

Misinformation in Open and Closed Online Platforms: Impacts and Countermeasures

Chapter for “Mobile Communication and Online Falsehoods in Asia: Trends, Impact and Practice”

Main text word count: 7,245

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Abstract

Misinformation can negatively influence people's reasoning, decision making, and behaviour even following the provision of a clear correction; this is known as the continued influence effect. Numerous cognitive and socio-cognitive factors underlie misinformation reliance and the continued influence effect. Cognitive factors include limitations in memory capacity as well as memory updating and knowledge revision capabilities; socio-cognitive factors include biased reasoning and perceived source credibility. Although misinformation is not a new problem, social media and instant messaging platforms have dramatically changed the information transmission environment, with their unregulated and user-controlled nature increasing the ease with which misinformation can be created and propagated. Drawing insights from cognitive, social, and political psychology, the current chapter provides a general overview of the cognitive and social factors underlying (1) misinformation belief, and (2) the continued influence effect of corrected misinformation. The discussion focuses on how the unique nature of online information acquisition, specifically characteristics of both open and closed online communication networks, not only creates an environment ideal for misinformation spread, but functions to inhibit accurate knowledge revision. The chapter concludes by providing specific recommendations for how to effectively mitigate the spread of misinformation within the online information ecosystem. The concepts and recommendations discussed in this chapter are broadly applicable regardless of social or cultural context.

Keywords: Misinformation, Continued Influence Effect, Corrections, Social Media

1. Misinformation in Open and Closed Online Platforms: Impacts and Countermeasures

Belief in misinformation — defined here as any misleading or erroneous information presented as factual¹ (Wang et al., 2019) — imposes a substantial cost on our global society. Inaccurate beliefs formed through exposure to misinformation have led individuals to refuse potentially lifesaving measures (e.g., refusal of the measles-mumps-rubella vaccine due to the faulty belief it causes autism; Donzelli et al., 2018), and actively partake in harmful behaviours (e.g., consumption of bleach due to the faulty belief it will kill the novel coronavirus COVID-19; Islam et al., 2020). The societal threat of misinformation has been exemplified by the COVID-19 pandemic, with misinformation surrounding the cause and dangers of the disease, as well as the safety and effectiveness of vaccines, likely resulting in avoidable illness and death (Huh & Dubey, 2021; Islam et al., 2020). In fact, a survey of Javanese adults found that of those who opposed receiving the COVID-19 vaccine, 48.5% cited blatant misinformation (specifically, that the vaccine contains a microchip) as a reason for this opposition (Utami et al., 2022). Similar negative effects have been seen throughout the Asia-Pacific region during the pandemic, with belief in misinformation negatively related to COVID preventative behaviours in South Korea (Lee et al., 2020), Malaysia (Azhar & Roshdan, 2021), Japan (Courtney & Bliuc, 2021), as well as Australia (Pickles et al., 2021).

Given the negative ramifications belief in misinformation can have, effectively countering misinformation has become a necessary pursuit. Theoretically, overcoming the problem of misinformation belief should be relatively easy. One simply needs to inform people that what they believe is wrong, or provide them with a basic correction, and they should stop relying on previously believed misinformation in their reasoning and decision

¹ The term misinformation is used in the current piece to encompass false information that is disseminated either unintentionally or intentionally (in which case it is often referred to as *disinformation*).

making. However, research has consistently shown that although corrections can partially mitigate the effects of misinformation, even clear and credible corrections rarely offset people's reliance on misinformation completely; the phenomenon that misinformation continues to affect people's reasoning post-correction is known as the *continued influence effect* (Johnson & Seifert, 1994; Lewandowsky et al., 2012; Walter & Tukachinsky, 2020). Continued influence is not only observed in situations where people have an underlying motivation to believe the misinformation (e.g., people with anti-vaccination attitudes motivated to believe worldview-congruent vaccine misinformation) but also in situations where no such underlying motivation exists (e.g., studies using neutral and non-controversial materials; Chan et al., 2017; Jia et al., 2020; Johnson & Seifert, 1994; Lewandowsky et al., 2012). Consequently, to effectively counteract misinformation, it is necessary to understand the factors underlying continued influence, and how the information ecosystem may inhibit correction acceptance.

This chapter focuses on how the modern information transmission environment — specifically the reliance on open (e.g., Facebook, Twitter) and closed (e.g., Messenger, WhatsApp, WeChat) communication networks for news acquisition (Flanagin, 2017) — may inadvertently function to facilitate tenacious belief in misinformation. To begin, we will provide a general overview of the cognitive and social factors underlying (1) misinformation belief, and (2) the continued influence effect of corrected misinformation. Our discussion will illustrate how the unique nature of online information acquisition may not only create an environment ideal for misinformation spread but may function to inhibit accurate knowledge revision. Furthermore, we discuss how the encrypted nature of closed online communication networks poses further challenges in this regard, when compared with open online communication networks. The chapter will conclude by providing specific recommendations for how to effectively mitigate the spread of misinformation on these online communication

networks. The concepts and recommendations discussed in this chapter are broadly applicable regardless of social or cultural context; however, where appropriate insights and examples are drawn from research conducted in the Asia-Pacific region.

