through digital data and assess the temporal dimension of protests via symbols.

Contemporary life and communication is characterized by increased acceleration (Rosa 2013) and social media has shortened the duration of discussions on various topics, with one

topic quickly replacing the next (Lorenz-Spreen et al. 2019). This acceleration of information may be contributing to the advent of momentary symbols, as social media allows protesters to instantly and widely diffuse their visually expressed dissent. Unlike traditional forms of communication such as print, legacy news, or word of mouth, social media enables a more dynamic and volatile process of symbol construction, where protesters can diffuse their visual dissent instantaneously. The increased acceleration of communication might be one explanation for the rise of such temporally contingent and momentary symbols. However, a case might also be made that the process of symbol construction has merely been made more observable, because of the "always-on" characteristic of digital trace data, whereas it was before taking place within SMs and less accessible to observation and precise timestamping.

While our analytical approach allows for a highly granular analysis of symbol construction processes, it also has limitations. Firstly, we observe a Hong Kong-based movement through an English-dominated digital medium, Twitter, which might influence the perspective from which the Anti-ELAB movement is represented in the data, and subsequently our analysis. Therefore, it could also be relevant to trace protest messages on for example the communication platform Telegram or the Hong Kong-based LIHKG Forum, where protesters allegedly coordinated protests in Cantonese (Kow et al. 2020; Shao 2019; Teo and Fu 2021), to compare cross-platform translations. However, English is a widely spoken language in Hong Kong, and as contemporary SMs are boundary-crossing in nature (Castells 2015), we expect this limitation to have little influence on our results. Secondly, due to resource limitations, we could only perform object detection for umbrellas. Carrying out similar analyses for masks and lasers would likely add nuance to our analysis of their translations. Lastly, the relative size of tweets related to the three objects is very small compared to the full dataset, which questions their importance in online discussions of the Hong Kong protests. To mitigate the risk of confirmation bias, we used Gensim to extract the

most common nouns in the data and found no indications of any relevant objects being missed. Further, our analysis indicates that tweets mentioning umbrellas, masks and lasers receive significantly more engagement than other tweets.

Despite these limitations, our study demonstrates the relevance of using processual and temporal approaches to capture the erratic and volatile nature of visual expressions in social protests. In the future, researchers might employ this approach to study how protest symbols evolve and acquire new meanings in other contemporary social movements.

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Tables

Table 1

	Number of tweets	Estimated precision of model
Umbrella	7470	71.5 %
Laser	3860	73 %
Mask	39761	73 %

Table 1. Number of tweets about actants according to constructed dictionary classifiers. Estimated precision of the three models are reported by manually assessing a randomly drawn sample of classified tweets.

