

Determinants of the backfire effect: Discrepancies between two groups with different political orientations

In this study, we explored the determinants of the backfire effect by analysing supporters' reactions to information propagated by the opposition camps. We focused on the topic of pork consumption. The study cohort ($N = 971$) comprised the supporters of the pan-blue ($N = 422$) and pan-green ($N = 549$) camps in Taiwan. Data were collected through an online survey. The echo chambers and message response emerged as robust factors influencing the backfire effect on individuals regardless of their political orientation. Message presentation negatively affected the induction of backfire effects. For the pan-green supporters, behavioural control and animal welfare attitude, respectively, exerted positive and negative influences on the induction of backfire effects. Our findings provide insights into the determinants of the backfire effect, a phenomenon wherein individuals fail to differentiate between fact and fiction despite receiving credible corrective information.

Keywords: *Backfire Effect, Disinformation, Echo Chambers, Message Presentation, Message Response*

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1. Introduction

Taiwan has undergone rapid political and economic development over the past six decades. However, it has also faced extensive diplomatic challenges because of regional politics, which have led to the exclusion of Taiwan from participation in numerous trade associations and international organisations. In particular, political factors often interfere with the import and export of agricultural products. Taiwan has two major political parties: the Kuomintang (KMT) and the Democratic Progressive Party (DPP). The party flags of the KMT and DPP are blue and green, respectively; thus, the terms ‘pan-blue’ and ‘pan-green’ are commonly used to denote political affiliations to these parties. KMT supporters are regarded as ‘pro-China’, whereas DPP supporters are regarded as ‘anti-China’ (Clark, Tan, and Ho 2018).

After the KMT government’s decision in 2012 to lift the ban on the import of ractopamine-containing beef from the United States, the later DPP government announced (2020) its intention to allow the import of US pork containing ractopamine in amounts compliant with international standards, but with strict regulatory measures in place. In response, the KMT—Taiwan’s largest opposition party—shared a video on its Facebook page, claiming that ractopamine-fed pig exhibit agitation and twitching, thereby provoking public outcry and disrupting the consumer market (Kang and Liang 2022a). However, the American animal protection group Animal Outlook, who are responsible for the video, later clarified that the epileptic pig in the video had not received any ractopamine diet. Thus, the video was confirmed as being a piece of disinformation aimed at political mobilisation. Although Taiwan’s Council of Agriculture immediately clarified this disinformation, it continued to circulate widely. Furthermore, consumers adjusted their purchasing behaviours on the basis of a ‘better to have it’ mentality, turning pork consumption in Taiwan into a political issue rather than a purely market-driven behaviour (Kang and Liang 2022b).

Studies have indicated that the dissemination of political messages on social media generates echo chambers and backfire effects. In this case, pan-green supporters refuse to believe or make negative remarks against the DPP, which is the current ruling party in Taiwan, whereas pan-blue supporters firmly believe and fuel negative rhetoric against the DPP (Rich 2009). The term “echo chambers” refer to a repetitive exposure to specific agreed-upon ideas in a particular media environment, which can distort these ideas into being perceived as facts by the general public (Sunstein 2009). The backfire effect, also known as the boomerang effect, describes how people react intensely and negatively to counterarguments against information that conflicts with their preferences, solidifying their existing views instead of accepting new information and debate (Nyhan and Reifler 2010; Redlawsk 2002). This effect is often influenced by individuals’ political orientation and the manner in which messages are disseminated. Both echo chambers and backfire effects can be influenced by the manner in which people respond to messages on a daily basis and both are considered planned behaviours (Peter and Koch 2016).

Although hundreds of relevant studies have been conducted internationally, few studies have focused on echo chambers and backfire effects in an Asia context.

Therefore, in this study, we compared the backfire effect among Taiwanese people with different political orientations and investigated the effects of planned behaviours, political orientation, information dissemination, message response, and echo chambers on the backfire effect. Through this study, we aimed to identify the determinants of the backfire effect, and to provide recommendations that can be used by relevant organisations and government departments to reconsider their strategies and regulations. In addition, this study serves as a reference for follow-up studies on human communication theories.