2. Why People are Susceptible to Misinformation

There is a wide degree of variability in both people's general misinformation susceptibility (Bryanov & Vziatysheva, 2021; Brydges et al., 2018), as well as the types of misinformation different people are susceptible to (Ecker & Ang, 2019; Van Bavel et al., 2021). The factors underlying these differences include: (1) cognitive factors, such as the degree to which people use analytic thinking, and (2) social factors, such as people's underlying worldviews and the social context of misinformation acquisition. We will now discuss these factors in more detail.

2.1 Cognitive Basis of Misinformation Belief

2.1.1 The Deficit Hypothesis

The deficit hypothesis argues that people are susceptible to misinformation because they lack the knowledge or skills required to critically appraise it (Hart & Nisbet, 2012; Scherer et al., 2021). A number of studies have provided support for this hypothesis, finding lower educational attainment (Scherer et al., 2021) as well as media and subject-matter (e.g., health, science, etc.) literacy skills (Guess et al., 2020) are associated with greater vulnerability to misinformation. Consequently, researchers have proposed the importance of providing media and information literacy training to reduce general susceptibility to misinformation, with promising preliminary results (e.g., in an Indonesian sample: Bilo-Thomas et al., 2022). This training involves teaching individuals how to critically appraise and evaluate information, including assessing the quality of the information and the credibility of its source (e.g., Craft et al., 2017). Although such interventions were found to reduce misinformation susceptibility in both US and Indian samples immediately following

training, the effect in the Indian sample was no longer present after several weeks (Guess et al., 2020).

2.1.2 Lack of Analytic Reasoning

In contrast to the deficit hypothesis, which focuses on a lack of skill to effectively discern true and false information, it has been suggested that people may fall for misinformation because they fail to critically appraise the information *despite* having the skills to do so. The dual-processing theory of human cognition purports that there are two distinct ways people process information: either based on (1) automatic and intuitive responses, or (2) using deliberation and analytic reasoning (see Kahneman, 2011). Research has shown people who apply higher levels of analytic reasoning are less likely to view implausible fake news headlines as accurate (Pennycook & Rand, 2019). While there are individual differences in people's analytic thinking abilities, situational factors that enhance or inhibit analytical thinking also influences belief in misinformation. For one, repeated exposure to misinformation has been linked to enhanced perceived truthfulness, even when the misinformation contradicts people's prior knowledge. This effect is argued to arise due to repetition boosting misinformation familiarity, and people applying a mental heuristic whereby they interpret familiarity as evidence of veracity (i.e., the *illusory truth effect*; Fazio, 2020; Hasher et al., 1977). Discernment of misinformation is also reduced when people lack time to deliberate (Bago et al., 2020), whereas discernment is enhanced when people are encouraged to think critically when evaluating information (Lutzke et al., 2019). Finally, cultural differences in thinking styles may influence misinformation susceptibility, with cultures that favour intuitive thinking strategies (e.g., many Eastern cultures) somewhat more susceptible to misinformation than those that favour analytic thinking (Xu et al., 2020). These

findings highlight that use of analytic thinking is a malleable trait that is influenced by environmental or contextual factors.

2.2 Motivational Basis of Misinformation Belief

Although cognitive factors play a role in people's susceptibility to misinformation, they do not explain all of the variability in misinformation belief (Scherer et al., 2021). Rather, motivational factors, such as worldview effects and group identity, must also be taken into consideration.

2.2.1 Worldview Effects

It is well-known that people have information-processing biases, meaning they have a preference to attend to, remember, and use information that is worldview-congruent — that is, information that bolsters their pre-existing values, attitudes and beliefs (e.g., Kunda, 1990). Likewise, research has consistently shown that people are more susceptible to *misinformation* that is worldview-congruent rather than worldview-incongruent (Swire et al., 2017; Van Bavel et al., 2021). The tendency to endorse worldview-congruent (mis)information (typically referred to as *confirmation bias* or *myside bias*; Treen et al., 2020; Zollo & Quattrociocchi, 2017) can arise from (1) selective exposure to worldview-congruent information and/or (2) biased appraisal of the information (Kunda, 1990; Van Bavel et al., 2021). That is, people may endorse misinformation because they selectively *choose* to interact with (mis)information that confirms their pre-existing beliefs (Guess et al., 2018), or because they are more likely to accept low-quality information that supports their worldview. The influence of worldview on misinformation belief is prominently seen in association with people's political views (i.e., *partisan bias*; Van Bavel et al., 2021), as political values and beliefs are often strongly tied to people's sense of self and their social identity (as seen in the lead up to the 2019 Indonesian election; Neyazi & Muhtadi, 2021) .

2.2.2 Group Identity

Not only do people's values influence their likelihood of believing specific types of misinformation, endorsement of information by a person's in-group can also drive belief (Cookson et al., 2021). People often shift their beliefs based on perceived normative belief of their in-groups (Moussaïd et al., 2013). For example, people believe misinformation more when it comes from politically congruent news sources, even when the misinformation itself is politically neutral (Traberg & van der Linden, 2022). In fact, if belief in a piece of misinformation is perceived to be normative within one's in-group, even in situations where the misinformation contradicts the general values of the group, people may endorse misinformation they would otherwise oppose (Cohen, 2003).