Figures

Figure 1

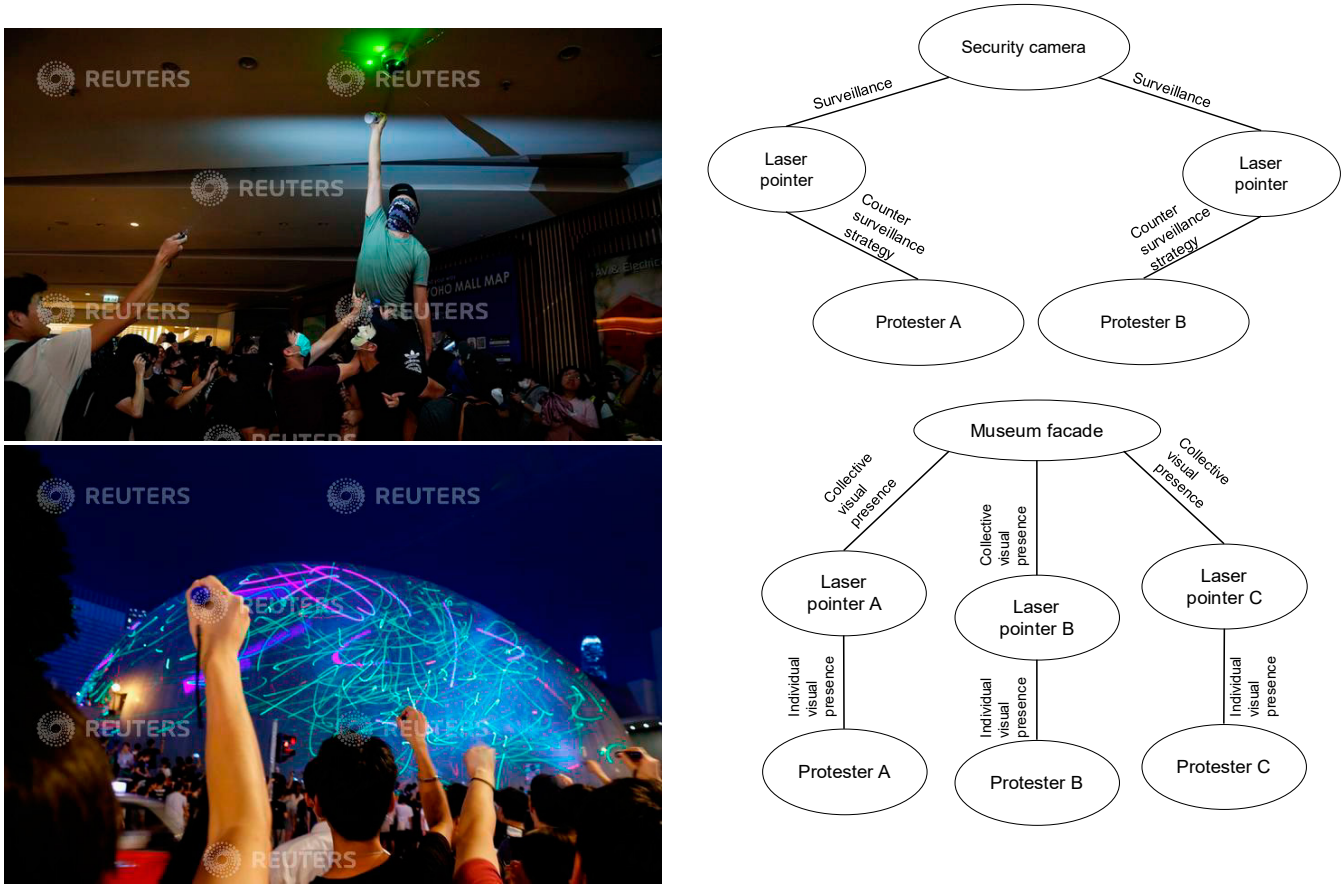

Fig. 1. On the upper left, an image from the protests in Hong Kong containing a laser. On the upper right, we draw a simplified actor-network surrounding the laser actant (containing a sub-set of the laser actor-network). First, we identify the (human and non-human) actants that are connected to the laser: protesters and the security camera. We then interpret the translations that the laser actant obtains from its associations. For the protester, the laser functions as a practical tool to combat the gaze from the surveillance camera, i.e., it is mobilized in a counter-surveillance strategy and translated as a practical-confrontational actant. For the bottom left image, the process is repeated. In this situation, however, the network suggests that the laser is translated into a symbolic-visual actant that visualizes a collective we-identity through a joint focus of attention (Collins 2005). Instead of this manual approach to outlining the actants' translations through

their associations in networks, we develop and use a computer-assisted framework in this paper that build on both text and images.