2. Literature Review

2.1. Backfire effect

The lack of a gatekeeping mechanism on the Internet, coupled with the anonymity and immediacy it offers, is highly conducive to information dissemination (Himma-Kadakas 2017). At the same time, the decision-making behaviours of individuals are influenced by internal and external message cues (i.e. message sender, message type, dissemination motivation, and surrounding environment) (Wu, Liang, and Ip 2022). When a message is posted online, the general public tends to respond in various manners, such as by liking, commenting, clicking, and sharing (Himma-Kadakas 2017). If the title and content of a message induce negative emotions, such as anxiety, fear, anger, or hatred, the message recipient's mental state can be easily affected.

Furthermore, efforts to correct factual misperceptions can actually increase the dominance of false beliefs and even induce aggressive behaviours, causing backfire effects (Haglin 2017). This effect arises because people tend to prefer information sources that align with their own stance; such that when they encounter perspectives or facts that contradict their beliefs, they may ignore or resist them (Buchanan 2021). Even if they identify information to be false, they may still have preconceived interpretations and make assumptions about follow-up information because of their alignment with the source of such information; this induces a backfire effect (Peter and Koch 2016). The backfire effect is a phenomenon in which attempts to correct incongruent information result in the reinforcement of recipients' original beliefs, and often elicit intense reactions (Nyhan and Reifler 2010; Petrova and Cialdini 2005).

While most of the aforementioned studies used experiment formats, giving the researchers an opportunity to observe belief change over time under controlled conditions, this study used self-reports about the likelihood of actively countering contrarian views; i.e., exploring people's (self-perceived) readiness for active behavioural response when encountering views that they disagree with, to add new theoretical and methodological insights to the literature.

The backfire effect is a form of confirmation bias. Highly controversial or poorly defined messages can easily trigger a backfire effect, but this effect is not necessarily

limited by personal ideology or partisanship (Vedejová and Čavojová 2022). Nyhan (2021) found that when people receive information that has been fact-checked, they tend to accept any clarifications, even if the accuracy-increasing effects of such corrective information are not always sustained or strengthened. Sincere and immediate factual clarifications may be more effective than simple allegations that the original message is false; however, people may still not fact-check because of the backfire effect (Swire-Thompson et al. 2021).

2.2. Political orientation and echo chambers

In the modern world, social media platforms serve as a catalyst for people to participate in politics and change society; however, people usually prefer media and information sources that are aligned with their own stances (Haglin 2017). Individuals can feel threatened when they encounter information that contradicts their beliefs because they tend to judge the authenticity of such information on the basis of their political beliefs (Nyhan and Reifler 2010). Partisan news media frequently invoke negative emotions among the general public, thus enhancing the effectiveness of information dissemination. When negative and extreme responses are generated by political news, the higher is the tendency of the general public to limit open and diverse perspectives and to reduce their trust in politicians (Hasell and Weeks 2016). People's political stances may further affect their communication and consumption behaviours, and highly politicised topics may promote mutual connections. Upon receiving messages that are against their own political beliefs, some individuals may resist or strengthen their own political beliefs (Copeland and Boulianne 2020).

The “echo chambers” is regarded as a phenomenon where information is propagated in a closed system and amplified through repeated communication, causing people to selectively accept information consistent with their own beliefs while ignoring contradictory information. This state of homogeneous reception and sharing leads to confirmation bias; and polarisation in politics and society is thus increased (Bakshy, Messing, and Adamic 2015; Sunstein 2009). Through an algorithmic mechanism, social media platforms filter and divide information such that users are exposed to a substantial amount of information consistent with their beliefs (Kitchens, Johnson, and Gray 2020). People tend to interact with others who share their perspectives. If the authenticity of information cannot be verified, the general public may consider it to be the mainstream opinion because of their frequent exposure to such information; then, secondary transmission occurs and people may gradually develop extreme attitudes (Bakshy, Messing, and Adamic 2015). This phenomenon can also be influenced by various regional or cultural factors and requires different confrontation strategies (Wang and Song 2020).