Importantly, the factors driving misinformation susceptibility are varied and not mutually exclusive; belief in misinformation is driven by a combination of the aforementioned cognitive and social factors (Ecker et al., 2022; Scherer et al., 2021).

3. The Continued Influence of Corrected Misinformation

If people are exposed to misinformation without having access to factually correct information, it is at least understandable that they will rely on this misinformation in their reasoning and belief formation (Scherer et al., 2021). However, this does not explain why people will often continue to rely on misinformation after they have received a clear and credible correction (Johnson & Seifert, 1994; Walter & Tukachinsky, 2020). In the following section, we will outline what is known about the cognitive and social basis of this phenomenon (the continued influence effect; CIE).

3.1 Cognitive Basis of the CIE

Research has shown that people are especially likely to rely on cause-relevant misinformation — misinformation that provides a causal explanation for an outcome/event — when corrections do not provide a causal alternative. This suggests that the CIE is likely to

arise in situations where corrections create incoherence in people's cognitive event representations, that is, a "gap" in their "mental model" (this is known as the *mental-model hypothesis*; Lewandowsky et al., 2012). To illustrate, in Johnson and Seifert's (1994) seminal CIE study, participants were provided information about a fictitious warehouse fire, which included the presence of oil cans in a closet being offered as a potential cause. When this cause-related information was retracted (i.e., it was stated the closet was in fact empty), participants continued to rely on the original misinformation when reasoning about the cause of the fire (e.g., referencing oil cans as a reason for the fire spreading so quickly). The persistent effect of the corrected misinformation was observed even though, when directly questioned, most participants were able to accurately recall the correction provided. This effect is believed to arise due to people favouring a complete (though faulty) mental model over an incomplete (yet correct) mental model. In line with this, the continued influence effect can be effectively reduced by providing detailed *refutations*, which provide individuals with a causal alternative to the original misinformation (as opposed to terse "X is not true" *retractions*), thus "filling the gap" in the mental model, or at least providing a reason for why the misinformation is false (Chan et al., 2017).

The CIE can also arise from memory failures. Specifically, when people encounter a correction, they must properly encode it and co-activate it with the stored misinformation in memory so effective memory updating and knowledge revision can occur (Kendeou & O'Brien, 2014). Even when a correction is adequately associated with a piece of misinformation, their memory representations can remain separate, such that a piece of misinformation can be retrieved from memory without concurrent retrieval of the correction (Gordon et al., 2019; Johnson & Seifert, 1998; Lewandowsky, Cook, et al., 2020). The role of memory is further supported by findings that susceptibility to the CIE is linked to individual differences in memory ability (Brydges et al., 2018; Jia et al., 2020; Sanderson et al., 2021).

3.2 Motivational and Social Basis of the CIE

Although the CIE is observed in situations where no underlying motives exist to believe the misinformation, the CIE is sometimes found to be greater when the original misinformation is congruent with participants' pre-existing attitudes (see Walter & Tukachinsky, 2020). For example, a number of studies looking at political misinformation have found corrections to be less effective when the misinformation was in line with the participant's political beliefs (Ecker & Ang, 2019; Nyhan & Reifler, 2010; Thorson, 2016). The influence of worldview on the CIE is also supported by real-world observations. Specifically, despite the substantial quantity of high-quality counterevidence, sub-groups within the population continue to hold conspiratorial beliefs surrounding the likes of the COVID-19 pandemic (Allington et al., 2021), climate change (Douglas & Sutton, 2015), and vaccines (Donzelli et al., 2018). As such, many have argued that the continued influence effect is unlikely a purely cognitive effect, but rather is at least somewhat influenced by social factors.

Findings that corrections of worldview-congruent misinformation can be ineffective have, however, often failed to replicate (Ditto et al., 2019; Ecker et al., 2021; Wood & Porter, 2019). Specifically, although belief in and reliance on misinformation following a correction is typically higher when the misinformation is worldview-congruent than when it is not, this often simply mirrors differences in belief prior to the fact-check, meaning the reduction in belief level associated with a correction can be relatively equivalent in those whose views align with the misinformation and those whose views clash with the misinformation. As such, an emerging consensus is that although an effect of worldview on CIE may occasionally arise in certain situations (e.g., when specific beliefs are strongly held), higher post-correction misinformation belief in individuals with congruent attitudes likely results from higher initial

belief rather than reduced correction efficacy (Ecker et al., 2022; also see Swire-Thompson et al., 2020, 2021).

In addition to motivational effects, the trustworthiness of the correction source has been argued to influence the CIE. Specifically, corrections from individuals high in perceived trustworthiness have been found to be more effective than those from individuals low in trustworthiness (Ecker & Antonio, 2021; Guillory & Geraci, 2013). By contrast, and somewhat counterintuitively, reliance on corrected misinformation is not found to be significantly influenced by the level of expertise of the correction source (Ecker & Antonio, 2021; Guillory & Geraci, 2013). This is likely due to factors such as individual differences in perceptions of trustworthiness of those with (objectively) high levels of expertise (e.g., an environmental engineer working for a mining company), perceived ulterior motives underlying the provision of a correction by the individual, and/or limited weight being placed on expertise when evaluating information. The interplay between perceived correction source motives and acceptance of the correction is further supported by the enhanced effectiveness of self-corrections (that is, the same source providing both the misinformation and the correction) compared to corrections provided from a source different to the source of the misinformation (see Walter & Tukachinsky, 2020).