Figure 2

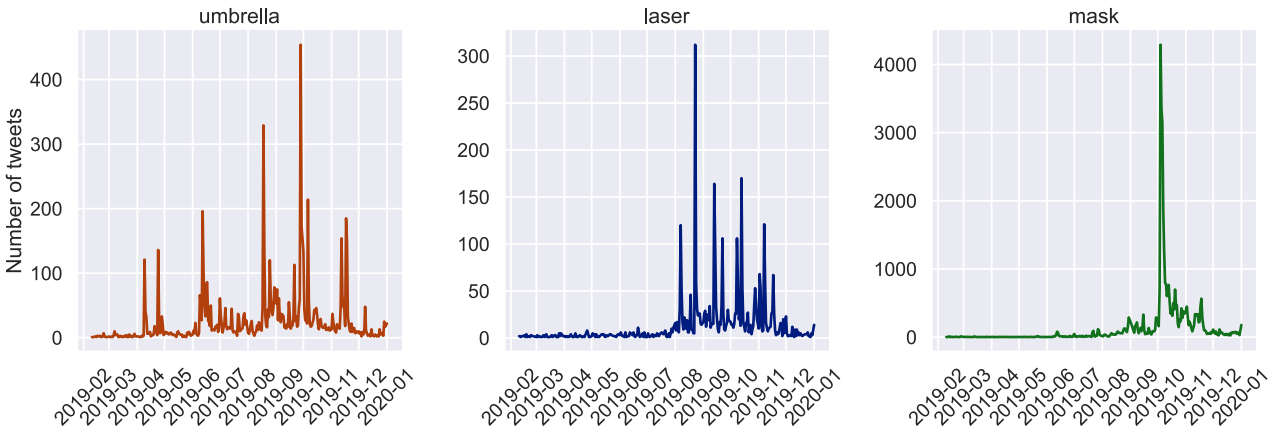

Fig. 2. The daily mentions of umbrellas (left), lasers (middle) and masks (right) in 2019 in tweets on the Hong Kong protests. Based on constructed dictionaries containing words describing each actant. The figure shows that the activity surrounding each is not constant throughout the protest period.

Figure 3

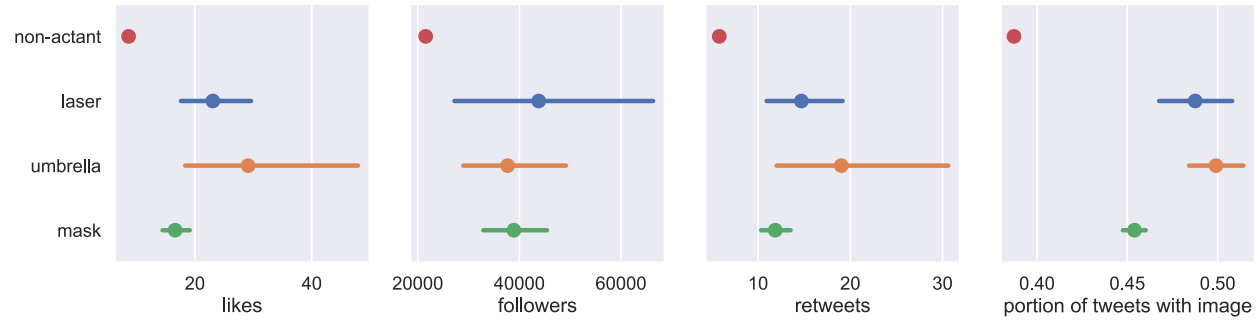

Fig. 3. Forest plots with mean likes, followers, retweets and image associations for non-actant and actant samples. Errors bars indicate 99% confidence intervals drawn from 10.000 bootstrap samples. Z-tests ($p<0.000$) and Mann-Whitney U-tests ($p<0.000$) confirm statistically significant higher means and medians on all parameters for actant tweets compared to non-actant tweets (for details see Appendix F).