The segmentation mechanism helps divide a network community into several echo chambers with different orientations. Some echo chambers promote boundary spanning, some focus on broadly popular topics, some emphasise reputation building, and some relate to locally popular phenomena (Lee, Britt, and

Kanthawala 2022). People share articles with similar views and track communities with the same stance as their own, resulting in group polarisation (Currin, Vera, and Khaledi-Nasab 2022). Social media users may exhibit highly prominent and polarised behaviours (Kubin and von Sikorski 2021), and politically mobilising messages strengthen the echo chambers (Jarvis 2010). When individuals observe high homogeneity in their environment in terms of their political ideology, they avoid being overly exposed to opposite narratives; this avoidance is conducive to deep political mobilisation (Boutyline and Wille 2016). Because of the large number of responses reflecting similar ideas, the members of polarised online communities may incorrectly believe that the general public agrees with their opinions and may lead them to take drastic actions, which sometimes can have severe consequences (Luzsa and Mayr 2021).

2.3. Planned behaviour and information dissemination

The theory of planned behaviour, which is derived from the theory of rational action, proposes that human behaviour is generally influenced by various external and objective environmental factors rather than being regulated by self-will (Ajzen 1991). People often pay attention to certain messages because of their needs, interests, and values (Zaichkowsky 1994); this attention focus affects their behavioural intentions and actual behaviours due to their attitudes, social pressure (i.e. subjective norms), self-confidence, and support from others (i.e. perceived behavioural control) (Sun and Liang 2020). Attitudes refer to a positive or negative emotion experienced by individuals when they receive a message (Ajzen 2020). Subjective norms represent the comprehensive expression of a series of psychological processes and behavioural tendencies; they are also the influence of significant others or the pressure of external groups on individuals when they take specific actions (Bodur et al. 2000). Perceived behavioural control refers to the ability and resources that people require to judge information and the degree to which they can grasp the information (Ajzen 2020). The attitudes of social media users positively influence their intention to share information, and perceived behavioural control is a robust factor that encourages people to use fact-checking platforms (Koohikamali and Sidorova 2017).

Messages can be presented by a dynamic or static approach. Dynamic presentation includes images, sounds, and animations, whereas static presentation includes text, images, and graphics. Dynamic presentations attract more attention than static presentations do; while higher levels of diversity in messages confer better communication effects (Kang and Liang 2022b; Maity, Dass, and Kumar 2018). The publishers of news are closely associated with the content of the published information, and the public judges the fairness and accuracy of such information according to its source; hence, the credibility of officials, experts, and scholars tends to be high. In addition, the degree of professionalism of the publisher is considered by the public when processing the published information (Lewandowsky et al. 2012).

3. Methods

In the present study, we conducted a questionnaire survey in May 2022. The first page of the questionnaire clearly conveyed that that the target sample of this study would comprise individuals with experience in purchasing pork or pork-derived products. In addition to publicising the survey through social media, we contacted the supporters of different political camps at the caucuses of the major political parties in the Legislative Yuan (the highest legislative organ in Taiwan) and the parliamentary caucuses of different political parties in various counties and cities as well as people's representatives and media workers (at all levels) with different political orientations. Questionnaires were also distributed to the employees of various radio stations, online media platforms, and television stations.

This questionnaire helped provide data on the following seven domains: demographics (sex, political orientation, educational level, and age), political stance [three items referring to the study of Copeland and Boulianne (2020)], planned behaviour [12 items referring to the studies of Ajzen (2020), Bodur et al. (2000), and Koochikamali and Sidorova (2017)], information dissemination [seven items referring to the studies of Buchanan (2021) and Maity, Dass, and Kumar (2018)], message response [three items referring to the studies of Ettinger and Jehiel (2021) and Himma-Kadakas (2017)], the echo chambers [four items referring to the studies of Kitchens, Johnson, and Gray (2020) and Sunstein (2009)], and the backfire effect [five items referring to the studies of Nyhan and Reifler (2010) and Peter and Koch (2016)].