In sum, to understand continued reliance on corrected misinformation we must consider both individual and situational factors, as well as how these factors may interact. Despite this, however, research often overlooks how the unique situational factors created by online information ecosystems may drive misinformation belief and correction resistance. The following section will provide an overview of what is currently known in this area.

4. How the Internet Facilitates the Spread of (Mis)Information and Misinformed Beliefs

Although widespread exposure to misinformation has occurred since the conception of mass media, the rise of the internet, and in particular social networking sites, has

fundamentally changed the news media environment. In contrast to traditional media, where information production is highly regulated and gate-kept, information is increasingly created and spread between users via social media channels detached from traditional standards of credibility and validity (Metzger & Flanagin, 2013). This has permitted the creation and propagation of low-quality information, from benign mistruths to defamatory campaigns, at a rate and quantity previously unfeasible (Allcott et al., 2019).

Not only has the rise of social networking sites changed the type, and increased the quantity, of information people are exposed to, it has drastically changed *how* people receive and interact with news information. Specifically, in contrast to traditional media, which are characterised by a one-way flow of information from a centralised and highly regulated body to the masses (Flanagin, 2017), social networking sites are primarily dependent on a user-to-user or user-to-few flow of information more akin to interpersonal communication.

Accordingly, the way we receive and consume news information has shifted from relatively asocial to being driven by our social connections (Allcott et al., 2019; Flanagin, 2017; Fletcher & Nielsen, 2018). This occurs both explicitly, with people directly turning to social media and instant messengers to access news information (Pew Research Center, 2021), and incidentally, with people encountering news information on these sites due to it being shared by others within their social network (Fletcher & Nielsen, 2018; Kaiser et al., 2021).

However, the mere presence of misinformation is not a sufficient criterion for people to hold misinformed beliefs (Qiu et al., 2017). Further, although the presence of misinformation in today's society is quantitatively greater than previously observed, misinformation makes up a relatively small proportion of the total content online (Allcott et al., 2019). Despite this, however, exposure to, and belief in, misinformation permeates mainstream society both globally (Oliver & Wood, 2014), as well as locally within Oceania (Marques et al., 2022) and Asia (e.g., China, Singapore, and Indonesia; Kajimoto et al.,

2018). In the following section, we will discuss how similarities and differences in the two online information environments — open (social media platforms; e.g., Facebook, Twitter) and closed (instant messaging platforms; e.g., WhatsApp, Messenger, WeChat) communication networks — facilitate misinformation beliefs.

4.1 Overview of Open Communication Platforms

Social media sites, or open communication platforms, such as Facebook, Instagram, Twitter, TikTok, and YouTube, are characterised by user-generated content that is broadcast to others in one's social network (Bossetta, 2018). Although most social media sites allow for some degree of privacy (e.g., only allowing “friends” or “followers” to view posts), information can also be made publicly available. This allows for the viral spread of user-created information, whereby (mis)information can be broadcast to unconnected people and/or rapidly shared between users, potentially reaching millions (Törnberg, 2018). The potential danger of unregulated content creation was exemplified by the Jakarta gubernatorial election in 2017, where a video of a Christian candidate, Basuki Tjahaja Purnama, also known as “Ahok”, was doctored to appear as if he was making an offensive comment about Islam, and disseminated on social media. This was not only argued to have a direct effect on the outcome of the election, but resulted in Ahok being sentenced to two years imprisonment for blasphemy (Kaur et al., 2018; Kwok, 2017).

4.1.1 How Open Communication Networks Can Facilitate Misinformation Spread and Belief

Approximately 500 hours of video are uploaded to YouTube (Statista, 2016), and over three million statuses are uploaded to Facebook (Noyes, 2021), by users every minute. The sheer quantity of user-created content means systematically removing all potentially dangerous misinformation and/or bad actors is unviable (Shao et al., 2018). Beyond this, the business structure of social media platforms often directly disincentivises the removal of viral

misinformation. Specifically, most platforms primarily rely on advertisement revenue for profit, and thus their profit is dependent on users' time spent consuming content (and by proxy advertisements; Farkas & Schou, 2018). Given misinformation is not confined to the constraints of reality it is often created with the intent of maximising user engagement and information spread (e.g., highly emotive, provocative and surprising content; Kozyreva et al., 2020; Qiu et al., 2017). In fact, post engagement is substantially greater for sources that regularly share misleading content than for non-misinformation sources (Edelson et al., 2021). Thus, removing misinformation from social media platforms would likely lead to reduced engagement and subsequent revenue loss. As such, as long as there continues to be an incentive for misinformation creation, the nature and business model of open communication platforms will continue to facilitate its spread (Braun & Eklund, 2019).