Figure 4

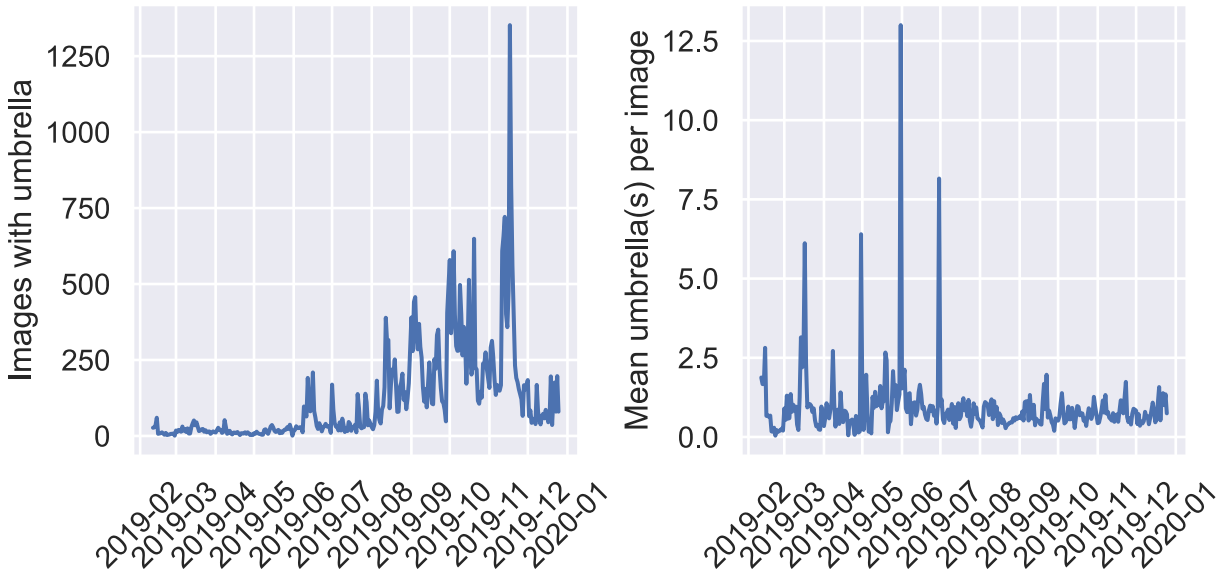

Fig. 4. Daily counts of images containing umbrella(s) (left) (n=37,005) and mean umbrellas per image per day (right) (N=671,164). YOLOv4 object detector used to identify umbrellas in images. Only umbrella detections with confidence scores above 0.5 are counted as a match.

Figure 5

Fig. 5. Two images from the dataset containing umbrella(s). The left image is from April 30th, 2019 and shows protesters marching holding umbrellas. The object detection pools a large area of many umbrellas into one, suggesting the estimate on the count of umbrellas in the image is conservative. The right image is from November 17th, 2019, showing teargas and a protester holding one umbrella.

Figure 6

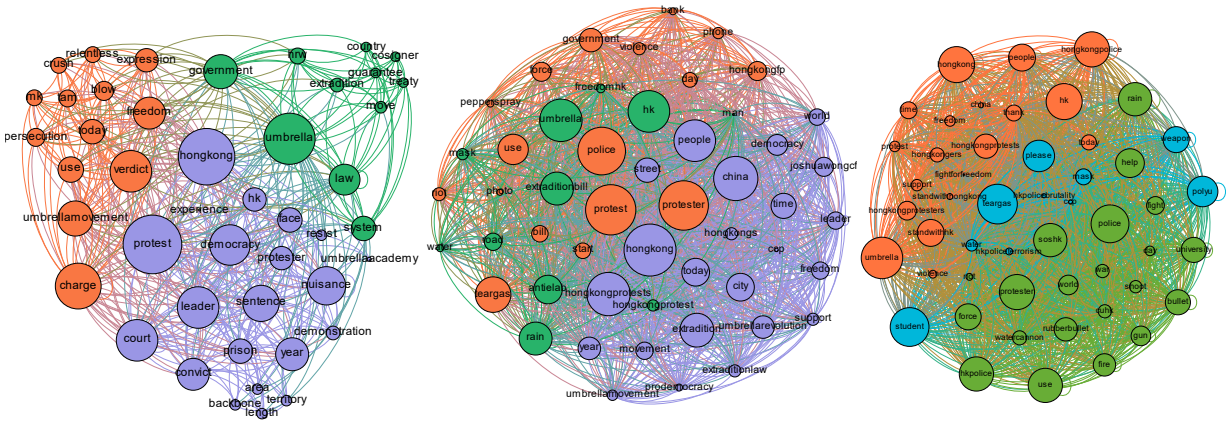

Fig. 6. Three ego networks for the umbrella actant at different time points. On the left for period 1 (2019-04-08 – 2019-04-21), in the middle for period 2 (2019-06-04 – 2019-08-16), and on the right for period 3 (2019-11-10 – 2019-12-31). Node sizes denote degree centrality, and node color denotes cluster belongingness. All networks are visualized using the Force2Atlas algorithm.