The responses were scored on a 6-point Likert-type scale (1, *strongly disagree*; 2, *disagree*; 3, *somewhat disagree*; 4, *somewhat agree*; 5, *agree*; and 6, *strongly agree*). The survey was hosted on SurveyCake. All questions were in multiple choice format, and responding to all questions was mandatory. Because the responses could be submitted anonymously and the questionnaire clarified the study purpose on its first page, the respondents did not have any privacy concerns. After analysing the responses in the pretest stage of this study, we found that each question exhibited high reliability and validity. Data were analysed using SPSS (version 25). Descriptive data were used for demographic variables. We performed factor, variance, and multiple regression analyses.

4. Results

In total, 1,427 questionnaires were returned. We removed invalid questionnaires with 0 variance and the questionnaires completed by respondents with a median political stance ($M = 8-13$). On the basis of their political stances, 422 respondents with an average political stance value of ≤ 7 were included in the group supporting the pan-blue, whereas 549 respondents with an average political stance value of ≥ 14 were included in the group supporting the pan-green. Finally, a total of 971 valid respondents were analysed. Table 1 summarises the demographics of the respondents.

Demographic variables	Percentage (Frequency)		
	Men	Women	
Sex	56.7% (551)	43.3% (420)	
Political orientation	Pan-blue camp	Pan-green camp	
	43.4% (422)	56.6% (549)	
Educational level	High school and under	Undergraduate	Postgraduate
	12.8% (124)	63.3% (615)	23.9% (232)
Age	≤35	36–44	≥45
	29.1% (283)	27.8% (270)	43.1% (418)

Note: Own editing.

Table 1. Respondent demographics ($N = 971$)

The criteria used in the factor analysis were having eigenvalues greater than 1 and having factor loadings greater than .4. For the factor analysis of planned behaviour, three factors were extracted, namely attitude, perceived behavioural control, and subjective norms (Table 2). The α value of each factor was higher than .75, which indicated high reliability. The total cumulative explained variance was 63.47%, which indicated high factorial validity.

Factor/Item	a	b	c	Mean	α	%variance
Attitude (a)				5.53	.77	26.67
Pig farms should maintain satisfactory environmental cleanliness.	.83					
Pig farms should have ample feeding space.	.78					
Healthy eating is important.	.76					
I value food safety.	.71					
Perceived behavioural control (b)				4.56	.80	20.19
I can judge whether information is true and am not easily misled.		.87				
I know various methods for finding correct information regarding food ingredients.		.84				
I do not overinterpret information.		.83				
I have friends who have specialised in agriculture or food and can be consulted if necessary.		.67				

Subjective norm (c)	4.33	.79	16.61
Friends or coworkers influence my choice of food purchases.	.87		
Loved ones influence my choice of food purchases.	.84		
Influencers or Internet celebrities influence my choice of food purchases.	.80		
Government-released inspection data influence my choice of food purchases.	.61		
Total variance explained			63.47

Note: Own editing.

Table 2. Results of the factor analysis for planned behaviour ($N = 971$)

For the information dissemination, two factors were extracted, namely, message presentation and message source (Table 3). The α value of each factor was higher than .6, which indicated good reliability. The total cumulative explained variance was 55.88%, which indicated good factorial validity.

Factor/Item	d	e	Mean	α	%variance
Message presentation (d)			4.84	.72	40.35
Dynamic information (video or animation) is more likely to attract my attention.	.86				
Illustrated information attracts my attention.	.85				
Positive information attracts my attention.	.60				
Message source (e)			4.55	.64	15.53
I often receive news-related information from certain news media (e.g. television and newspapers).	.77				
I pay attention to information released by government departments.	.71				
I often receive news feeds from social media, such as Facebook, Instagram, and LINE.	.60				
I often receive news information from relatives and friends.	.59				
Total variance explained					55.88

Note: Own editing.

Table 3. Results of the factor analysis for information dissemination ($N = 971$)

In the present study, political stance was an independent variable with a single dimension. The relevant α value was .96, which indicated high reliability. The total cumulative explained variance was 91.89%, which indicated high factorial validity (Table 4).

Factor/Item	Political stance	Mean	α	%variance
Political stance		3.60	.96	91.89
I believe that the government strictly regulates the inspection of ractopamine-containing pork.	.97			
I believe that importing pork or related products that have passed safety inspections reflects the government's emphasis on food safety.	.96			
I believe that President Tsai values animal welfare.	.60			
Total variance explained				91.89

Note: Own editing.