One factor of social media that directly increases consumption is what is known as the *infinite scroll*, whereby the content a user is exposed to on their feed appears unlimited (Heaney, 2016). Together with the sheer quantity of content available, this creates an overloaded information ecosystem, whereby the amount of information people are exposed to far exceeds the amount of information they have the cognitive capacity to critically appraise (Ciampaglia et al., 2015). As such, on social media people must make a trade-off between accurate quality discrimination (which requires analytic reasoning) and information overload, often resulting in people favouring reliance on intuitive reasoning (such as heuristics and cognitive biases) when making evaluations of information online (Qiu et al., 2017).

Although biases and heuristics are often effective and useful techniques to reduce cognitive load and increase speed of processing, they are prone to errors (Metzger & Flanagin, 2013). As discussed earlier, biases such as confirmation bias and intergroup bias lead people to evaluate information more favourably if it is in line with their pre-existing worldviews or the perceived beliefs of their in-group (Cookson et al., 2021; Treen et al.,

2020). As such, people may be more likely to endorse worldview-congruent (mis)information on social media than in information environments where analytic reasoning is favoured (Metzger & Flanagin, 2013; Pennycook & Rand, 2019; Qiu et al., 2017). Additionally, the ability for (mis)information to go viral on social media can mean that people are exposed to the same piece of misinformation multiple times (Ahmadi, 2020). This repeated exposure enhances familiarity, which (as discussed earlier) can enhance the perceived truthfulness of misinformation online (Ahmadi, 2020), as well as the likelihood of misinformation being shared, which in turn can boost its reach and negative impact (Buchanan, 2020).

Further, unlike traditional media, where people receive information in relative isolation from their social network, information on social media is often associated with social information. This comes in two primary forms: (1) the source of the post, both primary (the original poster) and secondary (people in one's feed sharing a post; Mena et al., 2020), and (2) engagement metrics (e.g., 'likes'; Peters et al., 2013). When other cues of credibility are unavailable or perceived as untrustworthy, social information (e.g., social or in-group endorsement) is often relied upon (Luo et al., 2022). Due to this, people may be more susceptible to misinformation on social media, especially that which is highly endorsed, than they would typically be (Avram et al., 2020; Flanagin, 2017).

4.1.2 Countering Misinformation on Open Communication Networks

Platform Features. A number of social media platforms (e.g., Facebook, Twitter, Instagram, and TikTok) have implemented features that identify and, based on perceived severity, flag or remove potentially dangerous content, including misinformation (such as flagging or blurring content; Sharma et al., 2019). Such features create a degree of friction both at the point of misinformation exposure and misinformation transmission, which has been found to reduce belief in, and spread of, misinformation (Garrett & Poulsen, 2019).

However, although implementation of platform-based mitigation efforts has shown promising results, these platform features are restricted. For one, in practice it is impossible to track all information produced on social media, and so some misinformation is inevitably missed (Shao et al., 2018). Further, there is a wide degree of variation in the type of content that leads to misinformed beliefs, including that which is subtly misleading or fabricated but not technically false (e.g., hyper-partisan content; Ross et al., 2021). This content is more difficult to identify, and countering it, if perceived as politically motivated, can result in backlash (Brandtzaeg et al., 2018). Additionally, in cases where content does fit the criteria to be flagged as misleading, the flags used on social media often simply add a false label to misinformation (i.e., a simple retraction), and do not provide an alternative explanation to the misinformation. In line with the mental model hypothesis, these simple retractions are relatively ineffective, and are often associated with larger continued influence effects than more comprehensive refutations (Ecker et al., 2020). As such, although platform corrective techniques may reduce misinformation belief, their effectiveness is limited, especially for misinformation people already strongly endorse (Oeldorf-Hirsch et al., 2020).

The potentially dire consequence of social media companies' negligence in effectively countering misinformation spread on their platforms could be observed during the Rohingya genocide. Specifically, despite being aware of ongoing human rights abuses against Rohingya people in Myanmar, Facebook allowed unmoderated disinformation inciting violence against Rohingya people to be created and spread by Myanmar civilians and government officials (Galvan, 2020). Though it is impossible to know the extent to which Facebook enabled and perpetuated the genocide, a causally-relevant facilitative impact is likely (Siddiquee, 2020). Some have used these events, as well as the role of social media platforms in the spread of COVID-19 misinformation, to call for legal or regulatory interventions to compel social

media companies to be more proactive in minimizing the spread of potentially dangerous misinformation (Galvan, 2020; Lewandowsky, Smillie, et al., 2020).

Independent Fact-Checkers and Social Corrections. In contrast to platform fact-checking features, independent fact-checkers (e.g., Snopes.com), content experts, news bodies, or the source of the misinformation themselves often quickly fact-check misinformation online (Humprecht, 2020). Although these sources typically provide high-quality refutations, especially in contrast to those provided by platforms, they either require users to seek out the fact-check information themselves, or for the fact-check to be shared within a user's network, dramatically limiting their reach. Further, in many cases fact-checking sources, although often having a high level of expertise, are perceived to have a political agenda and are thus distrusted by subgroups in the population, often including those most at risk of adopting misinformed beliefs (Brandtzaeg et al., 2018). This is especially true for government-run fact-checking sources — which are common in many Asian countries — given the both real and perceived potential for them to be used as a tool to spread state-sponsored propaganda, subsequently further limiting their effectiveness (Huang, 2017; Schuldt, 2021).