Figure 7

Fig. 7. Tweet from the umbrella sample containing the 'umbrellamovement' node for time period 2019-04-08 to 2019-04-21. Tweets for specific clusters and nodes were extracted by searching for the node word and extracting a random sample for the chosen time period. Afterwards, manual readings of the sample were carried out.

Figure 8

Fig. 8. Tweet from the umbrella sample containing the ‘rubberbullet’, ‘war’, and ‘watercannon’ nodes for time period 2019-11-10 to 2019-12-31.

Figure 9

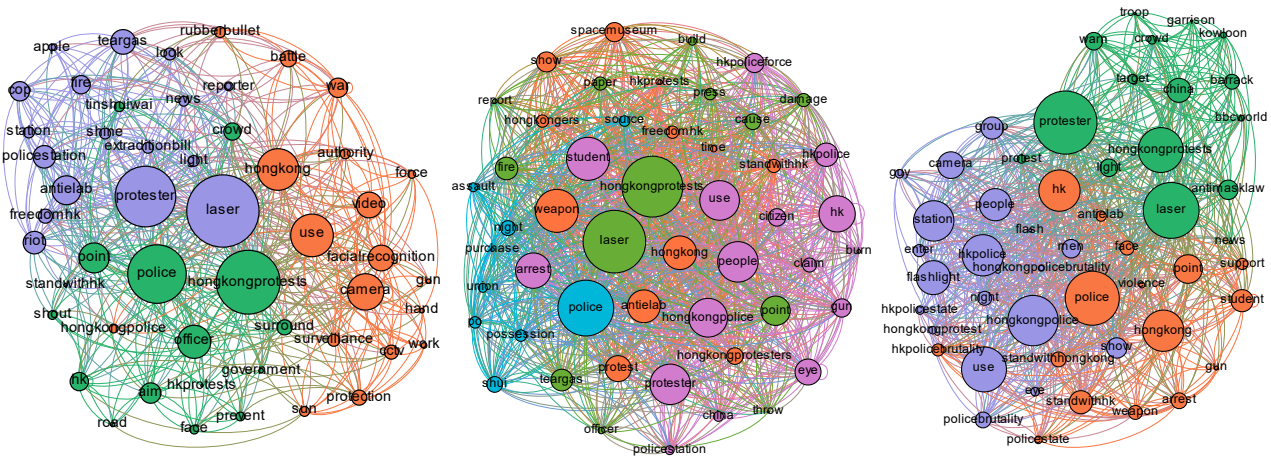

Fig. 9. Three ego networks for the laser actant at different time points. On the left for period 1 (2019-07-25 – 2019-08-05), in the middle for period 2 (2019-08-06 – 2019-08-22), and on the right for period 3 (2019-10-25 – 2019-11-11). Node sizes denote degree centrality, and node color denotes cluster belongingness. All networks are visualized using the Force2Atlas algorithm.

Figure 10

Fig. 10: Two images from the time period 2019-07-25 to 2019-08-05. On the left, a tweet containing the node 'facialrecognition' (from the orange cluster), and on the right, a tweet with the node 'policestation' (from the purple cluster).