Table 4. Results of the factor analysis for political stance ($N = 971$)

Message response was an independent variable with a single dimension. The α value was .81, indicating high reliability. The total cumulative explained variance was 72.92%, indicating high factorial validity (Table 5).

Factor/Item	Message response	Mean	α	%variance
Message response		4.19	.81	72.92
I leave a comment to respond to news or information that I am interested in.	.88			
I share or forward news and messages of interest.	.85			
I press the "Like" button on news or posts I am interested in.	.84			
Total variance explained				72.92

Note: Own editing.

Table 5. Results of the factor analysis for message response ($N = 971$)

The echo chambers was also an independent variable with a single dimension. The α value was higher than .7, indicating high reliability. The total cumulative explained variance was 57.03%, indicating high factorial validity (Table 6).

Factor/Item	Echo chambers	Mean	α	%variance
Echo chambers		4.13	.72	57.03
I trust the words of like-minded people.	.82			
I like to interact with like-minded members of social media groups.	.80			
I often browse sites that share my philosophy.	.79			
I avoid messages I do not agree with.	.59			
Total variance explained				57.03

Note: Own editing.

Table 6. Results of the factor analysis for the echo chambers ($N = 971$)

The backfire effect was a dependent variable with a single dimension. The α value was .85, indicating high reliability. The total cumulative explained variance was 63.26%, indicating high factorial validity (Table 7).

Factor/Item	Backfire effect	Mean	α	%variance
Backfire effect		3.43	.85	63.26
I report statements or messages that I disagree with.	.86			
I block comments or messages I disagree with.	.83			
I call friends to correct what I believe to be wrong.	.79			
I refute statements or messages I disagree with.	.78			
I set hidden fields for information sources I do not align with.	.71			
Total variance explained				63.26

Note: Own editing.

Table 7. Results of the factor analysis for the backfire effect ($N = 971$)

An independent samples t test was performed, and the results revealed that the average value of the backfire effect of the pan-blue supporters was significantly lower than that of the pan-green supporters (Table 8).

Variable	Pan-blue (n = 422)		Pan-green (n = 549)		t	Levene	df
	Mean	SD	Mean	SD			
Backfire effect	3.18	1.02	3.63	1.13	-6.42***	10.69	943.87

Note: *** $p < .001$, own editing.

Table 8. Results of the t test for political orientation ($N = 971$)

We performed a multiple regression analysis of the backfire effect of the pan-blue supporters. The overall model reached statistical significance ($p < .001$), with an explanatory power of .37 (Table 9). The echo chambers ($\beta = .36$; $p < .001$) was identified as the strongest factor inducing a backfire effect. Message response ($\beta = .35$; $p < .001$) exerted a considerable positive effect, whereas message presentation exerted a negative effect.

Variables	Backfire effect				
	Unstandardised beta coefficient	Standardised beta coefficient	t	p	VIF
(Constant)	.01		.01	.990	
Planned behaviour					
Attitude	.18	.08	1.94	.054	1.15
Perceived behavioural control	.03	.03	.77	.441	1.12
Subjective norms	.03	.03	.59	.559	1.25
Information dissemination					
Message presentation	.17	-.14	-3.13	.002**	1.30
Message source	-.03	-.03	-.54	.589	1.45
Message response	.31	.35	7.19	.000***	1.56
Echo chambers	.44	.36	7.29	.000***	1.63
Summary	R^2		.37		
	F		36.87		
	p		.000***		

Note: ** $p < .01$ and *** $p < .001$, own editing.

Table 9. Results of the regression analysis of the backfire effect of the pan-blue supporters ($n = 422$)

We evaluated the backfire effect of the pan-green supporters. The overall model reached the level of significance ($p < .001$), with an explanatory power of .36 (Table 10). The echo chambers ($\beta = .37$; $p < .001$) was identified as the strongest factor, followed by message response ($\beta = .27$; $p < .001$), perceived behavioural control ($\beta = .12$; $p < .01$), and attitude ($\beta = -.13$, $p < .01$). However, message presentation ($\beta = -.12$; $p < .01$) exerted a negative effect.