Although corrections from independent fact-checkers are somewhat effective at reducing misinformation belief, people are more receptive to corrections provided by individuals within their social network (e.g., people following each other; Hannak et al., 2014; Margolin et al., 2018), whom they perceive as highly trustworthy (Sterrett et al., 2019). Unfortunately, however, analyses of online fact-checking suggest that it is most common for corrections to be provided by a stranger, whose beliefs, motives, and trustworthiness are relatively unknown (Hannak et al., 2014). Given the role of correction-source trustworthiness (Ecker & Antonio, 2021) and the retaliatory response that can occur in the face of corrections from strangers online (Hannak et al., 2014; Mosleh et al., 2021), it is likely corrections

provided on social media platforms are relatively ineffective. Consequently, to reduce the CIE of misinformation online, increased effort should be placed on providing corrections framed in a way that reduces worldview-related dissonance whilst using sources high in perceived trustworthiness for the intended correction recipients.

4.2 Overview of Closed Communication Platforms

Although a large quantity of research has focused on misinformation spread on open social media platforms, such platforms only make up a fraction of the user-generated content and user-to-user information transmission online. Specifically, over recent years there has been a dramatic rise in the use of closed communication platforms to receive and share news information, especially in the younger generations and in the Asia-Pacific region (Faisal & Al-Qaimari, 2020). In contrast to open communication platforms, closed communication networks (often referred to as *instant messaging or IM platforms*; e.g., WeChat, WhatsApp, Facebook Messenger) are characterised by small scale (one-on-one or small group) private interactions (Gill & Rojas, 2020). Sharing of information on IM platforms is almost entirely dependent on individuals *choosing* to interact with each other, and thus information spread occurs almost exclusively between individuals with pre-existing social ties (Memmi, 2006). This is in direct contrast to open communication platforms, where an undefined number of people could potentially be exposed to (mis)information simply due to others in their network interacting with it (Flanagin, 2017).

The preference of closed, compared to open, communication platforms in many Asian countries is believed to be due to both government regulations prohibiting the use of certain social media platforms (Yuan, 2018) and the closed structure being favoured as it facilitates kinship connections and conversational communication, creating a greater synchrony between users (a communication structure arguably preferred in collectivist cultures; Gill & Rojas, 2020). Although the structure of closed communication platforms has a number of

benefits for information transmission, allowing for quick and targeted dissemination of information to a diverse (and, in many cases, previously inaccessible) range of contacts (Metzger & Flanagin, 2013), it can create an information ecosystem that can promote unimpeded spread of misinformation.

4.2.1 How Closed Communication Networks Can Facilitate Misinformation Spread and Belief

Most closed communication platforms (for example, WhatsApp, Messenger, and KakaoTalk) use end-to-end data encryption, whereby the message is encrypted for transport and can only be decrypted by the unique cryptographic key connected to the intended recipient's account (Endeley, 2018). Due to this, not only are third parties and independent fact-checking services unable to access the data shared between users, the platform itself has no ability to regulate the information shared. This not only inhibits the platform's ability to target misinformation spread, but creates an environment where users may feel safe from outside scrutiny (Gill & Rojas, 2020).

In addition to message encryption, the risk of misinformation spread on closed communication networks is confounded by the fact people primarily interact with others they have some sense of shared identity with (Gill & Rojas, 2020). This network structure can promote the creation of echo chambers and ideologically homogenous networks akin to those seen in traditional interpersonal communication (Flanagin, 2017). In these homogenous networks, worldview-congruent misinformation has the capacity to spread more readily than on open communication networks, where false information can be rebutted or reported by third parties (Lazer et al., 2018). Thus, if misinformation is favoured within a network, closed communication channels provide an environment that fosters its consumption and spread through adjacent networks (i.e., distinct groups that share members), whilst simultaneously inhibiting the provision of corrections (Yee, 2017). This was arguably seen in the Malaysian

general election in 2018, where “cyber armies” spread a high quantity of fake news through platforms such as WhatsApp, which was suggested to have swayed public sentiment, especially in those with low media literacy (due to them having a comparatively lower ability to discern true and false information; Jalli & Idris, 2019). Additionally, people often have a high degree of trust in individuals they have close social connections to, and thus people are likely less critical of information (and thus more susceptible to misinformation) they receive through these channels (Ecker & Antonio, 2021; Hannak et al., 2014).

It is important to note that, due to government regulations, no message encryption is present on the instant messaging feature of WeChat, the primary social media and instant messaging platform used in China (Zhou & DiSalvo, 2020). As such, unlike other closed communication platforms, the information spread on WeChat is highly regulated (Gill & Rojas, 2020). Accordingly, when it comes to countering misinformation, WeChat is a relatively unique case, as will be discussed in more detail in the following section.

4.2.2 Countering Misinformation on Closed Communication Networks

Due to the end-to-end encryption, platforms and independent fact-checking services have no way of directly tracking and targeting the misinformation spread (Kaur et al., 2018). Consequently, efforts to counter misinformation on closed communication networks are somewhat distinct from those used on open communication platforms. Below we will discuss the effectiveness of current misinformation mitigation techniques, specifically (1) platform features, (2) social corrections, and (3) educational campaigns.