Figure 11

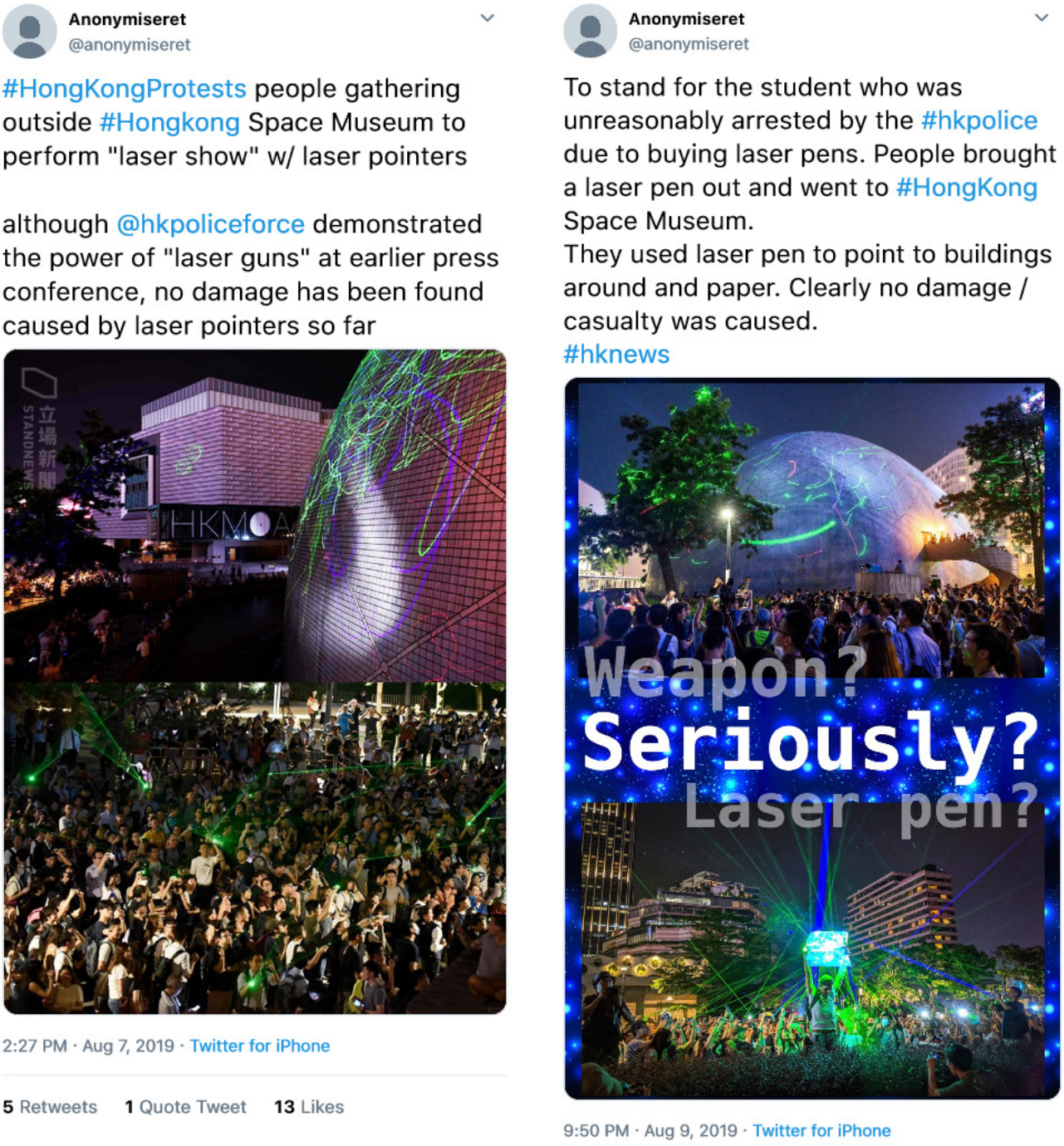

Fig. 11: Two images from the time period 2019-08-06 to 2019-08-16. On the left a tweet containing the node ‘spacemuseum’ and ‘show’ and on the right a tweet with the node ‘paper’.