Variables	Backfire effect				
	Unstandardised beta coefficient	Standardised beta coefficient	<i>t</i>	<i>p</i>	VIF
(Constant)	1.17		2.53	.012	
Planned behaviour					
Attitude	-.27	-.13	-3.27	.001**	1.32
Perceived behavioural control	.17	.12	2.94	.003**	1.32
Subjective norms	.10	.08	2.03	.042	1.19
Information dissemination					
Message presentation	-.21	-.12	-3.04	.002**	1.38
Message source	.00	.00	.06	.956	1.61
Message response	.33	.27	6.36	.000***	1.58
Echo chambers	.50	.37	8.27	.000***	1.69
Summary	R^2	.36			
	F	45.55			
	p	.000***			

Note: ** $p < .01$ and *** $p < .001$, own editing.

Table 10. Results of the regression analysis of the backfire effect of the pan-green supporters ($n = 549$)

5. Discussion

5.1. Factor structure and connotation

We divided the participants into pan-blue and pan-green supporters to explore the differences between them in terms of the backfire effect. According to the results of the factor analysis, the variables of planned behaviour were divided into the following subcategories: attitude, perceived behavioural control, and subjective norms.

Attitude referred to the participants' recognition of the importance of animal welfare and a healthy diet. Perceived behavioural control referred to their participants' confidence in their information judgement or capacity to respond to disinformation regarding food or agriculture. Subjective norms referred to the extent to which the participants were influenced by relatives, friends, and others when purchasing food. The average value of attitude was substantially higher than that of the other two factors, indicating that the participants, regardless of their political orientations, strongly recognised the importance of animal welfare and a healthy diet.

Information dissemination, another independent variable, was divided into the subcategories of message presentation and message source. Message presentation referred to the dynamic or graphic presentation of information to attract attention, and message source referred to the receipt of information from specific channels and government departments. On average, the participants' recognition of message presentation was higher than that of the message source, which suggested that they were more affected by message presentation. We further evaluated the political stances of the participants on the basis of whether they supported the government's policy on the importation of ractopamine-containing pork from the United States. The connotation of this variable included the belief that the government controls and attaches importance to animal welfare and food safety. The reliability and validity of the test were both high. In the present study, message response referred to the manner in which the participants responded to messages pertaining to their interest. Furthermore, the echo chambers referred to the participants' network behaviours in a specific media environment; while the backfire effect referred to their responses to contradictory information and self-reinforcing behaviours.

5.2. Differences between the Pan-blue and Pan-green supporters in terms of the backfire effect

As stated earlier, Taiwan has two major political parties, the KMT and the DPP. The terms 'pan-blue' and 'pan-green' are used to signify political affiliations to the parties. KMT (pan-blue) supporters are regarded as 'pro-China', whereas DPP (pan-green) supporters are regarded as 'anti-China'. When the KMT was in power, its government lifted the ban on the import of ractopamine-containing beef from the United States in 2012, and later when the DPP was in power, its government announced its decision to allow the import of US pork containing ractopamine in amounts compliant with the international standards, with strict regulatory measures in place in 2020. Our results revealed that the average value of the backfire effect of the pan-green supporters was considerably higher than that of the pan-blue supporters. Pan-blue supporters mostly comprised traditional ethnic groups from China. Therefore, these supporters are expected to receive diverse information rapidly. They consider themselves to be intellectuals and are confident of their ability to analyse and judge the information they receive. They supported the importation of ractopamine-containing pork from the United States on the basis of their value-based judgement, political beliefs, and scientific evidence. Therefore, they can be easily caught between

their political orientation and the scientific argument, which reduces the strength of backfire effects. This finding is in line with those of international studies (Peter and Koch 2016; Yang, Qureshi, and Zaman 2020).