Platform Features. Although limited, some IM platforms have attempted to implement features designed to impede the spread of viral misinformation without compromising encryption, and thus user privacy. For example, in an attempt to counter viral misinformation, WhatsApp has restricted users’ ability to share “highly forwarded messages” (defined as messages which had already been forwarded five times) to only a single user or

group at one time. However, independent research into the effectiveness of this feature found that although this tactic slows the spread of viral misinformation, it has limited effectiveness reducing the quantity of misinformation that is ultimately spread within a network (de Freitas Melo et al., 2020). Additionally, although these tactics slow the spread of messages, they do not discriminate between true and false information, and do not provide corrections of false information. As such, not only are they unable to reduce belief in misinformation people have already been exposed to, people may actively disregard the warnings due to their untargeted nature.

Due to the lack of encryption on WeChat, the platform can target misinformation spread through private networks directly, similar to tactics used on open communication platforms. Specifically, the “anti-rumour” mini program contained within the app replaces the misinformation spread on the platform with corrections that directly refute the misinformation (Rodrigues & Xu, 2020). Although theoretically this feature allows for high-quality targeted corrections, the fact-checking is highly regulated by the Chinese government and thus biased by their political agenda (Chen, 2016). As such, due to differing political ideologies or worldviews, or general distrust, people may actively discount corrections from these sources. Further, even if the fact-checking were to come from an unbiased source, implementing such features on other platforms, such as WhatsApp or KakaoTalk, would come at the expense of privacy, which would likely result in individuals boycotting the platforms. Though this arguably removes bad actors from the specific platform, rather than fixing the misinformation problem it would likely just cause misinformants to turn to other, more secure (or less regulated), platforms where misinformation is harder to track and counteract, thus potentially perpetuating the problem (Urman & Katz, 2020).

Social Corrections. The inability of platforms and independent fact-checkers to permeate closed communication networks creates a situation where misinformation

corrections must occur primarily through social connections (Rossini et al., 2021). However, this requires the message consumer to either (1) know the information being provided to them is wrong, or (2) be sceptical of the information shared with them to actively fact-check it (Detenber & Rosenthal, 2018). Beyond having the resources to correct the information, the barrier to correct must be sufficiently low (or motivation to correct sufficiently high) for people to be willing to correct others in their network. One's willingness to correct misinformation spread in closed networks is likely inhibited by the fact people typically interact with those they have close social connections with, and thus providing a correction could place an individual's group membership at risk (Brady et al., 2017; Mashuri & Zaduqisti, 2013). This is of particular concern in collective societies, given people's personal identity is often directly shaped by their relationship to others within their social group (Detenber & Rosenthal, 2018).

A situation where people do not feel comfortable providing corrections despite being aware the misinformation is wrong seems, at first, like a relatively benign situation given this individual will be unlikely to further perpetuate the misinformation (Vosoughi et al., 2018). However, if recipients of misinformation do not directly oppose it, this could be perceived by the misinformation sharer as endorsement (Gill & Rojas, 2020). This has the capacity to create the perception of *false consensus*, whereby the misinformation sharer perceives the misinformed belief as normative for their in-group (Schulz et al., 2020). This perceived in-group endorsement may then function to reinforce the belief in the individual, in turn strengthening their conviction that the misinformation is true. By contrast, *if* people do provide corrections on closed communication platforms, and others in their network are receptive to the corrections, research suggests these corrections could be more effective due to the intimacy of the social network (Hannak et al., 2014). However, these findings are primarily based on observational data and Western (specifically US) samples. As such, we

refrain from making generalised recommendations regarding the implementation of campaigns encouraging social corrections before experimental, and cross-cultural, research into the effectiveness of in-group corrections has been conducted.

Educational Campaigns. There is recent evidence that the use of trusted sources to spread accurate information could be leveraged on closed communication platforms. Specifically, although targeting specific misinformation on encrypted platforms is impossible, mass sharing of information that contradicts viral misinformation can indirectly target misinformation. Preliminary evidence of the effectiveness of such a mechanism was recently shown in a study conducted in Zimbabwe, where receiving factual information about COVID-19 through newsletters on WhatsApp significantly decreased people's likelihood of not abiding by COVID-19 preventative measures (e.g., lockdowns) (Bowles et al., 2020). This technique is consistent with media literacy training measures, and highlights the importance of providing individuals with the skills and knowledge required to discern true from false information (Ecker et al., 2014; Kaur et al., 2018).

5. Recommendations and Future Directions

Although there have been some promising advancements in online misinformation mitigation efforts, more is required to counter misinformation on different communication platforms. Below we provide specific recommendations for doing so. These recommendations are broadly applicable across countries and online contexts, though their implementation is especially important in regions, such as South-East Asia, where there is a high reliance on social media and instant messaging platforms for information (social media penetration in South-East Asia sits approximately 14% above the global average; Dang, 2021).