Figure 12

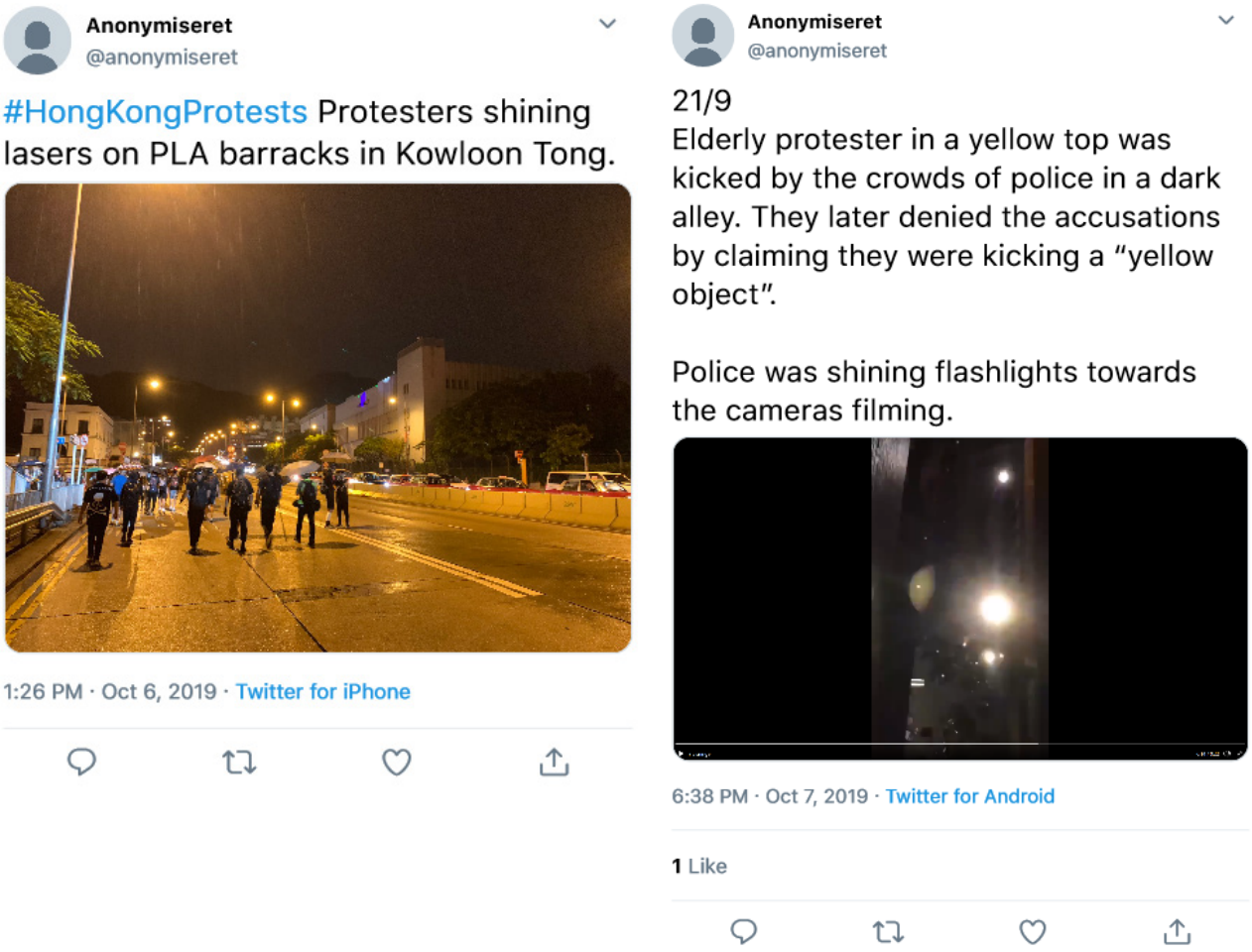

Fig. 12: Two tweets from the time period 2019-10-25 – 2019-11-11. On the left a tweet containing the node 'barracks' and on the right a tweet with the node 'police' and 'camera'.