Pan-green supporters have traditionally been dominated by pan-blue elites. These individuals might have been dissatisfied with the dominance of a single party when the KMT was in power for prolonged periods and thus started supporting the opposition party. Because of their experience of the 228 incident and other white terror incidents, older pan-green supporters might have been appalled by the heavy-handed ruling methods adopted by the KMT. Therefore, regarding political matters, they can easily develop resistance to the propositions of the pan-blue. The KMT launched a referendum to initiate blue–green confrontation. The pan-green supporters in the Legislative Yuan vigorously protested against pork importation, expressing solidarity with the pan-greens and strengthening their political alignment. The authoritarian control of communication media by the pan-blues has been released through the transformation of Taiwanese society and the rapid advancement of online media. In present-day Taiwan, the general public can voice their opinion through grassroots media. Moreover, beef importation was initiated soon after the pan-blues came into power. Taken together, the aforementioned factors induced the backfire effect of pan-green supporters. Highly politicised topics promote connections among individuals with similar political stances and encourage confrontation towards those with contradictory stances (Copeland and Boulianne 2020; Luzsa and Mayr 2021); this finding is consistent with those of the aforementioned studies.

5.3. Causes of backfire effects

We identified the echo chambers and message responses to be the most resilient positive factors influencing the backfire effect. The Internet has substantially altered media patterns and usage behaviours; and traditional media no longer serve as the only source of information. Online communities have gained popularity as platforms for people to socialise and obtain information. Because most online communities offer anonymity, their members feel comfortable expressing their opinions. Our findings seem to confirm that increased exposure to or association with echo chambers can lead to backfire effects. Thus, the more accustomed individuals are to respond to messages of interest, the more likely they may exhibit the backfire effect. This finding partly echoes that reported by Yang Qureshi, and Zaman (2020) and lays a foundation for further studies on backfire effects.

We noted that message presentation negatively influences the backfire effect of individuals regardless of their political orientations. In particular, a highly graphic and textual dynamic presentation of information may result in an increased suppression of backfire effects. Peter and Koch (2016) reported that if a receiver is prompted to immediately judge the authenticity of the information they have received, the backfire effect will be reduced and the receiver's memory will be prevented from introducing bias. Similarly, Yang Qureshi, and Zaman (2020) stated that the adoption of a pacing and leading strategy upon the receipt of information may

prevent the induction of backfire effects more than a direct argument would. They further indicated that in addition to the immediate response and a pacing and leading strategy, the dynamic presentation of information (pictures and texts) may substantially mitigate the occurrence of backfire effects.

Among pan-blue supporters, an attitude towards promoting animal welfare and a healthy diet did not induce backfire effects; by contrast, in pan-green supporters, this attitude inhibited the induction of backfire effects. In Taiwan, foreign pork products can be imported only after domestic and overseas factory inspections and the provision of evidence of compliance with international standards. Recently, the government has allocated a budget of approximately 44.5 million US dollars (NT\$1.35 billion) to promote animal welfare programmes, revised the Animal Protection Law, and incorporated animal protection laws into the country's constitution. The residents of Taiwan generally attach considerable importance to animal welfare and a healthy diet. Therefore, while confronting disinformation regarding the importation of ractopamine-containing pork from the United States, consumers in Taiwan may not exhibit a backfire effect because of their firm attitudes and civic virtues; and even pan-green supporters are likely to suppress their impulsive remarks on this topic. Consequently, most pan-blue supporters may not be politically mobilised in terms of expressing their negative emotions towards this type of disinformation.

In pan-blue supporters, perceptual behavioural control in response to disinformation did not induce backfire effects. However, in pan-green supporters, this behavioural control increased the induction of backfire effects. This difference may be associated with political orientation. Most pan-blue supporters recognised the disinformation regarding ractopamine-containing pork as political mobilisation. The residents of Taiwan are generally accustomed to consuming fresh pork and purchasing it from traditional markets. Imported frozen pork products are sold primarily to restaurants and food processing industries; such products have negligible effects on the livelihood of the general public. Several agricultural and youth groups constitute the traditional supporters of the pan-greens; when they are presented with disinformation regarding importation, they actively reject such information and strengthen their beliefs, thus inducing a backfire effect.