For one, increased effort to enhance the strength of corrections across both open and closed communication channels is paramount to reduce misinformation's continued influence

(Lewandowsky, Cook, et al., 2020). Specifically, as previously mentioned, refutations, which explain why a piece of misinformation is wrong or provide people with an alternative explanation, are substantially more effective at reducing reliance on misinformation than simple retractions. Given the sheer quantity of unique misinformation spread through social media, adapting platform corrections to provide these high-quality corrections is currently unfeasible (Qiu et al., 2017). Thus, ensuring trusted individuals and independent fact-checkers are equipped with the necessary information and skills required to provide high-quality, unbiased refutations of misinformation is necessary.

As alluded to throughout this chapter, eliminating the spread of all misinformation online, especially on closed communication channels, is unviable (Shao et al., 2018). Additionally, once people believe or endorse a piece of misinformation, even high-quality corrections often fail to reduce this belief to baseline levels (Chan et al., 2017). As such, pre-emptive techniques, which increase people's resistance to misinformation *prior* to misinformation exposure, are arguably preferable for online misinformation mitigation campaigns (Lewandowsky, Cook, et al., 2020; Lewandowsky & van der Linden, 2021; Lewandowsky & Yesilada, 2021). Consequently, online misinformation mitigation efforts should expand to include both retroactive (debunking) and proactive (e.g., media and information literacy training) techniques (Guess et al., 2020; Pennycook & Rand, 2019). This is particularly true for countering misinformation spread on closed communication networks, given the inability of independent fact-checkers and platforms to target the misinformation directly.

One pre-emptive technique shown to be particularly effective at reducing misinformation vulnerability is inoculation (Lewandowsky, Cook, et al., 2020; Maertens et al., 2021). In contrast to corrections, which debunk misinformation people have already been exposed to, inoculation involves forewarning people about potential misinformation exposure

and the deceptive techniques commonly used in viral misinformation (e.g., cherry picking, false experts, logical fallacies; see Cook, 2020). During misinformation inoculation, people are typically provided with an example of the misinformation to highlight these deceptive techniques and reduce their vulnerability to similar misinformation in the future (Lewandowsky, Cook, et al., 2020). Importantly, given inoculation does not require directly targeting specific misinformation, unlike debunking, it can be effectively implemented on closed communication networks without compromising user privacy. Further, research has found inoculating people against deceptive techniques used in one misinformation campaign (for example, fake experts used in tobacco industry propaganda) may generalise to reduce people's susceptibility to other misinformation campaigns using similar techniques (e.g., fake experts used in climate change disinformation; Cook et al., 2017). As such, not only does this mean that inoculation campaigns do not have to be directly targeted to the misinformation spread in the network (thus ideal for data-encrypted closed-communication platforms), but the effectiveness of inoculation may also be greater than what is possible with debunking measures. However, although inoculation is highly effective in the short term, without repeated exposure its effectiveness decays over time (Maertens et al., 2021). Therefore, to effectively reduce misinformation susceptibility within online communication networks, it is recommended that inoculation techniques are included in platform features, or repeatedly reinforced through educational campaigns.

It is important to note that, despite best efforts, pre-emptive techniques and debunking measures cannot fully counteract all misinformation. As such, where misinformation poses a direct global threat, such as in the case of vaccine and climate change misinformation, there may be a need for regulatory interventions. Some countries have begun the implementation of such techniques. For one, the Indonesian government blocks problematic websites and prohibits the creation of fake accounts and content (Hidayat & Mahardiko, 2020), laws which

resulted in the individual who doctored the aforementioned footage about political candidate Ahok being himself sentenced to 1.5 years jail (Soeriaatmadja, 2017). Similarly, Singapore has the Protection from Online Falsehoods and Manipulation Act, whereby a government minister can order for false content to be corrected or removed (Foo, 2021), and in Vietnam creating and/or sharing harmful misinformation is classed as a criminal offense (Kaur et al., 2018). However, in many other countries (e.g., Australia, South Korea, and the Philippines) there is opposition to regulatory measures, with many suggesting they are in direct conflict with freedom of expression (Kaur et al., 2018). Though this debate is beyond the scope of the current chapter, we must acknowledge the potential harm unregulated misinformation spread poses to societies, and the importance of imposing the necessary measures to counteract this harm.

Further, though the current chapter has primarily focused on social communication platforms, the role mainstream media plays in misinformation dissemination cannot be underestimated. In fact, research suggests more people may be exposed to uncorrected (or poorly corrected) misinformation through mainstream news channels than on social media (Tsfati et al., 2020). As such, to adequately counteract the spread of misinformed beliefs, misinformation interventions must be implemented not only on social media, but across all mass communication platforms.

6. Conclusion

In sum, the information-dense and social nature of open and closed communication platforms creates information transmission environments that, in many cases, facilitate the spread of misinformation and impede the provision of corrections. The end-to-end encryption of closed communication channels poses a particular challenge, making it impossible to directly track and target misinformation spread. Based on this, we suggest that although, where applicable, targeted misinformation removal and high-quality refutations should

continue to be used, online misinformation mitigation efforts should also employ pre-emptive measures. Specifically, implementation of inoculation tactics and educational campaigns are paramount to reduce the spread of misinformed beliefs in information ecosystems, such as those present on social media and instant messaging platforms, where elimination of misinformation itself is increasingly unfeasible.

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