Figure 13

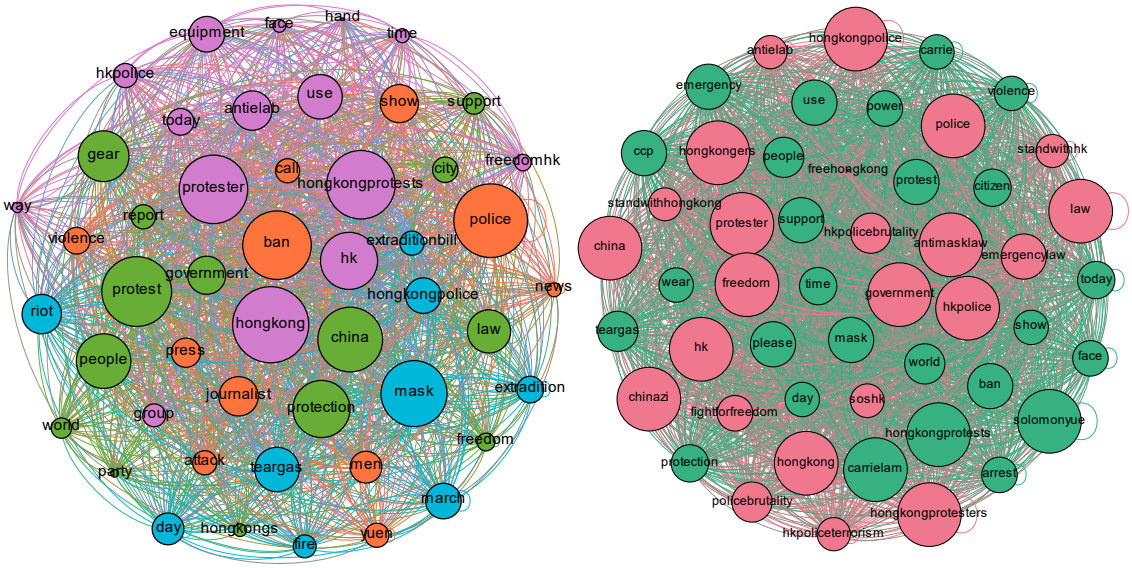

Fig. 13. Two ego networks for the mask actant at different time points. On the left for period 1 (2019-02-11 – 2019-08-01), and on the right for period 2 (2019-09-24 – 2019-10-24). Node sizes denote degree centrality, and node color denotes cluster belongingness assigned by the modularity algorithm. Networks are visualized using the Force2Atlas algorithm.

Figure 14

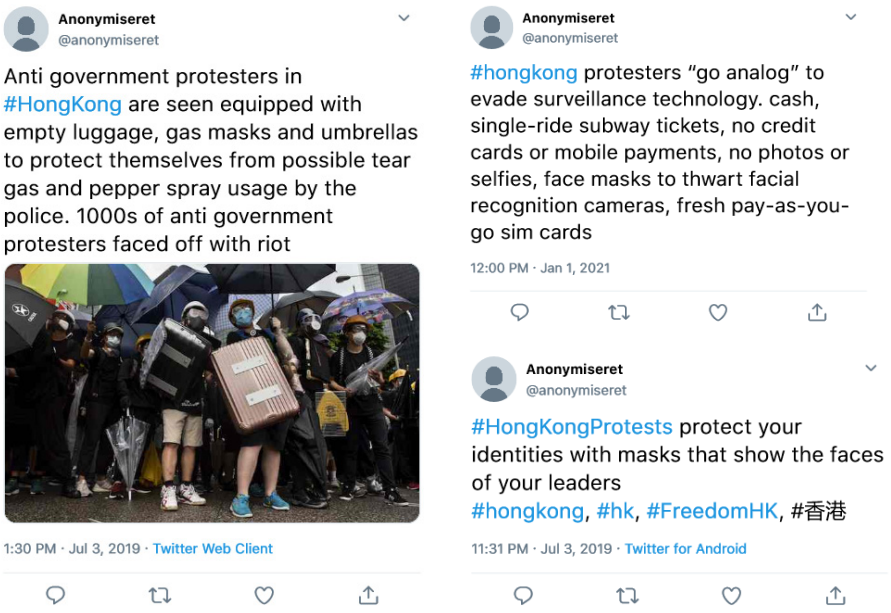

Fig. 14: Two tweets from the time period 2019-02-11 – 2019-08-01. On the left a tweet containing the nodes 'teargas', 'riot' and 'police'. On the right two tweets with the nodes 'facialrecognition', 'camera' and 'protect'.

Figure 15

Fig. 15: Two tweets from the time period 2019-09-24 to 2019-10-24. On the left a tweet containing the nodes ‘help’, ‘world’ and ‘please’. On the right, a tweet with the nodes ‘world’, ‘india’ and ‘Xi Jinping’, showing how Anti-ELAB symbols spread internationally.