We found that the message source and subjective norms did not induce backfire effects in individuals regardless of their political orientation. As previously indicated, the residents of Taiwan exhibit a high degree of consensus on the importance of animal welfare and a healthy diet. Their sensitivity to disinformation has been increasing gradually. Pork-based foods are consumed daily by most residents of Taiwan. Thus, these individuals are unlikely to boycott pork products because of political mobilisation. The induction of backfire effects is thus unlikely because of the similarities and differences in terms of the message sources or subjective norms.

Nyhan (2021) suggested that the intermediary role of sustaining belief systems must be considered in order to prevent backfire effects. This is because the manners in which corrective information should be targeted and made effective are important. Our findings support those of Nyhan (2021) regarding their recommendation to break the association between group identities and disinformation and to decelerate the spread of disinformation. Our findings suggest that the timing of disruption and

the manner of deceleration are crucial too. Clarification should be provided soon after the spread of disinformation, which will enable individuals to reason instantly and make judgements simultaneously upon receiving information. Furthermore, the presentation of corrective information should be dynamic and nondirective to avoid the spread of disinformation and to present various perspectives reinforced by the media and the elites of society.

6. Conclusions and Recommendations

The residents of Taiwan generally have strong consensus on the importance of animal welfare and a healthy diet. Echo chambers and message responses appear to be the most resilient positive factors influencing the backfire effect of individuals regardless of their political orientation. Individuals who are more accustomed to echo-chamber communicators and responding to messages of interest are more likely to exhibit backfire effects. Furthermore, message presentation was found to negatively influence the backfire effect of people with different political orientations. Dynamic presentation through pictures and texts may suppress the occurrence of backfire effects. Conversely, the message source and subjective norms did not influence backfire effects. The self-confidence of pan-green supporters in responding to disinformation (perceived behavioural control) induced a backfire effect; however, their attitudes towards animal welfare and healthy diets mitigated this effect.

On the basis of the findings of the present and previous studies, we propose four strategies for government legislative and executive departments to mitigate the backfire effects of the general public. First, the government should review previous case histories before promoting new policies (particularly those likely to induce political protests) and invite experts to forthrightly present scientific evidence and related discourses to ensure that corrective information reaches the general public. Corrective information must be widely distributed in communities comprising people with different political orientations, thus reducing the backfire effect related to political confrontations. Second, clarifications must immediately follow the spread of disinformation; this will enable individuals to reason while receiving information. Corrective information should be dynamic and presented through non-directive modes to avoid repeating disinformation and present various perspectives reinforced by the media and the elites of society. Through multiple broadcasts, the public's impression may be strengthened to avoid misunderstanding. When receiving disinformation and clarifications simultaneously, individuals may make rational judgements. Third, the government should encourage the public to use fact-checking platforms. In addition, formal and continual education must be provided for media literacy to improve individuals' steady and factual adherence to favourable attitudes and reduce their extreme confidence towards related disinformation. Fourth, agricultural departments should continue to promote animal welfare and healthy diets among the general public. By following the four aforementioned recommendations, the government can effectively regulate the backfire effect of the general public in the future from, for example, the introduction of controversial agricultural

policies related to the importation of food items from countries that have endured, e.g. nuclear disasters.

Despite receiving credible corrective information, the general public sometimes fails to differentiate fact from fiction. The present study was based on the premise of disinformation regarding pork consumption. We enrich the theoretical knowledge on the backfire effect by introducing several self-report variables (facilitators) of this effect and by investigating their interactive associations. The findings add new theoretical and methodological insights to the literature which may help us defend human civilisation against destruction.

Our study has some limitations. First, we focused on a single regional context and used a single experimental topic related to political consumerism. Second, few in-depth studies have been conducted on the backfire effect related to pork consumption in Taiwan; thus, we found it difficult to validate our findings. Finally, the quantitative design of this study might have introduced biases in the findings related to the social and psychological states of the participants.

Considering the aforementioned limitations, we propose the following recommendations for future studies. To expand the generalisability of these findings, future studies should focus on including examples that are closely related to people's lives. Second, advanced statistical methods should be used to enhance the validity of the findings and to develop strong communication and consumption theories. Finally, qualitative in-depth interviews could be conducted to explore the psychological characteristics of the study participants.

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